Design and Deployment Considerations for Ethically Advanced Technologies for Human Flourishing in the Workplace

Judith Molka-Danielsen

Molde University College

Britvn. 2, Postboks 2110, 6402, Molde, NO

j.molka-danielsen@hhimolde.no

ORCID 0000-0002-4476-5465

Jazz Rasool

 Ravensbourne University London

6 Penrose Way, Greenwich Peninsula, SE10 OEW London, UK

j.rasool@rave.ac.uk

ORCID 0000-0002-9733-8758

Carl H. Smith

Ravensbourne University London

6 Penrose Way, Greenwich Peninsula, SE10 OEW London, UK

c.smith@rave.ac.uk

ORCID 0000-0001-8490-4864

*Abstract*— Advanced technologies are increasingly integrated in to modern workplaces in situations to automate mundane tasks, improve safety, increase speed and efficiency in work production. Artificial Intelligence (AI) is playing an increasingly central role in advanced technology design. In parallel, there may be growing concern from workers that AI in workplace technologies will take away jobs and autonomy from humans. This paper proposes how to include key ethical factors in technology design processes and discusses future implications for AI in the workplace. Key ethical factors considered are privacy, security, integrity and equity. We reflect on employee experience factors of belonging, purpose, achievement, happiness and vigour that can underpin discretionary efforts of workers and discuss how these factors relate to low desire behaviours. We review application areas and propose a layered model approach and design and deployment considerations needed for cultivation of ethically advanced technology (ETHAD), that give potential for human flourishing.

Keywords—human code of conduct · smart workplace · intelligent workplace · artificial intelligence · discretionary efforts · employee experience · human work interaction design · ethical advanced technology

1. Introduction

In the age of automation and use of Artificial Intelligence (AI) the nature of the workplace and work are changing. Employees may feel challenged by the threat to their existing jobs and the needs to develop new skill sets. Additionally, external forces can exert pressure on workforces, such as production complexities in global supply chains and global competition. Organizational culture may also exert pressure on commitment of workers. The heightened pressures on workers can have negative impact on the workers’ psychological health and well-being and can trigger worker behaviour that has been recently labelled as “low-desire” behaviour, a term that was first introduced by management scientist, Kenichi Ohmae [1]. The workers psychological response may be characterized by low-trust or low-expectations in their relationship with the employer. Recent research has explored the connection between engagement in work and employee experience. Employee experience and well-being, as described in the literature review, are found to be underpinned by factors of *belonging, purpose, achievement, happiness* and *vigour*. In this paper we propose that AI, if ethically designed and employed in the workplace, can play a positive role in contributing to worker well-being. AI offers affordances, in that it can take away the dull and dangerous work, the technology at the same time may provide opportunities for more engaging work, support workers with greater autonomy in shaping their daily work, and enable workers to develop a greater sense of mastery.

However, the method of design and use of advanced technology in the workplace will play a pivotal role in employee experience. The risks are that AI if it has been applied, scaled up, and in some cases utilised in ways beyond what it was originally proposed for, that it may demonstrate consequences of ethical liabilities. To prevent ethical liabilities, in the case of algorithms and programming associated with machine learning and AI, the concept of ethically advanced technologies (ETHAD), could be introduced into intelligent workplaces. A design approach for ETHAD would embody the consequences of the technology use as it is being selected, designed or even as it is being coded. The advantage of addressing these considerations in the design process is that the first ripple effects of such a potentially disruptive technology that has ethical features incorporated, will be seen at prototyping stages, rather than later in its adoption cycle when the technology in use is a scaled-up implementation and diversified for use by many user or application demographics. Ethical liabilities can be detected and compensated for within the very first prototypes to deliver a novel experience. This will ensure that with general release and implementation, the technologies, especially those to be used in the workplace, cultivate human flourishing in their use of resultant technologies.

This paper will present a design strategy for designing ethically advanced technology (ETHAD) for human flourishing in the workplace. In Section 2 we review former research on the meaning of concepts such as smart workplaces and the role of AI in the workplace. We review literature on the factors that comprise discretionary effort and how they relate to low desire behaviours. The contribution of the paper will develop as follows. In Section 3, we introduce application areas and explore the potential of ETHAD. In Section 4, we propose a practical approach for encoding ETHAD principles into technology, considering layers of design and deployment needed to encourage the creation of technology that facilitates human flourishing. In Section 5, we discuss practical considerations for deployment of ethically advanced technologies through intervention of a Value Engine that utilizes ethical algorithms. In Section 6 we explore future and emerging impact areas. Section 7 brings focus on the contribution of this paper and recommends directions for future work.

1. Literature Review

This section presents the fundamental concepts and former research, including smart technologies in the workplace, ethics in the workplace, employee experience and human flourishing in the workplace.

* 1. Smart Workplaces

The concept of intelligent or smart workplaces at its core provides automation or tools for efficiency in the workplace [2]. Automation through AI can provide opportunity to free up workers time from mundane tasks and instead allow workers to gain autonomy in shaping their ways of working and co-creating their workspaces to allow more collaboration. For example, an AI tool that allows workers to perform self-time-tracking or scheduling can give them increased ability to be masters of their own time. Some argue that automation is driving a need for social and emotional skills in the workplace [3]. This is because emotional skills such as advanced communication, creativity, and empathy are needed to drive the complex activities that cannot be automated [3].

The intelligent workplace should become a humanized system that senses and adapts to human needs. It should promote responsiveness, flexibility, and adaptability to the needs of the worker promoting their comfort and well-being [4]. As a starting point, workplaces, according to European Agency for Safety and Health at Work (EU-OSHA), have the obligation that they should be safe and secure for workers’ physical and psychological well-being, by upholding individuals’ information security and privacy [5]. It is important to stress that there is a change in the concept of the intelligent workplace whereby the goals are for a stronger emphasis on the needs and choices of the human worker. Smart or intelligent workplaces should be able to collect data and react responsively to the conditions in the workplace environment that may indicate harm to workers or other threshold needs [6]. Through a variety of technologies for monitoring and response, AI should pave the way to safe and secure workplaces.

* 1. AI and Ethics in the Workplace

In recent years, industry and business leaders have come to increasingly agree on the importance of ethics with the advent of AI and its embodiment as Industry 4.0 practices [7]. In order to minimise risk or prevent it, ethics cannot be applied in hindsight.

In this paper, we identify four key factors of ethical deployment that are privacy, security, integrity and equity. The factors *privacy* and *security* ensure utilization of workplace technologies are done in a protected, safe way. *Integrity* and *equity* ensure it happens in a sound way while providing appropriate access and affordances that respect diversity and inclusion of the workers. As will be expanded in section 4 these factors are key contributing components of empowerment and enablement through technology. We propose that, to ensure responsible implementation, ethical factors cannot be acted on in hindsight. Rather, ethical pillars must be integrated with a foresight mind-set. Ideally, they need to be extrapolated into business processes and strategies. Importantly, there needs to be ethical integration embodied in research and development that drives product or service innovation. Selection of AI technologies in the workplace cannot be done simply as a consultation or participatory design exercise. Ethical considerations must be formally embedded as a moderating feature within designs of organizational hardware, software and applications as well as developmental and implementation life cycles. We propose the future of ETHAD technologies in the workplace could begin by understanding the employee experience and by applying a different methodological approach to designing AI.

* 1. The Role of Discretionary Effort

"Discretionary effort is the level of effort people could give if they wanted to, but above and beyond the minimum required." —Aubrey C. Daniels, Ph. D [8]

This quote leads us to reflect, what factors comprise discretionary effort and how do they relate to low desire behaviours? Employees in companies or citizens in society typically will have a low desire to comply with the rules they have to work and live by if the only reason to follow the rules is to avoid getting into trouble [9]. The term of 'discretionary effort' describes the level of desire or effort someone is prepared to put into an activity beyond what is demanded. Low levels of discretionary effort will typically be accompanied by a low desire mind-set to carry out work or align to social norms. Hesketh, Cooper and Ivy [9] studied the link between discretionary effort and levels of worker engagement. They identified the ‘stay-out-of-trouble’ work effort at 35% and the maximum long-term sustainable work effort at 85%. Therefore, the potential of discretionary work effort for a workforce could potentially expand by 50%. Their findings concurs with other studies that have identified work engagement in extra time, brainpower and energy to have tremendous value to the organization when a critical mass of the workforce are so engaged [10]. However, the mechanism to invoke discretionary effort “cannot be achieved by a mechanistic approach which tries to extract discretionary effort by manipulating employees’ commitment and emotions.” [11 p.9]. The study of [11] applied a well-being psychometric instrument, ASSET [12] to identify the drivers for discretionary effort among a Police workforce in northern UK. They found that if workers had “control” -over what they did, had “job security” -permanence of employment, and had positive “job conditions” -e.g. work being challenging and not dull and repetitive, low risk of physical-violence, that workers were more likely to offer more discretionary effort. Alternatively, factors like “resources and communication” –having enough resources to do a good job, e.g. training and equipment, “work relationships” -with leaders or peers, and “balanced workload” – amount of hours worked, unsociable hours, conflict with personal life, deadlines; seemed to not be significant in contributing to greater discretionary effort [11]. This highlights potential of ETHAD principles contributing more desirable workplace conditions that address worker control and positive job conditions, thatis ETHAD technologies can be central in achieving the worker control or autonomy, and positive job conditions that afford the worker to address challenging work rather than the mundane.

* 1. The Role of Positive Reinforcement

The approach of motivating people to stay out of trouble, otherwise known as 'negative reinforcement ‘, is not sufficient in itself to prevent the degradation of the desire to work, follow rules or engage in actionable ways with others. Giving someone a reward or a good reason for behaviour, positive reinforcement, is historically seen to work in a more sustainable way to maintain desire to comply or to collaborate. As far back as Pavlov's [13] work showing how dogs would salivate in the anticipation of a reward received after a bell would ring, there have been efforts to use reward or remuneration systems to maintain and build desire in human beings to cooperate, collaborate and comply with policies, laws as well as strategies. It is possible through tracking employee engagement metrics to establish patterns which could be used with data science to forecast where desire to work needs to be strategically managed and cultivated.

Pavlov's work illustrates research that formed the basis of understanding of what came to be known as 'classical conditioning'. It is a part of the branch of Behaviourism learning theory. The UK's HR professional’s development body, the Chartered Institute of Professional Development (CIPD), also recognises 'Operant conditioning' [14] originally promoted by B.F. Skinner in 1957 [15]. Skinner highlighted that voluntary compliance in development of new skills or aligning to specific behaviours was associated with the use of positive or negative reinforcement, on whether someone was given a reward or punishment for their behaviour. Behaviourism though is one category of learning and development. Others the CIPD recognises include Cognitivism, Humanism, Constructivism and Social Learning as well as Neuroscience informed models such as Rapid Application Development (RAD), SCARF (an acronym standing for Status, Certainty, Autonomy, Relatedness, Fairness) and AGES (an acronym standing for Attention, Generation, Emotion, Spacing) [15].

Of the models the CIPD underpins human resources (HR) practices with, positive reinforcement aligned to practices that could favour employee empowerment and flourishing, are best understood through exploring the importance of an employee’s learning environment or 'learning culture' [16]. Nigel Cassidy, in a 2020 CIPD podcast, highlights the relationship between learning cultures and positive learning environments and how the balance helps organisations flourish [17]. Much of current Learning and Development strategy is focussed on an organisation flourishing but not necessarily the employees flourishing without there being a return on investment for the business. As such, modern forms of employee flourishing are an outcome of kinds of operant conditioning where return on investment for an organisation rewards employees. Cassidy's discussion of learning culture with industry leaders highlights important principles that must be embedded in development of future learning culture strategy and its influence on flourishing employee experience.

* 1. The Design Approach and Employee Flourishing

Modern forms of innovation for business products and services adopt a *design thinking* methodology for development following design stages that include *empathise, define, ideate, prototype and test* [18]. This methodology could also be applied to encouraging employee flourishing and amplifying discretionary effort. This can be done in a way that does not involve classical or operant conditioning strategies but instead involves employees in less covert routes to organisational return of investment and pathways which the employees have more conscious agency on how they are being developed. After all, the very first stage of *design thinking* methodology involves the utilisation of empathy to engage in a transparent and authentic way. Using a design thinking mindset will then progress the initial empathic interactions into clearly defined problems that ideas can be prototyped from and tested, using workflows that maintain integrity in employer-employee relationships with the necessary accompaniment of transparent and authentic communications. This approach can lead to flourishing of employees first and provide a more sustainable foundation for subsequent organisational flourishing.

Duke Corporate Education highlights this in an online article [19]. They state that applying design thinking principles to internal processes, organisations can begin to genuinely engage employees and put their needs first. In the article they state that "Design Thinking is a human-centred process 'powered by a thorough understanding, through direct observation, of what people want and need in their lives' ". In the article, they discuss how the Nike company has adopted Design approaches in their HR function, "A few progressive companies, like Nike, are starting to see the advantages of viewing their employees as customers. They are applying design-thinking principles to internal processes to reshape their organizations for a fast-changing world. These external and internal efforts require leaders throughout the business who can think and act more like designers. [19]” The article goes on to state the importance of several key abilities that align to the stages of the design mindset. Specifically, if employees could be viewed as customers, then the company’s HR products and services could be adapted to the employees needs and prospectively cultivate their flourishing as well as the organisations.

* 1. Employee Experience and the Role of Ethical Factors

Employee experience (EX) is a new term that companies are beginning to recently develop strategies for managing [20]. Investments in EX provide both tangible and intangible business value. These include reduced recruiting costs, lower attrition, higher employee work performance, as well as increased discretionary effort. So, any attempt to manage low desire must be encapsulated within such an umbrella strategy. Forrester Research has produced two reports relating to such a strategy, “Introducing Forrester’s Employee Experience Index” [21], and “The Employee Experience Technology Ecosystem” [22]. The first identifies three main factors that contribute to employee engagement: empowerment, inspiration, and enablement. The second outlines the variety of technologies that impact employees’ daily journeys and identifies the ones that have the greatest impact on EX. Even with their conclusions the factors of privacy, integrity, equity, and security are key contributing components of empowerment and enablement through technology. But can they also be prerequisites for inspiration that could counter low desire states?

In a 2017 IBM report [23] authors refer to a study [24] that states that “the battle for the hearts and minds of employees is played out daily through their workplace experiences.” The experience at work for employees is now being re-examined by organizations. In a 2007 paper such experience management is seen as a path to improved job performance [25]. A 2016 Deloitte report shows that such management can lead to sustained competitive advantage [26].

The need to foster empowerment, enablement and inspiration of employees is conceptualized in the 2016 Globoforce report as an employee experience that is a positive and powerful – and ultimately human – experience, in which employees are able to invest more of their whole selves into the workplace [27]. The report highlights employee experience as being at the root of the dynamics relating to such a factor as discretionary effort. Employee Experience is defined in the report as “*A set of perceptions that employees have about their experiences at work in response to their interactions with the organization*”. Five dimensions of employee experience are considered to frame its nature and dynamics. (1) Belonging – feeling part of a team, group or organization (2) Purpose – understanding why one’s work matters (3) Achievement – a sense of accomplishment in the work that is done (4) Happiness – the pleasant feeling arising in and around work (5) Vigour – the presence of energy, enthusiasm and excitement at work. These are seen as part of a larger context of organizational culture. The report further states that “..employee experience has its beginnings in the direction and support of leaders and managers, who drive organizational practices that create the employee experience. Ultimately, a positive employee experience is associated with improved employee outcomes such as better job performance, *increased* *discretionary effort* and higher retention.” [27]. A significant outcome of the report is that discretionary effort is almost twice more likely to be reported when employee experience is positive (95 percent compared to 55 percent). In producing data science metrics for low desire contributing factors, such as low levels of positive employee experience and the resultant reduction in discretionary effort, a preliminary spectrum of parameters should include measures of empowerment, enablement and inspiration. It may be that these factors themselves are underpinned by *belonging, purpose, achievement, happiness* and *vigour*.

Engaging employees through initiatives that reduce low desire behaviours at work through the use of strategies which enhance Employee Experience based generation of discretionary effort in ethical ways through the use of technology will be a major area of research and development for occupational psychology professionals. If we have measures of such dynamics that is one thing but if technologies can be designed to facilitate the ethical generation of discretionary effort then employees and employers alike will benefit, not to mention the clients, customers and markets they serve. ETHAD technologies, that are accelerants for discretionary effort generation, can help curb emergence or low desire trends in behaviour in workplaces as well as amongst citizens in society. Key foundations can begin to be laid in adapting existing services for employees and citizens whether that is through employer intranets, social media platforms or government supported services for citizens that operate through state managed public sector digital platforms.

1. Application Areas: Potential of ETHAD Technologies

AI (or machine learning) tools as system elements are increasingly integrated into system solutions for navigating increasingly complex and global problems. Adoption of AI tools that are guided by oversight from ethical frameworks could be the next step in the evolution of intelligent system solutions. As an example, AI tools can be integrated into existing Employer Intranets or Public Sector portals. They can be designed and deployed with discretionary effort cultivation strategies. These ETHAD strategies can be based on methodologies and technologies guided by ethical, AI based algorithms to prevent low desire behaviours emerging amongst employees or citizens.

* 1. Employer Intranet Employee Experience services

Employer Intranets often focus on providing services relating to Human Resources and internal organisational communications. Their design and content though follow information driven design methodologies rather than ones that enhance engagement, develop employee experience or cultivate discretionary effort. The states discussed earlier in the paper that feed these factors such as empowerment, enablement and inspiration as well as the components they comprise of, *belonging, purpose, achievement, happiness* and *vigour* are not overtly or actively developed. Shivakumar has done a thorough development of methodologies to build platforms for employees that focus on Employee Experience [28].

Shivakumar describes Employee Experience Platforms (EXPs) as “*employee-centric intranet platforms that personalize the experience for all employees and that provide contextual content and services*”. He goes on to say that “EXPs offer next generation digital workplaces that engage employees throughout the employment lifecycle and improve their productivity for their day-to-day activities”. Shivakumar compares traditional employer intranet platforms to Employee Experience driven platforms in Table 1. There are many factors needed for effective EXP design. Several of these factors we quote from the work of Shivakumar in Table 1 [28, pp3-4]. These factors can be responsible for contributing to discretionary effort and, if provided, could reduce low desire behaviours.

**Table** 1. How legacy intranet platforms do not meet modern employee needs and challenges, [28, pp3-4]

|  |  |  |
| --- | --- | --- |
| Category | Employees’ Needs and Expectations | Challenges with Traditional Intranet Platforms |
| User experience | Modern employees expect seamless user experience across all services and information.Employees demand consumer-grade on-the-go mobile and omnichannel experiences.Dashboard experience provides a unified view of all information and transactions. | Mainly a desktop-driven user experience.Disjointed user experience across various tools and Intranet applications.Challenges with usability and accessibility.Inconsistent brand identity. |
| Information architecture | Personalized and contextualized information. | Difficult to find relevant information. |
| Collaboration | Information should be easily shareable.Instantly collaborate with colleagues. Create interest-based groups and communities.Harness collective intelligence for increased productivity. | Challenges with cross-team collaboration.Lacks engagement and motivation for employees.Needs integration of multiple collaboration tools. |
| Analytics   | Employees expect analytics-based insights such as personalized content and information based on past transactions. | Minimal or absence of analytics.Absence of seamless analytics across various touch points. |
| Tools and features | Employees expect self-service and productivity improvement tools.Educate, learning, training tools. Usage of gamification features. | Minimal or absence of gamification features. Minimal self-service tools. |
| Artificial intelligence | Employees expect AI–based continuous learning and improvement of the platform. | Minimal or absence of AI-based methods. |
| Information discovery | Organized information; provides contextualized and relevant personalized content. | Takes too much time to find relevant information.Duplicate and outdated information. |
| Content management | Easier authoring and publishing. Easier content discovery.Intuitive content workflows. | Lacks targeted and personalized content.Lacks localized content. |

The list, although not exhaustive, includes the user experience, personalized and contextualized information, ability to instantly collaborate with colleagues, create interest-based groups and communities, analytics-based insights such as personalized content and information based on past transactions, education, learning, and training tools, usage of gamification features. And further, tools to harness collective intelligence for increased productivity, AI based continuous learning and improvement of the platform, user participation that allows easier authoring and publishing, easier content discovery as well as intuitive content workflows.

* 1. Public Engagement Portals

There are many state activities that require public participation in order for them to function. These could be as simple as encouraging people to vote, combating crime, or coming together to help manage a community in a crisis such as a natural disaster, pandemic or a decline in economic wealth amongst local businesses. Increasing the desire of citizens to help out as well as contribute to their own self-care to reduce loads on public services, such as healthcare or utilities, has become very predominant in the year of the 2020 COVID19 pandemic. An example of a digital experience platform that serves citizens is provided by Belgium based CitizenLab [29] which focuses on “Introducing local democracies to the digital age”. Since 2015, they have been on a mission to strengthen local democracies by using community engagement to increase efficiency and legitimacy. They provide digital participation platforms to local governments to help them consult citizens, increase transparency in decision-making and gather actionable insights.‍

CitizenLab helped take the Youth for Climate movement inspired by Greta Thurnberg, to get politics to act against climate change. The movement in Belgium led to CitizenLab creating a platform for participants to exchange their views and communication. In a period less than 3 months, users posted over 1,700 ideas, 2,600 comments and voted over 32,000 times for the initiatives they wanted to support. In order to turn these ideas into meaningful actions and recommendations, Youth for Climate needed to process thousands of ideas in a short period of time. This was a perfect use case for the automated data analysis feature of the CitizenLab platform. AI driven Natural Language Processing was used on a wide scale to collect and analyse the thousands of contributions written in a variety of languages. CitizenLab have used their capabilities to provide Digital Experience Platforms for a variety of Belgian initiatives including boosting citizen engagement in Liège, in Lommel to involve citizens in urban planning decisions, crowdsourcing innovative ideas to improve mobility in Brussels as well as helping 24,450 citizens take part in Peñalolén’s participatory budget. In their 2020 Impact Report [30] CitizenLab describe how their e-democracy platform has supported 200+ local governments and organisations in more than 15 countries over these past years. This led to the launch of 8,796 projects, which enabled 732,327 citizens to make their voices heard. And they have done so quite convincingly, sharing 134,239 ideas, 330,078 comments, and 4,222 proposals on their platforms.

1. Practical Encoding into ETHAD Technologies - What is needed? How can it be done?

This section will propose an approach to encourage technology that facilitates human flourishing. To achieve this, the applied empowering strategies must shape behaviours and building of technologies through many layers of design and deployment. Initial attempts at applying ethics to technology have focused on influencing effects on human beings. For example, the ‘Ethical OS’ approach attempts to mitigate negative effects of lack of integration of human directed ethics in various risk zones, of which we address (1) Truth, disinformation, and propaganda (2) Machine ethics and algorithmic biases, (3) Data control and monetization, (4) Implicit trust and user understanding [31]. These risk zones, amongst others, are risk categories arising from failures in applying human directed ethics. Users generate data and the experience of that data gathering must be respectful of that user’s privacy and security. This needs to be done in a way where the integrity or accuracy of the data is not corrupted or compromised. In addition, users must have access to their own data without excessive constraints so commercial companies that harvest data must facilitate equity of access. This is achieved by supporting the *integrity* and *equity* of user data and experience while wrapping the data harvesting process in software and hardware containers that secure trust in the management of *privacy* and *security* [32].

Examples of these deeper layers have been explored in the paper “Transforming TEL for Human Flourishing: Learning Enhanced Technology (LET)” [33]. This includes three layers, (1) Human Directed Ethics, consisting of Privacy, Security, Integrity and Equity (2) Interface and Experience Ethics, including User Experience (UX) Storyboarding and User Interface (UI) Design and (3) Hardware and Software Ethics, comprising of Ethical Operating Systems and Algorithms as well as Ethical Machine Architecture. Applying ethics to workplace technology often is limited in practice to the top Human Directed Ethics layer usually focusing on managing privacy and security as well as data and user integrity and equity.

Companies such as Salesforce and Microsoft have prioritised ethical policy implementation at this human directed ethics level. Consultancy firm Deloitte comments, “Salesforce has appointed a chief ethical and humane use officer to guide the company’s use of technology. The function aims to ensure that the company has a clear framework in place to guide technological decisions...” [34]. Further, “leaders at Microsoft recently created an AI and Ethics in Engineering and Research Committee, composed of senior leaders from across the company working together to proactively monitor and address issues that may arise as the company advances development of its AI platform and related solutions. Examples of areas on which the committee has focused include addressing bias in AI systems and implementing requirements of the General Data Protection Regulation” [34].

Ethical advanced technology goes beyond such visible human facing affordances. It ensures more fundamental and primary levels are integrated. These include User Experience (UX) and more primary User Interface (UI) features in application development. These could be as simple as accessibility and language features to personalise the user experience or ethically respectful use of icons, menus or themes. At the most sophisticated levels these interfaces and experiences could be customised for users from a particular culture or learning style. Advanced features would ensure customised privacy and security while ensuring accessibility, integrity and equity of data as well as experiences.

In 2018, Somos of UX Studio, explored a redesign of the Facebook interface towards more ethical interactions. He suggested modifying the Facebook platform [35]. His proposal referenced Aran Balkan’s Ethical Design Manifesto that is centred around a pyramid, shown in Fig, 1 that focuses on what design workflows need to become ethical [36].



1. Ethical Design Needs [35] [36]

These kinds of features are examples of ethically enhanced technology, focused on UI and UX. To ensure ethical embodiment in the design of applications and their deployment, that is ethically advanced technology, frameworks have to be utilised that provide ethical affordances which are native to computer operating systems, their algorithms as well as the machine architecture that underpins them.

1. Practical Deployment of Ethically Advanced Technologies

The discussions so far have been on the prospective structure of an approach to applying ethics to advanced technology and what is needed in terms of ethic risk zones, layers of ethical integration and ethical design needs. It follows we must move on from what is needed to how technology that is ethically advanced will be designed and implemented in practice. Any proposal that addresses how to design technology that is ethically advanced must consider the two foundations for it, the hard (machine) and soft (human) factors. These include the categories of ethics mentioned earlier, human directed ethics, interface and experience ethics and hardware and software ethics [33]. Also, to be referenced are the layers in Figure 1. These two aspects need to be brought together into a methodology and workflow that can be deployed in practice. The layers of ethical integration (ethics directed at human beings, user interfaces and user experiences as well as hardware and software domains) must be applied to fulfil ethical design needs of employee experience platforms (employee experiences, efforts, and rights).

* 1. Considerations for Ethics in a high-level view of an AI Architecture

The practical ‘hard’ process of embodying ethics into hardware, software and information technology processes must explore how values and virtues, which form the morals that are the foundations for ethics, can be incorporated into the design and deployment of systems and human operations, especially at their interfaces. To do this the structural components of typical computer or information systems that underpin AI operations must be embodied with the values and virtues from the applied ethics factors.



1. Typical Computer Architecture

Figure 2 is a schematic of a typical computer architecture showing how data can flow in through inputs, be processed and then either placed in temporary memory, short- or long-term storage as well as be output to external peripherals or destinations.

Figure 3 expands the typical computer model architecture to consider deployments of these components in modern computing domains that AI operations may be run on, particularly employee experience platforms that may have private walled digital environments as well as exchanges with external public domains especially with streaming and social media channels. Each component must be ethically moderated in a way that is specific to the affordances and operations of that component while remaining congruent to ethics embodied in other components and in the system as a whole.



1. Sources and Flows of Data in an AI computing system to be moderated by ethical functions

A prior study by Shneiderman has considered including moderating support functions for ethical oversight of software design practices and associated human activities. Recommendations have been offered for Human Centred AI (HCAI) systems [37]. Of the recommendations [38] the focus on how to ‘adapt proven software engineering team practices’ is of concern in this discussion [39]. Focusing on employee experience platforms, the first subset of the fifteen recommendations needs to be addressed, which relates to the technology architecture for reliable systems based on sound software engineering practices for a team [38].

This includes recommendations for

1. Audit trails and analysis tools
2. Software Engineering Workflows
3. Verification and validation testing
4. Bias testing to enhance fairness
5. Explainable user interfaces

Not having systems in place to address, embody and enact these recommendations and any lack of system-wide consideration for associated ethical design needs leaves individuals and target groups using employee experience platforms open to vulnerabilities. It can cause potentially harmful outcomes to marginalized target groups. Categories and the descriptions of potential harms in absence of ethical considerations are considered by the Alan Turing Institute’s 2019 report on Understanding Artificial Intelligence Ethics and Safety [40, pp. 4-5]. These include

* *Bias and Discrimination*

Features, metrics, and analytics structures of AI systems are chosen by their designers. These factors can replicate or reinforce designers’ preconceptions and biases.

* *Denial of Individual Autonomy, Recourse, and Rights*

It may not be possible to hold AI systems accountable for decisions that impact individuals.

* *Non-transparent, Unexplainable, or Unjustifiable Outcomes*

Complex AI systems can produce outcomes that are non-transparent, unexplainable or appear to be unjustifiable to users regarding how the decisions were reached.

* *Invasions of Privacy*

AI systems involve the utilization of personal data. This data can be potentially captured and stored and revealed without consent.

* *Isolation and Disintegration of Social Connection*

Algorithms can reinforce and lock-in patterns of social views, relationships, world views, limiting views that are different.

* *Unreliable, Unsafe or Poor-Quality Outcomes*

Human error in data management, systems design and data deployment can lead to AI systems that produce unreliable, unsafe, or poor-quality outcomes that individuals, organizations, or societies may pre-emptively trust. This can result in damage to wellbeing and welfare.

The report also cites that the implementation of an ethical platform to embody ethical approaches to AI should comprise of a framework of

* ethical values
* actionable principles based on those values
* process based governance framework for operationalizing those actionable principles [40, p 9].

The Turing report safety overview though focuses on the ethical operational delivery of a project to develop AI technology or processes. The process of embodying ethics into the components of AI systems such as hardware and software is implied but not explored. The main operational process consists of a cycle of reflecting on the requirements, acting on them and then justifying those actions -reflect, act, justify. The justification is done after acting whereas this really should happen prior to action. Governance should not follow action, primarily it should be carried out in advance of it as a structural pathway for delivering proposed actions.

Governance should not just happen through human beings, project oversight and enacted policies; it needs to be encoded into hardware and software systems, in the underlying computing code and architecture, to offset flaws arising from a lack in human oversight. Just as a nuclear power plant has hardware and engineering safety monitors and fail-safes such as radioactivity monitors or automatic fire suppression, AI systems must include fundamental, elementary fail-safes that operate without human intervention. These basic fail-safes can then be refined for more complex forms of interventions for higher level, abstract processes, and more complex ethical challenge events.

To scale AI, ethical fail-safes from low level hardware to high level software, alongside the code and data flow driving the AI functions, there must be a parallel governance code and technology set for embodied and encoded ethics to oversee and moderate the AI, there needs to be a partner to the AI, an ethics or ‘Value Engine’. The three-part structure of the Turing Institute report, consisting of a values framework, actionable principles, and process-based governance, needs to be made more atomic in its application, down to the scale of generation, modification, and management of raw data as well as how that data progresses through a pipeline of AI software algorithm libraries, computer hardware architecture as well as the local and wider internetworks. Ethics must be applied not just to the humans that use AI but also to the landscape and ecosystems of technologies that run AI and that AI spans its operations across.

Creating a Value Engine that oversees the AI as well as moderate it to optimise for an employee experience platform requires a holistic systems design approach where the technologies that interface with AI, act on its periphery or in its contextual environment as well as comprise its core functions must be included in applying ethical guidelines. A Value Engine will operate much like how an anti-virus software can span its monitoring from Hardware through Operating System to Software and file level operations, preventing harmful events through warnings as well as restricted permissions, in this case relating to prospective emergent threats to ethical operation. However, the engine must also facilitate and inform users much like a spell-check or grammar monitor, highlighting incorrect application of rules as well as provide useful alternative options that might prove to be more understandable, communicable, and aligned to regulations.

* 1. Applying Ethical Design Principles through a Value Engine

An AI design and deployment framework should apply a value engine that can facilitate a systems design thinking that has checks and balances as part of the workflow. This workflow must apply ethical design principles at every stage of the design process, at every handling point of data. For example, it must be applied in the classic domains of computer and IT architectures such as systems where data is input, output, kept in long term storage, short term memory as well as in system cores where processing is done. Ethical values must Support, Underwrite, and Motivate (SUM) and actionable principles must have behaviours of Fairness, Accountability, Sustainability, and Transparency (FAST) [40] applied not just at high level human operations but also to low level scales of AI systems -to their hardware and software. The Turing report offers a key concept, ‘Normativity/Normative’:

*“In the context of practical ethics, the word ‘normativity’ means that a given concept, value, or belief puts a moral demand on one’s practices, i.e. that such a concept, value, or belief indicates what one ‘should’ or ‘ought to’ do in circumstances where that concept, value, or belief applies. For example, if I hold the moral belief that helping people in need is a good thing, then, when confronted with a sick person in the street who requires help, I should help them. My belief puts a normative demand on me to act in accordance with what it is indicating that I ought to do, namely, to come to the needy person’s aid.”* [40, p. 9]

Should an ethical issue arise that calls a response algorithm, it must have normative functions that can act on an underlying reference ethic, value, or virtue. User Interfaces must adapt to users facing specific challenges unique to their diversity, inclusion, and justice ethical fingerprint.

Ethical Algorithms must be applied across three technology layers

* *Software* -Employee Experience (EX) platform software must answer to the underlying operating system’s ethical algorithms.
* *Operating System* -the OS must answer to the atomic level ethical normative functions embodied in the underlying hardware. The existing industry practice is to respond to events and triggers from software or hardware activity so this level of ethical application must be part of the OS event-driven architecture.
* *Hardware* – this must encode normative functions into its drivers, machine code and assembly level firmware, especially hardware that receives direct sensor-based signals relating to wellbeing of employees.

The three layers must be designed to act in coherence with one another but must ultimately answer to the atomic level of ethical normative functions that have morals, values, and actionable principles as their foundations.

* *Software* -at this level an example of someone using software that requires ethical oversight would be an employee reporting stress regarding a workplace experience. The Employee Experience platform software can ensure that, with permission, an appropriate message is logged and reported to the company staff responsible for managing wellbeing and the employee is given some initial guidance to begin the process of ensuring they are helped according to their unique circumstances.
* *Operating System* - an example of an OS level event that would require ethical response would be the registration of the employee stress report in a database as a new record is added for his case. The OS can ensure that the data is monitored so that it gets a verified response within a given time. This ensures accountability and transparency. The employee can provide the final permission for the record to be generated.
* *Hardware* – at this level, some devices could be made available to measure stress, for example relating to heart rate or skin resistance. If any sensors register signals beyond healthy norms the hardware can generate a call for the operating system to record an event in its wellbeing database and register the circumstances in the employee experience platform, raising appropriate flags to accountable staff. Prior to any submission of signal data, the employee can choose which elements can be shared and what permissions are valid for the different layers of communication.

So, the process-based governance that oversees human operations in AI projects must, in a fractal, scaled and parallel way be translated into the operations internal to technologies and their respective partnered hardware, firmware and operating systems as well as human facing software.

1. Future and Emerging Impact Areas

As AI emerges as an integrated part of the smart workplace, present and future efforts need to be made to allow the rise of technologies that moderate that intelligence so they ethically process input data, processing of data as well as output and dissemination of data. In other words, AI must be chaperoned by Artificial Ethics. Machine Learning must be shaped by Machine Ethics algorithms to ensure outcomes are not biased and that cultivate empowering human creativity and flourishing.

Between 2016-2019 the IEEE supported a study on Ethically Aligned Design, to explore these layers of ethical applications to technology. In that study deeper areas of ethical application are explored to “advance a public discussion about how we can establish ethical and social implementations for intelligent and autonomous systems and technologies, aligning them to defined values and ethical principles that prioritize human well-being in a given cultural context” [41, p.2]. The IEEE study marks a shift in focus to encapsulate design and integration of ethics management features and functions within technology and systems rather than predominantly external to them in human-to-human interactions.

The study [34] has theoretical implications in that it emphasises value-based systems design and the importance of flourishing. It states, ‘Eudaimonia`, as elucidated by Aristotle, is a practice that defines human well-being as the highest virtue for a society. Translated roughly as *flourishing*, the benefits of Eudaimonia begin by conscious contemplation, where ethical considerations help us define how we wish to live. Whether our ethical practices are Western (Aristotelian, Kantian), Eastern (Shinto, Confucian), African (Ubuntu), or from a different tradition, by creating autonomous and intelligent systems that explicitly honour inalienable human rights and the beneficial values of their users, we can prioritize the increase of human well-being as our metric for progress in the algorithmic age, immunizing people from work-life contexts that trigger low-desire behaviours. In practice, measuring and honouring the potential of holistic economic prosperity should become more important than pursuing one-dimensional goals like productivity increase or GDP growth [36, p.5]. The IEEE provides a series of recorded webinars on “Ethical Considerations for System Design” that serves as a good starting point for developers in exploring considerations for embodying ethics into systems and their design [42].

1. Concluding Remarks

AI is playing an integral role in emerging smart workplaces. The potential benefits of AI are that it may provide opportunities for more engaging work, support workers with greater autonomy in shaping their daily work, and enable workers to develop a greater sense of mastery. However, there remain many challenges to achieve a positive Employee Experience that may in turn increase the worker’s discretionary effort. The challenges include an ever-growing need for workers to interact with advanced technologies both in and outside of the workplace. Added challenges can be the blurring of work-personal life boundaries, e.g., the uncountable experiences of work-life from home under the COVID 19 pandemic. But, more importantly, supporting worker control (autonomy) and offering challenging work are critical factors in motivating discretionary effort [9]. It is, therefore, not a simple incentive or reward system that can be the foundation of positive EX. Recently publicised cases of Low-Desire society in Japan have pointed to workers losing a sense of expectation towards their employers and towards the work itself [43][44]. The future workplace environment will need to consider other factors beyond the technology, such as organisational culture, that is a good starting point for future research. However, in this paper we emphasise the critical need for a design approach that does not impose risks of ethical liabilities.

This paper at its core has proposed the need for an increased emphasis on embodying ethical principles into the design and production of the technology itself, especially in its User Interface and User Experience processes. We identified four key factors in ETHAD deployment that are privacy, security, integrity, and equity. Five critical factors that underpin EX have been identified that are belonging, purpose, achievement, happiness, and vigour. We propose there is a critical link between a positive employee experience of these factors and discretionary effort. At the core of successful EX is human flourishing, where the optimal outcome is where human experience is delightful. Such employee experience can only be achieved through technology that respects ethical design needs. The proposal to address this is the design and deployment of a Value Engine that is driven by ethical algorithms that monitor software, operating system and hardware for ethical oversight.

Analogs of components or systems that underpin a future Value Engine are already being innovated. Of these the ones that will need to be capitalised on are those that connect human emotions, affect and underlying value driven motivations with operational activities within an engagement or discretionary effort transformation process. Three examples of efforts demonstrating this in the Human Work Interaction Design field should be mentioned. The first effort, BioStories, a four year project that focussed on uniting affective and ubiquitous computing with context aware multimedia environments real-time generation [45]. This explores how multimedia storylines could be emotionally adapted on the fly, so that end users would unconsciously be determining the story graph. This kind of agency, sourced from emergent human states, is what will be needed to support triggers of Value Engine activity and moderation. The majority of developments will centre on making the Business-IT communication cycle more enriched with benefits for employee experience, engagement and empowerment. The model a business uses to operate must be effectively communicated to ensure employee compliance and engagement. To ensure ongoing discretionary effort availability businesses must be able to identify disruptions or breakdowns in business-IT communication through their business models, something that Ferreira J.J., de Araujo R.M., Baião F.A. have analysed in their 2011 paper [46]. A final example, relating to corporate intranets is worth exploring. Géczy P., Izumi N., Akaho S., Hasida K. in their 2006 paper [47] state that “Knowledge regarding user browsing behavior on corporate Intranet may shed light on general behavioral principles of users in Intranet spaces and assist organizations in making more informed decisions involving management, design, and use policies of Intranet resources.” An easy win in developing infrastructure for a workable Value Engine might be able to be achieved through browser-based applications and services.

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