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Co-Designing Socio-Technical Interventions with Skilled Trade Workers

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***Abstract*—This paper lays out an approach to co-designing Artificial Intelligence (AI)-enhanced smart hand tools with skilled trade workers employed at a local municipality. Skilled trade workers contribute to society by building the infrastructure upon which the public depends. In addition, these technical interventions offer an opportunity for workers to benefit from the data they generate via smart hand tools, potentially creating a new empowerment dynamic with employers. Therefore, we consider technologies that support skilled trade workers in performing their work effectively, safely, and with increased levels of autonomy to be considered Public Interest Technologies (PIT). Interdisciplinary research is underway that aligns these approaches with Public Interest Design (PID) principles which informs researchers' desire to explore how emerging technologies – data cooperatives, blockchain, smart contracts, and data dividends – can further smart hand tools' empowerment dynamic. Future participatory design efforts may deliver additional insights and further impact technology deployment.**

Keywords— Public Interest Technology (PIT), Public Interest Design (PID), AI, Blockchain, Smart Hand Tools

I. Introduction

Imagine a future where skilled trade workers use "smart" hand tools that automatically provide them with feedback on tool use, techniques, and safety conditions, while supporting ownership of the valuable data they generate and even instant compensation for task completion. Such a future is fundamentally different from today, where workers are largely at the mercy of their employers to assess work quality, address safety hazards, and authorize payment for work performed. This paper lays out an approach for potentially achieving this worker-centric future.

Skilled trade workers use tools and machinery to perform complex tasks. The shortage of skilled trade workers, estimated at almost 700,000 in the United States (U.S.) alone, is impacting society at many levels from construction to infrastructure building and maintenance, to supply chain interruptions [1, 2]. In addition to outpaced demand for skilled trade workers, this employment sector is likely to be affected by information technologies, including Artificial Intelligence (AI) [3]. Historically, technological innovation related to skilled labor has been a disruptive force resulting in job displacement [4]. Socio-technical interventions that include Public Interest Design (PID) principles may be effective in retaining and attracting new skilled trade workers to address shortages while also offsetting the negative effects of automation of the skilled trades.

Our research goal is to demonstrate how socio-technical interventions, such as smart hand tools, data cooperatives, blockchain technology, smart contracts, and data dividends, can increase agency and autonomy for skilled trade workers [5, 6]. To achieve this goal, an interdisciplinary team is conducting qualitative research through semi-structured interviews as a first step to involve workers in the design process of smart hand tools [7, 8, 9, 10]. The data resulting from smart hand tool use may help workers perform their tasks more safely and with greater effectiveness. To counteract any unintended negative consequences of smart technology, such as surveillance in the workplace, we explore the introduction of what we term "data support technologies" namely data cooperatives, blockchain, smart contracts, and data dividends. Fig. 1 illustrates how these concepts relate to one another. As the worker uses the smart hand tool, data is generated, thereby providing the worker with information in real time. In concept, the data may also be voluntarily contributed (with the worker's permission) to one or a combination of the data support technologies - a data cooperative, to the blockchain, or for informing the creation of smart contracts, and/or data dividends. As a result of integrating smart hand tools and data support technologies, workers may be able to achieve a greater sense of agency and autonomy by controlling access to their data, being able to receive collective insights from their data, and perhaps even

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