Thesis Project Portfolio

Investigating the Impacts of Different Software Development Methodologies.

(Technical Report)

The Impacts of Artificial Intelligence on Music Making

(STS Research Paper)

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Executive Summary

Introduction

My technical paper discusses how different software development methodologies impact different performance factors for software development teams. This is a theoretical paper that discusses the possible merits and limitations of Agile software development in comparison to more traditional waterfall methodologies. My interest in pursuing this was my summer internship at the Federal Home Loan Mortgage Corporation and how different teams would organize their works and face different levels of cost and time overruns. My STS research paper is on an unrelated topic. It is about the impact of Artificial Intelligence on music. This paper explores the economic, creative, and social impacts of how generative AI may affect musicians and music listeners. It relies on the social construction of technology framework in describing how the perceived value of music has declined due to the proliferation of streaming services that allow listeners to access an unimaginable amount of music for a relatively small monthly subscription fee. The paper also discusses the legal implications of companies training their generative AI music software on copyrighted/unlicensed music if that constitutes as fair use.

Understanding the Impacts of Different Software Development Methodologies on the Developer and Industry

My paper examines Agile and Waterfall software development methodologies, focusing on their impacts on software quality, developer performance, and workforce retention. Agile development emphasizes flexibility, collaboration, and continuous delivery through iterative cycles, but its fast pace can strain developers, especially juniors, and sometimes sacrifices thorough testing and documentation. In contrast, Waterfall follows a rigid, sequential process

with longer timelines, which can introduce different but less frequent stresses. The proposed technical project would analyze developer performance data (completed story points, code smells, budget adherence, etc.,) from various teams across firms and study the relationship between those metrics and how said teams software development workflow. Studying additional long term heuristics like developer satisfaction and talent retention could provide firms insight into how software development methodologies can affect their talent.

Agile's short-term focus can cause burnout and disconnection from broader project goals, particularly in global or contracted teams. Improving communication, ensuring context-driven work, and balancing Agile's speed with workload management are key recommendations for organizations seeking sustainable, high-quality software development. Through this I stress the need for mindful adjustments to development processes that prioritize both technical excellence and developer well-being, aiming for better retention, maintainability, and reliable products.

The Impacts of Artificial Intelligence on Music Making

My STS paper explores the impact of Generative AI on music creation, using the Social Construction of Technology (SCOT) framework, which sees technology as shaped by societal values. I discuss how AI models like Suno and Udio generate music, often using copyrighted works without consent, raising major legal and ethical issues. Historically, randomness and probability in music (e.g., Brian Eno, aleatoric composers) have parallels to today's AI, but key differences exist since AI users often cannot control or understand the underlying processes. In the paper I critique AI's current musical capabilities: while able to produce sub-par pop music, models struggle with emotional depth, long-form structure, and nuanced genre-specific tasks.

Testing revealed strong biases toward common pop keys and vocal-driven music, revealing training data limitations. From a technical perspective, AI systems use machine learning techniques like GANs, Transformers, VAEs, and diffusion models, but their outputs are heavily shaped by biased datasets and engineering choices. Legal frameworks are lagging behind: issues around copyright, fair use, and artist impersonation are still unresolved, creating uncertainty about the ownership and value of AI-generated music. I posit that AI could worsen income inequality for musicians by flooding the market with cheap, generic content, further devaluing music in an industry already stressed by streaming and further push artists to use their music as a part of their brand as opposed to creating standalone art.

The discussion points toward co-creativity—where AI acts as a collaborator rather than a competitor—as a promising path forward. Still, concerns remain about creative homogenization and the need for transparent, inclusive AI development to preserve musical diversity.

Conclusion

Working on these vastly different areas of research illustrated to me the rise of new ways of understanding the role data and information plays in our lives. When firms seek to improve the efficiency of their developers it can often come at the expense of long term growth, and retention. As AI firms target the music space it may further drive our listening to a place where we maximize our attention in the most efficient way possible. Perhaps the future of capitalism is increasingly depersonalized and reaches a singularity of completely optimized choices, something we see in the erosion of institutions of culture and democracy. Personally, exploding

two broad topics into detailed impacts has taught me about focusing on aspects of an issue rather than trying to understand the bigger picture immediately.