

A series of thin, black, overlapping lines forming various geometric shapes and polygons, primarily located in the upper-left and central portions of the slide.

MANAGING EMERGENT ETHICAL CONCERNS FOR SOFTWARE ENGINEERING IN SOCIETY

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AGENDA

Introduction

Projects Studied

Frameworks Proposed

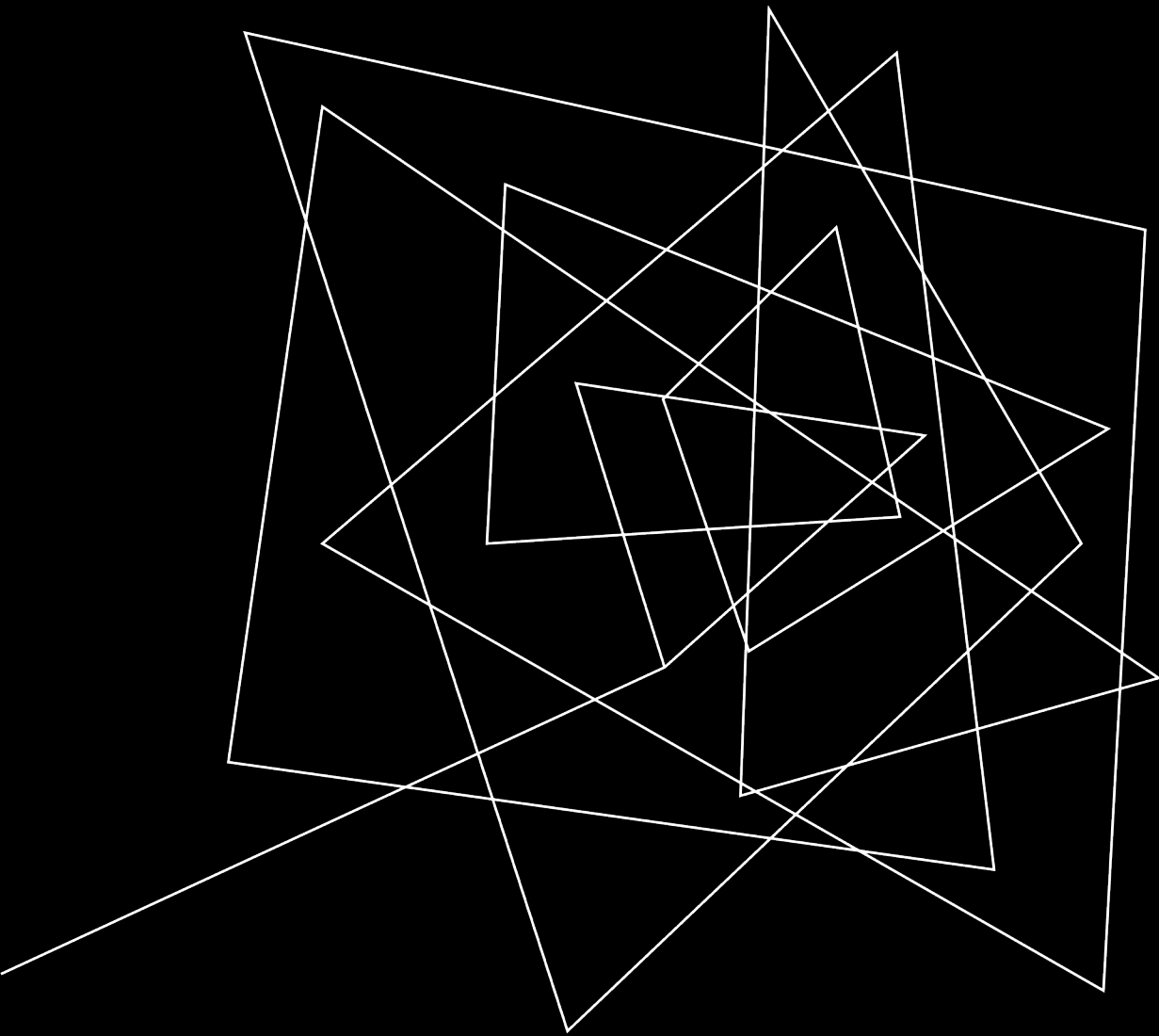
Conclusion

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INTRODUCTION

- The paper focuses on talking about providing an initial framework for managing emergent ethical concerns during software engineering in society projects.
- The article argues that such emergent considerations cannot be understood as unchanging guidelines for how to behave in response to known, measurable conditions. They cannot be solved by merely phrasing them as demands that must be met despite not being functional.
- The framework was created using a retrospective examination of ethical issues in four software engineering in society initiatives that were conducted in three distinct fields.



PROJECTS STUDIED

1. Policing Tools for Online Child Protection
2. Social Media Tools for Community Empowerment
3. Future Utility Infrastructure

POLICING TOOLS FOR ONLINE CHILD PROTECTION

- In order to help investigators, examine the deceit and disguising techniques used by child sex offenders in online social networks, Project Isis created a new digital persona analysis approach.
- To make the strategy operational, the toolkit needed to employ modular software engineering techniques that would make it simple to change and upgrade in response to new or evolving criminal strategies.
- On the other side, Project iCOP created an innovative method that combines complex filename and media analysis techniques to automatically highlight fresh/previously undiscovered child abuse media on peer-to-peer (P2P) networks. This makes it possible for investigators to separate the sources of such material from the vast amount of (legal or illegitimate) activity on P2P networks.
- In order to allow integration with workflows and investigative tools used by law enforcement, service-oriented software engineering was employed to combine the various analysis approaches.

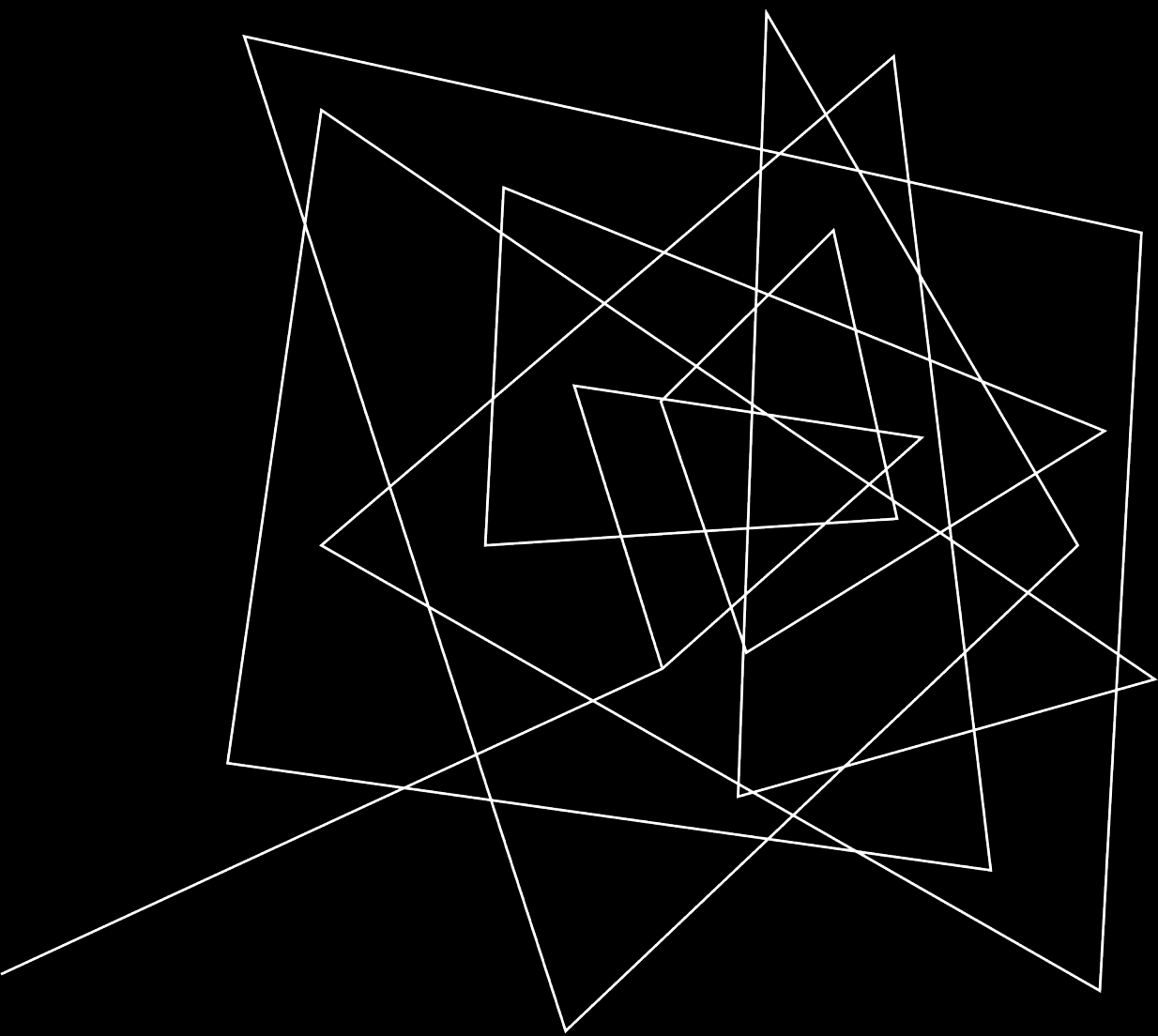


SOCIAL MEDIA TOOLS FOR COMMUNITY EMPOWERMENT

- The new social media platform called UDesignIt provides several features that encourage public participation in system design. Critically, these technologies aim to involve social groups that are typically marginalized, like young people, the disabled, the elderly, or those who are digitally excluded owing to socioeconomic or criminal circumstances.
- The system divides the important topics being discussed into groups based on how closely they resemble the structure of a forma feature model using a combination of natural language processing and feature modelling to identify the key themes being discussed. In order to make the resulting feature model understandable and accessible, a "image-cloud" overlay (a word cloud extension to image-based representations) gives a highly visual depiction of the themes.

FUTURE UTILITY INFRASTRUCTURE

- A multidisciplinary study called "All-in-One" looked at utility infrastructures for towns that could survive for 100 years. This required determining if a single utility product could meet all the needs of the end users. For instance, might the end user have equipment that "convert" power into water using the local sewage system and recycled rainwater?
- In relation to such an "all-in-one" utility idea, the study investigated the gaps in science and technology. Analysis of requirements, technological and scientific feasibility studies, and risk and economic evaluations were all part of this
- The provision of all utilities through a single physical infrastructure, such as the delivery of electricity and water through a single water pipeline, was considered as one of two all-in-one vision alternatives. Given a set of required utility services and inputs, a potential technological chain for utility provision was suggested. Where chain links were missing, new technological development opportunities were identified.



**PROPOSED
FRAMEWORKS**

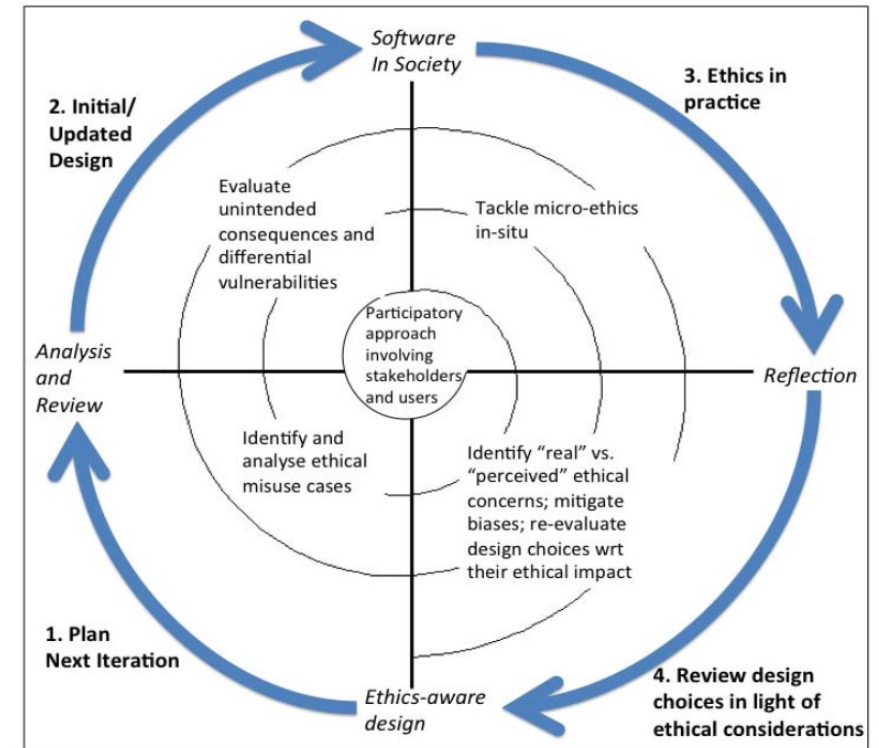
PROPOSED FRAMEWORKS

They have provided an iterative paradigm that views ethics as a continuous process based on a retrospective review of our experiences handling emerging ethical challenges in the a forementioned projects.

The framework was built on Boehm's Spiral Model of Software Development which accepts the “messiness” of social life and research.

This framework highlights the steps which may be most essential to tackle certain emergent concerns. They are grouped into 4 essential categories which are, ethical misuse cases, unintended consequences, micro-ethics of emergent content, contact, conduct risks and Differential vulnerability across user groups.

The figure discusses the “good practice guidelines” identified by experience rather than applied universal rules.



ETHICAL MISUSE CASES



UNINTENDED CONSEQUENCES

- Unintended effects of specific design decisions have higher-order ethical ramifications. The majority of the time, top-level features or non-functional qualities have only a first-order impact on software requirements. Until software interacts with real users or real operating situations, second and third order effects are not immediately visible.
- Special attention has been pointed to the role of Toolkits and Investigators becoming overly dependent of Toolkits. Despite the toolkits' high level of accuracy, their level of precision was limited by the underlying artificial intelligence and machine learning techniques. However, as they produced increasingly accurate intelligence and helped catch criminals, investigators would eventually become overly dependent on them.
- Due to this, workflow steps were "designed-in" to enforce cross-checking and examination of any decisions resulting from the analyses in the toolkits, and the user interface and reporting features were reviewed to ensure that appropriate confidence levels were attached to any results generated through the toolkits.
- A similar consideration of “designing-in” checks was re-quired when generating infrastructure design outlooks in the All-in-One project.
- Another example of un-intended consequences involved the provision of smartphones to users engaging with UDesignIt

MICRO-ETHICS OF CONTACT, CONTENT AND CONDUCT RISKS

- Micro-ethics represent the minutiae of ethical decision-making which require software engineers to negotiate the fluidity of the context in which the software is to be situated.
- An example of such micro-ethics included the need to refine the performance and accuracy of the Isis and iCOP toolkits.
- The material's nature presented a considerable danger of harm to researchers who were exposed to it, not to mention the fact that it was wrong and immoral to watch it. To ensure that any initial tool training was conducted on non-sensitive data or features extracted from sensitive data in a way that prevented their use in reconstructing the original data, protocols needed to be established.
- Participants were explained the Acceptable User Policy (AUP) while maintaining a careful awareness of the "delicacy" of doing so without seeming to labor under the presumption that participants would engage in the undesired behaviors we were laying out. This was crucial to avoid perpetuating the unfavorable assumptions about the young people we were working with and giving the impression that we were "lecturing" the participants, which would have discouraged them from engaging for the UDesignIt trials.

DIFFERENTIAL VULNERABILITY ACROSS USER GROUPS

Our ethical concerns were shaped by the groups we were engaging with at a particular time.



CONCLUSION

Our experience demonstrates that controlling ethical usage of information and communication technology and more conventional considerations like data protection are only a small part of addressing ethical issues during software engineering in society.

“Without full and frank consideration as to their presumptive base, fears and cultural assumptions are too readily translated into ethical concerns of the sort that institutionalist ethics procedures demand software engineers to identify”



REFERENCES

Awais Rashid, Karenza Moore, “Managing Emergent Ethical concerns for Software Engineering in Society”, IEEE/ Acm 37th IEEE International Conference on Software Engineering May 16-24, 2015. Available:

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THANK YOU