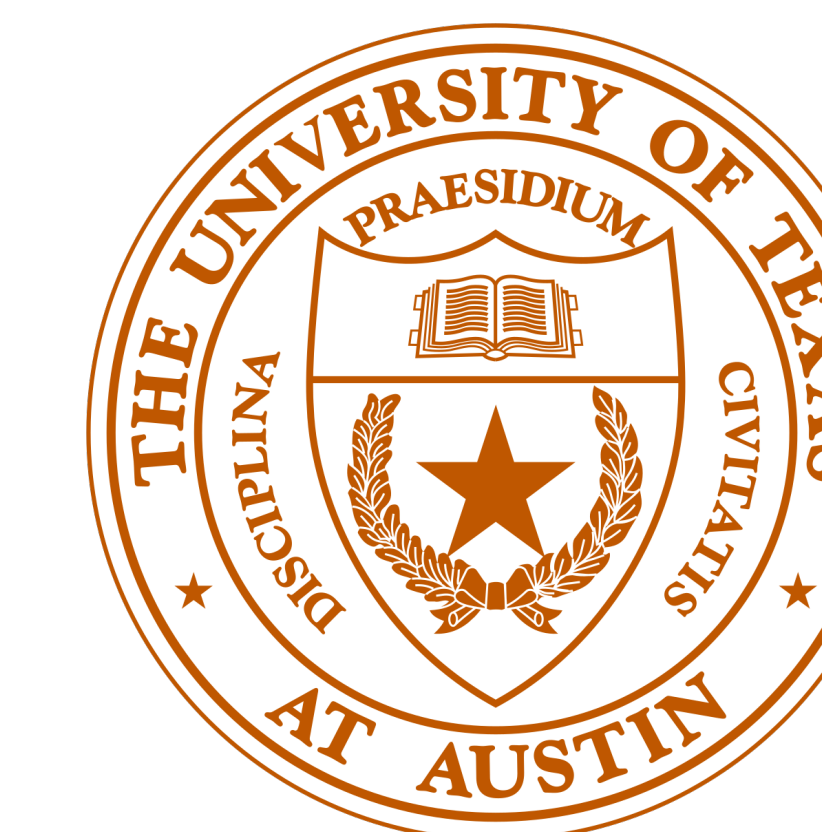


Preserving Algorithmic Systems: Using Paradata for Fairness, Accountability, and Transparency

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Introduction

- Algorithms are not separable from the social settings in which they are conceived and operated,
- Social contexts are not separable from the algorithms that shape them.
- Algorithms are both conceptual and contextual,
- Any approach to their preservation must attend to both of these characteristics.
- Paradata can support goals of fairness, accountability, and transparency by creating complex and rich records of algorithms
- Recordkeeping professionals can and should draw from the principles and tools of their trades to contribute to these efforts, in turn benefitting from the contributions of critical data studies, information studies, and computer sciences.

Research Goal

We sought to develop an appropriately multifaceted method for algorithmic preservation by engaging the tools and methods of the recordkeeping professions.

Methods

Through a series of literature reviews, we cataloged existing approaches to algorithmic preservation and paired them with examples of their application in practice.

Literature from critical data studies, information studies, and computer sciences encourages preservation through a constellation of artifacts and practices from these collective contexts.

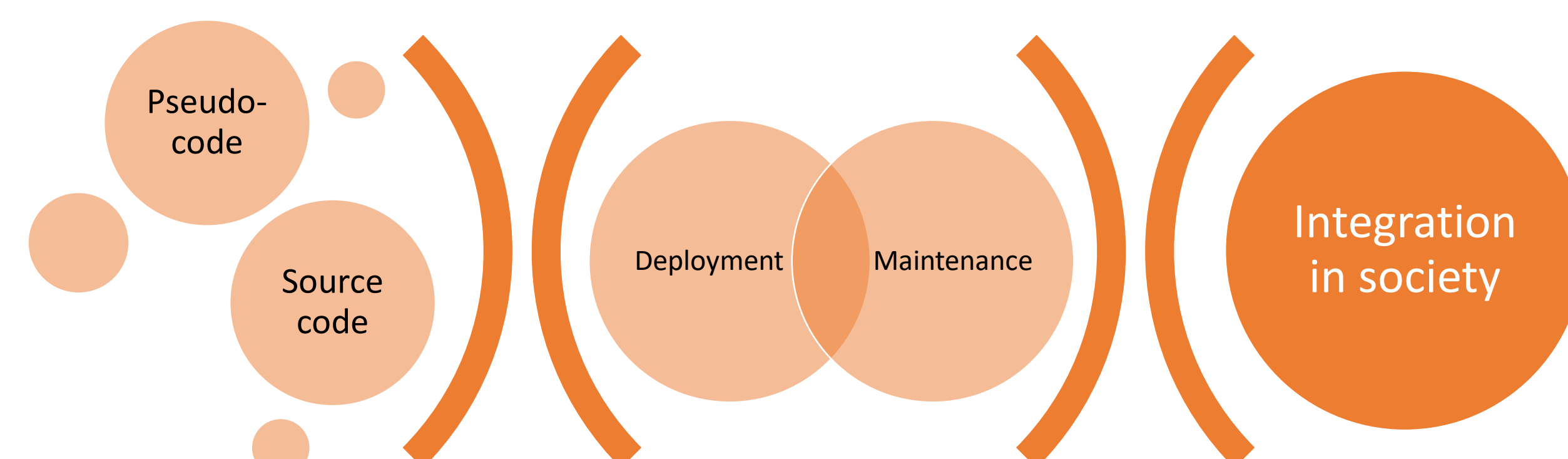


Figure 1. Algorithms through the lifecycle

Figures and Results

We found that paradata solves the need for accountability and transparency in algorithmic systems. Paradata most effectively preserves algorithms when they are considered as the sum of their social and technical components, embedded in socio-technical assemblages.

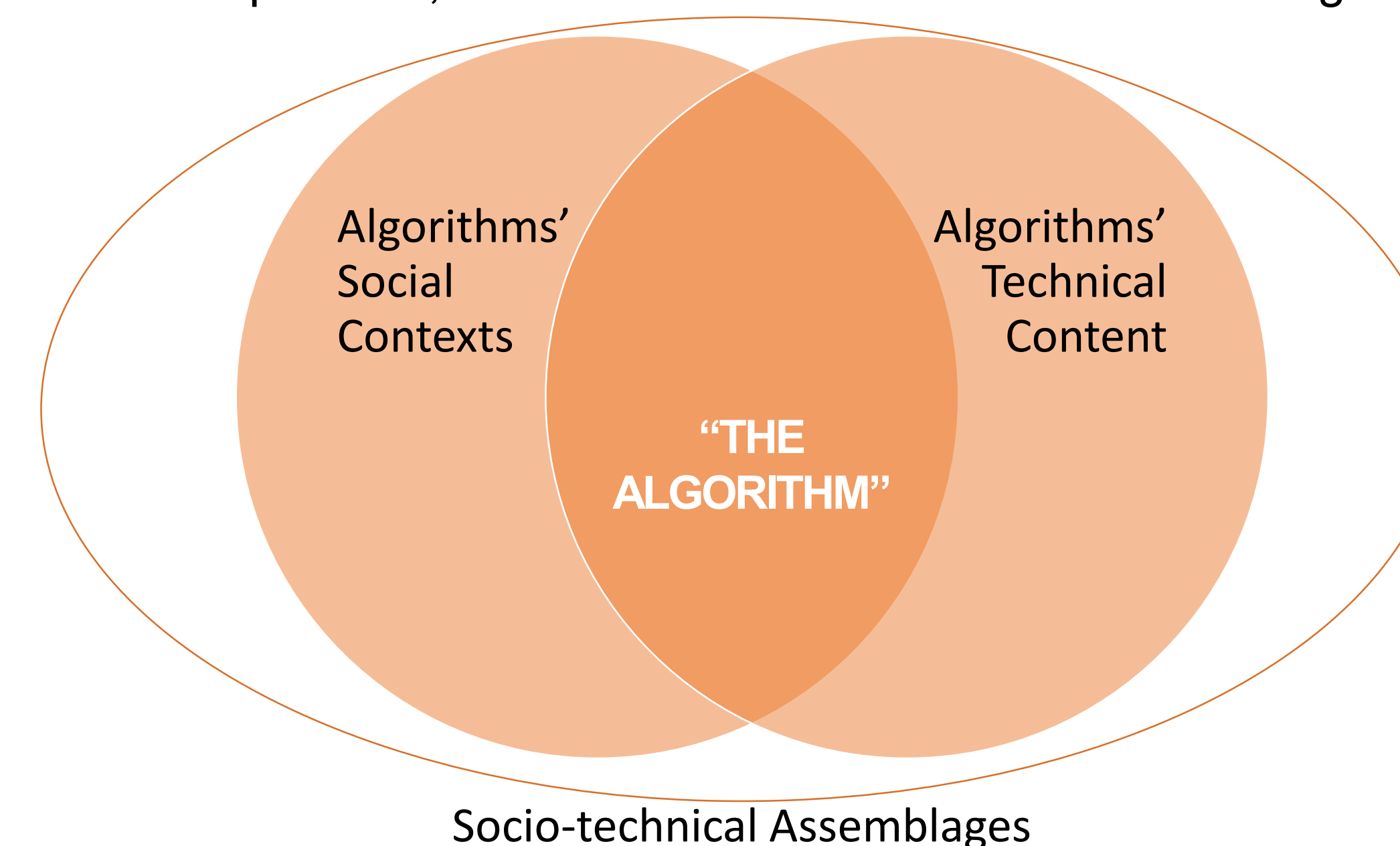


Figure 2. Algorithms are the sum of their social and technical aspects

	Artifacts	Work practices	Histories of artifacts and practices	Production and deployment	Assumptions and experiences
Algorithms as pseudo-code/ source code	Pseudo-code, source code, rule sets, programmer comments	Designing, developing, and discussing	Algorithmic evolutions, translations of code by language and platform	Documentation of source code in use beyond initial development	Developers, researchers, developers, and managers
Specification of algorithmic systems	Compiled software, system specifications, input data, metadata, outputs, user comments	Implementing, testing, and adjusting	Multiple implementations across variations in operating systems, platforms, and systems	Purposes, environments, and organizations using compiled software	Researchers, users, those seeking to optimise algorithms for gain
Algorithms as produced and practiced	Interview data from designers and coding teams	Task translation, production, and revision, design decisions (languages, constraints, etc.)	Changing practices of software development	Regulatory and legal framework, institutional and financial arrangements, clients, users and markets	Designers, coding teams, researchers
Socio-technical assemblage of algorithms	Company interview data, promotional and industry material, procurement tenders	Workplace culture, corporate policies and governance	Histories of projects	Technological stack, legal and standards frameworks, markets	Coding teams, other key actors (as creators), promoters of algorithms
Algorithms at work in the world	Output data, documentation of populations affected by algorithms	All information practices of daily life	Documentation of changing relationship to algorithms	Different domains such as play and work	People in the world

Table 1. Approaches for archiving algorithms (adapted from Kitchin 2017)

Conclusion

The materials and contexts necessary to sufficiently document algorithms already exist, and it is the task of archivists and recordkeepers to locate and preserve them.

The standards, principles, and practices of the recordkeeping professions can inform the effective use of paradata for robust documentation of algorithms and AI systems throughout their lifecycles, resulting in usable records of algorithms' material development and socio-technical deployment.

These records are a vital component in fairness, accountability, and transparency of algorithms-as-such, algorithms in culture, and the organizations that deploy them.

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