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# Human Values in Tracking and Sharing Computer-Mediated Activity at Work

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**Abstract**

Recording and sharing detailed, in-context data about computer-mediated work can help workers, their peers, managers, and researchers gain rich insights about work. But tracking it raises a number of privacy questions: how do we help people understand and control what is being recorded? What data is sensitive? Who owns the data? We present work-in-progress using Value Sensitive Design to identify values and tradeoffs involved in tracking and sharing computer-mediated work activity.

**Author Keywords**

Values; activity tracking; computer-mediated work; value sensitive design; privacy

**ACM Classification Keywords**

H.5.2. Information Interfaces and Presentation: User Inter-Faces classifiers.

**Introduction**

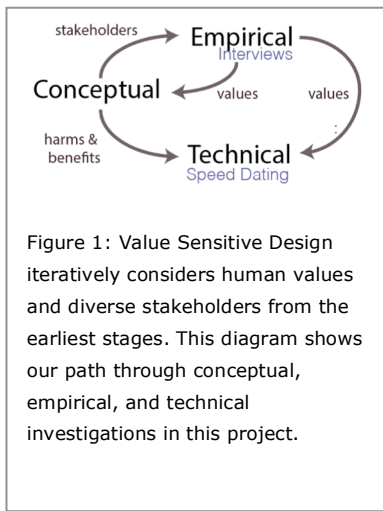
Detailed recordings of computer-mediated work could yield useful insights for workers, employers, researchers, and developers. Unrestricted availability of this information, however, could lead to privacy violations, legal and intellectual property risks, reputational harms, and other ethical and social concerns. If researchers and developers want rich, in-context data about work activity, we need to consider and address workers' privacy and security concerns before designing and deploying recording tools.

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Value Sensitive Design (VSD) is uniquely suited to developing tracking software in an organizational context as the subtle value considerations inherent in tracking and storing activity histories and the broad network of stakeholders in organizational contexts are explicitly acknowledged and accommodated from the beginning of the VSD design process.

### Value Sensitive Design

Value Sensitive Design (VSD) is an iterative, three-part, value-conscious design process [4] that uses conceptual, empirical, and technical investigations to explore and incorporate human values into design.

VSD has been applied to activity tracking [2] and has effectively designed software for use at work. Here, we use Value Sensitive Design to explore work activity tracking software.

### Conceptual

Conceptual investigations map out the context of designed object, specifically by identifying stakeholders and potential benefits and harms. We reviewed literature on privacy and ubiquitous capture, reflected on our own experiences, and refined what we found with the outcomes of our empirical investigation. Here we present the final results.

#### Stakeholders

Direct stakeholders include trackers who record their work activity and recipients with whom the trackers share recordings. In our literature review and interviews with participants, the most frequently mentioned stakeholders were the user, coworkers, managers, significant others, researchers, software developers, and bad actors, like hackers and thieves.

Indirect stakeholders primarily include bystanders whose information is recorded by others.

We are most interested in increasing adoption of work-activity tracking software by workers, so we focused our investigations on the prospective user. However, we found users had different and compelling concerns depending on who might see the recorded information,

so we used our stakeholder list to structure our empirical and technical investigations.

### Benefits

**Self-knowledge** – Participants mentioned curiosity about their work activity and habits. This knowledge does not have to be acted on to be valuable.

**Group-knowledge** – Tracked work activity can benefit group knowledge. For example, tracking activity can make knowledge transfer through tutorials easier [5].

**Productivity** – Tracking can directly improve productivity by informing work habit improvements, or indirectly, by facilitating administrative tasks like filling out time cards.

**Security** – Participants mentioned using tracking services to help locate their devices.

**Reputation** – If the user can control how her work is presented, it can benefit her reputation. One participant wanted to show her boss how much work a project took.

### Harms

**Security** – Tracking can also reduce security by revealing a user’s location or inadvertently sharing sensitive information such as banking credentials.

**Privacy** – Tracking increases the risk of revealing information that may not threaten security, but that people would rather not share, like personal emails.

**Reputation** – Sharing work activity has the potential to harm one’s reputation; this was mentioned often when discussing distracted behavior at work.

**Productivity** – Tracking could also harm productivity if the tracking itself takes time away from doing work.

### Empirical

Empirical investigations use qualitative or quantitative methods to understand the relationships between stakeholders and values in the use context. To ensure that the values designed for were as free from our

assumptions as possible, we used our empirical investigations to discover values [6].

We recruited twelve participants for interviews in France and in the United States. All participants did the majority of their work on computers. We asked interviewees to describe their willingness to track and share different types of work-related data with different audiences. Here are the eight overarching values we found.

*Results: Values*

**Self-knowledge** – Our participants were interested in better understanding their own beliefs, history, and habits. Some wanted to use this information to improve their work practices, and some cited simple curiosity.

**Intimacy** – Intimacy is deep, personal knowledge of self and others. While people value intimacy, they are selective about whom they share personal data with. Intimacy was a reason to share, for example, with a spouse, and a reason not to share with a manager.

**Autonomy** – Autonomy “refers to people’s ability to decide, plan, and act in ways that they believe will help them to achieve their goals” [3]. A desire for autonomy over tracking decisions and work practices motivated several participants oppose any kind of required activity recording at work.

**Ownership** – Ownership is a right to possess, use, manage, derive income from, and bequeath something [3]. Participants wanted to be aware of recording, control what was recorded, and specify how other people could use recordings. Our participants were more concerned with whether data would be sold than with sharing data with companies for other purposes.

**Privacy** – Privacy is “a claim, an entitlement, or a right of an individual to determine what information about himself or herself can be communicated to others” [3]. Participants were concerned about their own privacy and were aware of digital bystanders.

**Security** – Security is having one’s self and property free from harm or threat of harm. Concerns for security motivated arguments both for and against tracking; participants wanted to be able to find lost devices, but did not want thieves to know when they were away from home.

**Productivity** – Productivity refers to the ability to produce a large amount of goods. Our participants mentioned several facets of productivity including improving work habits and making it easier to do administrative tasks such as time reporting. Concerns for productivity also motivated the desire not to spend much effort on tracking.

**Reputation** – Reputation refers to a desire to be well thought of and respected. Participants were concerned with reputation when sharing recordings of work that showed distractions from work, even as they predicted that most people are similarly distracted.

Participants were concerned with their managers and coworkers seeing distracted behavior, and less worried about spouses, developers, or researchers.

**Technical Investigations**

Technical investigations test the designed object, a prototype, or a feature set in context. We used “speed dating” to test feature sets in different situations.

*Speed Dating*

Speed dating is a method for exploring design concepts that allows designers flexibly explore a design space without technical implementation (as sketching does) but takes contextual factors into account (as prototyping does) [1].

We recruited ten participants from the United States and France. All of our participants did the majority of their work on a computer and did some independent, collaborative, and supervised work.

We gave participants 9 options for editing recorded work activity, or interventions. Users could delete, abstract, or annotate their data by hand, do so with the

help of the computer, or they could delegate the entire task to the computer.

We presented participants with 10 scenarios with different contexts, audiences, goals, and concerns in which an office worker might share work activity. They ranked and justified the three most appropriate interventions and one worst. Participants' explanations helped us understand the values and contexts involved in tracking and sharing work activity, and how design decisions interact with these values.

Preliminary analysis suggests that participants were:

- Reluctant to erase data they might later want; they often preferred to obscure with abstraction or highlight important information with annotation
- Concerned about perceptions, including that deleting data would leave gaps or other evidence that recordings were deleted
- Mistrustful of algorithms and would avoid giving complex or sensitive decisions to the computer
- Likely to group abstraction and deletion as ways to obscure, and use annotation to explain reasoning, add context, or highlight moments
- Likely to care more about role of the recipient than the content of the recording
- Likely to distinguish between teaching and conveying the gist of an event or jogging memory. They were willing to put more time into the former.
- Likely to use the human + computer approaches to save time and retain control
- Likely to describe combining or chaining methods without being prompted.

### Next Steps

It is clear that decision-making about privacy is context-dependent and subtle. There are still some key questions we want to answer about our interviews and speed dating sessions:

- When did participants change their minds, and why?

- When were participants immediately sure about their choice, and why?
- When participants chained or combined interventions, what did they combine and why?

We will also use insights from this project to develop work activity tracking software for researchers that can gather rich, in-context data and protects user privacy.

### Acknowledgements

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