From personal to collective informatics

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Introduction

Individuals are motivated to collect data about their bodies and lives for many reasons, including to inspire self-reflection and gain self-knowledge [2]. This practice has become increasingly common over the past few years, aided by consumer devices which allow people to track features of their sleep, mood, and activity via smartphones, wearable devices, or external sensors [10]. Also referred to as "Quantified Self" systems, these tools have traditionally been developed from a single-user perspective. However, recent research suggests that there is a need to understand such self-tracking behavior as a social act, and as one that produces data streams that are not only useful for an individual, but for groups of people.

In this position paper, we discuss a concept we are calling "collective informatics," which can be loosely defined as collective contribution to and sense-making around personal data. Collective informatics can be investigated at varied units of analysis, each having unique relational structures—from familial, friendship, or professional groups to those based on citizenship to a particular neighborhood, town, city, or state. In this final category, the notion of collective informatics becomes civic and local, and some the potential consumers of data might be community leaders, policy makers, or scientists attempting to understand a geographically constrained dynamic to inform interventions.

At each of these units of analysis, collective informatics systems have potential to be useful

- **FAMILIAL**—Could collective informatics systems help those suffering from illness receive social support and share data with family members or providers?
- **PROFESSIONAL**—Could co-workers collaborate to optimize individual and collective productivity and well-being?
- **CIVIC**—Could personal health data be used in aggregate to understand the prevalence of chronic health conditions or spread of disease? Could personal data sharing amongst a group help support community resilience during disaster recovery, or improve disaster response as suggested by Levy and Morton [5]?

While these units are not exhaustive, the above examples illustrate the potential for exploring such a system at scale. There are also challenges common across all units: issues of data representation, ownership, access, and privacy must be negotiated in social context. Taken together, these observations suggest that collective informatics systems might require novel infrastructure(s) that can adapt based on the dynamics of various group sizes.

Building on prior work

Organizational behavior studies in time-critical, high-reliability domains, such as healthcare and emergency response, have attempted to identify dynamics and barriers in the process of creating common understanding [4] [7]. Others have explored how shared material objects can help facilitate this process [8]. Weick's work on "collective sense-making" in organizations emphasizes the fact that the process of working in a group to understand and act on ambiguous information can be transformative at an interpersonal level [9]. However, there has been little exploration of collective sense-making of personal data, and at how this might influence interpersonal relationships or community dynamics. Many existing personal informatics systems have features that allow users to share facets of their data with other users, but this sharing is often geared to comparison or normalization rather than collective sense-making.

In a sociological study of self-tracking culture, Lupton [3] discusses the relationship between self-tracking and big data politics, noting that self-tracking data is part of a much larger phenomenon of personal data that is tracked passively as users browse the internet, use search engines, and go about their lives using digital technology. Lupton also discusses the way that much self-tracking data is in fact shared with others, though this is often done in order to improve one's own data tracking practices. Others have pointed out that most of the data collected through self-tracking is useful for others, as people tend to benchmark themselves against some norm [6].

Gathering insight from aggregated personal data raises issues of data ownership, access, commodification, and privacy; using self-tracking data for collective insight will necessarily require engagement with these issues. Norms of competition and bench-marking, as well as the dynamics of asymmetrical power dynamics within a group, are also interesting areas of exploration in collective informatics.

In citizen-sensing projects, participants voluntarily collect data about some factor of their immediate environment, such as the prevalence of pollutants, in order to create a dataset useful for scientists or policymakers. Participants tend to be motivated by a desire to gather information that is relevant to themselves or their family, and resultant data sets are often too sparse for scientists to study [1]. Collective informatics systems with goals of data aggregation will need to address these issues of participant motivation and sparse datasets, particularly in the case of civic collective sense-making within neighborhoods and 'smart cities.'

Looking forward

Many questions arise from this discussion that are interesting starting points for future research, including:

- What purposes might inspire individuals to allow self-tracking data to become a public or communally resource?
- With what level of anonymity is personal data considered acceptable to share, and how does this expectation change depending on group size and social context?
- Collective informatics applications will require novel design concepts, infrastructure, and interfaces. These systems will need to support reasonable expectations around data representation, ownership, access, and privacy. How can we leverage these concepts to build tools that support collective well-being and resiliency?

Workshop participation goals

Our workshop participation goals are (1) to discuss and get feedback on the ideas that we have raised in this position paper around collective informatics, particularly the unique issues and opportunities that arise in the transition from a "quantified self" to a "quantified community" and the potential (and challenges) for developing and evaluating novel infrastructure in this space, and (2) to participate in the co-creation of boundaries, definitions, and institution-building in the area of social issues in personal informatics.

About the authors

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