

INDIVIDUAL PERSPECTIVES ON DATA SHARING: HUMAN FACTORS IMPACTING THE DIGITAL ECONOMY

Digital economies rely on the exchange and sharing of data, but this type of sharing is relatively new. Any digital transformation will include a shift from data as a protected asset to data as a tool for collaboration and network building, but this requires a shift in individual and organizational mindsets. We examined individual perspectives that influence the decisions to share government and research open data by reviewing and synthesizing a decade of research, with a particular focus on how human psychology can introduce or exacerbate barriers. After a systematic, multi-stage search and article selection process, we identified 58 research articles that focused on this subject, with over one third published in the last few years. We clustered individual perspectives into six broad themes of barriers, and identified strategies for mitigating these barriers from the same literature.

KEY FINDINGS

- Individual perspectives are intertwined with factors like organizational structures, incentive systems, resource availability, and perceptions of institutional culture (system-level factors). With a focus on individual perspectives, we identified the following six inter-connected themes.
 - Perceived costs versus perceived value: whether implicitly or explicitly understood, costs are typically direct and immediate and personal, and the benefits are typically indirect, time-delayed, and dispersed throughout a broader community. The value they perceive in sharing data directly influences their perception of the costs.
 - A "culture of data sharing" appears often in the literature; at an individual level, there was a willingness to follow whatever the norm was in their organization (or research field).
 - Real or perceived skill and knowledge gaps, but not related to data skills. Individuals express concern about their ability to engage with the open data / research data management ecosystem: terminologies, practices, repositories, metadata regimes, etc.
 - Fear of misuse and loss of certainty on how data is used ranged from not being appropriately credited for their work to others misusing or exploiting shared data.
 - Perceived responsibility for sensitive or personal data is often warranted as there is data that cannot be shared, but this can also be used to justify not sharing data that could be shared. Individuals were not confident in their ability to anonymize data, and feared the potential consequences of accidentally sharing private data.
 - Concern regarding data quality or mistakes (and potential consequences), and the extra work required to achieve confidence in the data quality, was a surprising barrier.
- Strategies to mitigate these barriers are largely theoretical, as there was little evidence on their effectiveness and no papers focused on potential mitigations. We summarize some key suggestions, with more in the full report:
 - Sharing data is, at present, an act of altruism and generosity (or compliance with a mandate). All participants benefit in a general culture of data sharing, as most are both data owners and data

users, but early on someone choosing to share data cannot count on reciprocity. Encouraging open data use by data owners (rather than focusing on sharing), making it easier to find and use open data, and highlighting early success stories may focus data owners on the benefit side of the equation, and invoke an implied *quid pro quo*.

- The support we offer to researchers can mitigate or exacerbate these barriers. Improving data management throughout a project lifecycle will make data sharing more likely, and this support might come from peers who are a powerful force in emphasizing the benefits of sharing data.
- Training was often cited as a mitigation technique, but there is no standard for training and skills required, the level of training for each skill, and how to best deliver this training. We suggest that the scale of the intervention needed is likely small and might be suitable for a nudging-type approach; and that the training should focus on RDM-specific skills and jargon like data anonymization, FAIR principles, and data repositories.
- There are substantial gaps in this research field. Few articles included examining human factors as a primary objective. Even fewer considered mitigations; these were often offered as part of a concluding section as the authors' opinion. There was no evidence of collaboration experts in human psychology (motivation, fear), change management, incentive systems, persuasive computing, and other related fields.

POLICY IMPLICATIONS

- We need to critically examine our reward system in the context of human psychology. While we often think of reward in terms of career progression or access to funding or publications or other substantive forms of recognition, these rewards are time-delayed and indirect. At the level of individual psychology humans are motivated by surprisingly small rewards. Consider nudging, captology, and other techniques designed to guide human behavior.
- Data management sharing incentives need to carefully balance extrinsic (mandates) and intrinsic motivation. Extrinsic motivation is difficult to ignore (like publishers, funding agencies, public opinion). Intrinsic motivation is preferable because individual perspectives alter how one assesses the value and the costs/barriers of sharing data. Extrinsic motivation may change behavior in the short-term, but long-term change and a culture of data sharing require intrinsic motivation. Both are required, in the right measures, to effect culture change. There is no evidence on the correct balance.
- Research into sharing data is incomplete, and a substantial push for interdisciplinary research is required from two groups in particular: funding agencies interesting in making science data more open, and the field of library and information science which has been too insular in its ownership of research on this subject.

FURTHER INFORMATION

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