

Understanding and Improving Human Data Relations

Alex Bowyer

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Appendices

A The Pilot Study: CHI 2018 Paper

For additional context, see 1.3.1. The paper is on the following pages.

B Ethics Approvals

Index of Key Ideas, Insights and Contributions

This section serves as both a glossary to explain abbreviations and existing terms used, as well as an index to easily locate key HDR-related concepts, ideas and contributions that this thesis contributes.

HDR Wants

Direct Data Relations:

1. Data Visibility - 6.1.1
2. Data Understanding - 6.1.2
3. Data Useability¹⁰ - 6.1.3

Indirect Data Relations:

1. Process Transparency - 6.2.1
2. Individual Oversight - 6.2.2
3. Involvement in Decision Making - 6.2.3

HDR Objectives

The objectives are introduced in 7.2.4. They are explored in 7.3:

Objective 1. Data Awareness & Understanding - 7.3.1 Objective 2. Data Useability - 7.3.2 Objective 3. Data Ecosystem Awareness & Understanding - 7.3.3 Objective 4. Data Ecosystem Negotiability - 7.3.4 Objective 5. Effective, Commercially Viable and Desirable HDR Systems - 7.3.5

HDR Obstacles

The obstacles are collectively shown in Figure 7.3 and are explained in the following subsections of 7.3:

- Closed, Insular and Introspective Practices - 7.3.5
- Complex and Invisible Personal Data Ecosystems - 7.3.3
- Diminishing Individual Agency - 7.3.4
- Data Holder Hegemony - 7.3.4
- Immobile Data - 7.3.2
- Inaccessible Data - 7.3.1, 7.3.2
- Insufficient Machine Understanding of Human Data - 7.3.5
- Intractable Data Self, the - 7.3.4
- Invisible Data - 7.3.1
- Lack of Metadata - 7.3.3
- Lack of Individual Demand - 7.3.5
- Lack of Interoperability - 7.3.5
- Lack of Provider Investment - 7.3.5
- Non-Interrogable Data - 7.3.2
- Personal Data Diaspora, the - 7.3.1
- Unmalleable Data - 7.3.2
- Unrelatable Data - 7.3.1

HDR Insights

Insights in 7.3:

- 1 - Life Information Makes Data Relatable
- 2 - Data Needs to be United and Unified.
- 3 - Data Must be Transformed into a Versatile Material.
- 4 - Ecosystem Information is an Antidote to Digital Life Complexity.
- 5 - We Must Know Data's Provenance.
- 6 - Data Holders use Four Levers of Infrastructural Power.
- 7 - Human-centred Information Systems Must Serve Human Values, Relieve Pain and Deliver New Life Capabilities.

- 8 - We Need to Teach Computers to Understand Human Information.

Insights in 7.4:

- 9 - Individual GDPR Requests can Compel Companies to Change Data Practices.
- 10 - Collectives can Compare and Unify their Data and Use it to Demand Change.
- 11 - Automating the Identification of Entities can enhance Machine Understanding and Unburden Life Interface Users.
- 12 - The ‘Seams’ of Digital Services need to be identified, exploited and protected.
- 13 - It is Possible (and Necessary) to Demonstrate Business Benefits of Transparency and Human-centricity.

HDR Approaches

The four approaches are collectively summarised in 7.5, and illustrated and explained individually in subsections of 7.4:

- Approach 1. Discovery-Driven Activism - 7.4.2
- Approach 2. Building the Human-centric Future - 7.4.3
- Approach 3. Defending User Autonomy and Hacking the Information Landscape - 7.4.4
- Approach 4. Teaching, Championing and Selling the HDR Vision - 7.4.5

Contributions and Major Concepts of This Thesis

- Auditing Data Holders - 7.4.2
- Categories of Family Civic Data - ARI4.1
- Categories of Personal Data - Figure 3.6
- Data Access & Understanding Services - 7.4.2, 7.4.4
- Data Literacy in an HDR Context - see HDR Literacy
- Data Cards - Figure 3.5, 3.5.2, 4.2.1; 4.4.2, Bowyer *et al.* (2018)
- Data Wants - Chapter 6
- Data Relations, Direct - 6.1
- Data Relations, Indirect - 6.2
- Digital Self Curation - 4.4.3, 5.5.2, 6.3
- Ecosystem Detection - Insight 4
- Ecosystem Information - 7.2.4, Insight 4
- Ecosystem Information Display - Insight 4
- Ecosystem Negotiability - 7.2.4, 7.3.4
- Empowerment (in the context of data wants)** - 6.3
- Family Design Games - see Bowyer *et al.* (2018)
- Family Facts - see Bowyer *et al.* (2018)
- Free Data Interfaces - Bowyer (2018)
- Human Data Relations (HDR) - 7.2
- HDR Literacy - 7.4.5

- HDR Wants - see Data Wants
- Human Information Operating System - 7.3.2
- Human Information - see Life Information and Ecosystem Information
- Inclusive Data Flows - 7.4.3
- Information Standards - 5.5.1, 7.3.5
- Landscape of HDR Opportunity - Figure 7.3, 7.4, Figure 7.36
- Life Concepts - 7.3.1
- Life Information Utilisation - 7.2.3, Figure 7.1
- Life Information - Insight 1
- Life Interface Design - 7.4.3
- Life Partitioning - 7.4.3
- Locus of Decision Making (LDM) - 4.4.3
- Meaning in Data - Figure 2.1, 4.3.2, 5.4.2, 6.1.2, Insight 1
- Perceived Individual Power - 5.3.4
- Personal Data Diaspora, the - 7.3.1
- Personal Data Ecosystem Control - 7.2.3, Figure 7.1
- Personal Data as a Proxy for Involvement - 5.4.4, Bowyer *et al.* (2018)
- Personal Data Stewardship - 4.3.3, 5.6
- Pushing the Seams - Insight 12
- Proxy Representations of Immobile Data - Insight 4
- Shared Data Interaction - 4.2.4
- Surface Information Injustices - 7.4.5, Insight 12
- Storyboarding Action Cards - ARI4.3
- Trust - 4.3.4, 4.4.1, 5.3.4, 5.4.4, 6.2.1, Insight 13
- Types of Personal Data (by origin) - Table 5.2
- Useability10 (as distinct from Usability) - 6.1.3]

Glossary of Pre-Existing Abbreviations, Names and Terms

Action (stage of Personal Informatics) - see **SI Action Research** - a mode of research where cycles of investigation shape future studies **Accessibility Tags (ARIA)** - tags within HTML code that screenreaders use and which can be exploited for seam hacking **Activism** - using vigorous campaigning to bring about political or social change **Agency** - the ability, described in HDI, to act for oneself in a system, see HDI **Barriers Cascade** - a series of obstacles in SI **BBC R&D** - the Research & Development division of the British Broadcasting Corporation, where I did a research internship **Boundary Objects** - tangible objects and representations that help different populations that may think in different terms to collaborate effectively **Card Sorting** - a technique used in Participatory co-design where participants arrange cards to convey their thinking **CHC** - Connected Health Cities** - government initiative behind the SILVER project, which I worked on **Civic Hacking** - technologists or enthusiasts working to reconfigure the way society works **Civil Libertarianism** - argues for

the supremacy of individual rights and personal freedoms over imposition by **thority** Collection (stage of Personal Informatics)** - see SI **Consent, Dynamic** - ongoing and changeable expression of preference **Consent, Informed** - initial one-time expression of preference **Constructivism** - a belief that new knowledge is formed by developing one's own mental models in order to explain new experiences **Conceptual Anchors** - the mental scaffolds which we use to organise our thinking and human information **Context-aware Computing** - designing systems that take account of the user's situation and varying needs **Co-experience** - bringing participants towards a shared perspective **Cornmarket** - codename for the BBC R&D PDS project I interned with **Critical Algorithm Studies** - research into making computer systems and their behaviour more understandable and **countable** Data Access Request** - see Subject Access Request **Data Brokers** - third parties that buy and sell user's data **Data Controller** - an organisation responsible for collecting and storing user data **Data Download Portal** - a website or service that allows users to access held data in a 'self-service' manner **Data Flow Auditing** - the use of apps or system services to monitor the communication and data sharing behaviours of consumer apps **Data Justice** - research into the relationship between datafication and social justice **Data Portability Request** - a particular kind of access request focussed on retrieving data in a machine-readable and useable format **Data Processor** - one who handles user data on behalf of a data controller **Data Provenance** - the history and origin of a piece of data **Data Self** - the representation of an individual in data through which state or commercial actors understand that **rson when making decisions** Data Subject** - the individual about whom data is stored **Data Transcendence** - the idea that data should not be tied to a single machine, but should move freely to the places it is needed **Data (general)** - digitally-encoded human information **Data, Civic / Family Civic** - the data stored about families by social care organisations such as Early Help programmes **Data, Acquired** - personal data that has been obtained from an official or public source or a third party **Data, Derived** - new data that has been extrapolated through interpretation of existing data **Data, Metadata** - data about the data itself, or about the incident recorded in data **Data, Observed** - data collected about individuals automatically, as a by-product of other actions or in the background **Data, Personal** - data about or related to identifiable individuals **Data, Volunteered** - personal data that has been knowingly shared by that individual with an organisation **Data, Trapped** - data that is hard to access due to technical, commercial or other restrictions **DERC** - Digital Economy Research Centre, funders of the Healthy Eating Web Augmentation project **Design, Co-** - researchers and participants collaboratively exploring problems and solutions **Design, Adversarial** - the design of systems or processes that challenge current norms **Design, Design After** - the ability to repurpose products or services for new objectives that might not have been initially considered **Design, Disrespectful** - design practices (often in user interfaces) that prioritise commercial needs over human convenience **Design, Experience-centred** - design that focusses on human psychology and lived experience of the situation **Design, Magical** - the presentation of

technology offerings as powerful and mysterious, that need not be examined or understood

Design, User-centred Design - design approach that builds up an understanding of user needs that is subsequently used by technical experts

Design, Value-centred Design - designing in ways that focus on positive impacts on human life

Device Tenancy - the idea that we are no longer owners of our devices, and lack control and autonomy over their use

Digital Civics - a multi-disciplinary research field encompassing HCI, governance, education, planning, social science and computer science, practiced by Open Lab, where I studied this PhD

Digital Self - see Data Self

DIKW pyramid - see Wisdom Curve

DPA - Data Protection Authority** - the official authority for regulating data use in a given country

DPO - Data Protection Officer** - the individual legally responsible for managing data use within a company and for handling access requests

EPSRC - Engineering and Physical Sciences Research Council, funders of this PhD research

Early Help - a set of programmes in UK local authorities designed to identify ‘at risk’ families and help them with targeted interventions

Effective Access - ensuring that individuals have all necessary skills, systems and capabilities necessary to see and understand information

Embodied Interaction - allowing users to create their own practices in information interaction

Empowerment in Use - having freedom to use products and services in the way you want

Entities - people, places, organisations, brands, topics or other identifiable ‘things’ that could be a stakeholder of, or related to, a piece of data

Entity Extraction - the process of identifying real-world entities in data

Explainable AI - algorithms whose decision making processes are described to system users

Faceted Search - the ability to search information by its shared aspects

File Biography - the lifetime of past actions on a computer file

Files, why they need to die - article by myself (Bowyer, 2011)

GDPR - General Data Protection Regulation - the EU’s 2018 regulations that give users rights over the collection and

e of their personal data Gatekeeper** - One who controls the flow of data or information between an organisation and an individual

HCI - Human Computer Interaction** - research and practice that explores how people relate to and use computer systems

HDI - Human Data Interaction** - a subdiscipline of HCI that focuses on people’s relationship with data, rather than with the system

Hestia.ai - Swiss company working in the data access and understanding services space, which I currently work for

HII - Human Information Interaction** - a discipline in library sciences that considers how humans relate to

formation regardless of technology used

Humane Technology** - a movement focused on making technology that is more sensitive to people’s lives and needs

ICO - Information Commissioner’s Office** - the UK’s Data Protection Authority

Ideation Deck - a participatory design technique that uses ‘ingredients’ cards shuffled in a grid to generate new ideas

Individualism - the pursuit of one’s own objectives as a primary objective

Information (general) - facts and assertions understood by interpreting data

Information, Human - information about people that can be related to their lives or to their digital world

Information, Life - information about people’s lived experience that can be found within data

Information, Ecosystem - information about people’s data, where it is stored, and how it is used and

shared **Information Landscape** - the general terrain of available information that a user can see and interact with through **e services and apps they use** **Infrastructural Power**** - see Power, Infrastructural **Integration (stage of Personal Informatics)** - see Self Informatics **Interoperability** - getting systems to connect and exchange information through data standards or conversion **Interoperability, Adversarial** - making systems connect together in ways that were not intended by manufacturers **Legibility** - the ability, as defined in HDI, of being able to understand stored data **Lifelogging** - the practice of maximal data capture for personal SI benefit **Lenses** - different ways of focussing on some data or information according to the aspect of interest or the current role **Life Sketching** - a process of mapping out mental models of one's life on paper **MyData** - an organisation whose members pursue a human-centric change agenda **Negotiability** - the ability described in HDI to flexibly adapt and change one's preferences as the world or digital **stem changes** **NER**** - Named Entity Recognition** - see Entity Extraction **Open Lab** - the research lab in Newcastle University in which I conducted this PhD research **Orienteering** - an associative process of information-finding **PDS - Personal Data Store** - See Personal Data Lockers **PIM - Personal Information Management** - the 1990s/2000s discipline that focused on new ways to manage and interact with data and information **PIM systems, contextual** - PIM systems that organise information according to what context it relates to **PIM systems, networked** - PIM systems that focus on the relationships between different pieces of information **PIM systems, semantic** - PIM systems that focus on the underlying meaning of the stored data **PIM systems, spatial** - PIM systems that focus on arranging data in a virtual space for easier management **PIM systems, subjective** - PIM systems that focus on the varied individual needs of users **PIM systems, temporal** - PIM systems that represent information using timelines or other visualisations that highlight change over time **PIMS** - Personal Information Management Services** - See Personal Data Lockers **Participatory Action Research** - see Action Research **PDE** - Personal Data Economy** - the emergent marketplace of companies innovating and offering services relating to the management, self-exploitation or harnessing of one's personal data **Personal Data Ecosystem** - the network of systems, accounts, files and digital information that constitutes an individual's digital life **Personal Data Lockers** - a place to store personal data so that it can be united, unified and interpreted by the data subject **Personal Data Vault** - See Personal Data Lockers **Personal Informatics** - see SI **Preparation (stage of Personal Informatics)** - see SI **Perspectives** - different presentations or aspects of information that support different mental models, focus or tasks **Point of Severance** - the point at which data is handed over, beyond which data subjects lose visibility, control and influence **Power** - Behavioural Influence** - persuading others to carry out the desired behaviour **Power** - Interpretative Influence** - determining how reality is externally represented **Power** - Network Centrality** - becoming an indispensable hub of a wider ecosystem **Power, Authority** - ownership of technology or infrastructure **Power, Disciplinary** - using an influential position to affect others' mental models **Power, Infrastructural** -

a model of understanding how providers exert power over their users, created as part of the digipower investigation **Power, Interpretive** - creating the internal representations of reality within an organisation **Power, (power to)** - an individual's ability to act (see Agency) **Power, (power over)** - a dominant actor's ability to limit or manipulate the actions of others **Power, Obscure** - where the subservient cannot tell when they are watched **Power, Pervasive** - where the one in power can see everything all the time **Power, Processual** - changing processes for competitive advantage **Power, Rational** - controlling decision-making processes **Power, Resource Control** **Power, Social**** - power where the power holder attempts to influence the behaviour of individuals in pursuit their desired outcomes **Power, Socially-shaped** - influencing a wide audience to settle upon a preferred interpretation **Power, Systems/Structural** - see Infrastructural Power **Power, Zero Sum** - winning a battle for ownership/resource control at the other party's expense **Power Imbalance (over Personal Data)** - the established fact that data holders have more power in service relationships than data subjects. **Pragmatism** - an epistemology that believes knowledge is constantly renegotiated by individuals **QSM** - Quantified Self Movement** - see SI **R&D** - Research & Development **Reflection (stage of Personal Informatics)** - see SI **Recursive Public** - a community of people who are attempting to reconfigure society for the better **SAR** - Subject Access Request **SI** - Self Informatics** - an umbrella term for Personal Informatics and the Quantified Self Movement, where people track their activity in data and reflect upon it, setting goals and tracking progress **SILVER** - the project working in the Early Help space that I worked with for Case Study One **Sitra** - Finnish non-profit research organisation for which the digipower investigation was conducted **Scraping** - the process of programmatically extracting information from interfaces such as websites that were intended for human browsing. **Seams** - the 'edges' of products and services, at which service providers can exert restrictions and at which users **n find new ways to adapt their product usage and data access** Subject Access Request** - a request to a DPO of an organisation for a copy of held personal data **Support Worker** - a specialist social worker who helps a family in an Early Help context **Supported Family** - a family participating in an Early Help social care programme **Text Mining** - the process of programmatically examining textual data to infer new facts and assertions from the data **ToC - Theories of Change** - a model for thinking about how to achieve change in society **Things to Think With** - the idea that tangible representations can be useful to aid discussions **Timelines** - visual representations of information anchored against points in time **TrackerControl** - see Data Flow Auditing. **Troubled Families** - historic term for those families targeted for help by programmes such as Early Help **VRM** - Vendor Relationship Management** - a model where vendors are selected by customers in response to their published needs, instead of relying on broadcast advertising to find customers **Web Augmentation** - the process of modifying a web page to provide new functionality or access data after it has been downloaded to a user's web browser **Web Extensions** - pieces of user code that are loaded into a web browser to modify or programmatically interrogate web pages **Wisdom**

Curve - the process of converting data, to information, to knowledge, to wisdom
world2vec - a system in Facebook that attempts to understand the world through analysis of social media content

Bibliography

- Bowyer, A. (2011) 'Why files need to die'. available at: <http://radar.oreilly.com/2011/07/why-files-need-to-die.html>.
- Bowyer, A. (2018) 'Free Data Interfaces: Taking Human- Data Interaction to the Next Level', *CHI Workshops 2018*. available at: <https://eprints.ncl.ac.uk/273825>.
- Bowyer, A. *et al.* (2018) 'Understanding the Family Perspective on the Storage, Sharing and Handling of Family Civic Data', in *Conference on human factors in computing systems - proceedings*. New York, New York, USA: ACM Press, pp. 1–13. doi: 10.1145/3173574.3173710.