Datafied child welfare services: unpacking politics, economics and power

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Abstract

This article analyses three distinct child welfare data systems in England. We focus on child welfare as a contested area in public services where data systems are being used to inform decision-making and transforming governance. We advance the use of "data assemblage" as an analytical framework to detail how key political and economic factors influence the development of these data systems. We provide an empirically grounded demonstration of why child welfare data systems must *not* be considered neutral decision aid tools. We identify how systems of thought, ownership structures, policy agendas, organisational practices, and legal frameworks influence these data systems. We find similarities in the move toward greater sharing of sensitive data, but differences in attitudes toward public-private partnerships, rights and uses of prediction. There is a worrying lack of information available about the impacts of these systems on those who are subject to them - particularly in relation to predictive data systems. We argue for policy debates to go beyond technical fixes and privacy concerns to engage with fundamental questions about the power dynamics and rights issues linked to the expansion of data sharing in this sector as well as whether predictive data systems should be used at all.

Keywords: Datafication, child welfare, data assemblage, predictive analytics, data systems

Introduction

The extraction and use of data about us by commercial enterprizes to try and modify our behaviour as well as make decisions that influence access to opportunities and services is leading to profound economic and societal shifts. Some argue we are witnessing the emergence of a new capitalist order predicated on digital surveillance (Zuboff 2019, Couldry and Mejias 2019) and that we have moved to a condition of "surveillance culture" in which being "seen" through data has become "a way of life" (Lyon 2018). A logic of data accumulation, and with it an emphasis on prediction and pre-emption, extends to governments and the emergence of 'digital welfare states' (Alston 2019). While digital governance is often promoted as an objective means to provide more efficient and targeted services, critics view the datafied turn of government decision making and services as highly political and one that further undermines the rights of the already marginalized while exacerbating inequality and discrimination (Eubanks 2018, Alston 2019, Benjamin 2019). A key problem is that we know too little about where and how changes are taking place and therefore also about the larger *political* implications of the data systems introduced and their *economic* underpinnings. The lack of information publicly available about the systems makes it often near impossible to know how data systems are developed, implemented and used which in turn limits public debate and civil society involvement.

In this article we consider the political economy of public sector data systems by drawing upon findings from the one-year project Data Scores as Governance, the first comprehensive study of government uses of data driven systems in the United Kingdom. In particular, we focus on three distinct systems used in child welfare by three different local authorities in England as there are differences in the legal and regulatory frameworks guiding child welfare services across the United Kingdom. We focus on child welfare as a significant area in public services where data systems are being used to organize and inform decision-making with regards to families and

individuals, and as a contentious example of emerging data assemblages transforming governance. We are particularly focused on the wider context and political economy of these data systems by which we mean the "arrangements of power and authority" (Winner 1980, p. 124) that shape their development and use in relation to child welfare in England.

We view the framework of data assemblages, as proposed by Kitchin and Lauriault (2014), as a way to advance a grounded and situated analysis of the politics of data systems. Considering data systems as complex assemblages of artefacts, people, programs, infrastructures, ideas, etc. provides a means to consider how these systems are socially constructed while also taking them seriously as technical artefacts in their own right (Winner 1980, Kennedy 2016, Couldry and Powell 2014, Gangadharan and Jedrzej 2019). While others have advanced an analysis of data assemblages in education and cities (Williams 2017, Kitchin 2015), to our knowledge this is the first attempt to do so in the area of child welfare.

We analyse three different data systems in child welfare by drawing on data collected through our Data Scores as Governance project. The data used for analysis for this article consists of interviews, freedom of information requests, grey literature as well as documents collected through computational methods. Using the data assemblage as an analytical framework, we isolate and detail different apparatuses that influence these three applications including: systems of thought, political economy, marketplace, forms of knowledge, infrastructures and practices as well as communities and places. In doing so, we argue for the need to understand the *contingent* nature of data systems and their use, and for debates to take greater account of contextual factors and key differences in design and application as a way to advance more meaningful political and policy responses.

Data assemblages in child welfare

Previous research has documented increasing uses of data technologies across public services in different countries. These applications range from the creation of large and linked real-time datasets to algorithmic and machine learning predictive analytics applications. Others have produced insightful taxonomies of the different types of data technologies being employed by governments (Yeung 2018, Engin and Treleaven 2019). Most of the data technologies we refer to in this article do at least one of these things: a) collect and combine a range of data (some real-time) about children and families in "data lakes" in order to classify them or b) involve the use of an algorithm to predict a particular outcome (Gillingham 2019). Some of the systems do both. Concerns are being raised about how the logics and systems used to rank and score people for commercial purposes can now be found within the public sector and are influencing decisions about funding, resources and frontline services (Eubanks 2018, Angwin et al. 2016, Molnar and Gill 2019, Dencik et al. 2015). Our own study of uses of predictive analytics by U.K. Local Authorities identified 53 councils making use of these systems (Name removed to maintain anonymity). The data systems considered in this article range from the use of data analytics and visualization tools to try to identify connections and better understand families and individuals to uses of predictive analytics systems to anticipate risk for children and families. There is much research considering the implications of large and interlinked datasets and databases, particularly in the area of child welfare. This previous work focuses on the challenges of categorization, concerns about lax interpretations of data protection and privacy law, the harm that data sharing can do, the negative effects of an emphasis on data capture on already overworked professionals and how data systems influence working relationships (Anderson et al. 2006, Gillingham 2015, Munro 2010, Peckover et al. 2008, White et al. 2010). Previous research on uses of predictive

analytics in child welfare raises concerns about the prevalence of inaccurate predictions and the way the models punish the poor as many of the heavily weighted variables are proxies for poverty which means that low income families are disproportionately negatively affected (Eubanks 2018, Gillingham 2016). Other areas of concern include: an overall lack of transparency about data system practices and applications, the ways discriminatory bias can be unintentionally or intentionally embedded in these systems and the potential for data profiling and scoring systems to lead to stigmatization, concerns about the accuracy and reliability of scoring and predictive systems, and the limits of the systems given the limits of the quality of data being used (Gillingham, 2019, Keddell 2018, Eubanks 2018, O'Neil 2016). Moreover, a common problem cited across research about data systems is that it is difficult for people to interrogate these systems due to a lack of access, resources or specialized knowledge (Pasquale 2015).

Building on these previous studies of child welfare data systems, we provide a contextually focused analysis of recent data systems used in child welfare in England. In order to ground our understanding of these developments, we use the concept of 'data assemblage' as outlined by Kitchin (2014) as our analytical framework. The concept is based on an understanding of data systems as socio-technical systems comprising people, political, social and legal contexts, infrastructures and processes of sense-making (Kitchin 2014, boyd and Crawford 2012, Ruppert 2012). We use the "data assemblage" as an analytical framework can to deconstruct data infrastructures in order to better understand the relations and processes that are influencing how a particular data application works (Williamson 2017). Doing so provides a means to better understand how the data system in question reinforces particular sets of

rationalities, influences, how people and issues are represented and understood, and can lead to shifts in policy and governance more broadly (Bennett et al. 2014).

Kitchin provides an outline of the apparatuses and elements that make up a data assemblage. Apparatuses are understood as entwined and contingent parts of the larger system (Kitchin 2014). The table below is a reproduction of his (2014, p. 25), re-ordered here to reflect the order in which we address each apparatus in this paper.

Table 1 Data Assemblage, Apparatus and Elements

Apparatus	Elements
Systems of thought	Modes of thinking, philosophies, theories, models, ideologies, rationalities, etc.
Political economy	Policy, tax regimes, incentive instruments, public and political opinion, etc.
Marketplace	For data, derivatives (e.g., text, tables, graphs, maps), analysts, analytic software, interpretations, etc.
Finance	Business models, investment, venture capital, grants, philanthropy, profit, etc.
Organisations and institutions	Archives, corporations, consultants, manufacturers, retailers, government agencies, universities, conferences, clubs and societies, committees and boards, communities of practice, etc.
Governmentalities and legalities	Data standards, file formats, system requirements, protocols, regulations, laws, licensing, intellectual property regimes, ethical considerations, etc.
Forms of knowledge	Research texts, manuals, magazines, websites, experience, word of mouth, chat forums, etc.

Practices	Techniques, ways of doing, learned behaviours, scientific conventions, etc.
Materialities and infrastructures	Paper/pens, computers, digital devices, sensors, scanners, databases, networks, servers, buildings, etc.
Subjectivities and communities	Of data producers, experts, curators, managers, analysts, scientists, politicians, users, citizens, etc.
Places	Offices, field sites, labs, data centres, server farms, business parks, etc, and their agglomerations

Source: Kitchin (2014: 25).

The aim behind "unpacking and deconstructing" a data assemblage is to better be able to assess how contextual and situational forces influence the way data systems are shaped and gain a better appreciation of the work they do in the world (Kitchin 2014, p. 24). The list of apparatus in Table 1 presents the parts that make up complex data systems. The column of elements provides a listing of different data and sites that could be used to structure an analysis. Our analysis is guided by the data we were able to collect about the systems analysed. We are able to speak to many aspects of this framework, but not all. For example, we are able to identify modes of thinking and policies that influence the introduction of the data systems analysed, but due to access issues we are not able to speak in detail about places of use. Nonetheless, using the data assemblage as an analytical framework enables us to isolate the different ways that the data infrastructures being studied are influenced by political, institutional and disciplinary contexts as well as the people working within particular institutions (Kitchin and Lauriault 2014). From a critical perspective, this kind of analysis also destabilizes their normalization and facilitates discussions of how these systems are contingent and therefore might be otherwise. As we go on

to argue, this is a key, yet often sidelined, aspect of contemporary policy debates on data systems that have overwhelmingly focused on ways to "improve" aspects of the technology, particularly in relation to privacy, instead of addressing more fundamental questions about their legitimacy and how they may shift ways of understanding and responding to people and issues.

Method

In this article our aim is to build on research about government uses of data technologies with a particular focus on the UK and child welfare. This approach builds upon our findings that while there are important overarching shifts in governance and practices, applications are also highly context specific and there is a need to contend with both general trends and particular applications (Authors). Specifically, we focus on assessing similarities and differences that bring to light political and economic dimensions of these systems through a comparison of applications in child welfare services in three different local authorities: Hackney's Children's Safeguarding Profiling System; Manchester's Research & Intelligence Database; and Bristol's Integrated Analytical Hub. Hackney cancelled its pilot of the system in late 2019, however a similar system developed by Xantura is being trialled in Thurrock and was trialled and cancelled in Tower Hamlets.

For each of our three case studies, we conducted interviews with the managers and developers (5 people in total) involved in the development and use of the systems for the local authorities considered. In some cases we also drew upon recorded public presentations by practitioners for additional data about the systems analysed. We complemented this with ten interviews with members of civil society organizations concerned with digital rights, welfare rights and citizen participation. In addition, we used targeted freedom of information requests to investigate the three systems under study as well as the collection of grey literature and media

coverage in order to better understand the wider context within which they are operating. We also sent out more general FOI requests to local authorities across the United Kingdom through WhatDoTheyKnow, an online service that simplifies the process of submitting UK Freedom of Information requests run by the non-profit organisation mySociety. We submitted 423 Freedom of Information requests in total.

Finally, we used computational methods to construct a Data Scores Investigation Tool[1] drawing on the methodology of the Algorithm Tips project (www.algorithmtips.org). This involved the use of search engines to scrape documents from UK government sites (gov.uk, nhs.uk, police.uk, mod.uk and sch.uk) and media sites based on a list of keywords relating to data analytics and algorithmic decision-making. For this article our analysis draws upon the Tool's list of documents related to software and companies to better understand how the systems under analysis are linked to a wider data system marketplace in the UK. The tool provides us with a visualization of the companies and systems referenced across these documents and active across the government data system landscape. The tool also helped us bring together a range of documents from different sources in order to identify references to company practices operating in different areas of the UK.

Analysing child welfare data assemblages

Our research shows that in relation to child welfare, different local authorities have taken different approaches to the use of data technologies. There are no public lists of where and how governments are making use of algorithmic systems for public services, although there have been calls for such a list (STC 2018). Given this, it is impossible to know with complete certainty *all* of the places in the UK where risk scoring systems are being used in child welfare. To date reports as well as our research points to uses and trials by the councils of Thurrock, Newham,

Tower Hamlets, Somerset, Hackney and Bristol. The What Works Centre for Social Care is partnering with the Office of the Children's Commissioner to pilot risk scoring systems in some councils that have not been named. Other councils are not using risk scoring systems, but are making use of different kinds of data systems in some cases to profile individuals and families and in others for population level analytics through the development of what is being referred to as data warehouses or data lakes, such as in Manchester. These data pools combine data about families to enable frontline workers to access and analyse more information about the people they are working with. The three data systems that inform our analysis have key similarities and differences. Each of the systems depends upon linking up multiple datasets and the creation of new data sharing arrangements, with some of this data provided in real-time. Two of the data systems analysed, Hackney's and Bristol's, also involve predictive risk scoring and assessments. Yet each system is distinct when it comes to ownership, development history and relationships with private companies.

Table 2, Data Systems Analysed

Bristol Integrated Analytical Hub	The Bristol Integrated Analytical Hub is a system developed in-house that makes use of a database that consolidates 35 social issue datasets about 54,000 families. Initially the Hub was created as a 'data warehouse' in response to the Troubled Families programme to provide a 'holistic understanding' of the family (interview with manager). Developers wanted a 'more strategic understanding of the city', challenges facing the city and families, the ability to make better plans and decisions and to better 'understand where the risk and vulnerability was in the city and who was working with those people' (interview with manager). After the data warehouse was developed the Bristol team began looking into ways to predict future needs and created a model for predicting child sexual exploitation, developing a risk score for all

	young people in Bristol.
Hackney Early Help Profiling System (now cancelled)	The London Borough of Hackney is making use of data for its child welfare services by working with Ernst and Young and a company called Xantura. The Xantura system trialled was called the Early Help Profiling System. This System was used to identify children at risk of abuse or neglect. The system uses 'a predictive risk model which brings together data from multiple agencies'. The system uses a model that analyses the data so that monthly risk profiles are sent to social workers for those families identified as most in need of intervention (LC 2018). Data is shared about people who are already working with an agency or professional and developers note that the system is designed to enable early intervention.
Manchester Research & Intelligence Database	Manchester purchased an IBM system called iBase and then modified and developed it according to their needs. Their system is called the Manchester Research & Intelligence Database and it is used to identify 'troubled families' and help caseworkers working with these families. The aim of the system according to developers is to make it possible for workers 'to make the best use of data they are legally able to see'. The data warehouse that Manchester created, as of 2016, combines 16 datasets and caseworkers are able to access data going back five years. As with Bristol, the stated aim is to enable a more 'holistic' understanding of people, needs and services. Unlike Bristol and Hackney, the Manchester system does not currently do family level prediction. Although it is noted that future goals include developing decision making tools and alerting tools, it is not clear if these will perform risk assessments (Holme and McNichol 2017).

A clearly stated goal of the developers in all of these systems is to make data sharing more efficient and to generate information that could be used to make decisions about service reform and save money. In the analysis that follows we isolate different assemblage apparatuses

and discuss the relations between them with a view to assess the social transformations and shifts in governance they are shaped by and are shaping.

Austerity and neoliberalism as key systems of thought

The first apparatus of the data systems in question we consider is systems of thought. We asked what modes of thinking, theories, ideologies or rationalities have influenced the implementation of the kinds of data systems we are looking at. This approach is rooted in recognition that the types of data systems being introduced are historically and culturally contingent and informed by the dominant modes of thinking of any time and place. Our research shows that the austerity context is creating the need for local authorities to look for ways to do more with less (see also the contributions by Birch et al, and by Prainsack, in this Special Issue). Since 2010 and the implementation of a central government austerity programme, local authorities have faced major funding cuts including cuts in the social welfare budgets of some of the poorest areas of the UK (Beatty and Fothergill 2016). The hardest hit government department between 2010 and 2015 was funding for the Local Government section of the Department of Local Government and Communities (Gary and Barord 2018), the branch of government directly responsible for the administration of the social support systems people rely upon in times of crisis. In England, children's services have been cut by 20 percent in real terms in the last ten years (Kelly et al. 2018). Research suggests that many local councils 'attempted to shield poorer groups from the most damaging impacts of budget cuts' as long as they could (Hastings et al. 2017). Research documenting the effects of the cuts, including this study, shows that the already marginalized are bearing most of the cost of austerity as funding cuts have led to cuts in services and increased workloads for frontline staff (Hastings et al. 2017). This leads to a perverse

situation in which some local authorities are having to reduce the early help and preventive services they know could help prevent families ending up in crisis at a later date and instead focus resources on attending to frontline crisis support services (Dennis, 2018). In an effort to try and do more with the limited resources they do have, some local authorities are turning to the use of data systems to try and be more efficient and better target their resources and services. The austerity agenda as a force leading local authorities to turn to data systems for help was stressed by interviewees across local authorities and is also referenced as a driving force in government documents and corporate promotional material.

It has been argued that, despite its critics, austerity programmes were embraced by conservative policy makers as a response to the 2007 financial crisis because they reinforced long-standing neoliberal logics which promoted the need to reduce state services (Gary and Barord 2018, Newman 2014, Springer et al. 2016 and Byrne et al. 2019). Whilst the introduction of data systems are perceived by local authorities to be a way to cope with such resource reduction, these technologies can be said to perpetuate and further legitimate these neoliberal logics. The use of these systems to target resources can be a way to identify and isolate most-need cases, moving and narrowing the parameters of social policy. This targeted approach moves away from a welfare state model designed to ensure rights. Moreover, in focusing on capturing risk, and basing such understanding on projected simulated futures that can be pre-empted before they happen, the embedded logic is one of actuarialism; a risk calculation that is attributed to individual characteristics and behaviours, shifting response away from focusing on underlying causes (prevention) to operationalism (pre-emption) (Andrejevic 2019). That is, response is based solely on the premise that something could happen, not with why or how. This is in line with a continuation of neoliberal forms of public administration, moving from New Public

Management to New Public Analytics (Yeung 2018), that are centred on risk management and on individualising social problems by directing attention away from structural causes of problems (Keddell 2015).

Political economy: **"***troubled families***"** *policy as driving force*

Following the data assemblage framework, our analysis of the political economic elements of these data systems considers how policy and incentives influence the kinds of data systems implemented. Each of the data applications being discussed in this article were introduced, in part, as a response to the Troubled Families Programme. The Troubled Families Programme was introduced in 2012 as a partial response to the 2011 riots in England. The Conservative led government of the time blamed the rioting on poor parenting and linked their response to their campaigning around "broken Britain". The programme was fueled by political rhetoric that there are a small number of families to blame for the high costs of social services (Crossley 2018). This idea and the "troubled family" label itself is attached to a much longer history of a 'deserving' and 'undeserving' poor binary. The first sees poverty as primarily a product of circumstances, the latter locates the cause of poverty within individuals (Edelman 1977). The programme, by labelling families "troubled" and not disadvantaged, locates the problems with families and individuals in a way that can motivate punitive action.

The first phase of the "troubled families" programme ran from 2012 to 2015. In this phase £448 million was allocated to fund local authorities that were able to identify "troubled families" based on set criteria. The goal was for there to be case worker provision for families identified and more direct interventions. Accessing funds also required an ability to demonstrate the sustained improvement of the families identified. A second phase of the Programme was launched in 2015 with £920 million allocated and a goal of identifying and helping 400,000

families by 2020. In a wider context of severe budget cuts, local authorities in England signed up to the Programme. To access funding through the programme local authorities must be able to identify a family as "troubled". To do so, in the second phase of this Programme, a local authority has to demonstrate that the family they have identified meet two of the Programme's six criteria: 1) parents or children involved in crime or anti-social behaviour, 2) children who have not been attending school regularly, 3) children who need help or are subject to Child Protection Plan, 4) adults out of work, at risk of financial exclusion or young people at risk of worklessness, 5) families affected by domestic violence and abuse and 6) parents or children with a range of health problems (Bate and Bellis, 2019). Identifying families that meet this criterion and thereby accessing the funding requires data and the ability to make connections between this data. This Programme therefore both requires and compels local authorities to collect and combine as much data as possible, focusing on data about individuals and families rather than wider structural and contextual factors contributing to poverty. The Programme has been criticized as part of a 'wider spectrum of policies which locates "troubles" or "problems" in the family itself and emphasizes behaviour as the target of action without regard to wider social or economic considerations' (Lambert and Crossley 2017, p. 87).

Manchester set up its Research and Intelligence Database to identify families that meet the criteria for the Troubled Families Programme and work with them. In Hackney, Xantura's profiling system was used to risk assess families for abuse and neglect. Xantura promotes the system as also helping Councils meet the expanded troubled families agenda in terms of service delivery and system change (Xantura 2019). A Hackney Council privacy notice also specifies that the system supports Council work in this area (Hackney City Council). In Bristol, the Integrated Analytical Hub was the Council's way of identifying families and "to encourage

services to deal with families as a whole" (Bristol City Council, 2018). In terms of policy, therefore, the Troubled Families Programme can be viewed as directly influencing the interest of Councils in linking data about families.

There have been mixed reviews about the success of the Troubled Families Programme. An early independent review found no evidence that it had made significant impact. More reviews of the programme's second phase are ongoing with early reviews indicating reductions in the number of looked after children and custodial sentences and convictions, but mixed to no change in areas such as employment, children in need, health and school attendance (Bate and Bellis, 2019). Importantly, in collating data in this way, there are significant asymmetries of power in the relationship between those working for local government and those whose data is being continuously collected and combined. The expanded troubled families programme means that more families are categorized as troubled. While those subject to these systems have very little say or ability to know how their data is used, they become infinitely more 'knowable' by government workers. This will increase the more that mobile technologies and sensing data get used, both of which are being suggested in recent industry promotional material (UK Authority 2019). Concerns have been raised about a lack of attention to the impact of the extensive data collection and sharing on people subject to the system, decision making and service delivery. Rights organizations are raising concerns about the implications of labelling in datafied contexts that include data sharing and integrated databases as labels can be amplified

Governmentalities, legalities and questions about rights

A privacy notice has been posted for each of the data systems analysed which indicates how the use of data meets laws and regulations. These notices demonstrate some similarities, for example that for the three data systems studied here local authorities duty of care responsibilities

are viewed as justification for their uses of data. The analysis also identified differing attitudes about the need for subject consent as well as levels of transparency indicating divided opinion in these areas. Each of the systems used for child welfare services under analysis depends upon the linking up of multiple datasets, which includes some data that is highly sensitive (see appendix for an example of data sets). In terms of legal protections, the Data Privacy Act requires that personal data be processed fairly and that people should generally be aware of which organizations are sharing their data and what it is used for (ICO 2011). In many cases this requirement is addressed by publishing privacy notices. In these privacy notices local authorities state what they view as the legal basis for collecting, combining and sharing data including highly sensitive data known as 'special category data' which can include data related to physical and mental health, sexual orientation, ethnicity and religious beliefs. Hackney and Manchester cite Article 9 of the General Data Protection Regulation, Manchester also cites Article 6. Both state that these regulations make data sharing legal for local authorities where necessary to perform their public tasks, to protect someone in an emergency, and to fulfill their legal obligation to safeguard or support the wellbeing of children and young people within their area (LBH 2019, MCC 2019). The need to balance privacy rights with the rights of vulnerable individuals is done, it was argued in the case of Hackney, by using pseudonymized data that only becomes identifiable to the professionals involved when an alert is generated indicating a high risk threshold has been passed (interview with Hackney developer). Bristol City Council cites a range of legislation in their privacy notice for the Think Family Programme that the Analytical Hub is part of (BCC 2019) [2].

The processing and handling of data differs by application as does differing levels of transparency, which suggests varied interpretations of what is required in terms of consent and

accountability. These varied understandings of what is required also demonstrate needed public and political attention in this area. In the case of Hackney, the sharing and linking up of multiple datasets is said to happen through data sharing agreements which ensure particular protocols are met. A request as part of this study for the data sharing agreements used to facilitate the Xantura system was not successful (London Borough of Hackney, 2018). The data sharing protocols require that anytime the data is accessed it is logged. Developers noted they are building a tool for council information governance so that reports can be generated that indicate everyone who has used the data and for what purpose (interview with developer). In terms of consent, those whose data is caught up in the data system are not being informed directly beyond a general privacy notice published online that their data is being used as it is argued that doing so and releasing details about the system may prejudice potential interventions and compromise the commercial interests of the company involved. The Privacy Impact Assessment for the Hackney system indicates there is no option to opt out of having data included (LBH 2017).

In the case of Manchester, consent is sought from those whose data is used in the system as it is viewed as good practice to let people know their data is being shared. However, it has been noted that there are occasions when people's data is shared without consent (Henry, 2016). Hackney, Bristol and Manchester privacy notices all observe that people have the right to be informed about the data that is held on them, to access this data, to rectify it (sometimes), to restrict use of it (sometimes) and to have data erased (sometimes). It is noted that inaccurate information can be changed but third party professional opinion or testimony is unlikely to be changed although disagreement can be noted (LBH 2019). The General Data Protection Regulation (GDPR) in Europe is supposed to make it easier for people to access information when they are subject to automated decisions. The ability of people to exercise the rights noted

above is limited by the fact that they may not be notified that they have been labelled as a troubled family, that they have been risk scored or that their data is part of a data system. In terms of GDPR, people may therefore not be aware they have been affected by an automated system orr it may be decided that the GDPR does not apply as the risk score is said to have been used as a decision aid for social workers, rather than being a *solely* automated decision.

The public sector as datafied marketplace

A comprehensive analysis of the changing government data marketplace would be a worthy study, but is beyond the scope of our project. However, through our investigatory tool we were able to collect documents that demonstrate the range of public private involvement in government data practices.[3] Our analysis of three different child welfare data systems reveals three different kinds of engagement with the larger data marketplace suggesting differing attitudes to what is appropriate in terms of private technology companies' involvement with social care systems. Bristol City Council deliberately decided to develop a system in-house. This was done to ensure 'complete control over everything', to prevent a black box scenario with staff not knowing how a system they were using worked, a pragmatic concern that any system used would be based on existing IT and that the Council would be able to control "maintenance costs going into the future" (interviews with developer, manager). Manchester's Research and Intelligence Database is a modified IBM product. Manchester bought the IBM i2 iBase IntelliShare in 2012 as part of their Troubled Families initiative to enable data matching and visualisation. It was purchased "off-the-shelf" and there was no collaboration with IBM in relation to the development of the system. There is also no data sharing agreement with IBM (Waterhouse K, 2018). Hackney does make use of its own in-house data analysts for a range of

public services but contracted Xantura to provide data analysis in connection with child welfare services as part of a piloted program. The contracted Early Help Profiling System has been funded by London Councils and also by Ernst & Young (EY) which is partnering with Xantura. A keyword search of documents contained in our data-scores.org tool indicates that Xantura is working with multiple local authorities on different data technology projects. Beyond child welfare, a number of local authorities report using Xantura's risk score system to help with assessments of benefits and council tax support claims.[4] When requesting information about these systems we were told in some cases that information about the system such as reports did not exist or in other cases that details about the system could not be released because they were commercially sensitive or because doing so would jeopardize the effectiveness of the system as people might try to game it.

Ernst & Young (EY), a multinational professional services firm which specializes in providing consultation support, has said it is partnering with Xantura to provide services in the area of Housing and Social Care and is now promoting its ability to help companies and government bodies make better use of artificial intelligence and data analytics more generally. In doing so EY is in line with other global consultancy firms like KPMG and McKinsey & Company who have expanded their services to include aiding 'big data' driven decision support. Big technology companies are also promoting their ability to help governments make sense of their data to inform public service decision making. The promotional materials of companies are similar, all of them promise to help governments facing major financial constraints to improve efficiency and better target services.

Differing levels of transparency for 'knowledge' outputs

We tried to understand how information is generated and knowledge is shared through the data systems we looked at by trying to collect different types of 'knowledge' outputs. We specifically asked for examples of: reports or evaluations of the systems, overviews of outputs produced, safeguarding measures, data visualization outputs, promotional and presentation material, contracts, training manuals, cost benefit analyses, software and data sources. We asked for these types of documents in interviews and also through freedom of information requests. We also gathered documents through targeted online searches for documents. We found it easier in some cases than others to gather this kind of information, which suggests that different types of systems and whether or not there are public private partnerships affects how much information is available.

We were able to access the most information about the systems that were developed or adapted in-house, Bristol and Manchester. Each of the systems analysed were designed for different purposes and each enable different kinds of knowledge outputs. Across all three systems, developers argue that they can compile and combine data more quickly than a caseworker can. As has been mentioned the aim of Manchester's Research & Intelligence Database was to enable identifying families with complex needs that meet the Troubled Families criteria, to make it easier and more efficient for frontline staff to access and share information to enable better support and to track interventions and outcomes. Enabling visualization to help case workers was also a goal. An overview presentation slide, detailed in Fig. 2, provides an illustration of what this visualization looks like.

Fig. 1, Manchester Research and Intelligence Database Visualization

Connections to support Case Work
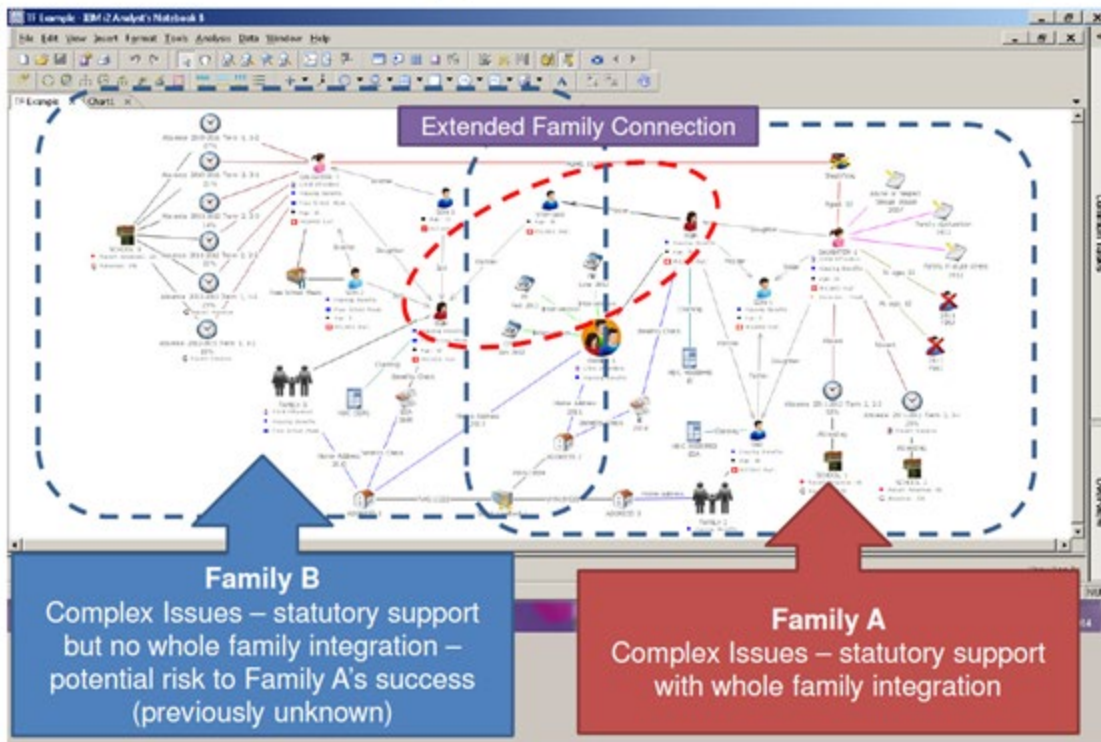
In public presentations developers use the visualization above to demonstrate how the system helps caseworkers visually identify connections between individuals and families. Other visualizations it is said can be used to help case workers and those overseeing services identify where there are connections that may suggest how services should be redesigned. This visualization does not make use of predictive analytics but instead aims to reveal connections that may otherwise not be apparent and enable easier access to information as case workers can access details about an individual or family from multiple areas without having to phone and request that data.

The Integrated Analytics Hub in Bristol is used to share data to provide an overview of a family and where to send families for services. As noted by one manager: "we've got far too much traffic coming through which is overwhelming and if we can work out a way in which

better decision-making could be made, then we will use our resources more wisely". This has meant "a lot of work on trying to understand what a family actually is and how to group people together and understanding their needs" (interview with data scientist). The system is also used for predictive modelling to inform decision-making. In the case of Bristol and Hackney, developers stress that predictive risk assessments should be used to support decision makers and not replace their judgements. "Instead the results are meant to be used as a tool to get ahead of the curve, this use of data supports an early intervention approach" (Bristol FOI Response). The risk scoring system in Bristol is said to provide a "context paragraph" next to any score so practitioners will see why the person was scored the way they were (interview with data scientist).

The Early Help Profiling System used in Hackney is a predictive risk scoring system. Developers say the model was designed with input from social workers and risk assessment outputs are provided in the form of a report instead of a risk score as is the case in many other predictive systems used for child welfare. The model is designed to create an alert when a risk threshold has been crossed and compile related information into a report for the relevant case worker, although we still do not know what such a report looks like.

The information collected provides us with an indication of the goals of these systems and what some of the systems look like. However, we still do not know how this translates into practice. As suggested by Prainsack (this issue), given the rapid increase in data linking and sharing across multiple areas of government and the profound imbalances of power accompanying this shift, the lack of a policy directive to insist on measuring impact(s) is a major problem.

Materialities, infrastructures and practices: the importance of historical context

There have been ongoing efforts to modernize and rationalize the way social workers collect information and make decisions through the introduction of various computational technologies over the last number of decades. Researchers studying their use have identified that while these technologies are introduced with the goal of enhancing social work, they bring with them challenges that can make things worse in some aspects. This history demonstrates the need to attend to how data technologies can limit ways of knowing. Work by Gillingham (2011) and Munro (2010) details how the introduction of new computer information systems and the input requirements that came with them changed the way social workers do their jobs and the kinds of relationships they have with those they are trying to help. A series of technologically driven reforms were introduced in the early 2000s (White et al. 2008). These reforms were introduced, in part, in response to a number of inquiries of child abuse tragedies that stressed the need for greater information sharing among and within agencies to prevent harm to children (Thompson 2011). This initiative included the development and trial of the Common Assessment Framework, a database of all children (ContactPoint) and the introduction of the Integrated Children's System designed to provide a record of the involvement of professionals with children (White et al. 2009). Researchers investigating the use of the Common Assessment Framework, which in practice ranged from an offline to an online form, found professionals with more experience opting not to complete particular "boxes" or cautious about the information added as well as worrying examples of novices relying on "common language" which can be misleading as it doesn't "engage effectively with the complexity of child and family needs" (Pithouse et al. 2009, p. 3). Social workers raised concerns about the rigidity of the form and requirements for categorization that forced binary choices (White et al. 2009). Concerns were

raised about how workload and time pressure prevented the input of data or took time away from interacting with service users (Broadhurst et al. 2009). In combination all of these concerns raise serious questions about the quality of the data and the 'kind' of data that is available for the systems in question.

Concerns with consent were also raised with these previous information systems. These concerns focused on how little attention was given to getting consent from children caught up in the assessment process (Pithouse et al. 2009). There were ongoing concerns raised about how databases could lead to increasing surveillance of families (Pithouse et al. 2011). A lack of notification and consent comes with particular concerns in relation to predictive risk assessment systems because of the high rates of inaccuracy that come with these systems.

To date, discussions of the accuracy surrounding the use of risk scoring systems in particular has been too limited. Previous research has noted that when those promoting these systems speak of accuracy they are most often referring to how often the systems 'rightly' identify families requiring intervention. Seldom discussed is how often the system is wrong, or how many families are falsely flagged as requiring intervention – and what effects these false positives have on affected families, and for the system. For example, Church and Fairchild's (2017) investigation into a predictive model promoted as highly effective in Los Angeles was in practice falsely flagging people 96 percent of the time. False positives are important because of the way they can wrongly suggest risk and potentially lead to "symbolic markers" that may stick to families and individuals affecting interactions with service providers (Murphy et al. 2011). False positives are also important because we know from previous research that risk scores can influence decision makers even when they are aware there are accuracy and reliability issues with these systems (Eubanks 2018). Given what is known about inaccuracies and fallacies of the

infrastructure and information system across the scoring systems in place, it is crucial that we have a better understanding of what happens when false flags or inaccuracies have been generated.

Organizations, communities, places and subjectivities: attending to agency and resistance

The last set of apparatuses we consider relate to 'ways of doing', the people involved in using these systems and who are caught up in them as well as their places of work and communities. Our research captured data on some institutional and organizational practices which indicated how data systems in child welfare are continuously negotiated, repurposed, advanced and resisted. This is in line with previous work identifying the awareness and work ongoing among public sector workers concerning the limits of datafied systems (Veale et al. 2018, Redden 2018). Although knowledge or evidence of the extent to which the introduction of data systems changes how decisions are made and actions taken remains a significant gap, our research pointed to the status of data systems in relation to domain-specific expertise and professionalism as a continuous source of tension. Whilst an emphasis on professional judgement in any decision-making process has been key to implementing data systems within local authorities in the face of what was recognized as a culture of technological skepticism amongst public sector workers, concern was also expressed in our interviews that these systems will transform the meaning of social work and the skills associated with being a social worker. One manager from Bristol noted in an interview that, as a community of practice, there has been a strongly-held view that "the only people who should tell you something about them is children and families themselves." The notion that those who develop data systems, and particularly predictive tools, and the types of resources that inform their understanding of child welfare (not

least with regards to commercial systems that are designed for scale), as legitimate actors is therefore contested. This understanding of hierarchies of knowledge and expertise (and what social work *is*) will inevitably shape how data systems are implemented within child welfare, opening up spaces of alternative interpretations of data and acts of resistance in relation to data systems.

At the same time, social workers expressed concern with a general transfer of expertise, in which a culture of quantification and the expertise of data scientists is taking increasing prominence. In part a continuation of an on-going digital overhaul of public service provision, such concern refers to ongoing forms of deskilling and a shift in organisational structures. There is still a need to get to grips with how data technologies are influencing social work practice, but the worry is that the data that social workers are required to collect form part of "performance management" and takes "focus from the presenting issues which need attending to" (interview with member of British Association for Social Workers). This is further amplified by potential "automation bias" (Cummings 2004), a well-known phenomenon in which people attribute higher value to technological outputs, sometimes trusting these more than their own judgements. Here, levels of professionalisation and institutional history are known to be key factors in shaping what we might think of as "algorithmic imaginaries" (Christin 2017).

Furthermore, our research points to mixed efforts at measuring impact. Manchester has invested resources into measuring the impact of Troubled Families interventions and argues that their system enables them to "know more about what works best with families and why, and also what works less well" (MCC 2017). They argue that information gained from their uses of data analytics have enabled them to adapt their approaches over time to achieve better outcomes (MCC 2017). This is in contrast to uses of predictive systems, where we found a lack of any

comprehensive assessment of impact or any concrete evidence of how decisions made or actions

taken might be changing with the introduction of *predictive data systems* in child welfare. This is

connected, we were told, to a lack of base-line data as well as the resource-intensive work

required to do such an assessment. In the case of Hackney, for example, developers say they are

able to validate their models, but that tracking the impact of their alerts and related changes are

challenging because councils do not have the baselines needed for them to measure and track

impact (interview with developer). Similarly, the developer of Bristol's system noted, "we can't

control what people do off the back of [the data system]… It might force them into activity they

wouldn't otherwise do". This is significant as, at the moment, there is no way of measuring if

and how these new systems are affecting those using public services, or those making decisions

about them, to gain perspectives on how effective different forms of engagement or early

interventions have been.

Conclusion

This article deconstructs data assemblages in child welfare through an analysis of three

distinct data systems in England. We advanced the use of "data assemblage" as an analytical

framework to structure a grounded analysis that foregrounds the *political* and *economic*

dimensions of data systems in child welfare. We focused on child welfare as an area of

governance where there remain key questions about if and how data technologies should be used

to inform decision-making and concern about how these data technologies may be transforming

governance. Using the data assemblage as an analytical framework, we isolate and detail key

similarities and differences that centres on questions about the political implications of these

systems and arrangements of power and authority. Our comparison of different data systems and

their applications advances an empirically grounded demonstration of how data systems in child

welfare must not be viewed as neutral, but instead as highly contingent on political and economic contexts. Building on previous research in Social Work and Critical Data Studies, our findings support much work in Surveillance Studies demonstrating how the already marginalized are those most subjected to new and emerging datafied government systems (Lyon 2002, Gandy 2005).

The data systems considered can be traced to the financial crisis and the austerity programme pursued by a conservative led government which led to massive cuts for local government, creating a need for local government administrations to find ways to do more with less. The systems were viewed as a way to provide more targeted services given their reduced resources and the increasing need in their communities. The austerity agenda has been linked to long-standing neoliberal logics that promote reduced state services and individual versus collective responsibility. The use of data systems to target services reinforce neoliberal logics by individualizing social problems and directing attention away from structural causes of problems.

In terms of policy, the Troubled Families Programme is identified as a driving force for the three data systems. The Programme requires and compels local authorities to collect and combine as much data as possible about individuals and families. The information system, like the programme, locates troubles or problems with the individual or family and not wider social or economic factors. Legally, we identify that local authorities view their duty of care responsibilities as justifying their rapidly expanding data collection and sharing practices. Although the differences identified in terms of seeking consent from those whose data is used in these systems demonstrates disagreement about what is viewed as appropriate and the need for greater attention in this area. This is particularly important given the power dynamics at play. In such a context, regulatory frameworks in place to protect rights in relation to both data and social

welfare, not least when it comes to vulnerable groups like children, need greater consideration in order to be meaningful. This is even more pertinent in light of the recognized limits and quality of data in child welfare that makes it crucial to understand why repurposing it, particularly for predictive analytics, presents such challenges (Gillingham 2019).

There is a growing data marketplace that requires attention. Each local authority analysed engaged differently with the larger data marketplace. Our research also identified differing attitudes about the appropriate role for private tech companies in the area of social care that also has consequecens for differing levels of transparency across the three local authorities concerning the kinds of information and knowledge outputs produced by their systems. Whilst actors continue to find ways to exercise agency in this space, we still lack proper knowledge of how data systems impact on resource allocations and actions taken, and how changes in practices have impacted on families and children. Engaging with these questions is set to become increasingly pressing as the data marketplace for child welfare and social care grows.

Using the data assemblage as a framework therefore provides a way to analyse data systems in relation to questions of epistemology, political economy and social practices that point to the significance of contextual factors in how systems are developed, implemented, and used. This is important for moving beyond simple binaries and general debate, and provides an avenue for contending with the actual realities on the ground. If policy pertaining to people's rights in an increasingly datafied public sector is to be informed by meaningful evidence, it is precisely in such deconstructions that analysis needs to be focused. Child welfare presents a particularly important challenge as an area of public services where experimentation with data

systems have been significantly advanced, in the UK and elsewhere, with only limited debate on its implications. With this study we hope to advance the discussion further.

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[1] www.data-scores.org

[2] These can be found in Bristol's privacy notice (BCC 2019).

[3] A list of companies and systems mentioned across government documents can be found here
as well as access to the documents mentioning companies and systems: http://data-
scores.org/insights/companies-systems.

[4] These include: Folkestone & Hythe District Council, East Riding of Yorkshire Council,
Weymouth and Portland Borough Council, Carlisle City Council and Purbeck District Council.

Appendix A

Code	Indicator Name	Source	Legal Gateways
Crime & ASB			
1A	Child / Adult committed offence	ASC	1, 5, 9, 10, 11, 12
1B	Child / Adult committed ASB	BCC & ASC	1, 5, 9, 10, 11, 12
1C	Adult Prisoner 12 Months from release	ASC	1, 5, 7, 9, 10
1D	Adult Subject to license or supervision	ASC	5, 7, 9, 10
1E	Child / Adult serving ABC's, Community Order or Restorative Justice	ASC	1, 5, 7, 9, 10, 11, 12
1F	Child / Adult Professional referral	Lead Professional	5, 7, 9, 10, 11, 12
School Attendance			
2A	Child persistently absent	BCC	1, 4, 5, 8, 9, 10, 11, 12
2B	Child 3 fixed term exclusions	BCC	1, 4, 5, 8, 9, 10, 11, 12
2C	Child permanently excluded	BCC	1, 4, 5, 8, 9, 10, 11, 12
2D	Child Pupil Referral Unit	BCC	1, 4, 5, 8, 9, 10, 11, 12
2E	Child not registered	BCC	*Not currently collected*
2F	Child Professional Referral	Lead Professional	8, 9, 10
Children Needing Help			
3A	Child Active LCS/EHM Episode	BCC	1, 2, 4, 6, 8, 9, 10, 11, 12
3B	Child looked after	BCC	1, 2, 4, 6, 8, 9, 10, 11, 12
3C	Child in need	BCC	1, 2, 4, 6, 8, 9, 10, 11, 12
3D	Child protection plan	BCC	1, 2, 4, 6, 8, 9, 10, 11, 12
3E	Child teenage pregnancy	NHS	1, 2, 4, 6, 8, 9, 10, 11, 12
3F	Child missing	ASC	1, 2, 4, 6, 8, 9, 10, 11, 12
3G	Child / Adult Homeless	BCC	1, 2, 3, 4, 6, 8, 9, 10, 11, 12
3H	Child risk of sexual exploitation	ASC	1, 2, 4, 6, 8, 9, 10, 11, 12
3I	Child Professional Referral	Lead Professional	2, 8, 9, 10
Financial Exclusion & Worklessness			
4A	Adult out of work benefits	BCC & DWP	1, 9, 10, 13
4B	Child risk of NEET	BCC	1, 4, 6, 8, 9, 10, 11, 12
4C	Child NEET	BCC	1, 4, 6, 9, 10, 11, 12
4D	Child / Adult Professional referral	Lead Professional	4, 6, 9, 10
4E	Child / Adult Benefit Cap	BCC	1, 9, 10, 13
Domestic Abuse			
5A	Child / Adult victim of DVA	ASC	1, 4, 7, 9, 10, 11, 12
5B	Child / Adult perpetrator of DVA	ASC	1, 4, 7, 9, 10, 11, 12
5C	Child / Adult domestic incident police callout	ASC	4, 7, 9, 10, 11, 12
5D	Child / Adult Professional referral	Lead Professional	7, 9, 10
Health Problems			
6A	Adult mental health problem	BCC	1, 7, 9, 10, 11, 12
6B	Child / Adult drug or alcohol incident	BCC	1, 4, 7, 9, 10, 11, 12
6C	Adult drugs / alcohol support	BCC	1, 7, 9, 10, 11, 12
6D	Adult receiving Universal Partnership Plus		*Not currently collected*
6E	Child / Adult Professional referral	Lead Professional	1, 9, 10