catalyst

A LOCAL PARTNERSHIP IMPROVING
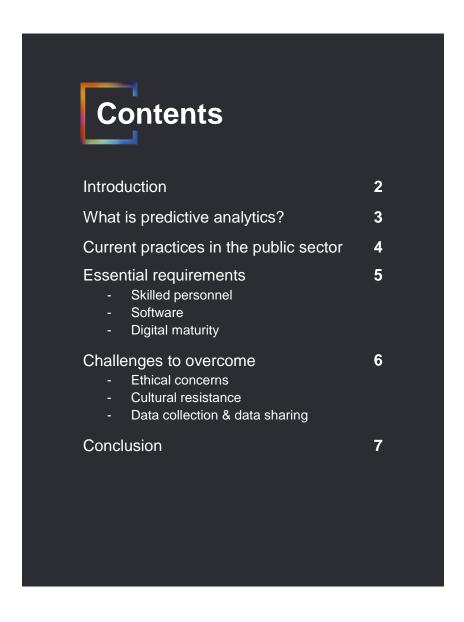COMMUNITY SERVICES

THE FUTURE OF PREDICTIVE ANALYTICS IN COUNCILS

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Introduction

This short paper aims to highlight the benefits that the adoption of predictive analytics[1] can provide to local authorities in the United Kingdom and address the future role of these methods in the public sector.

By integrating methods associated with predictive analytics into service delivery, local authorities can develop a better understanding of pressing issues, and hidden needs can be identified and addressed at a faster rate. Throughout the UK, several local authorities have already undertaken innovative pilots using advanced statistical methods. This report discusses emerging trends in the ways that data are being used by councils as well as essential prerequisites and challenges that need to be overcome for the successful adoption of advanced data manipulation techniques.

In the UK, councils are under significant financial pressure and are having to consider ways to refine their practices in order to continue providing essential public services. Data analytics and advanced technologies are beginning to play a key role in enabling councils to develop efficient service models, target limited resources more effectively, and manage increasing demand.

This paper will implicitly draw upon the experiences of the HEFCE-funded Catalyst Project at the University of Essex. For more insights from the Catalyst Project please take a look at our other publications available on our website.

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[1] Also known as predictive modelling or machine learning, these terms will be used interchangeably in this paper

What is predictive analytics?

When it comes to information management, planning and decision making, using advanced analytical techniques can help to provide a better understanding of the data at hand and the population it represents. Predictive models can be used to examine existing data and trends to better understand populations while also identifying potential opportunities and risks.

Predictive modelling is a process that uses statistics and probability to forecast potential outcomes. Predictive modelling is different from descriptive modelling which instead describes real world events and the relationship between the factors responsible for these events. Both of these techniques can be readily applied to datasets containing information relevant to a range of challenges currently facing local authorities.

Predictive and descriptive modelling can provide public sector staff and policy makers with intelligence derived from large data sets and decision-making tools to deliver more effective and timely interventions. This has the potential to result in better outcomes and, in a number of cases, cost savings and demand reduction.

Current data practices in the public sector

Developments in the accessibility of data manipulation techniques, powerful open access software and more capable hardware are enabling organisations to organise and analyse volumes of complex data that had previously lay dormant. The rate at which data is being collected and stored by organisations has meant that there has been an exponential increase in the amount of data available to analyse. Better tools and better data are enabling analysis, be it descriptive or predictive, to be carried out with ever greater precision and accuracy.

One of the most promising data-related developments in local government is the application of machine learning. Machine learning provides systems with the ability to automatically learn and improve from past experience. In many areas such as in search engines, marketing, and speech recognition, machine learning and artificial intelligence are already commonplace. Machine learning allows algorithms to adjust to change without specific programming. In the UK, councils in Suffolk, Essex and many London boroughs are developing or trialling forms of predictive analytics as a means of targeting the early provision of their support services.

The adoption of predictive analytics by these councils is not intended to disrupt existing practice but instead to supplement it. Predictive analytics offers decision makers the ability to draw upon objective and empirical insights. It can help to focus the allocation of scarce resources, identify adverse events, and ascertain the effectiveness of tested interventions. This can allow for a better understanding of populations at risk and enable better resource distribution, in turn helping these populations to improve their situation. Identifying factors that make people resilient can ensure that they will not become dependent on services in the future.

Essential requirements

This section will highlight and discuss some of the essential requirements for the successful uptake of predictive analytics in councils.

Skilled personnel

A common barrier to the uptake of new technologies is an absence of staff with the necessary knowledge and skills. Research by Nesta has found that in order to 'be able to extract value from the increasing amounts of new available data, much of it messy and unstructured, requires a combination of analytical and computing expertise, domain knowledge, business know-how and communication skills'.[2] Nesta also noted that staff with this combination of skills are often in short supply. Many leading examples of councils who are adopting predictive analytics are doing so through the use of external contractors, forming partnerships with universities, or undertaking large-scale staff training programmes.

Software

Most work involving data done by local councils involves only the use of Excel and SQL databases. Statistical software such as R, STATA, SPSS and Python provide tools and specialised packages allowing the user to analyse and manipulate data in advanced ways. These types of software need to be licensed or open access alternatives need to be made available on the organisation's IT network. Without the appropriate software, many of the most innovative data science techniques will remain off limits.

Digital maturity

Skilled personnel and software availability form part of a wider consideration relating to an organisation's digital maturity. The Social Sector Data Maturity Framework captures the varying stages of development that organisations find themselves, from unawareness to mastery (see table below).[3]

Unaware	Not interested; do not invest in data and and analytics
Nascent	Some awareness but little investment in data; use data for historical analysis
Learning	Know data is important but small investment
Developing	Becoming engaged and supportive
Mastering	Bridging online and offline views of service users

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[2] https://media.nesta.org.uk/documents/local_datavores_discussion_paper-july-2016.pdf
[3] http://dataevolution.org.uk/wp-content/uploads/sites/8/2017/01/Summary-Designed-Data-Maturity-Framework-Social-Sector-FINAL-v1.pdf

Challenges to overcome

Despite the vast potential benefits, the application of predictive analytics in the public sector is not without a unique set of challenges. This section offers an overview of some of the most common setbacks and offers suggestions about how these can be overcome.

Ethical concerns

The most prominent criticism of predictive analytics is that it poses risks of data misuse and the entrenching of prejudice. However, decision makers in the public sector rarely make choices completely free of bias or based upon complete information. Nevertheless, this is a valid concern that needs to be properly managed, and it is essential that ethical considerations should be put at the forefront of any discussions about the uptake and use of predictive analytics in any sector. It is essential that comprehensive ethical frameworks are produced in order to guide any organisation's use of predictive analytics. In addition, the algorithms and models behind the predictions must be transparent enough to undergo independent scrutiny to ensure that they are methodologically sound.

Cultural resistance

Resistance to change and misconceptions about predictive analytics can lead to push-back and act as a barrier to progress. Objections can be raised by various groups within an organisation. Resistance from management often stems from a fear that results will be complex and unusable. Resistance from operational staff can be based on worries that the outputs will contradict or expose mistakes in their prior decisions. These concerns can be managed by assuring such staff that predictive analytics will be used not to critique their choices, but to supplement their judgement.

Data collection and data sharing

A final challenge that could hinder the uptake of predictive analytics in councils is a lack of uniformity in data collection practices and a lack of data sharing between departments and public sector organisations. This requires changes in culture as much as in technology. A way to overcome this is to facilitate the creation of a cross-organisational data sharing platform and robust data sharing agreements. A leading example of this practice is the Essex Data programme.

Conclusion

This short paper has summed up some of the benefits and challenges that the adoption of predictive analytics can present in local authorities in the United Kingdom. Local authorities are well placed to begin taking advantage of the benefits that advanced data analysis techniques have to offer. With the correct personnel, software, and digital strategy, these techniques can be readily applied to existing datasets and help to combat range of challenges currently facing local authorities and their populations. However, in order to reap the benefits, the adoption of predictive analytics requires a willingness to undergo organisational transformation and to work to combat ethical concerns, overcome cultural resistance, and ensure better data collection and data sharing practices. The potential for cost savings and demand reduction should provide the necessary encouragement to work to overcome these challenges.

The Catalyst Project is led by the University of Essex and received £2.2 million funding from the Higher Education Funding Council for England (HEFCE) and is now monitored by the Office for Students (OfS).

The project uses this funding across the following initiatives:

Evaluation
Empowering public services to evaluate the impact of their work

Risk Stratification
Using predictive analytics to anticipate those at risk and to better target resources

Essex Volunteering Hub
Providing benefits to local community and students through volunteering