

Briefing Report



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Exploring the potential for automation and artificial intelligence in the regulation of the health and social care professions in the United Kingdom.

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Abstract

This horizon scanning Wellcome Trust funded project was tasked with exploring the impact of current advances in computing and information processing, in the field of professional regulation in the United Kingdom.

Although key advances in mathematics, information processing, machine learning, automation and artificial intelligence are beginning to disrupt and transform traditional practices in health and social care in the United Kingdom, the project found that the same cannot be said in relation to the field of professional regulation.

At present, the focus of the regulatory reform agenda has been on promoting a more joined-up, risk-averse and public-interest focused model of 'right touch' regulation. However, the project concluded that this agenda will not by itself enable regulators to embed current and future developments in automation and machine learning within their organisational structures.

The fractured and decontextualized nature of the current regulatory data lake means that despite their recent efforts to develop their respective intelligence and insight agendas to improve the predictive risk templates used to identify threats to public safety, at present regulators possess a very low level of readiness in relation to the information capture and analysis systems required by algorithmic digital technologies.

It is the **key recommendation** of the project that action be taken to **standardize current regulatory data warehouse information capture and processing systems**, with a view to **support the development of a shared data lake between regulators**. Furthermore, **this warehouse should be curated by an independent statutory body**, such as the Professional Standards Authority, to meet public-interest expectations and GDPR requirements, particularly in relation to the future development of regulatory predictive risk-templates.

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Introduction

This briefing summarizes the activity of a Wellcome funded Blue Sky project concerned with the potential impact on professional regulation in the United Kingdom of advances in the world of computing and information processing; including, for example, the growth of the smart phone and social media platforms, advances in diagnostic software to support Big Data analytics, and perhaps most importantly, machine learning algorithms and cloud-based data processing servers to automate intelligence gathering, information processing and organisational risk-based decision-making (Alanazi et al 2017, Darcy et al 2016, Walport 2016).

The following three activities were completed:

- A series of exploratory “what if?” workshops with members of public, as well as regulators, academics and experts from the computing and health technology sectors.
- The development of a ‘regulatory chatbot’ - “ROB” - to explore how this form of interactive machine learning algorithm might transform the public-regulator relationship.
- An exploratory proof of concept analysis of how regulatory data capture and risk profiling schemas could be enhanced by developing deeper linkages with other key stakeholders (i.e. NHS Digital).

Activity Summary

Workshops

Throughout 2018 the project held a series of workshops with a select number of participants. Presentations were made by key stakeholders from the fields of health, education, technology, regulation and the professions; including:

- Google DeepMind Health.
- The Behavioral Insights Team.
- Microsoft Healthcare NExT
- The Care Quality Commission.
- Oxford University Internet Institute.
- NHS Digital.
- General Medical Council.
- The Medicines and Healthcare Products Regulatory Agency.
- Drayson Technologies Ltd.
- The Royal College of Physicians Health Informatics Unit.





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Three discursive themes emerged during workshop discussion and in doing so shaped project activity:

- The organization of regulators into **regulatory silos** when contemporary health and social care work is largely delivered by teams working within complex and dynamic NHS organizational structures, and which possess distinctive operational working cultures at local and regional levels.
- The importance of effective **peer review** processes and quality control measures when implementing policy and practice reform in the healthcare and professional regulatory sector, and the need to ensure that accountability systems nurture professionalism, rather than stifle it.
- The need for regulatory intelligence and insight agendas to promote **data lake readiness** as computing, communication and information technologies increasingly transform practitioners working lives.

Workplace contingencies and regulatory silos

Workshop participants felt that contemporary developments in policy and practice reform have been driven by the well-intentioned goal of making healthcare safer and regulators more open, accountable and risk-averse. But it was also argued that the training and workplace tools implemented to support this transformation – for example, the introduction of medical revalidation for doctors – can on occasion clash with the delivery of complex health and social care services in what, for many, is an increasingly pressured and stressful NHS working environment.

Participants were also mindful of the separation of different occupations into regulatory 'silos', and that peer-review mechanisms continue to shape the quality assurance of professional work given the time needed by trainees to master workplace tasks and skills (Chamberlain 2017). It was argued that recent attempts by regulators to alleviate public concern about their quality assurance and leadership role, has for many practitioners highlighted the danger of using 'routinized' risk-based templates for judging workplace performance when mistakes and errors occur. Indeed, it was concluded that task-based standing setting, workflow optimization, and outcome-led quality assurance processes, need to nurture rather than impede, the collectively shared sense of professionalism and individual pride in one's daily service to others, which for many is why they became a doctor, or nurse, or pharmacist, in the first place (Chamberlain 2012).

It was argued that both NHS complaint procedures and regulatory disciplinary tribunal hearing processes have become increasingly focused on individual practitioners and their personal responsibility when mistakes occur. It was felt that this focus was, in some instances, obscuring the 'distributable' nature of blame, due in no small part to the day to day complexities involved in delivering complex health and social care services. As a result, well-documented high-profile cases, such as that of Bawa Garba for example, were felt to be indicative of how the reform agenda of the last decade has perhaps not achieved its underpinning aim of nurturing greater mutual understanding and trust between practitioners, the public and professional regulators. However, it was concluded that this goal was difficult to achieve because rather than emphasising individual blame, it must involve viewing safety concerns and public interest matters as often being:

- Shared across the clinical, administrative and managerial teams.
 - Emergent from complex localized working cultures and professional relationships, including those with patients and their families.
 - The result of systemic operational concerns and day to day 'environmental rhythms', rather than individual failings of diagnostic foresight, empathy, clinical skill or communicative competence.
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The opinions and experiences shared during workshops were not voiced by participants for the purposes of inclusion in a formal programme of empirical research. The project did not seek to elicit a methodologically rigorous representation of the broad range of views expressed by attendees. In accordance with their exploratory aims and objectives, the workshops were 'closed shop' events, with the focus very much remaining on sharing experiences, promoting mutual understandings, as well as developing networks and initial ideas which may subsequently lead to more collaborative work projects in the future.

This said, it does appear to be the case that professional elites and regulatory leaders have increasingly acknowledged the disruptive nature recent reforms have had on practitioners (GMC 2018). This can perhaps be most clearly seen in; firstly, the recent focus on stress, bullying and violence in the workplace (The Doctors Association 2018); and secondly, the strategic development of information sharing protocols between statutory bodies working across the health and social care sector, such as the recent *Emerging Concerns* agreement (CQC 2018).

Information capture and risk-based regulation

Against this background, the dominate theme emerging from workshop discussion was that regulators may have access to rich data sources, but they have a low level of data readiness in relation to 'plugging in' this data to machine learning, automation and A.I. algorithmic technologies. For example, the GMC possesses a rich historical archive, however its Siebel database system, which captures its core operational registration, complaint handling and tribunal workflow, dates to March 2006, so its immediate data resource is little more than a decade old (GMC 2015). Furthermore, the legislative separation of the regulators into occupational groupings means that their respective operational data capture systems do not share the same input and analytical coding schemas, with different categories often used to capture and process similar information (PSA 2017).

In its first workshop, the project showcased an interactive chatbot which was designed to help members of the public to make a complaint¹. Attendees acknowledged that this type of platform might well in the future transform the profession-public interface. However, it was felt that it would be unlikely to have a similar impact on the analytical and predictive reach of regulatory risk templates and resource allocation protocols, due in no small part to the operational contingencies highlighted in previous sections of this briefing. As a result, focus shifted to identifying what type of resource might yield data capture insights, and in doing so evidence the need for regulators to adopt a common data standard.

¹ Chatbot resource is available via this weblink: <http://healthcareregulations.swansea.ac.uk/chatbot/>

Proof of concept activity: Using routine NHS Trust performance data to enhance regulatory insight

The goal of automation is to make workflow more efficient and effective. Providers of essential public services operate with a limited amount of resource, and automation and related algorithmic advances in computing and information processing, possess the potential to help professional regulators to more effectively and efficiently target their efforts. At present, a significant amount of operational and outcome data concerning health and social care services is captured and scrutinized by core stakeholders; including, NHS Digital and the CQC.

The GMC, NMC and HCPC each kindly provided some GDPR compliant data regarding NHS England Trusts to enable the project to establish a dataset consisting of complaints to regulators and disciplinary tribunal sanctions between 2012-17, with 30,312 case outcomes tagged to 221 NHS Trusts.

The goal was identify if a pattern existed in the regulatory data when it was explored in relation to NHS operational outcome data. NHS Digital provided resource to GDPR compliant data to establish a local level basket of measures:

- Patient Safety Incident Reports;
- Upheld Patient Complaints;
- Litigation, Damages and Legal Costs;
- Workplace Abuse, Bullying, Violence & Discrimination;
- Staff Absences due to illness and stress, and also Vacant FTE Posts.

In establishing this data resource, the project was able to confirm that it is possible to automate some elements of this process as NHS digital release their datasets periodically. However, a key limitation of the analysis presented here is that it functions at a high granular level (i.e. NHS Trust, as opposed to individual units and departments). Consequently, the linear model below must be treated with robust caution. More detailed granular analysis is necessary to fully ascertain the potential for this particular method to significantly recalibrate current regulatory risk templates.

Nonetheless, the basket of measures are already embedded within the CQC dashboard used to identify areas of good practice and concerns prior to the routine inspection of sites. The key difference between the project and the CQC dashboard is that it is weighted by the commonly accepted measure for making comparative judgements regarding the operation of different sized NHS Trusts: the number of completed bed days.

The elements together, therefore, could be said to generate (albeit at a high granular level) a comparative heatmap of the local environment within which a practitioner works. The assumption is that 'hot' workplaces with high levels of complaints, more litigation payments made, higher than average staff absences and greater levels of abuse and bullying, will negatively influence day-to-day workplace operations, and may by extension lead to more complaints to regulators being made about the practitioners who work there.



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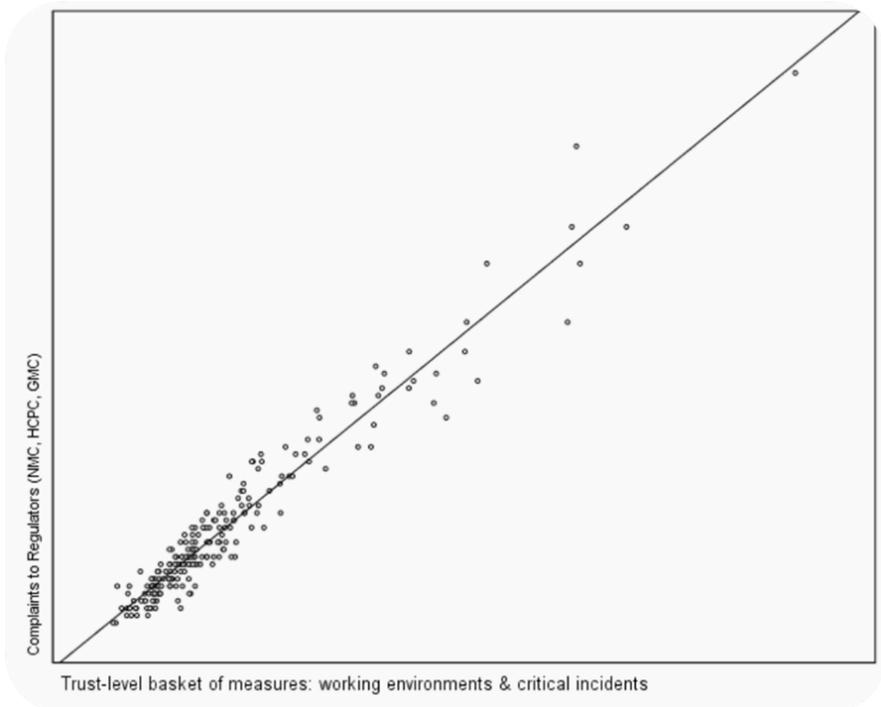


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The model allows for intelligence and insight development in relation to the impact of employment and workplace factors on individual performance, which in turn allows for the development of targeted local-level interventions to improve patient safety while at the same time advocating a 'learn not blame' approach when mistakes and errors occur in the workplace. Indeed, the linear model – figure one below – demonstrates this by showing that there is a strong positive correlation between the number of complaints made to regulators and the basket of measures used (R 0.92, r^2 0.85, $F = 196$, df 6, p 0.00 Coefficients all $p < 0.05$ & Durbin-Watson 1.86, 99% sample of 221 NHS England Trusts ,with dataset weighted by FCE Bed Days).

Figure One: Complaints made to regulators by the local basket of measures.





Concluding recommendation

The linear model developed for the project possesses a robust r^2 value, with 85% of the complaints received by regulators being co-emergent with the heatmap associated with the localized basket of measures. Although the model must be treated with significant caution due to the high level of granularity involved, it does seem to be the case that this approach might be able to provide the regulatory analytical toolbox with fresh insights regarding the influence of working conditions on practitioner involvement with fitness to practise processes.

As a result of its findings the project recommends that the statutory regulators overseen by the Professional Standards Authority seek to establish a shared data warehouse and expand the resulting data lake to include pertinent workplace related information from resource gatekeepers such as NHS Digital.



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