

DIGITAL LEADERSHIP

An interview with

Mike Hainey

Head of Data Analytics at HMRC

***An End to Data Poverty: How HMRC's
Big Data Solution is Helping
Transform the UK's Tax System***



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Capgemini Consulting: Can you start by giving us some background on analytics at HMRC and how the move to a big data solution started?

Mike Hainey: HMRC, or Her Majesty's Revenue and Customs, was created out of the merger of two departments – the Inland Revenue and Her Majesty's Customs and Excise. One of the key rationales for the merger was that by bringing information together from both departments, we would gain better insights and provide better service. However, while the fraud and error detection systems were there, they

largely existed in silos. For instance, we had separate systems for VAT fraud as well as for self-assessment tax returns. To compound matters, these systems weren't integrated. Therefore, if we wanted to assess risk, we had to dip in and out of these silos and have highly skilled people connect the dots in the different information sets. We were also limited in our ability to play with data. It used to typically take anywhere between a few weeks to a few months in order to set up a new way of looking at data silos. So while the departments had been brought together to improve matters, we were still missing a single view of the customer.

Leveraging Big Data

Capgemini Consulting: Can you tell us more about the big data solution implemented by HMRC?

Mike Hainey: Our big data solution to solving the data paucity challenges with our traditional systems was 'Connect'. 'Connect' starts by taking in data from over 28 different data sources. It then cross-matches this data over a billion internal and third-party items. These include items such as property purchases, tax returns, loans, bank accounts and employment data. By doing so, the system can uncover hidden relationships across organizations, customers, and their associated data sources. Once relationships are uncovered, the system graphically visualizes them enabling tax investigators to effectively interrogate and navigate through the data. The next step involves HMRC analysts who produce target profiles and models that assess the risk and generate cases for investigation. Finally, these are fed into the HMRC's case management system for tax specialists to undertake the appropriate intervention.

In a way, the data visualization acts like the 'Babel Fish'. It enables an effective communication between the data analyst and the tax specialist who work together on specific areas of concern to identify risk characteristics and collaboratively develop complex risking models. It significantly helps us to profile and visualize the data in an effective way.

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Our Big Data solution 'Connect' takes in data from 28 different data sources and cross-matches this data over a billion internal and third-party items.
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Capgemini Consulting: How do you manage the data volume?

Mike Hainey: Volume is indeed a major issue as we are talking about over a billion records. The challenge is that it is quite dynamic - we have information coming in regularly through tax returns or third-party data that we acquire. Our intent is to have the most up-to-date view of data made available to the 150 Connect analysts who apply profiling and modeling techniques and the 3,200 tax investigators who have access to the visualization tool. The more accurate and up-to-date that view is, the more beneficial it is in terms of decision-making.

HM Revenue & Customs: the Big Data Approach

Key challenges

28 different data sources

1 billion internal and third-party records



ROI

Pilot helped uncover **£330 million** fraudulent VAT repayments



'Connect' was built at an initial cost of **£45 million***

It delivered **£2.6 billion** as of April 2013

The analytics team

3 skill sets blended together



Operational research



Data specialists



Frontline tax expertise

The next step

Using **Big Data** and **analytics** to improve customer experience



*including running costs over 5 years



Capgemini Consulting: What about additional investment? How do you get funding on an ongoing basis?

Mike Hainey: A typical challenge in public sector projects is that most investments are made in a build-deploy-forget model. However, in the case of the big data solution we deployed, we were pretty clear right from day one that this is a system that needs to evolve and requires nurturing. One of the big factors that encouraged ongoing investments in the solution was the impressive ROI we realized. We deployed 'Connect' at an expense of around £45 million; this includes running costs over five years. Not counting additional investments, it has helped us deliver £2.6 billion as of April 2013. This is a fantastic return and helps immensely in influencing key decision makers when bidding for additional investment.

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Data and business specialists deliver best results when they work together.”

Getting the Skills

Capgemini Consulting: You are running a dedicated analytics team. What was the rationale behind the creation of this team?

Mike Hainey: At HMRC, we have always employed analytics talent for a long time. However, most of it was dispersed across departments, working largely in silos, which compromises efficiencies. Over the course of the pilot that we ran, we realized that data and business specialists delivered best results when they worked together. These teams were constantly working with one another on new innovative ideas and exploiting the data.

So, when we decided to launch our big data solution – 'Connect' – we realized that for us to be effective, we needed

to bring people from different analytical areas to work together within one community. We blended three skill sets together – operational research, data specialists and frontline tax expertise. This combination has proved effective in delivering results and provided practical insight to evolve our big data solution.

Capgemini Consulting: How do you address the scarcity of digital skills?

Mike Hainey: Big data is a hot topic, and there is a growing skills shortage. We had to rely on finding talent both internally and externally to drive the Connect solution. Internally, we identified people and up-skilled them. Training is absolutely essential in our team. For example, we ensure that people who use 'Connect' are put through a comprehensive one-year training program on all aspects of the tool and broader analytical skills. From a more long-term perspective, we are creating links with academic institutions with a view to support education programs and position HMRC as a leading employer of data analytical talent.

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Preparing for the Future

Capgemini Consulting: Going forward, what other challenges do you foresee?

Mike Hainey: A lot of the intelligence that our solution provides is a function of how optimally we have linked the data. A big challenge for us is to constantly evaluate different ways of linking up the massive amounts of data that we have to deliver the optimum results.

Capgemini Consulting: As digital becomes more pervasive, there are bound to be newer types of fraud. What is your view on emerging types of fraud which do not have historical data?

Mike Hainey: I agree, there are new types of digital frauds coming up and keeping up with them is indeed a challenging task. We rely on strong intelligence systems to acquire data on such frauds. Obviously, unlike traditional fraud, we don't have historical data to analyze them thoroughly. So we look at very specific datasets to understand and evaluate the potential impact of emerging types of fraud. It is a constant challenge. By constantly honing our intelligence systems, and then reacting to their output, we hope to stay ahead of digital fraudsters. Once our intelligence gives an indication that there is something we need to be concerned about, then a whole range of techniques can be deployed to actually test that.

Capgemini Consulting: What do you foresee as the future of analytics in HMRC?

Mike Hainey: The big data solution, Connect, was built within the Enforcement and Compliance directorate of HMRC. The objective was to better target customers for compliance. We have proved that it can work extremely well. Our ambition now is to look at analytics in a broader sense. For instance, how it can be used to improve customer support and end-to-end lifecycle of customer handling. So the task going forward is to leverage analytics beyond enforcement and compliance. And big data and analytics will drive this transition.

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Head of Data Analytics at HMRC

Her Majesty's Revenue and Customs (HMRC) is the UK's tax authority. HMRC has been one of the early adopters of big data analytics in order to combat tax and welfare fraud. Capgemini Consulting spoke to Mike Hainey, Head of Data Analytics at HMRC, to understand how a public sector department can benefit from big data.

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