The Python Analysis Toolkit for Children's Services

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In a project emerging from discovery sessions across Greater Manchester, the children's services data team at Wigan Council brought together funding from DLUHC's Local Digital Collaboration Unit, programming expertise from Social Finance, and hands-on development contributions from around a dozen other local authorities, to create **a new approach to data analysis in children's social care**.

The partnership saw the potential of using **free, open-source analysis tools** like Python to both extend the scope of what analysis is possible for LA analysts, and make high-powered, complex analysis available to those without access to Python in their LA. Together they learned new programming skills and developed a suite of data tools which any council can now use to perform critical data quality work in an easier, more timely way than ever before. How did it happen, and **what good is it doing?**

The problem

There are several problems faced by LAs in pursuing new analytical approaches, including:

1. **Local software installation and data sharing policies** inhibit new installations or divergence from the "global" corporate software offer, and mean that it is difficult to develop data sharing policies needed for working with externally hosted solutions.

2. Software like Excel lacks **capabilities needed for more complex analysis and visualization**.

3. **Sharing analysis and skills between LAs is difficult**, both in terms of sheer size and time taken to run Excel tools, and in terms of altering and adapting those tools.

These combine to mean that most councils either pursue large, expensive "one size fits all" software and processes to advance their analytics, or they limit bespoke development within a skilled and controlled central team – or, as we have found in several councils, they delay adopting new approaches and rely on inefficient and unsophisticated user-maintained approaches in tools like Microsoft Excel. To supplement these, they rely on data quality processes established by central government departments which are available at limited times and for limited purposes.

The "Quality CSC Data" project

Our solution to this challenge was to create **a platform allowing Python apps to be written and run without a Python install** locally, and without resorting to cloud-based solutions.

It was also important to **train a community of analysts** in Python and Git so they could work collaboratively to make apps and share finished apps. Doing this would increase access to high powered analysis for both those who wanted to write apps, and those who only wanted to use the finished products.

To achieve this, we convened a multi-LA community of analysts to develop an open-source Python analysis and dashboarding tool, with Python training and development lead by experts from Data to Insight and Social Finance. This led to the creation of **two unique web-based applications**: a multi-functional data quality tool which performed data validation ahead of the DfE's statutory data collections, and Patch: an "app store" of Python-based analysis code which can be run in the browser, featuring community-made analysis and dashboarding apps for common children's services datasets.

An important step taken by PATCh over other previous projects is that it provides **a simple framework for analysts to use Python** to generate frontend components for their apps, as well as the backend code, meaning there is no need for Java Script knowledge, which was necessary on previous projects. Key to this was to use Python to produce both the frontend and backend of any app, meaning users didn't need to learn to code the visual/interactive aspects of sites in other languages.

Now deployed, there are a growing number of PATCh apps that can analyse and present data in ways not normally accessible to LA analysts without Python or similar, and which can be used by anyone by simply pointing the web app at relevant local data. This has led to service leads in some participating LAs recognising the value of Python/PATCh and explicitly asking for PATCh apps to be made, such as in the case of the Social Care Providers and Children's Home Benchmarking app. In other instances, LAs are asking for Excel tools to be re-made in PATCh because they are faster, more lightweight, and easier to share.

On top of this, the work done with PATCh has opened conversations in several LAs leading to an increased interest in having Python deployed locally and has led to an interest in starting extended Python projects in some of those LAs.

How it works

The first stage of the project built a community of analysts, trained them in Python, and created two data validation services which **run Python code safely in a web browser using enabling software called Pyodide**, which removes the need to send data to servers, or have Python installed locally. As well as being immensely valuable in its own right, this generated an initial proof of concept for Patch-like apps, with a community of Python capable analysts to help build apps (to be joined later by new volunteers), and technical ability across Social Finance and Data to Insight to lead the further design and build.

As well as holding **twice-weekly workshops** covering a range of tool specific and general use Python that would scaffold the use of Python in day-to-day work once tool development finished, Data to Insight also produced **text and video guides** to teach introductory Python, tool specific Python, and the **workflow for collaborative work on GitHub**. This meant that analysts had resources to help them code, learn GitHub workflows, and projects to cement and reinforce their learning, leading to the creation of useful apps.

Deployment from GitHub means that there is a system for analysts to check and review each other's code, and the ability for Data to Insight to provide final code checks before anything is added to the app store as a layer of security and quality control. We can also help colleagues **produce code in their browser**, without installing local Python tools.

What we've learned

Catering for a range of ability levels among analysts in workshops has been a challenge, particularly balancing **onboarding new beginners whilst progressing more advanced users**. As a solution we've decided to periodically run complete beginner courses in workshops. We have also learned that it's important to communicate to LAs that whilst there is a time investment for learning Python, and initially analysts will be less capable in it than other tools, **a relatively short time investment will lead to big dividends**: brining Python into their normal workflow, and allowing them to upskill other analysts in their LA.

Pyodide, the tool that allows Python to be interpreted by the browser, does not run as fast as a locally installed version of Python, although it is still faster than other tools like Excel. Accordingly, we still encourage LAs to look at making Python available locally for more resource intensive tasks.

Patch extends the scope of what's possible for analysts in for analysis and visualisation, even to exciting things like machine learning. To make the most of this we need to **continue to provide opportunities for analysts to learn** advanced Python and encourage them to keep making apps. A benefit of this is that as well as improving PATCh, it improves analysts' skills for internal work.

What our colleagues say

Simon is an Intelligence Analyst for Hertfordshire County Council. His work includes analysing and projecting children's and adults' social care data to support service colleagues in their decision-making.

"Coding apps with Data to Insight for the Patch tool has **expanded my coding knowledge** and deepened my proficiency in Python. I have been able to utilise the skills I have learnt for work projects, and the app I have developed will **help my colleagues explore their data more easily and dynamically than before**.

Had I not become involved with Data to Insight I would have missed out on learning about complex coding methods such as classes and lambda functions, which I have now used in my projects as Intelligence Analyst."

"**Starting to attend the weekly Python workshops was a really good decision** as it allowed me to connect with other learners in a similar position, and motivated me to come up with better solutions to my problems. Whatever stage you're at in learning to code, I would recommend the Python workshops as a building block to deepen your knowledge."

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