

Scottish Environment Protection Agency Transforms Decision-Making with Data



Company: Scottish Environment Protection Agency (SEPA)

Headquarters: Stirling, Scotland

Industry: Government

Founded: 1996

Facilities: 22, present across all of Scotland

Envision the Scottish environment: A breathtaking landscape with towering mountains and rolling green hills, miles of rocky coastline, lush forests and valleys nestled along lakes (known locally as lochs), rivers, and pristine beaches. This unique scenery is a strongly loved and respected part of Scotland's national heritage.

At the same time, from the industrial revolution onward, Scotland became one of the industrial leaders of Europe that solidified itself as a manufacturing powerhouse. Though that has evolved over time, along with trends seen in other developed countries, industries like agriculture, oil and gas, and manufacturing remain vital to the country's economy and the prosperity of its people. Tourism also is increasingly vital to the Scottish economy; while only 5.5 million people call this beautiful country home, Scotland plays host to more than 3.5 million tourists who seek out this rich environment each year.

The Scottish Environment Protection Agency (SEPA) plays a key role in helping Scotland ensure economic competitiveness among global industries while protecting its irreplaceable environment. As a non-departmental public body of the Scottish Government, SEPA's role is "to make sure that the environment and human health are protected, to ensure that Scotland's natural resources and services are used as sustainably as possible and contribute to sustainable economic growth."

SEPA is tasked with monitoring and assessing air, water, and soil quality, advising on environmental regulation compliance, and providing best practices to Scotland's government, businesses, and the public. The agency has millions of records from the present day and dating back to the 1950s, including:

- Hydrological data such as river flow and rainfall
- Sample data such as chemistry, ecology, and microbiology samples
- Regulatory compliance data such as licensed activities, regulatory charges, and environment events
- General business data (planning, resources, budgets, projects)
- Photographs, documents, and emails and other unstructured data

SEPA characterizes its goals in two ways: one, to produce information and evidence that people use to make decisions. And two, to help people implement successful innovation—not minor improvements on business as usual. Its compendium of data, which grows ever larger by the day, is continually analyzed, reported, and distributed to work toward these key objectives.

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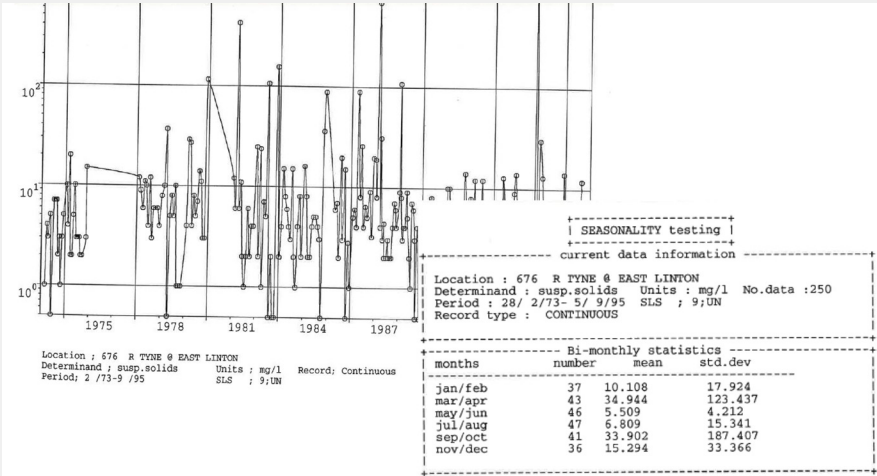
—Graeme Cameron,
principal scientist in SEPA's
informatics unit

A Desire to Increase Productivity with Limited Resources

With its current technology and processes, only 1,300 staff across the country, and a modest and rigid budget from which more and more output is constantly expected, surveying the entire landscape in person just wasn't possible. For years, SEPA relied on the manual collection, analysis, and reporting of its testing samples. The amount of time it took to visit a certain site and record its conditions stifled productivity, as did all the follow-up work required, including data analysis, paperwork, and communication with policymakers to drive decisions.

Before a site visit, staff would have to manually write code based on the site's past data, then write even more code to compare new data. “SEPA's analytics was very code-heavy. We were writing in R, in Python, and it's very time-consuming and not very reactive,” explained Graeme Cameron, principal scientist in SEPA's informatics unit.

All of the results from this code analysis would be printed out, kept in a binder, and referred to constantly—a very arduous process. “It was a very slow, custom process,” Cameron said. “We are writing code and it's really not sustainable.” It would sometimes take a number of weeks just to complete the pre-site visit paperwork. We needed to be able to analyze the environment and make decisions then and there, and couldn't keep waiting two weeks for someone to write some code and then start asking questions. We wanted a tool that could tackle multiple questions at once, as well as dive into some of the underlying issues related to those questions.”



SEPA Matures with a Modern Insights Platform

After a careful review of available solutions in the market, SEPA sought out TIBCO to overcome these challenges. Equipped with a powerful, mobile friendly analytics platform supplemented by data science and visualization, SEPA built and rapidly deployed a range of new, customizable solutions to address a wide variety of cases.

The reality of environmental protection is that even with the best technology, it's impossible to automate all processes—ultimately human inspectors in the field need to see the environment with their own two eyes to identify violations and verify compliance. Thus SEPA selected the platform that best complemented the required in-person work being done, which would help the agency choose when and how to deploy staff and when it could rely on data and predictions to tackle the challenges it faced. The intuitive and easy-to-use solution further expanded its applicability.

Now, staff members carry visual analytics on a tablet wherever they go. No longer needing to write code or carry physical binders of data analyses, users can run data analytics on the spot and answer questions themselves in the moment. This capability essentially allows them to provide policymakers with better, faster information so they can make fact-based decisions that have significant economic and environmental impact on Scotland.

TIBCO provided a way for SEPA to identify never-before-seen patterns in its data to help steer future programs that solved persistent and often hidden challenges hindering its environmental protection goals.

A Variety of Use Cases Lead to Positive Impacts Nationwide

Rolling out a modern analytics platform had a massive and immediate impact on SEPA. The group started with a traditional use case looking at pollutants, ecology, and lab measurements. It quickly expanded to use cases across the entire backbone of the organization; not just industry compliance, laws, and licenses, but broad business KPIs, business strategy and planning, and even human resources. TIBCO provided a way for SEPA to identify never-before-seen patterns in its data to help steer future programs that solved persistent and often hidden challenges hindering its environmental protection goals, and to make sure it had the right scientific specialists available to address the problem areas it was now seeing.

Change was felt within and outside of SEPA. The organization shared its dashboards with a number of groups who then used the data to further conservation efforts and predict the impact of changes offered by their organizations. For example, the national Scottish Water utility used tools built by SEPA to model and assess the environmental impact of its planned improvements, testing scenarios to determine which changes would have the greatest impact on water quality and in which areas.

SEPA's dashboard also helps Scottish organizations apply for grants through federal funds earmarked for ecological maintenance and sustainability. By making environmental findings more available to the public, those residing within a certain radius of a waste management site, recycling facility, or dump, can assess whether they are eligible for grants and apply for them. Developed in fewer than five days, SEPA published the tool to the public, and from the start, saw a massive influx of users including from other conservation organizations.

"We had a lot of users, and an especially lovely story was that charities began using the tool. For instance, one group focused on avian conservation used it to find areas where a grant could be used to protect birds," explained Graeme. Eventually, SEPA worked with the organization to assess all of Scotland to find the optimal areas that would benefit from wildlife conservation.

Data-driven Proof—Investing in Conservation Works

Another impact of the new platform is the ability to prove that Scotland's conservation efforts have been successful. The public is able to view more than 50 years' worth of data to create models showing the changes of an area over time. For example, River Kelvin -- one of the main tributaries into the Clyde in Glasgow -- was notoriously polluted in the 1960s but has since been improved. Users of SEPA dashboards can click on certain points along the river to see statistics showing

trends and changes of the river. Comparing the 1960s to the 2000s, a user can see fact-based evidence of the amounts of pollution, which correlated with Scottish government investments in river cleanup for the same period. This example and many others like it have helped reaffirm SEPA’s mission and secure budget for additional projects, as well as increase its credibility and confirm its place as a stakeholder in future environmental policy decision-making.

Accelerated Workflows Get More Work Done In Less Time

Before partnering with TIBCO, the post-visit process following trips into the field could take up to two days to complete. Inspectors spent a majority of their time documenting compliance violations and writing reports to share with the government and landowners. SEPA is far more efficient today. Armed with a new streamlined approach, field inspectors vastly improved the business workflow of their day-to-day operations. Everything from the pre-site-visit planning (What is the history of this area? Why do we need to go? Do we need to be aware of any safety risks, such as a hostile landowner or aggressive animals?), the inspection, and follow-up actions are analyzed on tablets. All data is digitally synced, allowing staff to quickly and efficiently assess the quality of the site inspection and complete post-visit reports.

“This solution is a major win for us because we can keep our staff out doing that work where they need to be rather than spending their time doing paperwork,” said Jonathan Bowes, senior specialist scientist. With the same number of inspectors and the same budget, SEPA is now able to have a bigger impact with help from TIBCO technology.

LIVE DEMO – WATER ENVIRONMENT HUB
- QUESTION DRIVEN ANALYTICS

A tool describing the water environment as a narrative to guide people through the current condition, and future work and impacts

Replaced static PDF report with hundreds of pages

Search Map and Data:

Question driven

This map displays the overall condition of bodies of surface waters in 2014

Overall condition of surface waters - number of surface waters

Condition	Number of Surface Waters
High	493
Good	1428
Moderate	713
Poor	414
Bad	194

Information on the Overall condition of individual bodies of surface waters in 2014

ID	Name	Condition	Further detail...
1	Forth and Clyde...	Good	Further detail...
2	Forth and Clyde...	Good	Further detail...
3	Forth and Clyde...	Good	Further detail...
4	Union Canal (Forth...)	Moderate	Further detail...
5	Union Canal (Dumfries...)	Moderate	Further detail...
6	Union Canal (Dumfries...)	Good	Further detail...
7	Union Canal (Forth...)	Good	Further detail...
8	Union Canal (Dumfries...)	Good	Further detail...
9	Union Canal (Dumfries...)	Good	Further detail...
3000	River Almond (Dumfries...)	Poor	Further detail...

NOTE: If no data is displayed on the map or it does not zoom to your date of interest, this means no data for the water bodies or protected areas you have selected to view.

A Tool for the Whole Community

Staff aren't the only ones benefiting from this new approach made possible by TIBCO. Any member of the public also can access fact-based insights about the health of the environment and better plan outings based on air and water quality. For example, one of SEPA's main goals is to monitor designated bathing waters (such as beaches and other bodies of water where people may swim). By collecting data over time, SEPA is now able to automate daily predictions for water quality and publish them publicly. Visitors looking to take a dip in Scotland's bathing waters can get accurate forecasting of bathing water quality each day. The same insights are used to track performance and review models for future learning and tuning.

Data That Makes a Difference

With a wide range of applicability for its data analytics foundation, SEPA can confidently assert that the Scottish environment is significantly healthier thanks to the new approaches. There has been a 40% drop in overall non-compliance, such as overspraying of fertilizers and pesticides, resulting in a measurable decrease in soil erosion. Back at the office, 80% of manual processes have been reduced due to digitization and eliminating paperwork, which means less bureaucracy and increased capacity to do more meaningful work.

"Our limited pool of specialists are in the field inspecting farms, speaking to farmers, educating, cleaning up the environment, where they should be," said Jonathan Bowes, Senior Specialist in the Informatics Unit. "Previously, staff were in the office, looking for maps, asking for phone numbers. Now, all the facts are available to them and they can focus on being in the field where they need to be."

Overall, the ability to analyze and visualize data has allowed SEPA to make huge strides in protecting and improving Scotland's environment. Funding is more easily dispersed through grant programs and tax incentives based on accurate environmental data and improved collaboration. SEPA can better partner with large industries and utilities to work toward common environmental and conservation goals. There is increased transparency for the general public on air and water quality, and proving results through fact-based reporting has had a massive positive impact on the organization's credibility. SEPA has saved roughly £1.4 million thanks to the digitization of the inspection workflow process alone, but the impact on transparency for the Scottish people, and the influence made on environmental policymaking processes globally, is priceless. It was all made possible by a fact-based environmental insights platform that helped SEPA stay focused on solving business-led challenges and fostering closer collaboration, without worrying about underlying code and technology.

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Despite a significant cyberattack in December 2020, the work at SEPA continues. In fact, it has given the organization the opportunity to make bold changes in how it builds new analytical developments by using cutting-edge solutions. SEPA looks forward to modernizing and maximizing its analytic solutions with TIBCO as it begins to rebuild.

What can TIBCO make possible for you? Talk to an expert today at tibco.com/contact-us/sales



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