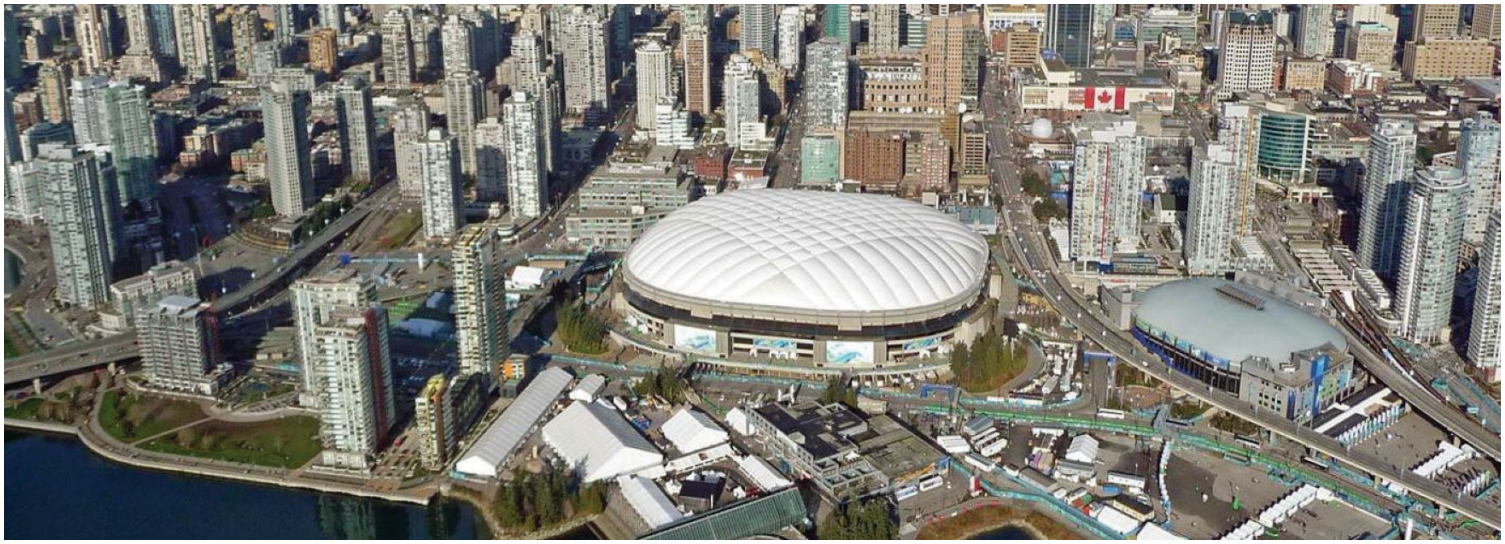

Law Enforcement

Author

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Key Takeways

Use GIS to display real-time Compstat data and information daily.

Transform and modernize VPD's Compstat into a user-friendly and interactive dashboard.

Implementation of the Compstat Dashboard has provided the VPD with many benefits including enhanced operational decision-making and increased situational awareness.

Modernizing Compstat at the Vancouver Police Department with GIS

The Vancouver Police Department (VPD) was one of the first adopters of Compstat in Canada and continues to innovate the application of this performance management system as a means of sharing information and improving on the effective use of its limited police resources. Compstat, short for "Computer Statistics," has been adopted by major metropolitan police services across the United States, Canada, and globally. Compstat is based on four distinct principles: timely and accurate intelligence, effective tactics, rapid deployment, and relentless follow-up and assessment.[1] This policing approach originated from the New York Police Department (NYPD) and is premised on assisting police agencies to prevent and reduce crime, identify crime trends and patterns, enhance operational decisions, and increase transparency and accountability.[2]

VPD's jurisdiction consists of four districts (patrol areas), each having a district commander who is responsible for overseeing efforts at combating, preventing, and reducing crime in their respective areas. These efforts are inspected at Compstat by executive management to assess the effectiveness and success of the measures implemented, and it is through this process that the district commander is held accountable.

For VPD to effectively combat, prevent, and reduce crime, Compstat inspections are held every 28 days, while some other police agencies may hold Compstat inspections every week or biweekly. The inspection is typically conducted using several core information products—maps, charts, crime statistics reports and spreadsheets, and PDFs—generated in a stand-alone ArcGIS Desktop environment. These information products help the district commanders, managers, and other operations staff understand and illustrate crime trends, patterns, and ongoing crime prevention strategies.

However, generating these reports can be time-consuming, as many are dependent on manual processes that result in static Adobe PDFs with a limited ability to distribute information in a timely manner. In an effort to make the Compstat process more efficient and fulfill a mandate to help the department innovate and become more intelligence led in its police operations, VPD's Crime Analytics Advisory and Development Unit (CAADU) researched various technology platforms, ultimately deciding on a browser-based solution that bridged the gap between real-time statistical reporting and GIS mapping.

Challenge

Although VPD compiled crime data daily, the information products for Compstat were published every 28 days. The static products were generated as Excel spreadsheets, PDFs, and ArcGIS shapefiles. The Compstat crime data presented in these disparate forms was not easy to disseminate and difficult for department staff to understand. Furthermore, licensed ArcGIS Desktop software was needed to view Compstat maps that were in ArcGIS shapefile format, thereby limiting the ability to share broadly.

This process meant that users would have to wait 28 days to see published Compstat information products posted to VPD's internal website. Once published, users would need to have Microsoft Excel, Adobe Acrobat Reader, and ArcGIS Desktop installed on their computers to view the Compstat information. In addition, they would also need to learn and understand how to navigate within these software applications to retrieve the necessary information. Users typically had to scroll through several Excel worksheets to view Compstat bar charts, and for Compstat mapping information, they had to scroll through several PDF maps or be trained in how to use ArcGIS Desktop.

According to Betty Ling, senior GIS coordinator for VPD, "This is where users find it challenging to get the Compstat data and information they need, when they need it." Because of this challenge, district commanders that require Compstat data outside of the 28-day cycle are dependent on assistance from specialized personnel to obtain the information. Ling continues, "Crime doesn't stop, so it is most optimal for district commanders to have real-time situational awareness."

Solution

According to Garry McCarthy, former Chicago Police superintendent and former NYPD deputy commissioner who ran Compstat meetings in New York for seven years, "Compstat is not just a meeting that happens every week or every other week; it's a process, and the process takes place every single day."[3] With this in mind, CAADU wanted to find a more efficient means for senior management, police officers, and other staff to view Compstat data and information whenever they need it.

CAADU staff gathered the business requirements and conducted a workflow assessment to determine what available technology could display real-time Compstat information on a daily basis. They specifically looked at what technology was available in-house and what would easily integrate with their existing infrastructure. CAADU also investigated the possibility of changing VPD's Compstat process to be more dynamic—where the data and information products are automated and updated on a daily basis—thereby providing Compstat stakeholders with mission-critical information as needed. Furthermore, CAADU wanted to provide users with real-time Compstat indicators, statistics, and benchmarks to monitor, track, and enhance operational decisions through a single user interface. The objective was to digitally transform and modernize VPD's Compstat system into a user-friendly and interactive dashboard that would leverage the department's existing ArcGIS Enterprise infrastructure. CAADU examined in detail each Compstat product that was published every 28 days to ensure that the Compstat Dashboard would, at a minimum, provide the same (if not better) information.

The change from static PDF reports to an interactive web browser format has had a transformational effect on how the police department approaches accountability and the timely dissemination of mission-critical information. This has assisted the VPD in becoming intelligence-led and being able to respond to emerging issues with a far more rapid deployment of resources.

Dr. Ryan Prox, OOM, S/Constable in Charge of CAADU

CAADU used an iterative design methodology in the digital transformation of their Compstat. The first design used a combination of Esri's ArcGIS Dashboards and ArcGIS StoryMaps. To match the existing Compstat format, the solution was divided into 14 crime categories, and for each of those crime categories, ArcGIS Dashboards consisted of a serial chart, interactive map, and indicator widgets.

Table 1. Compstat Crime Categories

- Murder
- Robbery
- Assault Level II/III (more serious offences)
- Robbery & Assault Level II/III (more serious offences)
- Sex Assaults
- Shots Fired
- Break & Enter Commercial
- Break & Enter Residential
- Theft of Vehicle
- Theft from Vehicle
- Other Theft
- Mischief
- All Property Crime (combined)
- All Violent Crime (combined)

The interactive dashboard was designed to be intuitive and easy to understand, eliminating the need for end-user training. It displayed the most pertinent crime information requested by the end-users while minimizing interaction to only five buttons in each category selected. A user would simply select a specific district and the desired crime category to view the respective Compstat information. In total, all 14 crime categories were aggregated through the ArcGIS Dashboards, and then displayed in a tabbed ArcGIS StoryMaps story.

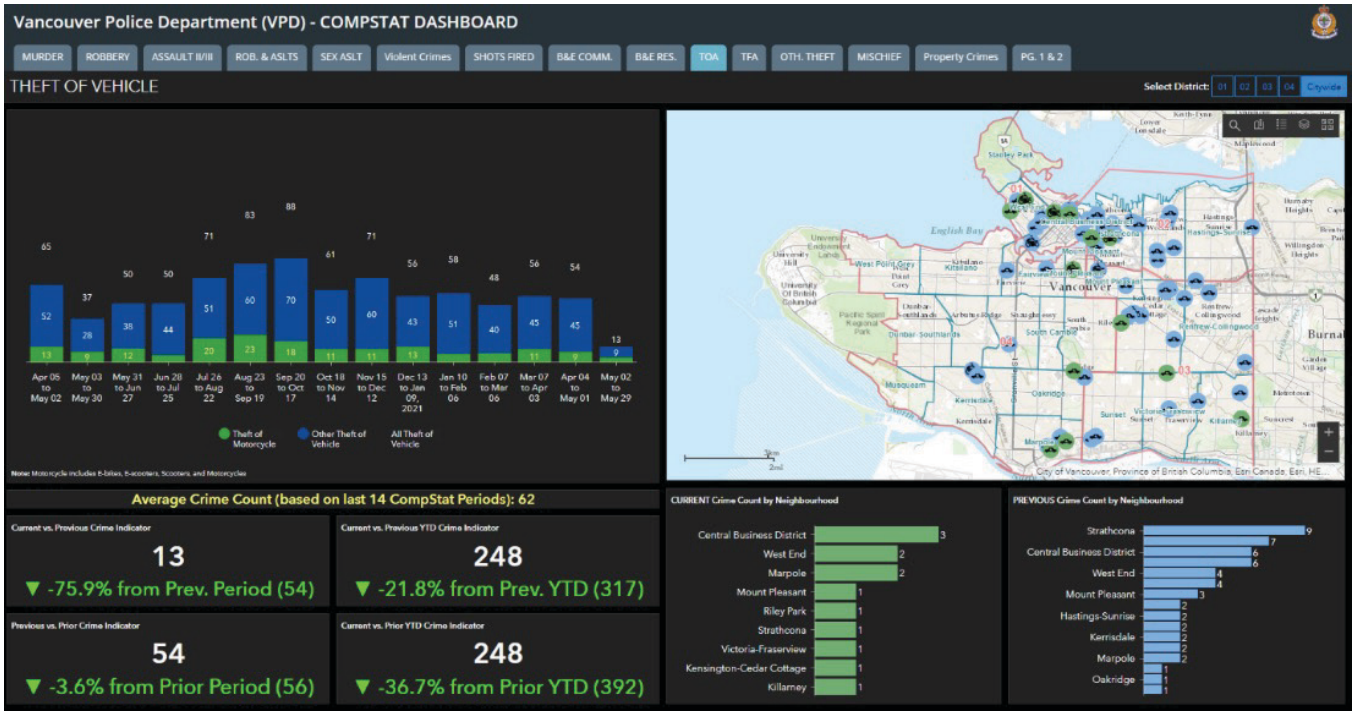
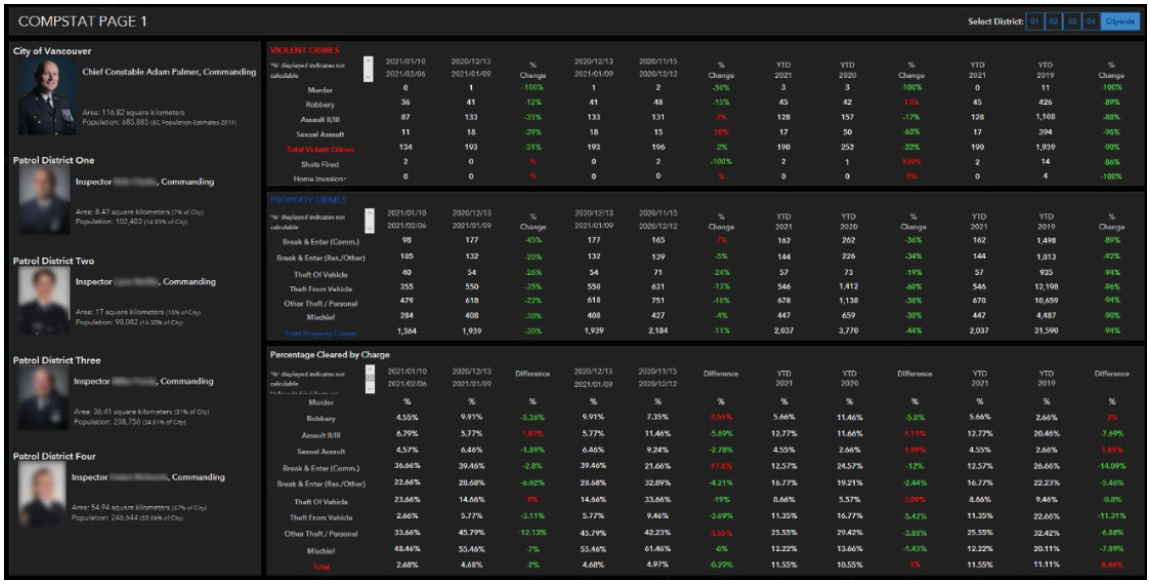


FIGURE 1. *VPD's first design of the Compstat dashboard*

The solution also included a Compstat crime statistics summary report that was a tabular display of all the crime categories summarized into a single page report. To do this, CAADU created a "tabular" element via ArcGIS Dashboards indicator widgets. However, over 350 indicator widgets were necessary to mimic VPD's current Compstat crime statistics summary report. Although this worked and displayed the required information, having over 350 indicator widgets in a single dashboard was not ideal for readability and system performance.



VPD's first design of the Compstat crime statistics summary in "tabular" format using *ESRI's ArcGIS Dashboards*

The second design leveraged much of what was created in the first iteration but integrated Microsoft Power BI. CAADU staff maintained the district breakdown and the 14 crime categories within ArcGIS Dashboards along with the compilation of the tabbed StoryMaps story. However, instead of the 350 indicator widgets, they integrated Microsoft Power BI to create the Compstat summary crime statistics report. The Microsoft Power BI design and format was similar to the Esri ArcGIS Dashboards, where the user was presented with five buttons to switch between the district and citywide information being displayed. In addition, the team implemented a drop-down filter for users to view historical Compstat crime statistics summary reports going back three years.

FIGURE 2. *Second (final) design of VPD's Compstat dashboard using ArcGIS Dashboards, ArcGIS StoryMaps, and Microsoft Power BI*

"The process to integrate the Microsoft Power BI report into the Compstat Dashboard was far less complicated than initially anticipated. This is because the first design already helped in developing the data format needed for the reporting structure requirements in Microsoft Power BI report," explains Ling. To integrate the Microsoft Power BI report into ArcGIS StoryMaps, an extra tab containing the Compstat crime statistics summary report was created. There was minimal configuration required, and the process flowed seamlessly.

Results

The creation and implementation of the Compstat Dashboard has provided VPD with many benefits, including cost savings, a streamlined workflow; enhanced operational decision-making; and increased situational awareness, transparency, and accountability of crimes occurring within the City of Vancouver.

Importantly, the use of the Compstat Dashboard did not require additional software licensing, as it relied on leveraging VPD's existing ArcGIS Enterprise and Microsoft Power BI Server. This approach allowed VPD to maximize its current investment in GIS technology and improve operational services and delivery, while incurring no additional costs beyond the initial technology investment. The integration of ArcGIS Dashboards and ArcGIS StoryMaps with Microsoft Power BI enables users throughout VPD to access Compstat crime data and information that is updated in near real time, replacing a dated process that limited access to this information to every 28 days. Users no longer need to use or understand how to use Excel spreadsheets, PDFs, or an ArcGIS Desktop license to review Compstat crime data and information. Compstat information is now available on a single web page display that can be accessed on any computer across the organization, without the need for any specialized software or customized installations. All that is required is a simple web browser, such as Microsoft Edge or Google Chrome.

> By successfully integrating Esri's ArcGIS Dashboards and ArcGIS StoryMaps, with Microsoft Power BI into a unified Compstat solution, the VPD was able to drive evidence-based decision-making to the forefront of daily policing activities.
>
> Dr. Ryan Prox, OOM, S/Constable in Charge of CAADU

Digitally transforming and modernizing Compstat to an easily accessible dashboard has also helped to boost staff's confidence in using technology and GIS. Police personnel are able to obtain the Compstat crime information they need, when they need it, without being reliant on specialized analytic staff. This in turn has created greater efficiencies within the organization releasing highly trained analysts and GIS specialists to focus on more complex and advanced tasks, beyond simple crime statistics reporting.

Prox adds, "We are continually innovating–pushing the unit to be early adopters of cutting-edge technology solutions that enhance and increase operational effectiveness of the department, support evidence-based decision-making, and contribute to a safer city."

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2. *William J. Bratton and Sean W. Malinowski, 2008, "Police Performance Management in Practice: Taking Compstat to the Next Level," Policing, Volume 2, Number 3, 259–265*
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