Case Study

Inside a Twigkit Secure Intelligence & Analytics Application

One of the largest law enforcement agencies in the United States invited Twigkit to explore how search and discovery technology could help them with **criminal profiling and analytics, lead generation,** and **identification**. With a population numbering millions in their juristiction, and with one of the highest crime rates in the country at 60 crimes per 1000 residents, they have a real need for targeted insight and intelligence.

Our technology enables organizations to create specialized applications that span multiple data sources simultaneously, and to deliver structured, collated findings back to operators in clear and understandable ways.

Being highly flexible, our technology is a good fit for any organization that wishes to surface otherwise hidden insight by layering multiple pieces of their data over one another. This approach works very well in identifying wider trends and flagging peripheral relevant information: useful when tackling nuanced, detail oriented problems such as crime.

Industry
Law Enforcement

Type
Secure Intelligence & Analytics

Data Platforms
Elastic, GSA, MySQL, ArcGIS

Development Time
10 days

The Data

Over the course of just 10 days we built a crime intelligence prototype based on our SIA (Secure Intelligence and Analytics) software stack. It brings together data from many different locations, but essentially consists of information about **people** (victims, witnesses, police officers, reporters, suspects and perpetrators), **places** (incident locations, addresses of individuals) and **incidents**. All data was supplied by the Dallas Police Department.

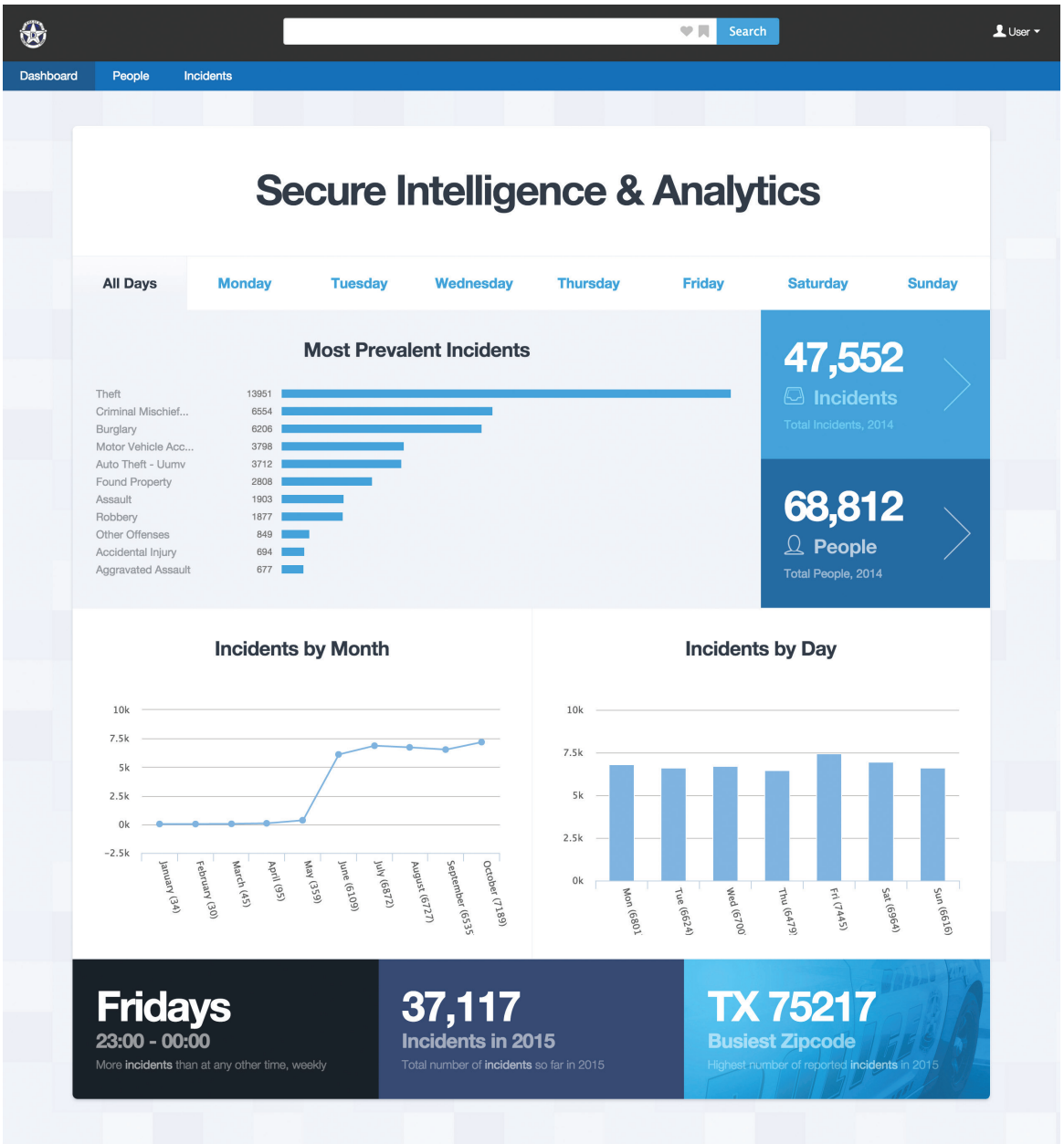
From the outset we wanted to go a little deeper than a traditional, text and facet led search application. Such applications are valuable, but they lack the peripheral and contextual elements that are so important in effective law enforcement. We wanted our tool to seek out and expose this wider context to officers, both out in the field and in the office (out of the box our applications work on mobile as well as desktop).

The proof of concept that we built over the 10 days has led to an application currently in development, and we hope that by showing what was achieved in that short time, you'll be able to appreciate how quickly Twigkit applications can be built, and how our technology can help make a positive difference to something as important as crime prevention.

Please note: We take data protection seriously. All data shown in this case study has been anonymised. In addition, the data used for the purpose of this prototype is open source, and available at www.dallasopendata.com.

The Dashboard

Once logged into the application, operators are greeted by the Dashboard. Dashboards are a great way of providing a visual 10,000ft overview of everything that's going on across the breadth of the application. We added additional value into the dashboard by making every chart, graph and statistic fully interactive.



Above: Dashboards are a tactile and approachable way for visitors to start a discovery process. Clicking any element: time, day, incident or place will filter the dashboard by that criteria. To support next steps, we added links to jump directly from the dashboard to incident and people search results that match any selected criteria.

"Tell me about when and where Assaults are occurring in Southeast Dallas". As additional criteria are chosen and added, the incident and people results set totals on the right become smaller and more targeted, making this a viable and organic way to start exploring and interacting with the data.

Interactive Dashboards

Interactive dashboards enable operators to do much more than just observe: they allow people to drill down into any area and combine subjects to generate tailored, precise statistics. And because the entire page dynamically updates as subjects are selected, it's like seeing a complete, bespoke report being run before of your eyes.

By including geographic areas and ZIP codes in the dashboard, other trends can potentially be observed and monitored. For example, an operator might identify that a certain neighborhood in Southeast Dallas experiences a weekly upswing in assaults on Sundays. This insight can be monitored and brought to bear when planning future allocations and deployments.

In the screen shot above we can see by looking at the donut chart that the highest number of assaults in Southeast Dallas took place within ZIP code 75217. On the next page we'll look at this ZIP neighborhood in more detail.

It's like seeing a complete, bespoke report being run before your eyes.

Knowing the Neighborhood

The ZIP code detail page brings a number of different elements together. An embedded map plots all recent incidents in the area. These incidents are listed in more detail lower down, complete with supplementary information: the whos, wheres and whats of each incident.

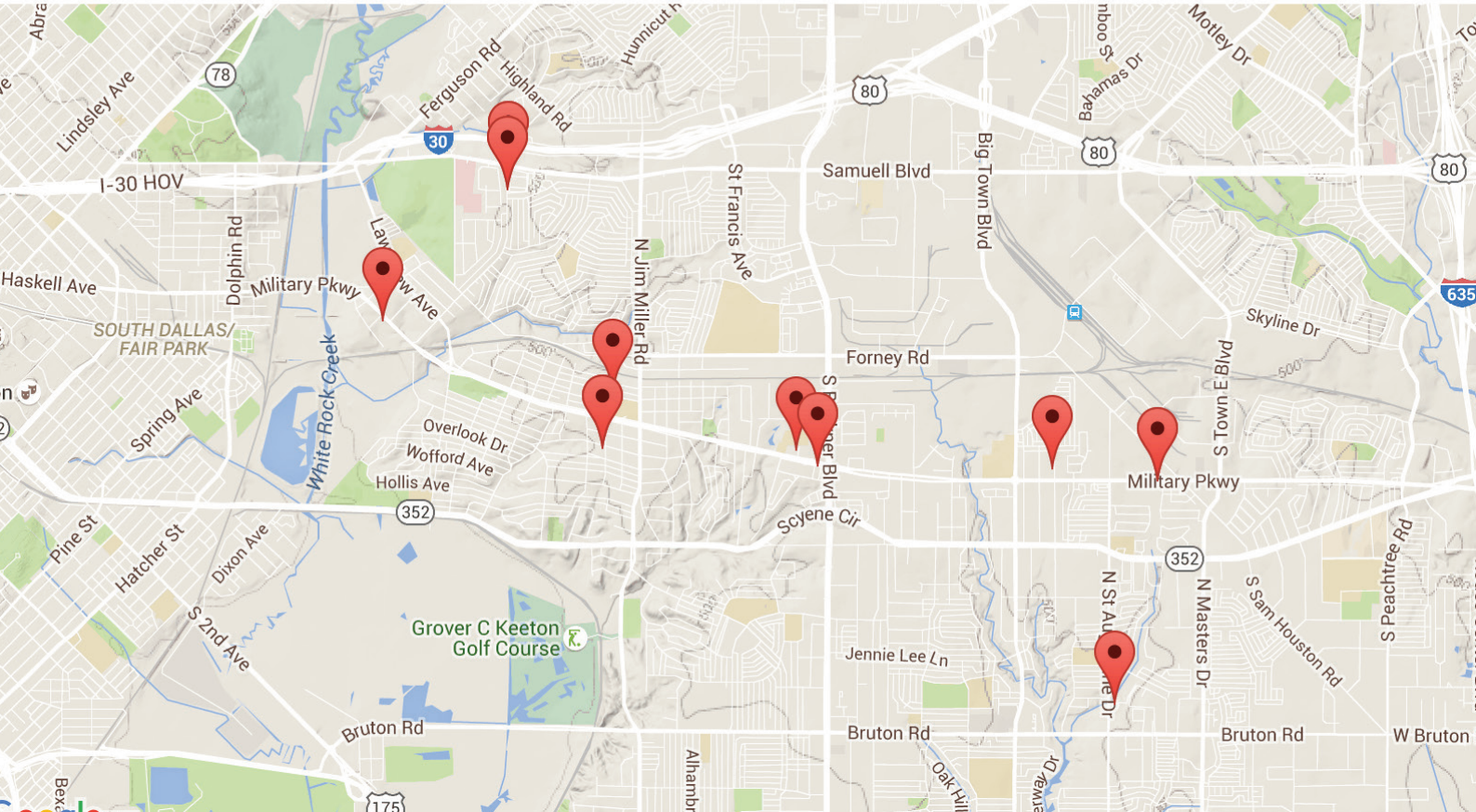
In addition to this, statistical information is generated that reveals more general insight about the local area, including overall crime priorities, trends, times of high and low incident activity, and a list of 'Local Faces' - the individuals who have historically interacted the most often with the police in this neighborhood (further categorized by their role within incidents: as victims, witnesses or arrestees). Officers associated with the highest number of incidents in the area are also shown (after all, who better to contact for local knowledge than the officers on the beat?), and social commenting allows this knowledge to be documented and discussed.

And because every piece of information on this page is generated entirely by search, it requires no ongoing maintenance and will always be up to date.

This page: All recent incidents are plotted on a map. Shown here is Google Maps but we integrate with all major map providers including ArcGIS.

Next Page: The ZIP code detail page has a number of notable features including (from top to bottom) personalized bookmarking, contextual filtering (to allow users to show only incidents of a certain type and/or status, e.g. "Open Assaults"), interactive visualizations, and a commenting feature that allows officers to leave first hand anecdotal information for colleagues.

ZIP Code 75227



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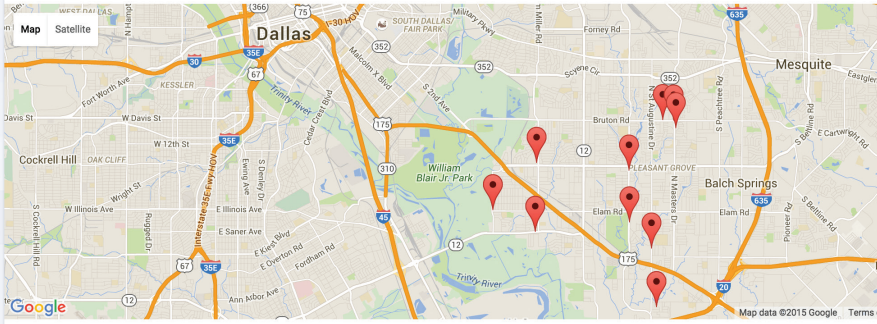
Search

Dashboard | People | Incidents

FLAGGED

ZIP Code 75217



HOME / INCIDENTS / PLACE DETAILS

✓ All Statuses
Status
Suspended (112)
Clear by Arrest (68)
Open (11)
Clear by Exceptional Ar

Assault (200) | All Statuses

Local Incidents

Incident: 012345-2015
Date of Occurrence: Feb 22, 2015
Address: 1234 WINDRIDGE WAY DALLAS TX 75217
Type of crime: Assault
Status: Suspended
Premise: Single Family Residence - Occupied

Incident: 012345-2015
Date of Occurrence: Mar 17, 2015
Address: 1234 ELAM RD DALLAS TX 75217
Type of crime: Assault
Status: Suspended
Premise: Single Family Residence - Occupied

Incident: 012345-2014
Date of Occurrence: Dec 02, 2014
Address: 1234 N PRAIRIE CREEK RD DALLAS TX 75217
Type of crime: Assault
Status: Closed/Cleared
Premise: Apartment Residence

Incident: 012345-2014
Date of Occurrence: May 29, 2015
Address: 1234 BRUTON RD APT 2036 DALLAS TX 75217
Type of crime: Assault
Status: Suspended
Premise: Single Family Residence - Occupied

Incident: 012345-2014
Date of Occurrence: Mar 30, 2015
Address: 1234 N JIM MILLER RD DALLAS TX 75217
Type of crime: Assault
Status: Suspended
Premise: Convenience Store

Incident: 012345-2014
Date of Occurrence: May 20, 2015
Address: 1234 PRAIRIE CREEK RD DALLAS TX 75217
Type of crime: Assault
Status: Suspended
Premise: Single Family Residence - Occupied

Incident: 012345-2014
Date of Occurrence: Sep 30, 2014
Address: 1234 GREAT TRINITY FOREST WAY DALLAS TX 75217
Type of crime: Assault
Status: Clear by Exceptional Arrest
Premise: Other

Incident: 012345-2015
Date of Occurrence: Mar 15, 2015
Address: 1234 BRUTON RD DALLAS TX 75217
Type of crime: Assault
Status: Suspended
Premise: Highway, Street, Alley ETC

10 | 25 | 50 | 100 Results per page 1 2 3 4 5

Officer Notes

Notes are visible to everyone accessing this page.

Leave a new note... Post

200
Total Incidents
Within this ZIP code

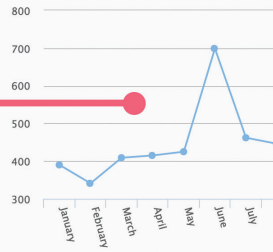
This Neighborhood

Prevalent Incident Types

Theft	1112
Burglary	783
Criminal ...	771
Found Pro...	648
Auto Thef...	467

Show More...

Monthly Incident Activity



2 Average Incidents / Day

Local Faces

Most Regular Complainants

City Of Dallas 358 / Mesquite Pd 24 / Dollar Ge
Garland Pd 15 / Mesquite Police Department 14
Metro Pcs 10 / 11-jul 9 / Balch Springs Pd 9
Garland Police Department 9 / Irving Pd 8 /
City Of Garland 7 / City Of Mesquite 7 / @city C
Arlington Pd 6 / At&t 6 / Dallas Police Departme
Family Dollar 6 / Mesquite Police Dept 6 / Show

Most Regular Arrestees

Doe, John 5 / Parker, Peter 3 / Davis, Martin 2
Courville, Eric 2 / Farrington, Reed 2 / Cheel, Ja
Knezic, Frank 2 / Show more

Top Officers

Murphy, John 135 / Marks, Onya 106 / Hamilto
Lewis, Katrina 88 / Aguilar, Lupita 87 / Jameso
Willis, Mary 76 / Warwick, Dionee 64 / Trank, Jo
Patton, Michelle 58 / Rushmore, John 56 / Quilc
Show more

June

10 | 25 | 50 | 100 Results p

Officer Notes

Notes are visible to everyone accessing thi

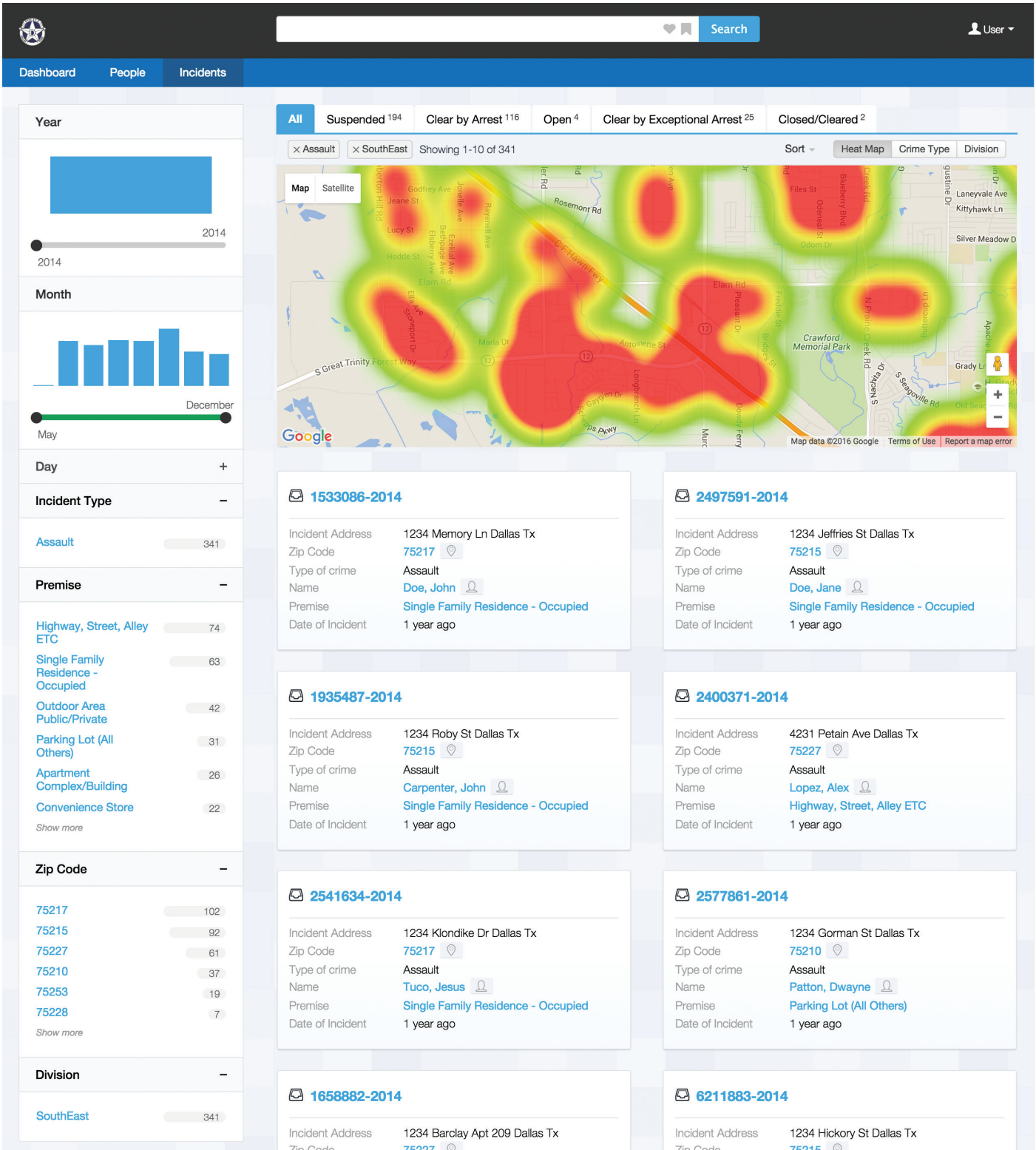
I believe that the spike of assaults seen i
area during June 2014 is attributable in
the open air festival that was held over
in Crawford Memorial Park.

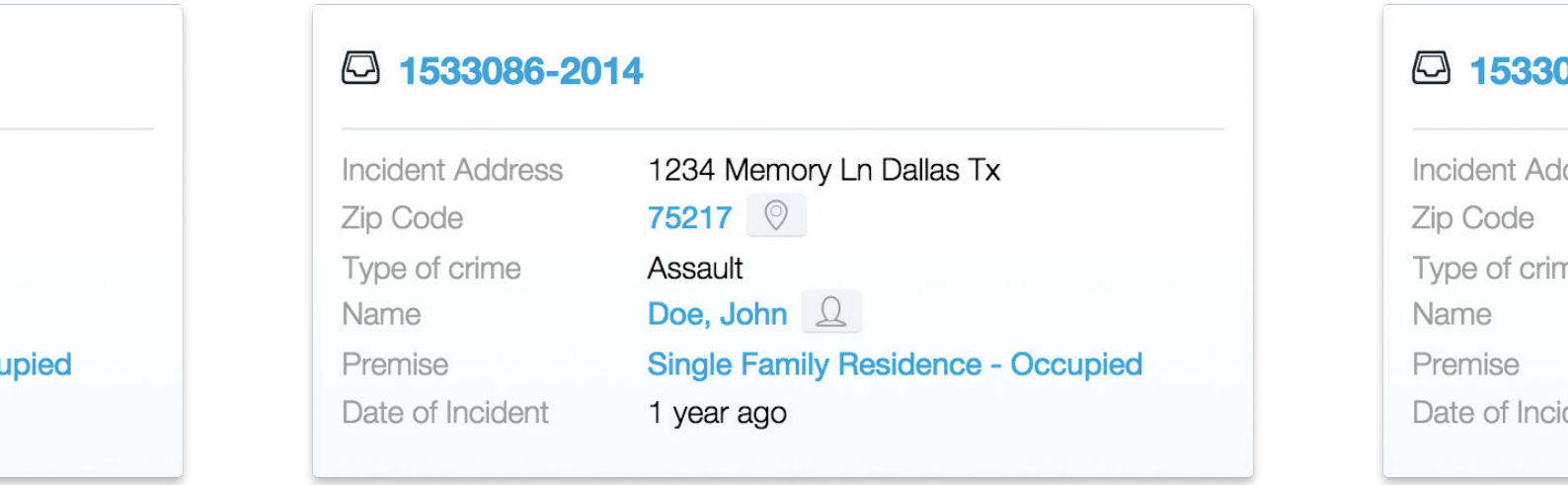
This page: ZIP code detail page.

Finding Incidents

The dashboard offers a streamlined way of exploring topics and jumping into a results set, but a more traditional search interface is equally important in giving operators a complete set of tools and filters to browse and find specific incidents.

Below: Incident search interface and results. The leftmost column shows categorized filters used to narrow down the results set. To allow operators to select ranges for dates or days of the week, histograms were added from Twigkit's UI components.





Card View

Individual incident results are presented as cards, with key information (incident id, incident type, location and associated individual) presented immediately to the operator. It would have been entirely possible to have added more elements to each card, but there's a balance to be struck: too little information can cause uncertainty and force users to interrupt their search by clicking away to detail pages; and too much information makes it harder to scan and compare items in the list by glancing over them.

In addition to lists of categorized filters the application offers further tools to help refine results. As shown on the previous page, dates are presented as histograms, enabling rages to be selected. A zoomable heat map allows geography to be considered, and pie charts inform operators about proportional incident volumes by crime type or division.

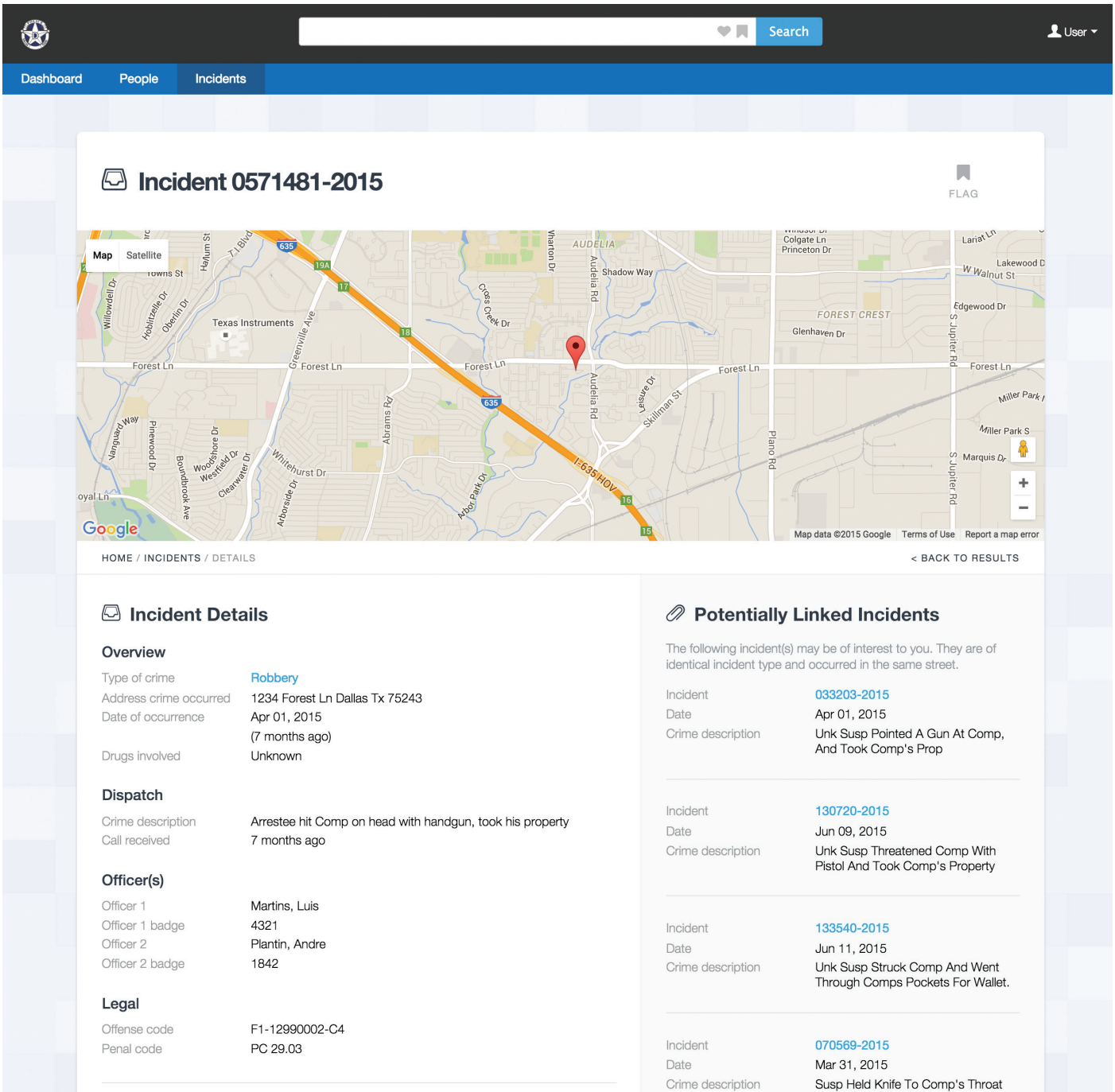
All of these tools and interface elements are provided by Twigkit as out of the box components.

The fields on each result card offer further options. Individuals and ZIP codes can be added as filters to the overall query, but we also included links to their respective detail pages (presented as icons, above).

An Incident in Detail

Incident detail pages bring together all details, people and places that relate to a specific incident. This would be useful in itself, but on this page we are also highlighting the wider neighborhood trends, and are attempting to identify and flag potentially linked incidents too. There is huge value in painting this broader picture: cutting down the signal to noise ratio and ultimately giving operators more contextually relevant information to work from.

The application can flag these related incidents by taking into account a range of criteria such as using key terms from the officer notes, type of incidents, proximity, time and people involved. Below this list of potentially linked incidents are overall statistics for the area (again to give additional context to the operator), and a notes function so that insight and information can be discussed and shared with others.



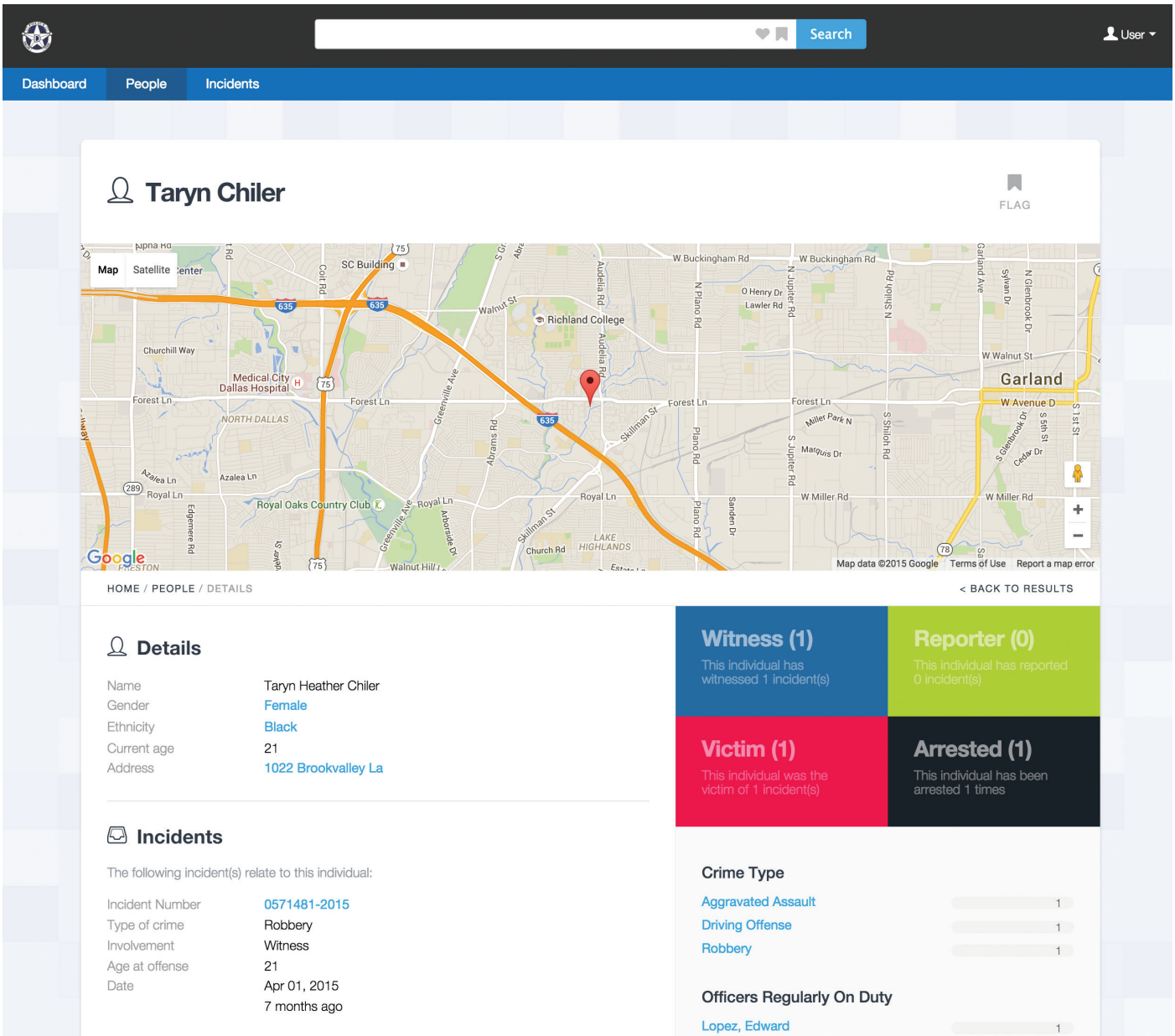
Personal Records and Interactions

An individual might be linked to different incidents in different capacities. This view aims to present all the facts available about someone in one place, in a clear and logical format.

The data brought together in this view includes both closed and open source intelligence about an individual: basic information about them (their name, address, age, family and profession) alongside more detailed information about incident involvement (as a statistical overview, and a breakdown: as victim, witness, reporter, suspect, perpetrator or a combination of the above), a map displaying all known addresses, and a breakdown of the types of offense that this person has witnessed, reported or committed.

On the road map for this view is a full chronological history of their interactions with the Police presented as a time line, and full integration with social media feeds to provide additional contextual information.

Below: Taryn Chiler (anonymised data) witnessed a robbery in 2014. We can also see that she was a victim of assault in 2014, and was arrested for a driving offense in 2015.



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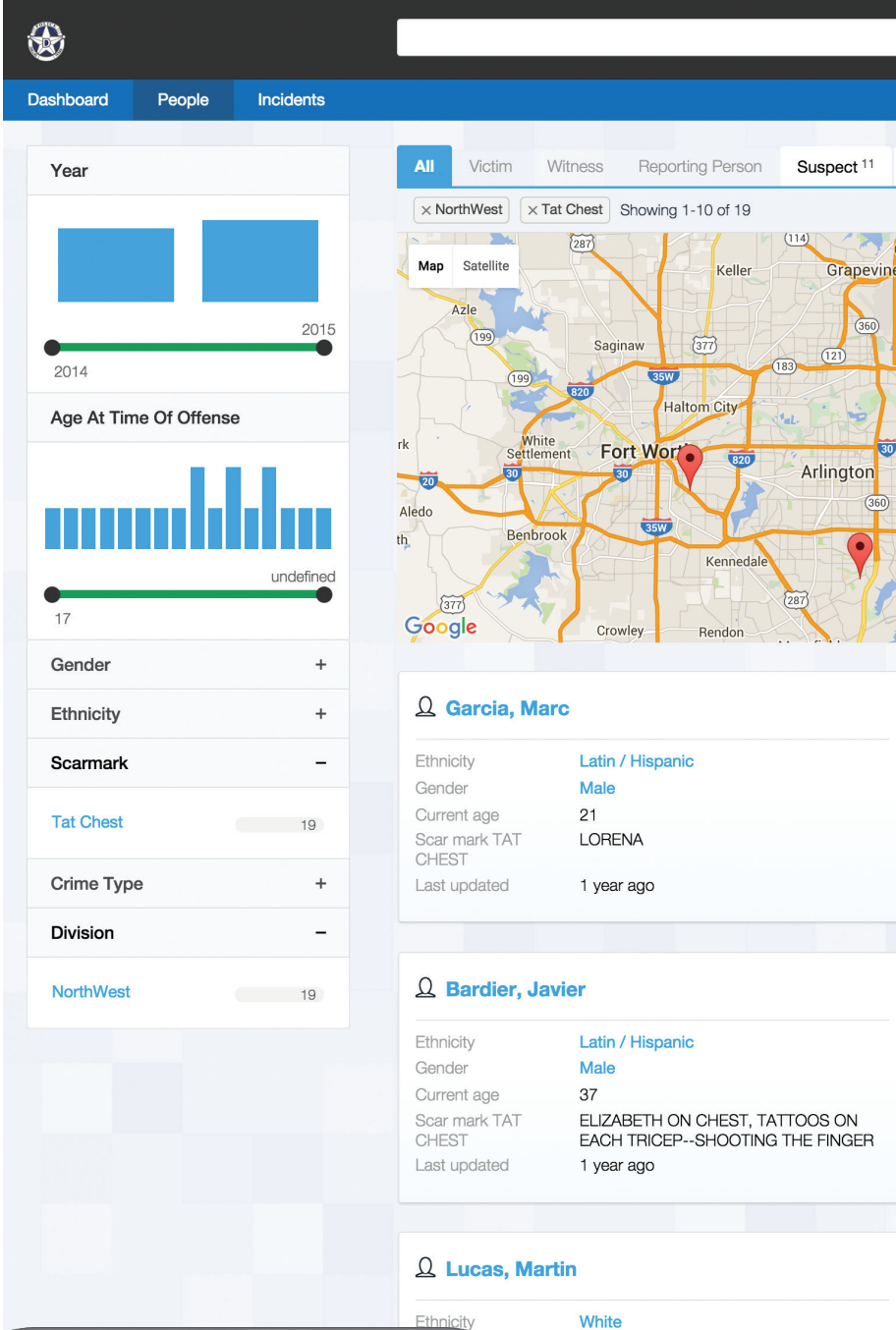
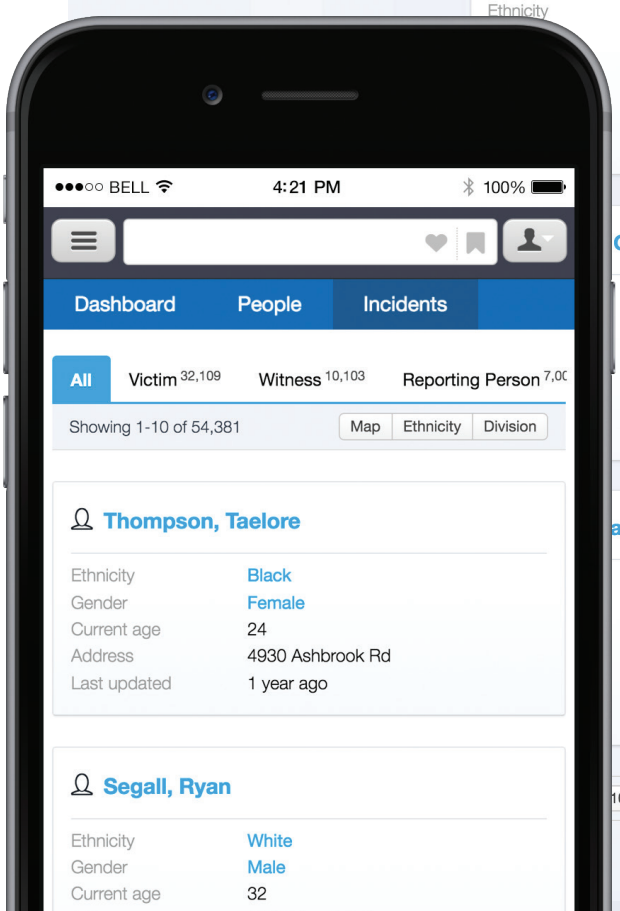
Looking for People

Much like the incident search page, the Person search page offers operatives a range of tools to find, refine and pinpoint an individual or set of individuals.

By invisibly embracing different data sets together on this page, we enable operators to mix geographical and personal data queries together. In this application we allow filtering on scar and tattoo data, allowing operators to define very specific queries: “Show me all people with chest tattoos in Northwest Dallas”, for example.

In production this view can be enhanced with additional sources of data and more sophisticated visualizations and statistics, for example the ability to automatically compare known individuals with unknown suspects based on distinguishing features; and adding more tactile, refined tools for choosing things like identifying marks or other physical attributes to make it quicker and easier for arresting officers to use the platform.





Right, top: by adding physical characteristics data to the application, officers can filter down searches with a higher degree of accuracy. With individuals plotted on the map, this could potentially open up new avenues for investigation (e.g. gang affiliation of individuals, and research into gang movement).

Right: The search interface works perfectly on all devices, to ensure suitability in the field.

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Summary

We believe that by making data easier to interact with, it can uncover new insights and make a real difference to people's lives.

This application provides a compelling case for search enabled offender profiling and crime analytics, and it was created in just 10 days. That's 10 days end to end; from initial loading of the data, to deploying a feature complete, mobile-ready application.

Our prototype combines high level overviews with dedicated detail views that pull together and present **relevant, peripheral behaviors and trends** including notable locations, commonly seen local characters, and **the ability to spot and highlight potentially related incidents**.

Perhaps most importantly, it allows operators to interact with, explore and journey across the data in an open way that supports their needs.

About Us

Twigkit is a software company with offices in San Jose, London and Cambridge. Over the past 7 years our technology has changed the way forward thinking global organizations access and make sense of their data.

Fortune 500 companies trust us with their search and discovery needs, alongside governments, military, manufacturers, media, retailers, charities, financial services, and more.

By solving complex problems with simple building blocks, marrying great defaults with fine grained control, and abstracting retrieval from any data provider, we enable custom search and discovery applications in a fraction of the time of bespoke development, and with demonstrably better results.

If you have a project of your own in mind please don't hesitate to get in touch with us at hello@twigkit.com or call us on **+44 (0)1223 653 163** (UK) or **(408) 678 – 0400** (North America)..