Vivid

**Improving Information Capture
for Law Enforcement**

Team Themis | Summer 2017

> " *I'm a big proponent of getting things down as quickly as possible [because] scenes change in an instant... there's a lot lost.* "
>
> **— Detective and Former Patrol Officer**
> Allegheny County Police

Executive Summary

Documenting information is a critical part of the criminal justice system. This information is passed between many stakeholders such as police officers, detectives, and attorneys, and plays a core role in their duties.

Police officers responding to the scene are often the first line of this information collection process. What they initially note down can decide the course of future steps. Currently, officers rely on a traditional pen-and-paper method for taking notes. This method can be cumbersome, resulting in incorrect details or mis-remembered information. The mistakes made can cause complications down the line.

In partnership with Deloitte Digital, Team Themis designed Vivid, a mobile application to improve information capture for law enforcement in the field. Vivid makes taking notes a less painful experience while improving information accuracy. It also allows new types of information capture not previously possible with pen and paper.
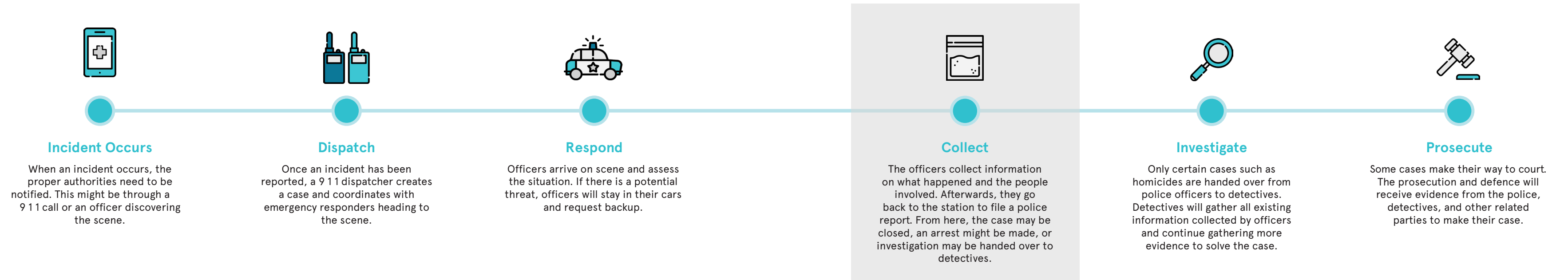
Table of Contents

Current Ecosystem of a Police Case

The life of a case has many steps that span multiple stakeholders. In this process, there are many areas that could benefit from better design.

Our solution focuses on improving the **Collect** stage, where we felt we would have the biggest impact.

Incident Occurs
When an incident occurs, the proper authorities need to be notified. This might be through a 9 1 1 call or an officer discovering the scene.

Dispatch
Once an incident has been reported, a 9 1 1 dispatcher creates a case and coordinates with emergency responders heading to the scene.

Respond
Officers arrive on scene and assess the situation. If there is a potential threat, officers will stay in their cars and request backup.

Collect
The officers collect information on what happened and the people involved. Afterwards, they go back to the station to file a police report. From here, the case may be closed, an arrest might be made, or investigation may be handed over to detectives.

Investigate
Only certain cases such as homicides are handed over from police officers to detectives. Detectives will gather all existing information collected by officers and continue gathering more evidence to solve the case.

Prosecute
Some cases make their way to court. The prosecution and defence will receive evidence from the police, detectives, and other related parties to make their case.

A Day in the Life of an Officer

Officer Robin Thompson is a patrol officer with the Pittsburgh police with nine years of experience. At 3:30pm on Saturday, July 29, he receives a call to respond to a hit and run.
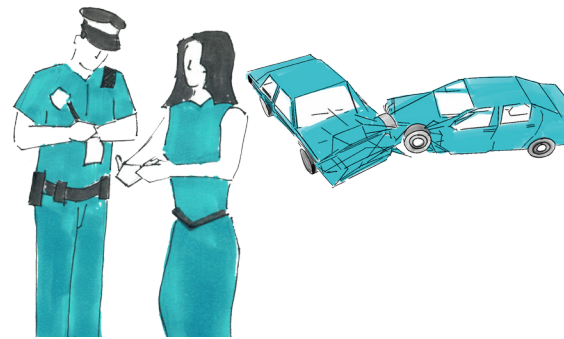
Officer Thompson takes victim's information

⚡ Officer Thompson needs to write down key information quickly in his notebook while talking to the victim and paying attention to the scene.

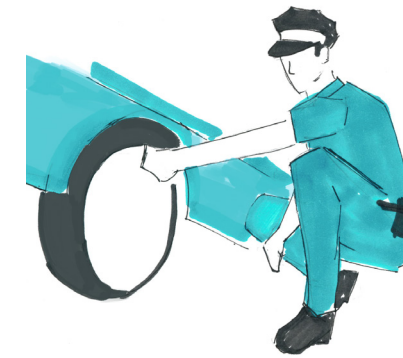⚡ Officer Thompson makes an error while copying down the victim's license number. Errors like this are common..

A witness tries to describe what happened

⚡ The witness does not speak English so Officer Thompson does not understand what he is saying and cannot capture his account.

Officer Thompson takes note of the scene

⚡ Officer Thompson writes down or sketches important information from the scene. This is time-consuming and it is impossible for him to capture all of the details of what he is seeing.

⚡ Officer Thompson does not include time, weather, or road conditions in his notes, all of which are important for investigators to be aware of later on.

Officer Thompson writes a report at the station

⚡ Officer Thompson spends a lot of time reentering all of the notes he has already taken into the reporting software.

⚡ Officer Thompson is filing his report at the end of his shift and finds it hard to recall exact details of the incident even with his notes. The report that he files ends up missing details and containing incorrect information.

> " *Sometimes I don't even recognize my own writing.*"
>
> — **Patrol Officer**
> Pittsburgh Police

The Problems With Note-Taking in the Field

Gathering People's Information is Tedious and Error-Prone

Currently when an officer interviews a victim, witness, or person of interest, they need to collect a standard set of information. This is a time-consuming process and officers can make mistakes or forget to ask questions.

Language Barriers Obstruct Understanding

Officers, especially in urban areas, regularly encounter people who may not understand English. In these situations, officers lack the tools and support to overcome this language barrier. This is especially detrimental if the person they are talking with was a victim of a crime or has critical information about the case.

Handwritten Notes Lose Detail

When officers need to remember details about a scene, they write a description in their notebook. Doing this is time-consuming and lacks the detail that things like photos provide. This forces officers to rely heavily on their memory and can lead to mis-remembered or forgotten details.

In some cities like Chicago, more than 70% of reports miss important details and more than 30% contain errors, resulting in many legal repercussions.

Taking Notes is Painful but Essential

Officers need to take notes at the scene to capture important details as well as their own thoughts. They refer back to these notes when filing paperwork and writing their narrative. While richer information like pictures and audio recordings can ease some of the notetaking burden, they do not completely eliminate the need for writing down notes.

Officers Dread Writing Reports

From the time that officers respond to a scene, they are dreading the paperwork they will need to fill out afterwards. With a few exceptions, reporting software is archaic, difficult to use, and requires officers to re-enter information they have already gathered onto the computer.

Introducing Vivid

An Information Capture Platform for Law Enforcement

With Vivid, officers can capture information on a scene with greater speed, accuracy, and detail. Vivid is designed based on months of research that uncover many pain points and opportunities in how officers take notes today.

Collect witness and victim information

Support interactions with non-English speakers

Capture multimedia information

Take notes digitally

Speed up the reporting process

1. Collect Witness and Victim Information

Getting Personal Information is Tedious and Error Prone

**Scan Documents to Accurately Record Critical Information**

Vivid makes the process of collecting witness or victim information faster and more accurate by allowing officers to scan documents such as driver's licenses. It parses information from these documents to automatically record ID information and personal details.

**Confidence in gathering information**

For cases when someone does not have an ID, Vivid helps officers collect important information from people by guiding officers through a questionnaire with commonly asked questions.

Officers in the field can use Vivid to quickly gather the necessary personal details with the peace of mind that their information is accurate.

Scan important case documents.
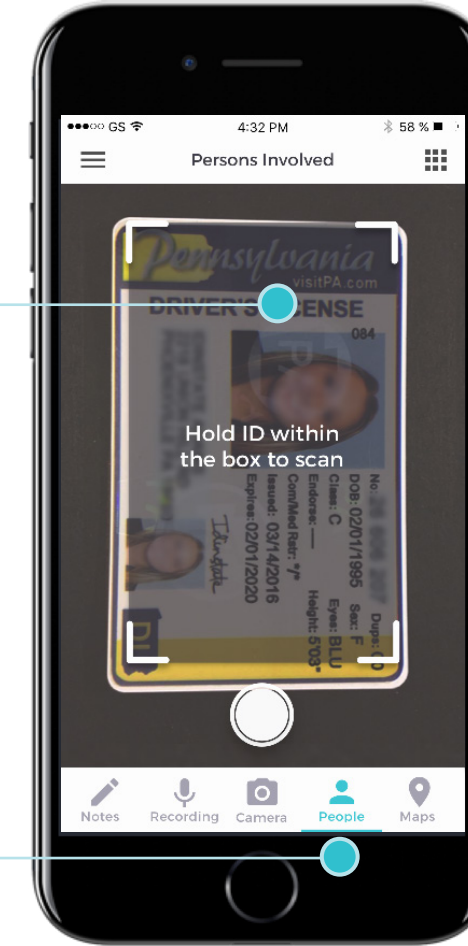
Capture information about people involved in cases
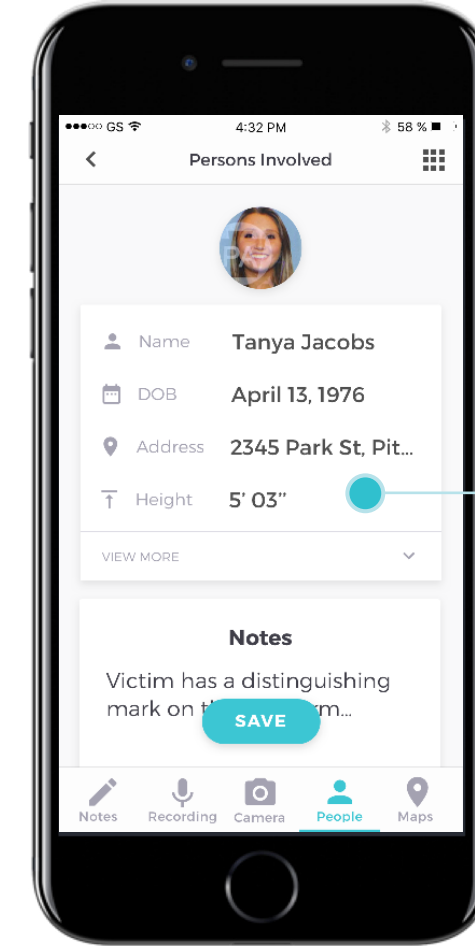
Automatically import critical information from documents

2. Support Interactions with non-English Speakers

The Language Barrier Obstructs Understanding is Tedious and Error Prone

Automatic live translation

Vivid allows an officer to record non-English speakers' accounts of events and translates them into English on the scene so that the officer can understand. The application saves both the English transcription and the original language transcription for professional translators can review if necessary.
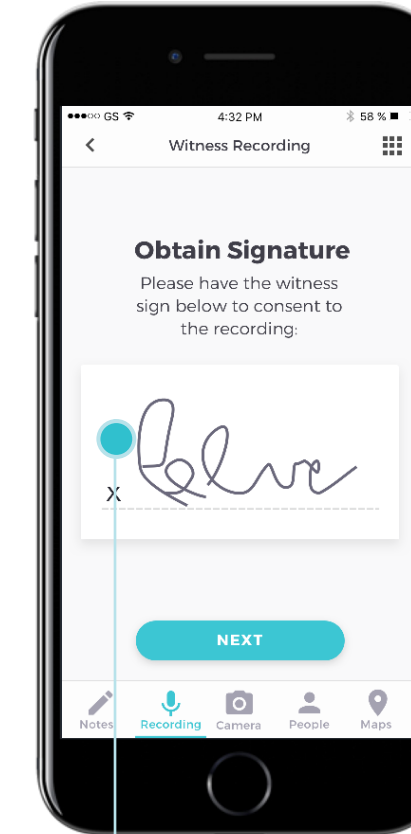
Breaking down barriers

Being able to understand what non-English speakers are saying without additional assistance or training means that more members of the police force can better serve a larger population of people.

Digitally acquire consent to record statement

View realtime translation of eyewitness accounts

Obtain Consent

Please read or play out loud the following consent form to your witness:

"Autoriza a la policía a grabar su testimonio para asistir en la resolución de su caso? Por favor firme si está de acuerdo."

NEXT

Obtain Signature

Please have the witness sign below to consent to the recording:

NEXT

English translation

I saw a tall man take off in a gray battered car as soon as he hit the other driver. He was wearing...

HIGH CONFIDENCE

Spanish transcription

Vi un hombre alto que se escapó en un carro chocado después de pegarle al otro conductor. Tenía puesto...

HIGH CONFIDENCE

0:03:43   NEXT

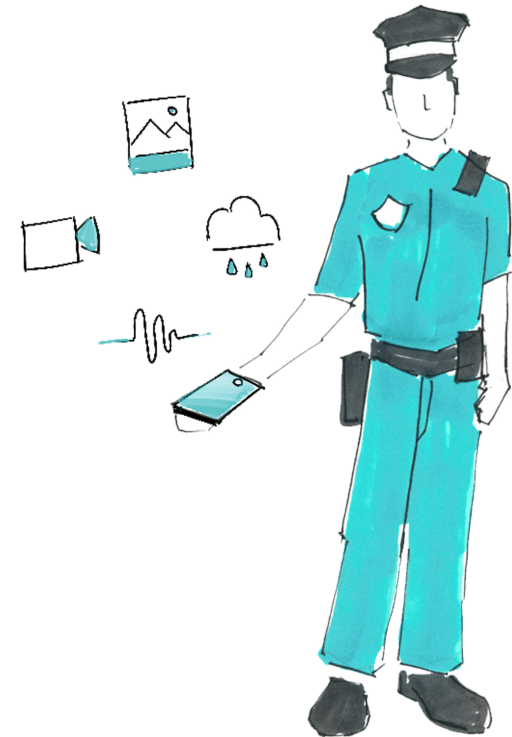Tab for recording witness or victim accounts

Easily capture a digital signature

Preserve transcription of original for records

3. Capture Multimedia Information
## Handwritten Notes Lose Detail

Capture multimedia evidence

Vivid makes it easier for officers to capture detailed scene information. Instead of writing down details in a notepad, officers can use Vivid to take pictures of the scene or to make notes about important locations or directions on a map.
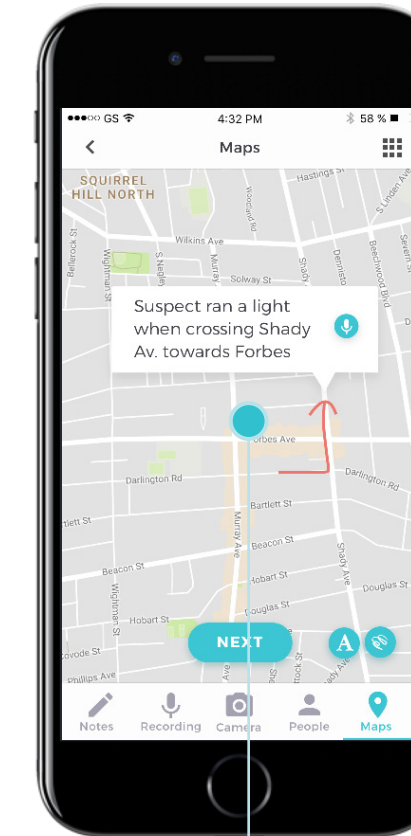
Clearer information, less interpretation

Capturing information in the form of pictures reduces ambiguity when referring back to notes later on, reducing the amount of time officers need to spend interpreting their notes or the notes of others.
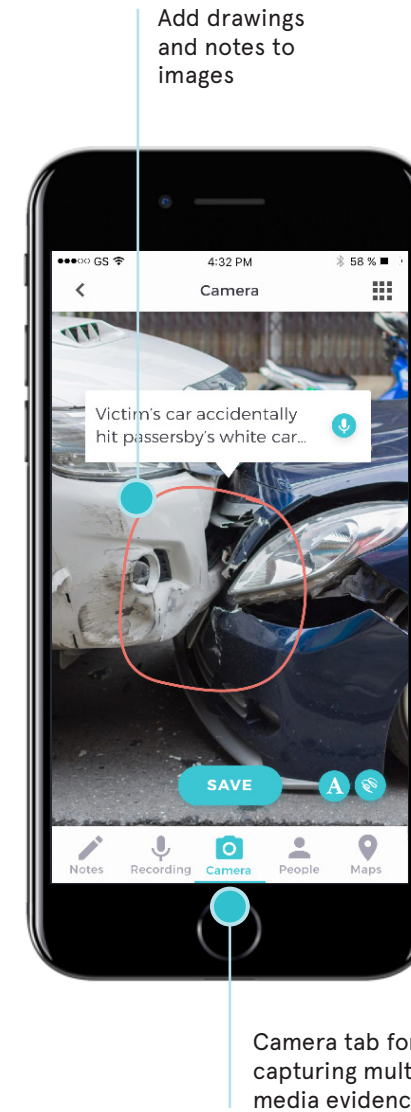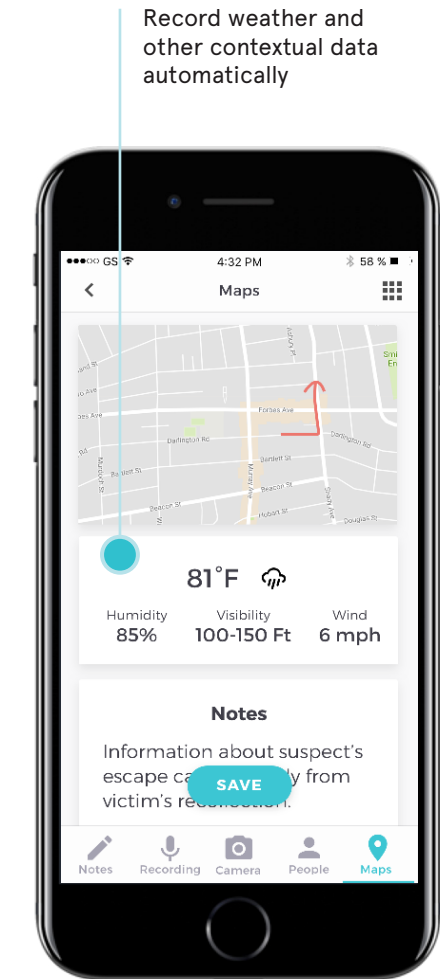
Add drawings and notes to images

Record weather and other contextual data automatically

Camera tab for capturing multi-media evidence

Annotate maps with contextual information

4. Take Notes Digitally

Taking Notes is Painful but Essential

Supporting the way officers already work

Vivid includes the basic functionality needed to take basic notes on a smartphone. Officers can take notes by dictating with voice, typing, or writing by hand.

Staying flexible

By including the basic feature of digital note taking, Vivid can seamlessly accommodate an officer's current workflow. This enables officers to use Vivid's other features as little or as much as they want while still being able to do their job.

This also makes Vivid more approachable for more experienced officers who may be resistant to changing how they work or who are not as comfortable using technology.

Notes can be typed or drawn with a stylus

Quickly capture notes while in the field
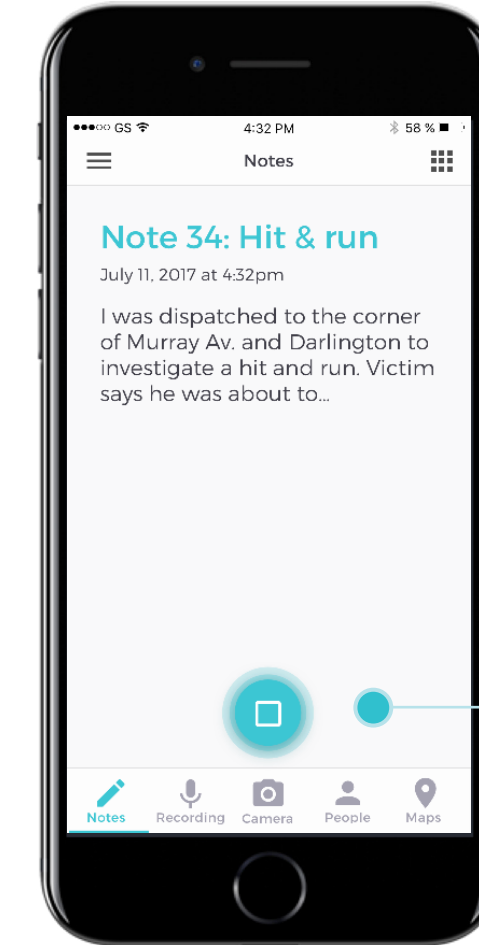
Dictate notes using voice-to-text technology

5. Speed Up the Reporting Process
Officers Dread Writing Police Reports

Vivid summary, smarter reports

Officers can review the information they captured using Vivid at any time, using either their phone or their desktop computer back at the station. Reviewing the information they captured, especially pictures and video, will help the officer to remember the details they need to include in their report.

Additionally, Vivid can help ease the burden of duplicating information in multiple locations. By integrating with the agency's Report Management System, Vivid intelligently completes parts of the report with the information the officer already captured using the application.

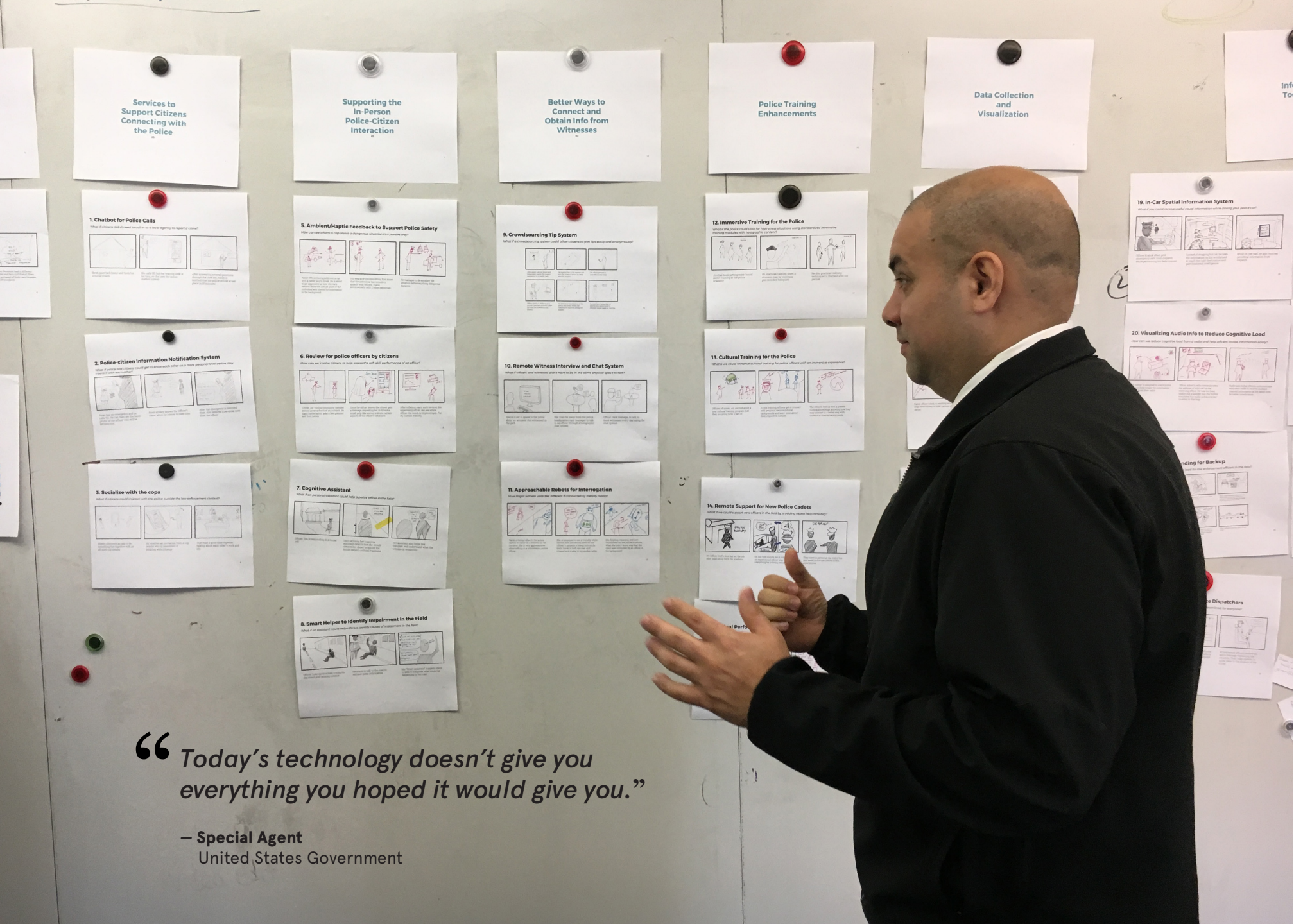### Making writing reporst easier and more accurate

Officers will be able to write more detailed reports with fewer errors, in less time.

Generate olice reports based on evidence collected

Review case notes on a desktop
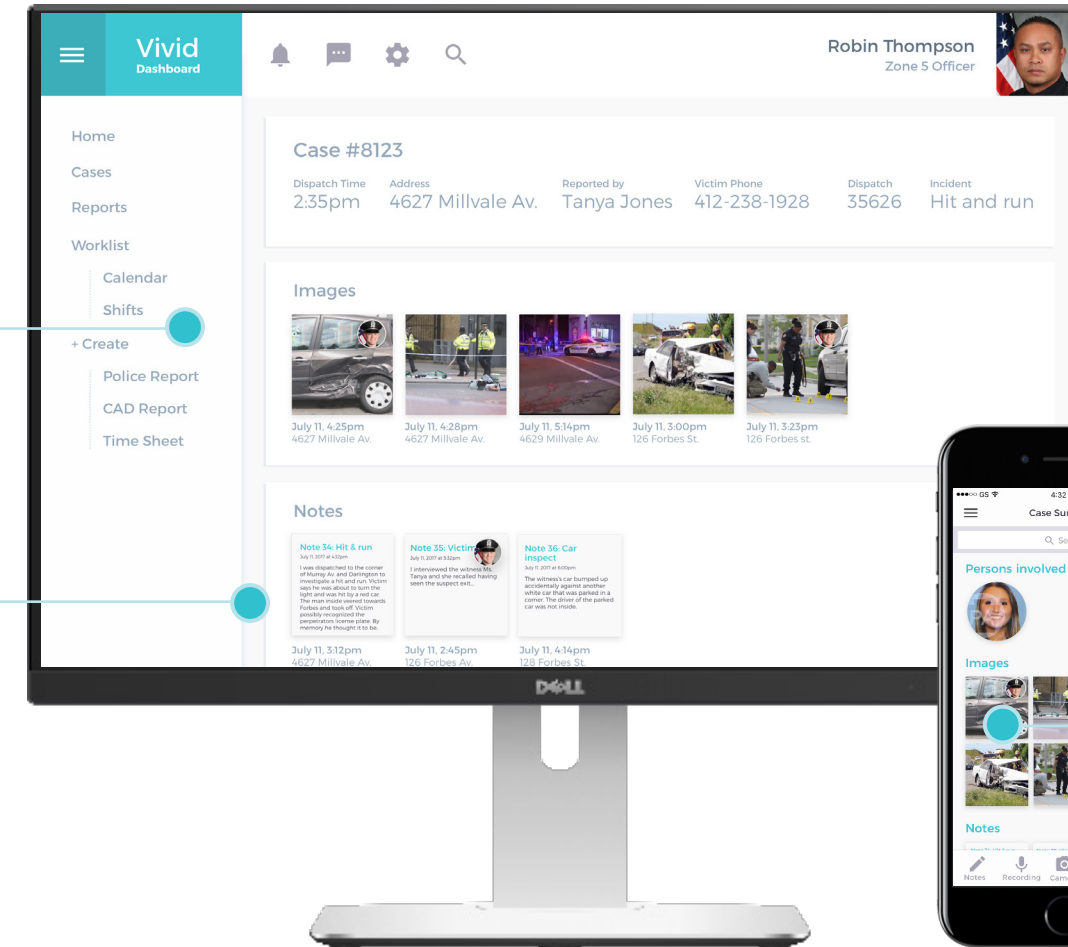
Review data collected by colleagues and collaborators

> *Today's technology doesn't give you everything you hoped it would give you.*
>
> **— Special Agent**
> United States Government

Key Design Factors

Through our research and testing, we identified four critical guiding factors when designing for police officers in the field.

Speed
Police work requires rapid responses to fluid situations; it is important to capture information quickly before the scene changes or before needing to leave to respond to the next situation. To be effective and desirable for police officers, a tool needs to be fast and unobtrusive.

Usability
Many police officers we spoke with, regardless of age, do not consider themselves to be savvy technology users. Like many people, they tend to blame themselves when they cannot understand how a piece of technology works and they look for ways to work around it. The application should reflect officers' mental model and not rely on hidden interactions like gestures.

Flexibility
After shadowing multiple officers in the field and testing Vivid with them, we found that each officer has a different approach to taking notes. Because we want Vivid to augment officers' way of working rather than disrupt it, we need to design with flexibility in mind.

Portability
Officers are always on the move and only bring what they can easily carry, such as pocket-sized notebooks. When designing a solution for police, it is important to be cognizant of how form factor impacts usability in the field.

Ruggedness
Officers need to feel comfortable exposing their device to rough conditions without a fear of breaking it. For example, in an emergency, an officer might need to drop what they are holding in order to draw their gun.

Our Process

Our Previous Research

We started our project by spending three months conducting exploratory research so that we could identify the most compelling opportunities to design for law enforcement. Here we summarize our insights from that research and the design directions we identified from those insights.

Reliance on Community Relationship

Increased transparency from law enforcement could help communities gain a better understanding of the police and build trust and rapport.

Influence of Social Media

While social media can be a valuable information source and platform to strengthen connections with the community, it has also increased public scrutiny of police.

The Necessity of Soft Skills

Officers regularly rely on their soft skills to comfort victims, collect information, and de-escalate intense situations. However, police training does not focus on developing these essential skills.

Inefficiencies of Technology and Communications in the Field

Officers need quick access to information in order to accurately make split-second decisions. Unreliable information, inefficient communication channels, and cumbersome tools can make fieldwork difficult and dangerous.

Design Direction 1
Designing to Improve Community Rapport

Law enforcement relies heavily on the support and cooperation of local communities to effectively perform their duties. Public trust in law enforcement is recovering from an all-time low in 2015 and as a result, officers have difficulty getting members of the community to trust and work with them.

Design Direction 2
Designing to Improve Tools In the Field

Fieldwork requires law enforcement officers to make split-second decisions in unpredictable situations which can escalate dangerously.

Tools officers use to collect evidence, communicate, and look up suspect information can be unreliable or cumbersome, costing precious decision-making time.

To learn more about our spring work, please refer to the spring book.

What We Did in Summer

Storyboarding and Speed Dating

We started the summer phase of our project by creating 36 storyboards focused around our two design directions. We showed these storyboards to law enforcement officers and members of the public so that we could identify the most compelling ideas.

Key Takeaway

Officers responded strongly to the need to collaboratively collect and analyze information on a scene. We found that citizens were not as interested in improving relations with police.

Police Ride Alongs

We shadowed several patrol officers to gain a better understanding of law enforcement's needs for collecting information during incident response.

Key Takeaway

When officers take notes on scene, they are primarily concerned with speed. Today, they rely on writing in paper notebooks, which are slow and error prone.

Design & Feedback

We created multiple design iterations and user tested them with law enforcement officers. Their feedback helped us shape Vivid to be more useful and usable.

Key Takeaway

Officers saw value in capturing richer data such as images and voice, which would be helpful for writing reports later. We also learned that a new digital tool must have a small form factor and high legibility to be adopted by officers.

> " I see this having a place in our existing system, especially for new cops."
>
> — **Detective and Former Patrol Officer**
> Allegheny County Police

About Us

The Team

Shannon Sullivan
Research Lead

User experience designer with a passion for research.

Alex Wang
Project Manager

Bachelor's in Information Systems and Human-Computer Interaction, Minor in Design

Vita Chen
Technical Lead

UI/UX engineer interested in developing user-centered applications and software.

Irene Alvarado
Prototype Lead

Interaction designer and creative technologist working on emerging technologies.

Sriram Venkiteswaran
Design Lead

Electrical Engineer from India. Interaction Designer & Experience crafter.

Clients

Devon Halley
Senior Manager,
Deloitte Digital

Alicia Salvino
User Experience Designer,
Deloitte Digital

Margo Femiano
Product Manager,
Deloitte Digital

Faculty Advisors

Nancy Duan

Derek Wahila

About HCII

The Human-Computer Interaction Institute (HCII) is a department housed in the School of Computer Science at Carnegie Mellon University. Drawing on research in the fields of design, computer science, and the behavioral sciences, the HCII takes an interdisciplinary approach to creating technology that supports and advances human endeavors. The Masters in HCI (MHCI) program is a 12-month, three semester, graduate program where students learn the fundamentals of programming, design, and research methods. In the second and third semesters of the program, we have the opportunity to apply the methods and skills we have learned in a capstone project. This book is the culmination of the third and final semester of the capstone project.

We would like to thank our client, our advisors, and the Carnegie Mellon HCII faculty for giving us their feedback and support throughout the project.

Additionally, we would like to express our sincere gratitude to the Pittsburgh Police Zones 1, 3, and 5 for allowing us to shadow officers and user test.

Team Themis + Deloitte Digital