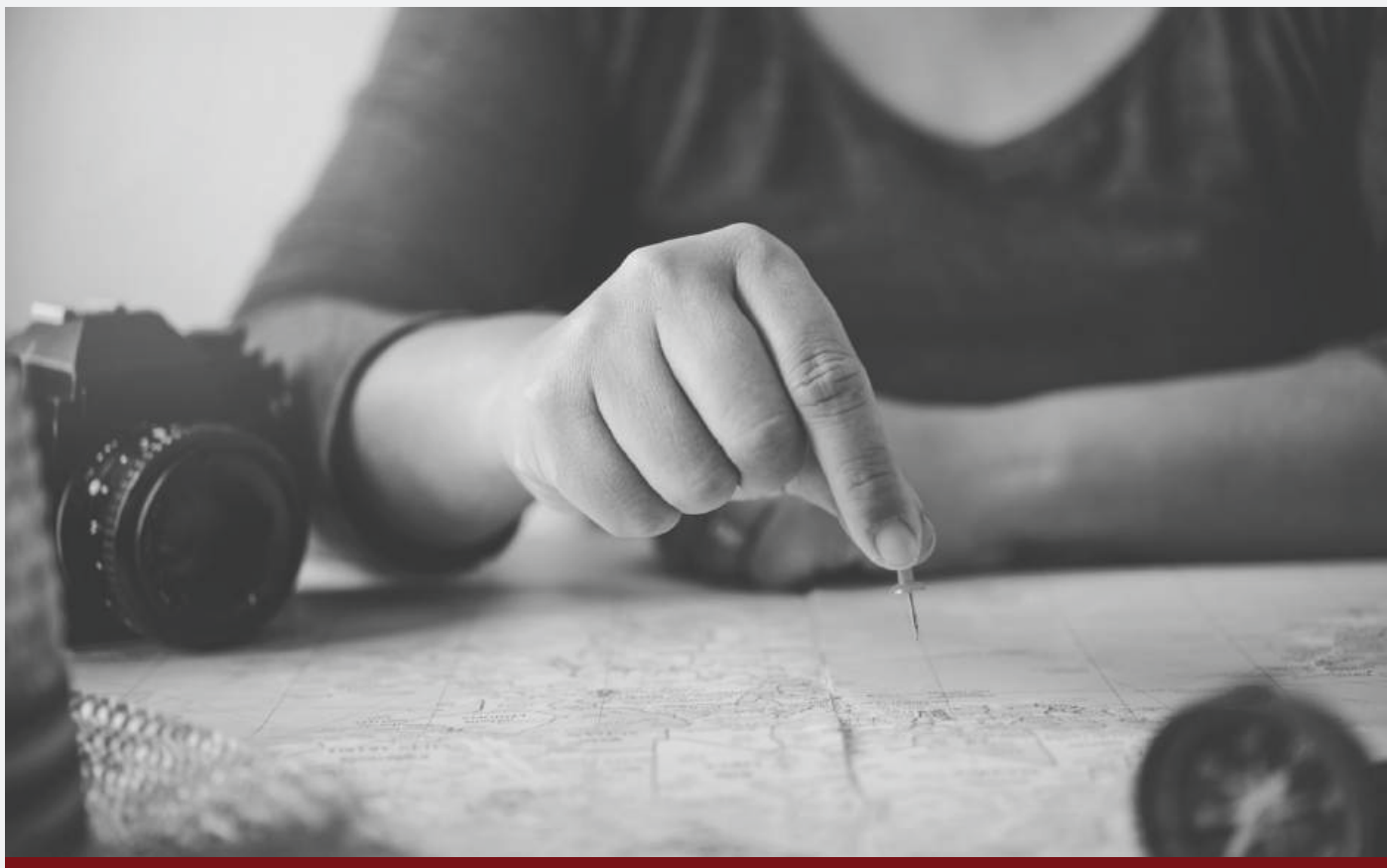




Leveraging AI and Creative Problem-Solving in Cold-Case Investigations

A Comprehensive Review Of Team Monocles
Summer 2024 Case Research



TEAM MONOCLES MISSION:

To bring hope, healing, resolution, and justice for the families of victims, while holding the perpetrator accountable.

OCTOBER 2024

Leveraging AI and Creative Problem-Solving in Cold-Case Investigations

A Comprehensive Review of Team Monocles

Fall 2024

Abstract

Cold cases represent some of the most daunting challenges in law enforcement. Time erodes evidence, memories fade, and the trail of clues can grow cold. In this context, the potential of artificial intelligence (AI) to sift through vast amounts of data and uncover hidden patterns offers a beacon of hope. Team Monocles was formed in response to this potential, driven by a mission “to bring hope, healing, resolution, and justice for the families of victims while holding the perpetrator accountable.”

This whitepaper chronicles the innovative journey of Team Monocles, a group of nine dedicated volunteers who united to reinvestigate a complex, decades-old, cold-case homicide in collaboration with the Indianapolis Metropolitan Police Department (IMPD). Drawing upon advanced AI tools and the Simplexity creative problem-solving process, the team sought new insights to propel the case toward resolution. Over four intensive months, they navigated the challenges inherent in processing non-digital historical data, coordinating among volunteers with demanding professional lives, investigating a complex homicide, and

grappling with the limitations of current AI technology.

Despite these obstacles, the team achieved significant milestones. They developed comprehensive profiles for key individuals involved in the case, advanced the use of social network analysis tools to map intricate relationships, and gained profound insights into the integration of AI in complex investigations. Their efforts contributed valuable assets to IMPD and generated widespread interest in applying AI and collaborative problem-solving in cold-case investigations.

This document delves deeply into the team’s composition, methodologies, successes, challenges, and the lessons learned. It offers candid reflections from team members and provides recommendations for future initiatives. Aimed at law enforcement agencies, policymakers, potential funders, AI practitioners, and engaged citizens, this whitepaper aspires to inspire and inform ongoing and future efforts to bring closure to unresolved cases, delivering justice and healing to affected families and communities.

Intended Audiences



Anticipated Readers

The team developed this whitepaper for a diverse audience, including law enforcement agencies seeking innovative methods to address cases, city officials interested in supporting such initiatives, potential funders, AI enthusiasts exploring real-world applications of technology, and engaged citizens fascinated by the process of solving cold cases. It provides a comprehensive and candid account of the project while offering insights and recommendations to inform future efforts in this critical field.

Contact Information

For more information, contact Ron Brumbarger –
ron@brumbarger.com / 317.490.4376

Introduction

In Fall 2022, the Indianapolis Metropolitan Police Department Homicide Branch engaged with Ron Brumbarger to apply innovative methodologies and technologies to a twenty-four-year-old unsolved homicide. This effort came on the heels of a similar partnership a few years earlier involving a different unsolved homicide with the intent to build upon some of the lessons learned. As with that prior endeavor, Ron's team had access to the actual case file to study and develop an action plan.

After some starts and stops with different teams and members, in 2024, the final eight members were locked in, and Team Monocles was born! This group contained a wide range of skill sets and life experiences, but all were thoroughly focused and dedicated to the mission before them. Once they agreed on their self-imposed deadline of four months, they set about a division of labor that made sense based on their interests and areas of expertise.

The effort yielded a fresh set of action items for detectives to pursue in our quest to realize the ultimate legal goals of arrest, conviction, and sentencing. But, more broadly, the effort is to provide hope, healing, resolution, and justice for the victim's loved ones and the community.

Like the trailblazing technologies of fingerprints and DNA and the trailblazing techniques of psychological profiling and cognitive interviewing, Team Monocles has now spearheaded the technology of artificial intelligence (AI) along with techniques of creative problem-solving (Simplexity) that may well prove to be an effective combination in advancing homicide investigations beyond traditional means. As with the aforementioned technologies and techniques that have proven their value in resolving tough cases, AI and Simplexity show some promise of similar usefulness.

Team Monocles and I hope their groundbreaking effort will pave the way for others to achieve success in the world of unsolved cases.

Captain Roger Spurgeon
Homicide Branch Commander
Indianapolis Metropolitan Police Department



Acknowledgments

Team Monocles thanks the Indianapolis Metropolitan Police Department, the City of Indianapolis, and Captain Roger Spurgeon, for entrusting them with this significant responsibility. The opportunity to contribute to such a worthy cause was an honor and a profound learning experience.

Donors

The team is deeply appreciative of the donors who supported the project financially. While the GoFundMe campaign did not reach its ambitious goal of \$10,000, the approximately \$1,000 raised was instrumental in covering essential expenses, including team incidentals, work session snacks and meals, and printing costs. These contributions made a tangible difference

in enabling the team to conduct their work. The team would like to thank the following individuals for their financial contributions to the effort – Matt Farr, Darlynn Edmonds, Jeff Lefever, Tom Hileman, Frank Howard, Joel Tragesser, Ron Brumbarger, and several anonymous donors.

Apprentice University Students

Team Monocles deeply appreciates the initial investigatory work, document scanning, and file preparation of the following Apprentice University students – Tanner Click, Evan Reynolds, and Arianna McEntire.

Encouragers

- Recognition is due to the media outlets covering the project, most notably Current Newspapers, for their initial team coverage. Their interest and reporting amplified the initiative's reach, bringing greater visibility to the challenges and opportunities in cold-case investigations.
- The team appreciates using a classroom at the Indiana Wesleyan Carmel, Indiana facility for weekly work sessions. Likewise, CoHatch's (Zionsville, Indiana) scholarship of meeting space proved invaluable.
- Finally, the team acknowledges the individuals who expressed interest in joining or supporting future projects. The widespread enthusiasm underscores the community's desire to see justice served and offers hope for continued efforts in this critical area.

Whitepaper Reviewers

Team Monocles is grateful to the following individuals for their assistance in reviewing and producing this document – Katrine Malika and Anissa Martin.



Team Composition

The strength of Team Monocles was in its diversity and the collective commitment of its members. The carefully assembled team included individuals with a wide range of expertise, ensuring multiple vantage points in analyzing the case details. The team's work sessions were conducted every Monday evening from June 2024 through September 2024. All team members contributed to the person of interest research. The members and their roles were as follows:



- **Robin Lanning, Work Session Facilitator**

Responsible for structuring meetings, keeping the team focused on objectives, ensuring that sessions were productive, and advancing toward the team's goals.

- **Sophia Delgado, Project Manager**

Managed the logistical aspects of the project, including scheduling work sessions, preparing detailed agendas, and meticulously documenting processes and decisions made during meetings.

- **John Qualls and Terrence Kunstek, AI Specialists**

Responsible for developing and managing the AI platforms, including the intricate work of prompt engineering and data integration. They were instrumental in attempting to adapt AI tools to process historical, non-digital data.

- **Cloe Kunstek, Technical Liaison**

Assisted team members with technical challenges, coordinated AI data management, and helped ensure network and information access.

- **Frank Howard, Team Cohesion & Partner Liaison**

Played a critical role in filling various roles in the absence of team members and managed relationships with potential third-party partners and stakeholders.

- **Dana Renay, Lead Researcher**

Led the effort in capturing, organizing, and synthesizing data from the team's research activities, ensuring that findings were systematically documented and accessible for analysis.

- **Ron Brumbarger, Team Lead & Communications Liaison**

Managed engagement with IMPD, other law enforcement agencies, media outlets, and the public. This role was crucial in maintaining transparency with stakeholders while safeguarding confidential information.

- **Ann Marie Stambaugh, Embedded Journalist**

Witnessed and wrote about, firsthand, the team's work from inception through project close. While not responsible for case research, having an embedded reporter proved valuable as a catalyst behind the significant media interest in the team's work.

Despite the team's solid foundation, there are inherent challenges in coordinating a volunteer group. All members were professionals with demanding careers. The project relied on their availability to perform case research, partner conversations, application development, project management, and collaboration outside regular working hours. Expected inconsistent availability introduced delays in meeting intra-session deliverables.

These challenges underscored the complexities of volunteer coordination in intensive projects and highlighted the need for clear expectations, consistent communication, and strategies to mitigate the impact of variable commitment levels. Nevertheless, the team's dedication to seeking justice for the victim and their family remained a unifying theme throughout the project.



Processes and Methodologies

The multifaceted nature of the cold case required an equally multidimensional approach that combined traditional investigative techniques with innovative problem-solving methodologies and advanced technological tools.

Traditional Investigative Techniques

Given the limitations of AI technology in processing non-digital, historical data, the team relied heavily on traditional investigative methods. Each member was assigned specific individuals from the case files to research thoroughly. This process involved several vital activities:

- **Manual Examination of Case Files:** Team members painstakingly read thousands of pages of scanned documents, which included detective notes, witness statements, and various reports. The lack of digital data meant that much of this work was done manually, often deciphering handwritten notes that were difficult to read.
- **Profile Development:** Using the information gleaned from the documents, members developed comprehensive profiles for each person of interest. These profiles included detailed biographical information, known aliases, relationships with the victim and others, and involvement in events pertinent to the case.
- **Timeline Construction:** The team assembled chronological timelines to map out events leading up to, during, and after the crime. While the team never entirely completed an exhaustive timeline, what was generated helped identify patterns, inconsistencies, and potential new avenues of inquiry.
- **Relationship Mapping:** The team constructed complex social network maps by identifying and documenting individual relationships. Unfortunately, these breakthroughs came late in the process, but the team is confident it would have helped uncover indirect connections and understand the dynamics within the network of people involved.

While labor-intensive, these traditional methods were essential in building a solid foundation of knowledge about the case that was useful to inform the AI tools and guide further investigation.

Applied Creative Problem-Solving

The team faced procedural roadblocks or uncertainty about the next steps at several points during the project. They employed the Simplicity creative problem-solving process developed by Basadur Applied Innovation to overcome these challenges. This methodology involves an eight-step process that fosters

a deep understanding of problems, generates innovative solutions, and informs effective action plans. The steps include problem-finding, fact-finding, problem-definition, idea-finding, evaluation and selection, action planning, gaining acceptance, and taking action.

By applying Simplicity, the team was able to:

- **Clarify Challenges:** Break down complex problems into manageable components, enabling a clearer understanding of the issues impeding progress.
- **Generate Innovative Ideas:** Encourage open-minded thinking and the generation of novel solutions beyond traditional approaches.
- **Facilitate Team Engagement:** Involve all team members in the problem-solving process, leveraging the diverse perspectives within the group.
- **Implement Action Plans:** Develop concrete steps to move forward, ensuring actionable strategies.

This approach helped navigate the complexities of the investigation and maintain momentum when progress seemed elusive.



Custom-Developed AI Applications

Recognizing the potential of AI to revolutionize investigative work, the team endeavored to integrate advanced technological tools into their process despite the inherent challenges. Several custom AI applications and tools were developed or attempted during the project, including:

- **Person of Interest Profile Generator:** This tool automated the creation of profiles for persons of interest by extracting and organizing relevant information from the case files. While the arrival of this tool was late in the team's process due to technical constraints, preliminary results indicated its potential usefulness in streamlining the arduous and time-consuming profiling process.
- **Social Network Analysis (SNA) Tool:** This application used node and edge technology and helped visualize the complex web of relationships among individuals involved in the case. It allowed the team to identify central figures, discover indirect connections, and gain insights into the social dynamics. Like the profile generator, this application also arrived late in the team's process and, while immensely valuable, could not be fully deployed. Future teams that use AI as a base toolset should start with an SNA tool. See more on social network analysis later in this document.
- **Discrepancy Catcher:** Planned as a tool to automatically identify inconsistencies and contradictions in testimonies and statements, the development of this application faced significant hurdles. The AI struggled to process the non-digital, often illegible (scanned) data, making it difficult to achieve reliable outputs. This application holds considerable promise for a subsequent case, but the complexity caused its late arrival in the team's process.

Assets Created

Throughout the project, Team Monocles produced several tangible assets that contributed to the investigation and will serve as valuable resources for IMPD for the case undertaken and future endeavors by other teams.

The team developed a comprehensive profile template for persons of interest, which became a foundational tool in their investigation. This template includes:

- **Biographical Information:** These schedules included detailed personal data such as full names (including any aliases or nicknames), dates of birth, and other identifying information.
- **Relationships:** This documentation included details of familial ties, friendships, professional associations, and any other connections to the victim or other key individuals.
- **Sequence of Events:** These lists include a detailed record of each individual's actions, movements, and statements related to the case, including any inconsistencies or notable behaviors.
- **Additional Notes:** Space for observations, unanswered questions, and areas requiring further investigation.
- **Technology Library:** A detailed list of all technologies, version numbers, source code, and configurations used by the team.

To the best of their abilities, the team ensured all persons of interest profiles were thorough and consistent by standardizing the information collected and facilitating more straightforward analysis. Further, the team standardized upon the template generated, and the template was the target output of the profile generator application.

Social Network Analysis Tools

The team advanced node and edge technology to visually represent complex relationships within the case. These social network maps allowed the team to:

- **Visualize Connections:** See how individuals were linked, highlighting direct and indirect relationships.
- **Identify Central Figures:** Determine which individuals were most connected or influential within the network, potentially pointing to key persons of interest.
- **Uncover Hidden Patterns:** Recognize clusters or sub-networks that might reveal significant social dynamics or motives.

The development of these tools not only aided in the current investigation but also provided a framework for future cases.



Documentation and Frameworks

Process documentation was a hallmark of the team's approach. Some of the key documents produced included:

- **Meeting Summaries:** Detailed notes from each work session, capturing discussions, decisions made, challenges encountered, and action items for follow-up.
- **Mid-Project Progress Report:** A comprehensive report presented to IMPD on August 17, 2024, outlining the team's progress, preliminary findings, and recommendations.
- **Lessons Learned Document:** This reflective analysis captured the insights gained throughout the project, including what worked and what did not and suggestions for improving future investigations.
- **Detailed Data Preparation:** This detailed document included a step-by-step document articulating the transformation of incoming (raw) data into a format ingestible by the AI and related applications.
- **Standard Operating Procedures (SOPs):** This document included guidelines and procedures developed for data collection, case file organization, social network analysis, and technological tools.

These documents provide structure and continuity for the team and serve as valuable resources for future teams undertaking similar projects.



Summary of Deliverables

The team delivered the following documents and materials to IMPD. They are mentioned herein for posterity and subsequent researchers conducting similar work.

- **Meeting Summaries:** The detailed notes from all work sessions capturing discussions, decisions, challenges, and action items.
- **Technical Specifications:** This documentation contains details of the AI tools and applications developed, including methodologies, algorithms, and limitations encountered.
- **Templates and Frameworks:** Copies of the Person of Interest profile template, data organization frameworks, and standard operating procedures developed.
- **Mid-Project Progress Report:** The comprehensive report presented to IMPD detailing progress up to that point.
- **Artifact Catalog and Lessons Learned:** An in-depth analysis of the (non-case specific) artifacts generated insights gained throughout the project.
- **Case and Research Notes:** The aggregated and compiled list of profiles for all people of interest.
- **Case Timeline:** The abbreviated (due to time) timeline of events discovered in the case files.
- **Standard Operating Procedures:** Detailed step-by-step instructions on creating the social network analysis tools and the data migration processes.
- **Relationship Analysis:** A document containing detailed relationship information of key persons of interests

Tools and Technologies

The following outlines the technology tools, assets, and innovative methods integrated into the investigation to support human efforts and AI-driven insights.

- **Secure Data Hosting:** The team explored potential private servers to host non-public information securely. They utilized a team member's server to store files and all work products.
- **Implementation of a Secure Digital Environment:** The team implemented a secure digital environment that incorporated the following technological elements:
 - **VPN:** Wireguard was employed to ensure secure network connections.
 - **Search Engine:** sist2 v3.4.2 facilitated efficient data search capabilities.
 - **Database Management:** FileBrowser 2.3.0 was used to organize and access files.
 - **GPT Assistant Models:** Advanced AI models were used, including Llama, ChatGPT, Gemini, and Claude 3.5 Sonnet.
 - **Secure Browser:** Firefox was selected to enhance security during web interactions.
- **Development of Custom Applications:** Several applications were created to generate profiles, enable search capabilities, and aid in AI data ingestion. Comprehensive documentation for these applications was compiled and delivered to IMPD.
- **Optical Character Recognition (OCR) Processing:** The team completed OCR processing for scanned documents using Amazon Web Services Textract, achieving an estimated 75% accuracy.
- **Social Network Analysis Tools:** The team implemented Graphiti 0.19.2 to aid relationship visualization, social network analysis, and timeline presentation. Graphiti leveraged the profiles generated by the profile builder application (below). The team created Standard Operating Procedures (SOP) and sample target Excel templates for IMPD.
 - **SOP for Data Collection:** Detailed procedures were developed and delivered to IMPD, outlining the ideal data collection and case file organization.
 - **Relationship Map – Best Practice Template:** The team created a template containing the ideal profiles, timelines, and relationship structures to aid in future social network analysis applications.
- **Profile Builder Application:** The team developed an application to automatically generate profiles of persons of interest for ingestion into the AI engines.
- **Communication Platform:** The team used Slack for all non-confidential communication among team members, facilitating coordination and information sharing.
- **AI Note-Taking Tools:** An AI-powered note-taking application was implemented to capture and document meeting details efficiently.
- **Server Setup and Configuration:** A private server was established and configured to host the Large Language Model (LLM) AI, handling work products and databases to support the project's computational needs and sharing confidential case information.
- **Problem-Solving Methodologies:** The team utilized Simplicity in various problem-solving exercises to identify innovative solutions for stalled research processes and methodologies.

Note: The team investigated leasing a private server to host the AI domain at a local secure hosting service provider. Unfortunately, the monthly fee of \$2,500 exceeded Team Monocles' budget constraints.

The team enhanced its investigative capabilities by integrating these tools and technologies, enabling a more effective and efficient approach to the cold case investigation.

Successes and Achievements



Despite the myriad challenges faced, Team Monocles achieved several significant successes that contributed meaningfully to the investigation and the broader field of cold-case research.

Data Organization and Accessibility

One of the team's most impactful achievements was the successful digitization and organization of thousands of pages of case files. This monumental task began with students from Apprentice University (AU) meticulously scanning and organizing documents into folders categorized by persons of interest. The team then refined this organization, correcting earlier mistakes, such as using "stage names," and developing a practical taxonomy for the case materials. The original research team at Apprentice University did not have a private AI platform. As such, the AU team creates profiles of persons of interest using stage names instead of actual names to protect case privacy and confidentiality.

Profile Development

The team completed comprehensive profiles for approximately 90% of the key individuals involved in the case. These profiles provided a structured, detailed understanding of each person, which was crucial for manual analysis and AI tool input.

Advancement of Innovative Tools

By developing and attempting to implement custom AI applications, the team pushed the boundaries of current technology in cold-case investigations. Their work in social network analysis and the creation of profile templates set a foundation for future technological advancements and highlighted the potential of AI when combined with traditional investigative methods.

Media Outreach & Awareness

The project garnered substantial media attention, starting with coverage from Current Newspapers in Carmel. This exposure raised public awareness and generated interest among individuals and organizations who may support future initiatives.

- **Current Newspapers** (Carmel), 5/29/24 - Volunteer sleuths, advanced AI aim to help IMPD solve cold case.
<https://www.youarecurrent.com/2024/05/29/volunteer-sleuths-advanced-ai-aim-to-help-impd-solve-cold-case/>
- **Fox59** (Indianapolis), 6/12/24 - IMPD cold case subject of AI investigation. Fox 59.
<https://fox59.com/news/impd-cold-case-subject-of-ai-investigation/>
- **CBS4** (same as Fox59) (Indianapolis), 6/12/24 - IMPD cold case subject of AI investigation. WTTV CBS4Indy.
<https://cbs4indy.com/news/impd-cold-case-subject-of-ai-investigation/>
- **WRTV6** (Indianapolis) - 6/19/24 - Team of volunteers using advanced AI to help IMPD solve decades old cold case.
<https://www.wrtv.com/news/local-news/team-of-volunteers-using-advanced-ai-to-help-impd-solve-decades-old-cold-case>
- **IndyStar** (Indianapolis) - 8/27/24 - Team Monocles learning how to use AI on cold cases.
<https://www.indystar.com/videos/news/crime/2024/08/27/can-ai-solve-cold-cases/74729335007/>



Challenges

The project was not without setbacks that provided valuable lessons for future efforts or teams undertaking similar projects.

Contract Delays

- **Engagement Memo:** While the City of Indianapolis' contract review process extended over several weeks, this period allowed the team to align their strategies and prepare thoroughly for the project. The anticipation fueled the team's enthusiasm, leading to a well-coordinated start once the review was complete.

Alternative Deliverables

- **Deliverables of Value:** The project highlighted the importance of collaboratively defining a broad range of valuable deliverables with IMPD from the outset – something the team's leadership failed to do initially. This realization opened avenues for the team to consider additional ways to contribute meaningfully, enhancing the overall impact of their work beyond initial expectations.

Technical Limitations

- **AI Processing Capabilities:** Working with non-digital, historical data presented a unique opportunity to explore and understand the limitations and potentials of AI tools in this context. This experience underscored the significance of data quality and inspired considerations for technological advancements in data processing techniques.
- **Data Quality Insights:** The challenges faced with scanned documents and OCR inaccuracies emphasized the critical role of accurate and robust data preparation. The team gained a deeper appreciation for meticulous data handling, which proved invaluable in refining manual review processes and ensuring the reliability of AI analysis.
- **Innovative Infrastructure Use:** Operating with limited funding encouraged the team to be resourceful, leveraging volunteer-provided infrastructure effectively. This experience highlighted the potential benefits of advanced systems and informed future strategies for securing resources to enhance project capabilities.

Team Coordination

- **Adaptive Team Dynamics:** The volunteer nature of the team meant that members' availability fluctuated due to professional and personal commitments. Inconsistent attendance at meetings and delays, while anticipated, impeded progress. This challenge, while completely unavoidable, forced the team to remain agile and adaptive to the changing team member availability.
- **Secure Communication Practices:** Adhering to strict confidentiality requirements led the team to innovate their communication methods. This commitment to privacy safeguarded sensitive information while inhibiting the team's ability to co-create documents, collaborate effectively in real-time, and abide by the requisite security parameters.

Data Handling

- **Creative Confidentiality Solutions:** Initially, the team employed stage names for persons of interest to maintain confidentiality while using open AI platforms. This approach later proved to be a hindrance, causing confusion and necessitating time-consuming corrections. While the contents of the profiles generated were of value, the general nature of the weekly meeting frequency introduced uncertainties in the team's case review.
- **Emphasis on Data Digitization:** The project underscored the significant benefits of having native digital data. This realization underscores the importance of clean, digital data in future projects and minimizing the impact on workload efficiency and the effectiveness of AI tools.



AI Limitations and Adaptations

Integrating AI technology into the investigation was invaluable and yet challenging.

- **Non-Digital Data Processing:** The age of the case meant that all documents were in physical, hardcopy form. The team implemented a handwriting-to-text application, saving immeasurable hours in case research. Despite efforts to scan and apply Optical Character Recognition (OCR) technology via an AI application, the quality of the scans and the handwritten nature of many documents resulted in documents being approximately 75% accurate. This level was insufficient for reliable AI processing, yet that which was legible proved invaluable to the team's research.
- **Data Security Constraints:** Maintaining strict confidentiality was paramount. The team established a dedicated private network, accessible only via VPN, and refrained from disclosing case information through unsecured channels. This necessity limited the ability to use more advanced, cloud-based AI platforms that might have offered greater processing power and capabilities.
- **Co-Authoring Limitations:** The team struggled to co-author documents due to confidentiality concerns. On the surface, this limitation seemed trivial, and the team worked through document creation regardless. In hindsight, as the project ended, the team determined this was a significant barrier to their document production efforts.

A key aspiration of the team was to create "synthetic suspects" – AI-generated personas the team could interrogate to uncover new insights without the suspect fearing prosecution. However, current AI capabilities, especially within the constraints of a secure, closed environment without access to extensive open-source data, were inadequate for this task. As of the date of publication (fall 2024) of this document, the rapid development of tools to enable synthetic persons of interest should be available soon.

Despite these limitations, the team's efforts in developing and attempting to adapt AI tools provided insights into the current state of technology. They highlighted areas where future advancements in AI could significantly benefit cold-case investigations.

Lessons Learned

The experiences of Team Monocles offer valuable insights for future projects seeking to integrate AI and innovative methodologies into cold-case investigations. The Edison quote summarizes Team Monocles' work, "I didn't fail to make the light bulb 999 times; I learned 999 ways not to make it."

AI Integration

- **Preparation of Data is Critical:** The effectiveness of AI tools is highly dependent on the quality and format of input data. Future projects should prioritize accurately digitizing and organizing case files by employing professionals skilled in data organization.
- **Current AI Limitations:** While AI holds great promise, current technologies may not be suitable for processing historical, non-natively digital data (scanned) without significant pre- and post-processing efforts. Teams should set realistic expectations and consider hybrid approaches that combine traditional methods with AI where appropriate.
- **Potential for Future Advancements:** Continued developments in AI, particularly in natural language processing and data recognition, may eventually overcome current limitations. Staying abreast of technological advancements is essential for future projects and those using the framework outlined in this whitepaper to inform their work.





Team Dynamics and Volunteer Management

- **Clear Roles and Expectations:** Establishing well-defined roles, responsibilities, and expectations from the outset is essential. This clarity helps ensure all team members understand their commitments and contributions to the larger project.
- **Consistent Communication:** Regular, transparent communication helps mitigate the challenges of coordinating a volunteer team. Utilizing secure communication channels and setting standards for responsiveness can improve collaboration.
- **Professional Support:** Incorporating professionals like librarians or data specialists can significantly enhance efficiency. Their data organization and management expertise are invaluable, especially when dealing with large volumes of complex information.

Miscellaneous

- The team encountered dead ends and experienced complexity in seemingly simple tasks. Such was attributable to the steep learning curve of the case details, an all-volunteer team, and – most importantly – the pioneering nature of the work.
- The team would have benefitted from having the “regular detective process” explained in detail earlier in the workflow.
- The inability to co-author documents collaboratively due to privacy concerns hindered expedited document creation. For example, we could not confidently use Microsoft Word to co-author documents due to confidentiality concerns.
- Many files contained several document types within one file (e.g., interrogation notes and polygraph results), making it difficult to search within the documents for specific information. For example, a file might contain arrest records and a polygraph report on the last page.

Recommendations for Future Teams

- **Team Composition:** Ensure the team's composition represents various skills and strengths.
- **Secure Adequate Funding:** Sufficient funding is crucial to access necessary technological resources and professional support and alleviates some burdens on volunteer team members.
- **Focus on Data Organization:** Investing time and resources in organizing and preparing data at the beginning of the project pays dividends in efficiency later in the project.
- **Balance Technology and Traditional Methods:** Recognize the limitations of technology and do not rely solely on AI. Traditional investigative techniques remain essential, mainly when dealing with historical cases.
- **Interim Deliverables:** Determine and enumerate interim deliverables that add value to the case investigation.
- **Engage Stakeholders Early:** Establish clear communication with law enforcement agencies and other stakeholders to align expectations, understand legal or procedural constraints, and ensure support throughout the project.
- **Review Relationship Changes:** Research persons of interest and include profile information in the case, including:
 - Check if any relationships have changed since the case went cold.
 - Review social media and other sources to investigate current activities and status of persons of interest.
 - Determine the potential significance of any new relationships.
 - Create a list of individuals and specific questions for detectives to use in follow-up interviews.
- **Use Open Source Information:** Gathering open-source or public information about persons of interest and including such in profiles might provide insights into the case. In real life, detectives have little time to conduct such research and catalog their findings.
- **File Storage:** Implement a secure document collaboration platform to enable document co-authoring.
- **Reinterview:** Reinterviewing former friends and romantic partners and their connections with persons of interest might lead to additional insights. Interview questions generated by an adequately primed AI could prove helpful.
- **Narrations:** Capturing handwritten notes via OCR with fidelity is challenging. Minimize this issue while simultaneously embellishing the notes by detectives (with firsthand familiarity with the case) reading and recording their notes in an MP3 format. The MP3 files can be readily ingested into the AI.



Team Reflections

The members of Team Monocles offered candid reflections on their experiences, highlighting both the challenges faced and the personal growth achieved.



Robin

Participating in Team Monocles has been a transformative experience, reshaping my understanding of AI beyond its everyday applications. Initially, I was surprised by the limitations we encountered, but the process taught me invaluable lessons about how AI truly functions, especially in complex cases involving old, non-digitized files. While challenging at times, the diversity of skills within our team was essential to our progress, even when we faced setbacks. This project has changed how I approach AI professionally, enhancing my ability to prompt and strategize with this technology. I am proud to have been part of something that holds the potential to revolutionize justice for victims and their families.



Sophia

Being invited to join a cold case investigation group was a surreal moment, especially after a lifelong interest in criminal justice. The chance to contribute to a real-life case felt incredibly significant, and I was eager to dive in. Initially, I had reservations about using AI for something of such gravity, but as I learned more about its capabilities, I realized its potential to have a transformative impact on our work. My teammates, each with their own unique skill sets, brought fresh perspectives to the documents we analyzed. One of my key responsibilities was documenting our process, and looking back, I see how much we managed to achieve in such a short time. This experience has been unforgettable, and I am deeply grateful for the opportunity to collaborate on this case with such an extraordinary team.



John

When I first got involved with Team Monocles, an AI initiative for solving cold case murders, I could not help but feel a surge of excitement. Finally, an AI use case that did not revolve around apocalyptic scenarios or robot overlords but instead something deeply impactful: bringing justice to the unresolved. Here was a chance to show the world that AI is not just for the doom-and-gloom crowd. In fact, it is a tool that could shift the narrative entirely.

Being part of such a unique project was like watching the best mystery show unfold, but I was not just an audience member this time—I was in the room where it happened. The diversity of the group was inspiring. We had AI experts, detectives, project managers, and people whose AI knowledge pretty much stopped at knowing how to use Siri. And yet, that mix was exactly what made it all work. Every discussion blended technical depth and the occasional "Wait, AI can do that?!" moment. It was a constant learning experience.

What really fired me up was the creation of a white paper and rubric—tools that would help others evaluate cases for AI use. Essentially, we were designing a roadmap for how AI can assist while keeping the focus on people, impact, and practicality. That process felt like building a bridge between AI and the real world, with a little bit of "okay, this actually is rocket science" thrown in for good measure.

Looking back, I am proud to say that we have turned a complex, multi-layered problem into something others could understand, replicate, and build on. The real win? Proving that AI doesn't just belong in the sci-fi section, it's here, helping us solve human problems, one cold case at a time. And hey, maybe, just maybe, we will change the way people think about AI along the way.



Frank

When I learned that Ron was assembling a team to use artificial intelligence in solving a cold case, I immediately knew I wanted to be a part of it. Although I have a very technical background in IT and cybersecurity, I had just begun exploring AI and was looking at how it could be applied to real-world challenges. I genuinely believe AI will be the most transformative development of my lifetime, and it is exciting to be in the early stages of its general adoption. This project was the perfect opportunity to learn and contribute to something meaningful while working alongside an incredible group of people.

This whitepaper has detailed the challenges encountered and lessons learned during this experience. However, my biggest takeaway is this: even with groundbreaking innovations like Artificial Intelligence, successful application of technology still fundamentally depends on people and processes.



Dana

Doesn't everyone want to help solve a Cold Case?

When I was approached to be a member of Team Monocles as the lead researcher, it was impossible to say no. When I heard that there was an opportunity to take evidence and try to figure out how to use Artificial Intelligence to identify actual suspects, answer questions that were not asked before, and potentially solve the case, I jumped right in.

As the team member with the least amount of AI knowledge, I had much to learn about AI and how some typical assumptions made in case research do not apply. For example, AI and related tools can be unreliable in deciphering a handwritten document converted by OCR, but they need people to help make the information usable.

My job was to take each scanned file (handwritten notes, records, polygraphs, police documents, etc.) and systematically read them myself while putting together relationships and timelines and pulling out critical information and unanswered questions.

This experience emphasized the need for a balanced approach, combining AI analysis with human expertise to ensure a thorough and accurate investigation. It also highlighted the importance of close collaboration between research and technical teams to maximize the potential of AI in solving such cases.



Ron

Opportunities to work alongside my friends at IMPD and provide leadership to the bright Team Monocles members do not happen often. Working alongside this highly motivated team to help bring closure to a decades-old homicide, serve justice to the perpetrators, and provide closure to the families and friends of the victim is both inspiring and motivational. Working with the fine members of Team Monocles and Captain Spurgeon on this case was an absolute honor.

Our team met every Monday evening for four months from June through September, save Labor Day. Week in and week out, we slogged through the case details, wrangled with the technology, experienced false starts, struggled with failure, and ran into dead ends (repeatedly). Yet, the crew of Team Monocles remained dedicated and optimistic we could help our friends at IMPD see something new in the case. I suppose there was a genuine sense of loss on the first Monday in October when we did not meet... battle buddies.

I hope our work inspires others to assist their local law enforcement agencies with a program similar to Team Monocles.



Roger

World War II-era General George S. Patton is credited with saying, "Don't tell people HOW to do things. Tell them WHAT to do and let them surprise you with their results." His quote succinctly describes this collaboration. I informed the team what ULTIMATE success would look like, but I recognized that it might not be achievable given their constraints. So, I also informed them of what REASONABLE success would look like, and they knocked it out of the park!

It is amazing how much ground can be covered quickly by a diverse group of people dedicated to a common cause. Their work likely provides renewed direction for the case at hand and a roadmap for previously unexplored terrain when investigating other cases by combining unique problem-solving methodologies with ever-advancing technologies. The trick is balancing the need for absolute investigative confidentiality with the force multiplier of allowing AI to draw upon open-source information that may be applied to everything currently known about the case.

I look forward to seeing where this groundbreaking effort may lead in the criminal investigation world!



Conclusion

The journey of Team Monocles underscores the complexities and challenges inherent in applying advanced technologies to cold-case investigations. While the project did not achieve all its ambitious goals, particularly in the realm of AI integration, it yielded significant achievements in data organization, profile development, and the advancement of innovative tools. Further, the work advanced the team's knowledge and understanding of undertaking subsequent engagements best. The team's experiences highlight the importance of balancing traditional investigative methods with technological innovation and the critical role of meticulous data preparation.

The lessons learned from this project offer valuable guidance for future initiatives. Key among these is the need for clear expectations and deliverables, the importance of adequate funding and resources, and the benefits of engaging professionals with specialized expertise. Additionally, the project demonstrates the potential for community engagement and the power of dedicated volunteers in supporting law enforcement efforts.

By sharing their experiences candidly, Team Monocles hopes to inspire others to pursue innovative approaches in cold-case investigations. Their journey reflects a commitment to justice, a willingness to embrace challenges, and a belief in the collective power of collaboration. It is a testament to the enduring quest to bring closure to unresolved cases, delivering healing and resolution to families and communities affected by these long-standing mysteries.