

WHITE PAPER: SLATE INVESTIGATIVE PLATFORM

1.0 Overview

in8development has created a first-of-its-kind software application called Slate to deliver an integrated, technology-driven solution that supports and enhances the entire investigative lifecycle. Slate allows users to organize, evaluate, analyze, report, and carry out investigations in a collaborative environment. The efficiency gains and improved effectiveness enabled by Slate have the potential to create significant savings by acting as a force multiplier for existing investigative resources. Slate allows agencies to fully equip their personnel with cutting-edge technology-driven tools to accomplish their investigative mission more effectively and efficiently.

2.0 The Need and Significance of Slate

There is a critical need for an integrated technology-based solution that helps investigation teams gather, evaluate, analyze, explain, and share information throughout the lifecycle of an investigation. The current lack of this solution impairs investigators' ability to accomplish their mission effectively and successfully. This can result in ineffective, inefficient, and even lost or abandoned investigations. It also leads to poorly utilized manpower and investigative resources. The absence of this solution affects not only investigators, but every participant in the investigative lifecycle, including management, litigators, judges, defense attorneys and victims.

Investigators currently utilize inefficient and archaic tools to conduct complex criminal and civil investigations. These include paper files, sticky notes, legal pads, whiteboards and basic technology such as Word and Excel. While powerful datamining and data analytics tools are available to generate leads at the beginning of an investigation, these tools abandon the rest of the investigative process. In fact, the sheer amount of data produced by datamining tools can overwhelm and confuse even the most skilled investigator without tools also designed to help evaluate the relevance of that data. Likewise, cutting-edge advanced Artificial Intelligence (AI) and Machine Learning (ML) tools are increasingly utilized to enhance investigations throughout the investigative process. However, the amount of data generated by these tools can become overwhelming and counterproductive without a simple, uniform way to integrate it with the rest of the significant investigative data. In the later phases of an investigation, other limited-scope tools are available to help organize scanned documents, produce pre-trial discovery or to present evidence at trial. However, these tools do not facilitate the investigative process itself. Finally, currently available tech-based tools are stand-alone, siloed applications that do not integrate with other technologies or processes, nor do they allow for the seamless, uniform transfer of useable data and findings to the various participants in the investigative process.

Slate has direct application to criminal and civil investigations, including internal investigations and legal proceedings. Slate accelerates the investigation and prosecution of major crimes such as fraud, waste and abuse. Slate would be an invaluable tool in the antiterrorism and intelligence communities, as well as background and security clearance investigations. The efficiency gains and improved effectiveness enabled by Slate have the potential to save money by acting as a force multiplier for existing investigative resources.

2.1 Slate's Impact Illustrated

The fallout of the COVID-19 pandemic highlights two unique and critical features of Slate that benefit investigators and prosecutors: deconfliction and remote work.

- **Deconfliction.** Slate's deconfliction features can assist in the coming wave of COVID-19 related fraud cases by deconflicting these complex, multi-agency, multi-jurisdictional investigations. Slate deconfliction allows agencies to respond faster, save resources and eliminate duplicative efforts by alerting agencies to instances where the same entity is present in multiple investigations. Slate deconfliction alerts participating agencies of many types of matching entities, including persons, businesses, email addresses, financial accounts, cryptocurrency keys and more. Slate's deconfliction features are described in more detail in Section 3.2 below.
- **Remote Work.** Slate is designed to allow users to access all investigative data and evidence even when working remotely or away from the office. Slate can be used in both connected and disconnected environments. Changes made to Slate investigations while disconnected will be synchronized to network and collaborating Slate users when the user reconnects to the network. The ability to work investigations in Slate irrespective of location or network connectivity would be a powerful asset in work-from-home conditions.

3.0 The Slate Investigative Solution

An investigation is a multi-phase process of gathering, evaluating, analyzing, explaining, and acting on information. Investigative information may include entities, facts, evidence, issues, or other related data. Slate delivers a technology-enhanced platform with integrated tools to improve effectiveness and efficiency across all phases of the investigative process.

The investigative lifecycle is marked by distinct phases, directed and accomplished by various members of an investigative team. During each of these phases the process of gathering, evaluating, analyzing and explaining information is repeated as needed. The phases of a criminal investigation include the following:

- **Lead Phase.** Information potentially warranting a full investigation is gathered or received, and then evaluated. This phase concludes with a determination to open a formal investigation, to disregard the information, or to monitor the information to determine if

future developments justify further action. Investigators and/or analysts typically lead this phase.

- **Investigation Phase.** A full-scale, formal investigation is conducted by investigators, assisted by analysts, and often with direction from prosecutors. During this phase, investigators continuously gather, analyze and explain investigative information, transforming leads into provable facts and evidence. Investigators must determine the relevance and meaning of that information, and ultimately produce a conclusive investigative report containing their findings and recommendation. This phase ends with a decision to pursue formal charges or dismiss the case.
- **Charging and Pre-Trial Phase.** Responsible individuals and entities are formally charged with violations of law. This phase is led and directed by prosecutors, with support from investigators and analysts. After formal charges are made, mandatory discovery of all investigation information is provided to the defendant's attorney. Finally, the prosecution team prepares the case for trial.
- **Trial and Post-Trial Phase.** Trial is held, directed by the court. The government's case is led by prosecutors with support from investigators, experts, and analysts. The defense is led by the defendant's attorney, often supported by their own investigators, experts, and analysts. After trial, all the information related to the trial is archived or provided to an appellate court if needed.

During each successive phase, the amount of information to be processed increases and the significance of accurately evaluating that information intensifies. The process is further complicated by the participants' need to collaborate in a dynamic environment of shifting responsibilities. Until now, no tool has delivered an integrated technology solution to support the entire investigative process. Slate provides the long-overdue technology investigators urgently need to accomplish their investigative mission effectively and efficiently.

3.1 Slate Functionality

Slate is an innovative investigation platform, focused on empowering investigators and investigative agencies to be more efficient, effective and productive. Slate's intuitive, user-focused design allows users to **organize, analyze, report, maintain** and **share** investigative data throughout the entire investigative lifecycle.

Slate is a cradle-to-grave, uniform investigative platform that enhances the entire investigative lifecycle. Slate provides an integrated experience, allowing investigators, management, attorneys, and the court to all collaborate in a single system. Slate's has been designed to include the following core features:

- **Organize**
 - Import and organize evidence and investigative data.
 - Unique identifiers applied to all evidence (enhanced Bates-type numbering).
 - Organize, view & manage entities, evidence, facts and issues.

- Visualize and define links and relationships between entities, evidence, facts and issues on a “canvas”.
- Evidence management.
- **Analyze**
 - Ability to integrate with AI and datamining tools.
 - Integrated proactive AI tools to help users identify meaningful items.
 - Deconfliction of entities between investigations.
 - Investigation-wide advanced search of data and evidence.
 - Evidence OCR text searching.
 - View and edit investigation objects, data and relationships in linked tables.
 - Create multiple canvases to visualize different aspects of an investigation.
 - Ability to work cases in an offline or disconnected environment.
- **Report**
 - Investigation summary reporting.
 - Report generation based on user-created relationships and investigative data.
 - Generate hyperlinked reports of investigative data, facts, evidence, links and issues.
 - Ability to create multiple issue-specific canvases in a single investigation.
 - Multiple monitor support.
- **Maintain**
 - Chain-of-custody tracking.
 - Archiving of closed investigations.
- **Share**
 - Multiple user collaboration on an investigation.
 - Uniform, integrated platform for the entire investigative lifecycle.
 - Import and export investigative data in multiple formats.
 - Discovery production and tracking.

3.2 Slate Deconfliction Functionality

Slate is designed to allow entity deconfliction within an agency and between multiple agencies when each is using Slate. Slate deconfliction allows agencies to respond faster, save resources and eliminate duplicative efforts by alerting agencies to instances where the same entity is present in multiple investigations.

- **Deconfliction and Notification Process.** Slate will allow entities to be deconflicted across all agency investigations. Slate can also perform deconfliction queries across multiple agencies that also use Slate. The deconfliction process automatically compares multiple types of entities in investigations using specific criteria. If potential matches are found, Slate will notify each investigator of the potential match, and list which criteria were matched. Slate does not share any additional investigative data about the entity match in order to avoid compromising any disclosure or secrecy laws that may apply to the investigations. This type of notification allows the case agents to discuss the potential match and to then determine how to proceed if the match is verified.

- Entity-Level Deconfliction.** Slate deconfliction alerts are made at the entity level for most investigation entity types and will automatically alert investigators of instances where the same entity is present in multiple investigations. Slate entity deconfliction criteria are summarized as follows:

| Entity Type | Deconfliction Match Criteria |
|----------------|--|
| Account | Account number |
| Business | Business TIN |
| Device ID | Device ID / MAC Address |
| Email | Email address (<i>1st level check</i>) |
| Email | Email suffix (<i>2nd level check</i>) |
| ETIN | Employer Tax ID Number |
| IMEI | IMEI Number (<i>unique 15-digit number assigned to every mobile phone</i>) |
| IP Address | IP address |
| Person | Last name/ DOB/SSN (<i>1st level check</i>) |
| Person | Social Security Number (<i>2nd level check</i>) |
| PGP Key | PGP Key |
| PGP KeyID | PGP Key User ID |
| Phone Number | Full phone number |
| Cryptocurrency | Cryptocurrency public key |
| Username | Name used while accessing web pages or the dark web |
| Web address | URL |

- Multi-level Person Deconfliction.** When deconflicting people, Slate first searches for matching records containing the same Last Name, DOB, and SSN. If a match is found, a deconfliction notice is sent to the affected investigators, informing of the possible conflict and the criteria that were matched. If there are no matches for Last Name, DOB and SSN, the application searches again for a matching SSN and notifies the respective investigators of the potential conflict. This multi-criteria, multi-level approach helps the investigator better understand the possible implications of a deconfliction match. For example, a matching SSN, Last Name and DOB would indicate the same person with almost 100% certainty. A matching SSN with a different name could indicate the possibility of identity theft.

3.3 User-Centric, Intuitive Design

Slate’s user interface is built around a central “canvas” where a user can visually create and analyze relationships between entities, facts, evidence, and issues. See Figure 1 below for an example of the Slate Workspace. Multiple canvases can be created within an investigation, allowing a user to focus on different aspects of an investigation. For example, an investigator conducting a cybercrime investigation may create one canvas depicting the flow of funds between co-conspirators, a separate canvas showing the use of funds to purchase personal assets, and another

canvas illustrating the relationship between coconspirators and victims. To the side of the canvas, an “accordion panel” contains expandable/collapsible lists of all entities, evidence, facts and issues in an investigation. The accordion panel organizes all investigative data and allows the user to add, view and edit objects, as well as navigate and search the lists, including full text searching of evidence and other items. Investigative data in the accordion panel can be dragged to the canvas to create and visualize relationships with other objects. Using the canvas and simple drag-and-drop actions, users can create links between entities, facts, evidence and issues. These links help the investigator deduce the meaning and interrelationship of investigative data as well as the evidence to substantiate them. A separate viewer window can be launched to view an object in greater detail. Beneath the canvas, all objects added to a canvas can be viewed in a table format, and those tables can be exported as spreadsheets for more in-depth analysis. All relationships and links documented in Slate can be used to generate customizable reports in many common formats. For example, one such report might be a hyperlinked PDF prosecution report containing a summary of the facts, entities and evidence in an investigation organized by the issues that would need to be proven in a successful prosecution.

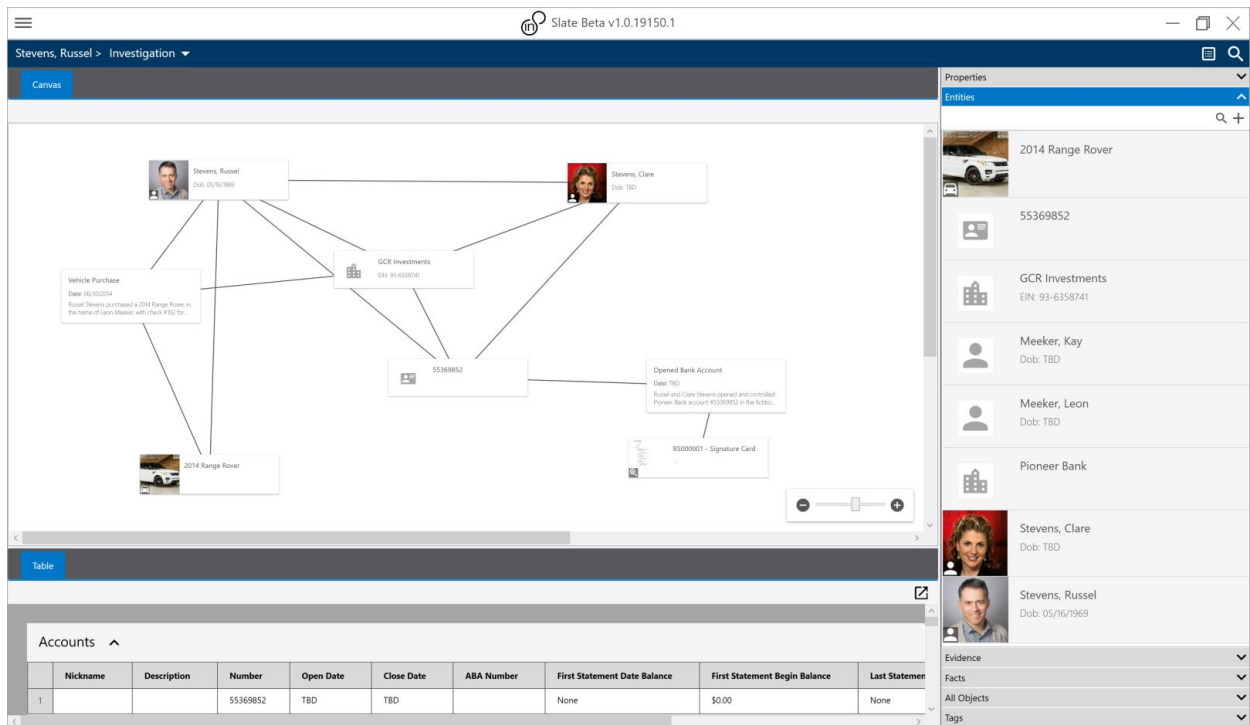
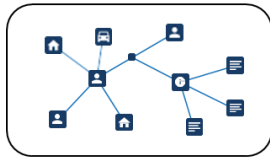
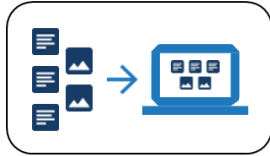


Figure 1 - Slate Investigative Workspace



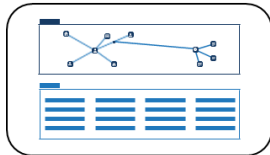
CANVAS

An interactive workspace where users can visually build and manage investigations. Easily drag-and-drop objects to the Canvas, create and qualify their relationships, substantiating evidence and facts.



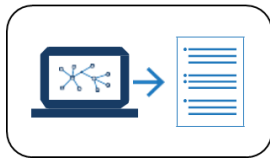
EVIDENCE

Quickly import evidence using an intuitive import wizard. Analyze, manage, and view evidence within our application. Unique identification numbers are added to all items.



TABLES

Objects added to the Canvas are also shown on linked tables. Data in the tables can be sorted and filtered. Tables can be expanded and collapsed. All tables can export to Excel.



REPORTS

Facts, and their supporting evidence, can be exported to a linked investigation report. The report includes the fact text, and references evidence items by their unique identifiers.

Figure 2 - Slate Design and Functionality

3.4 Slate's Impact

At a high level, Slate is an information management platform focused on the requirements of law enforcement investigative agencies. Slate manages the Entities, Evidence, Facts and Issues in an investigation and generates links between them. Slate then uses these objects, relationships and links to automatically generate investigative reports.

Slate's comprehensive, integrated, technology-enhanced platform will equip investigators and agencies with a powerful means of more effectively accomplishing their investigative mission. Slate benefits include:

- Eliminate inefficiency, improve work product, and reduce rework
- Fewer investigations will be abandoned or dismissed
- Improved investigation completion rates
- Complete more investigations with existing resources
- Cost savings driven by effectiveness and efficiency gains

Slate capabilities align with many of the strategic priorities commonly identified by investigative agencies, as detailed in the following chart:

| Common Strategic Priorities | Slate Impact |
|---|---|
| Develop and Enable an Exceptional Force: <i>Stronger, faster, more competent, confident and resilient investigative workforce.</i> | Created by investigators, for investigators. Acts as a force multiplier, enabling improved effectiveness with existing resources. |
| Enhance Readiness: <i>Fully equip agency and personnel for primary job of conducting timely investigations.</i> | Cradle-to-grave solution facilitates the entire investigative lifecycle, improving speed and capacity. |
| Cost-Effective Modernization: <i>Improved, more capable technology for better business practices and improved effectiveness.</i> | Delivers money-saving efficiency and effectiveness gains. |
| Drive Innovation: <i>Modernize reporting tools and incorporate new technology.</i> | First-of-its-kind integrated, technology-enhanced investigative platform to make the agency a leader in investigation technology. |
| Strengthen Partnerships: <i>Expand resources and spheres of influence via information exchanges and enhanced multi-agency collaborative efforts and initiatives.</i> | Collaborative features support improved cooperation and relationships with external partners. |

Figure 3 - Slate Impact on Strategic Priorities

4.0 The Science Behind Slate

Slate organizes and manages entities, evidence, facts, and issues related to an investigation and allows users to create links and relationships between them. Slate allows users to create and visualize these relationships and links on a “canvas” to better understand the investigative data. Slate users can create multiple canvases within an investigation in order to focus on different issues or events. Investigative data and relationships in Slate can also be displayed in a table format as desired. Slate allows full text searching of investigative data. Slate can also generate hyperlinked reports containing the facts, evidence, relationships and links created in Slate. Slate reports show links between facts, evidence and entities to the elements of each statute under investigation. For example, in profit-motivated investigations, links created in Slate will allow an investigator to not only trace funds for potential asset forfeiture, but also to automatically generate reports that will be used to prove the allegations.

Slate’s design can allow multiple users to collaborate on the same investigation. These users include investigators from other agencies, managers, prosecutors (judge advocates), the court and the defense team. Slate will also facilitate management review and approval of investigations.

4.1 Integrated AI and ML Functionality

The Slate platform provides a user-friendly investigative hub enabling investigators to view and analyze all relevant information and data gathered in an investigation. This includes the ability to integrate leads and data developed using third-party Artificial Intelligence (AI), Machine Learning (ML) and datamining tools. Cutting-edge advanced AI, ML and datamining tools are increasingly utilized to enhance investigations. However, the amount of data generated by these tools can

quickly become overwhelming and counterproductive without a simple, uniform way to integrate it with the rest of the significant investigative data. In8 has worked with strategic partners to add AI-based tools to the Slate investigative platform. These tools include the ability to ingest the results of external, stand-alone AI tools as well as utilize AI tools integrated within Slate. These AI tools include automated entity recognition, facial recognition, optical character recognition of text in photos and videos, language translation, audio transcription, and social media datamining. Some of these AI tools are explained in more detail below.

- **Automated Entity Recognition:** Slate will be able to import entities identified by AI tools. These AI tools analyze evidence, facts, audio/video and other data added to an investigation and automatically identify potential entities, such as persons, business names, addresses, phone numbers, bank accounts, etc. Slate will present these potential entities to the investigator and allow them to analyze and link them to other entities, evidence and investigative data in their investigation. This will significantly enhance an investigator's ability to better understand the significance of voluminous amounts of evidence and to identify significant trends in that evidence.
- **Automated Transcription Audio Files:** Slate will import AI-provided transcripts identified by the investigator as relevant, and then allow those transcripts to be used alongside other investigative data in Slate.
- **Facial and Object Recognition:** Slate will integrate with AI tools that can identify and recognize individuals and objects in video files via facial or object recognition. Slate will allow investigators to associate these entities and objects with the investigative data in Slate.
- **Identification of Data Anomalies:** Slate will integrate with advanced AI tools capable of automatically analyzing data in an investigation or other data stores. These tools patterns, anomalies, and outliers in order to help investigators spot possible issues or trends. This could provide significant assistance, for example, in identifying suspicious transactions among financial data. This tool could also be used to locate anomalies and outliers in historical data already maintained by an agency.

4.2 Architecture

Slate has been designed as an extensible investigative platform and contains integrated core functionality that can be configured to accommodate changes, customization and additional features as required by each user or agency. Slate utilizes three integrated, independently developed layers: (1) a backend datastore, (2) a middle layer implementing business logic and (3) a desktop application user interface. Slate uses a graph based Neo4j backend datastore. The middle layer is built on Microsoft's .net framework. Slate's front-end application layer is a heavily customized Windows Presentation Foundation (WPF) graphical user interface that incorporates a Model-View-ViewModel (MVVM) development architectural pattern. Slate's user interface was designed to follow Material Design user experience standards, and creates a modern, user-friendly experience.

Slate can be deployed as either an on-premises solution or in a cloud-based environment. For cloud-based deployments, in8 would utilize a FedRAMP-approved/authorized cloud service such as Amazon GovCloud or Azure Government.

4.2.1 Slate Current- and Future-State Functionality

4.2.1.1 Current Functionality

- Dashboard
 - Create new investigations
 - Pick from list of previously created investigations
 - Last five investigations appear on main dashboard
 - Ability to pick from list of all investigations
- Choosers
 - Entity (Person/Business/Address/Phone Number/Vehicle/Etc.)
 - Associate image with an entity
 - Evidence
 - View pdf evidence while importing
 - Item key applied to each page of evidence imported
 - Facts
 - All objects
 - Create object from chooser
 - Drag object(s) from chooser to Canvas Pane
 - Search for objects
- Canvas Pane
 - Drop object(s) from chooser onto Canvas Pane
 - Canvas card appears with associated image
 - Action item creation
 - Link Entities to Entities, Facts, Evidence and Action Items
 - Link Evidence to Facts, Entities and Action Items
 - Link Fact to Entities, Evidence
 - Link Action Items to Entities and Evidence
 - Link Multiple objects to another object
 - Zoom In/Zoom Out
- Table Pane
 - Objects displayed on the canvas appear in tables
 - Table can be exported to excel
 - All tables can be exported to single excel file with a sheet for each table
 - Sort table columns
- Properties Pane
 - Edit properties of selected item on the canvas
 - Edit properties of selected item from a chooser
- Workspace
 - Create workspace

- Delete workspace
- Edit workspace name
- Create fact report (From facts visible on current workspace)
- Viewer
 - View pdf evidence selected from canvas card
- Application
 - Can be customized with a configuration file for individual customers

4.2.1.2 Slate Functionality Currently Under Development

- Viewer
 - Redact document and export
 - Highlight word searches
 - Convert bank statement to csv
 - Document splitting
- Customized Linked Reports
- Deconfliction
- Live Collaboration
- Multiple Users
- Customized workflows
 - Administrative forms (creation, submission, review)
 - Managerial review and approval of reports and forms
- Application
 - Optimization of application speed

4.2.1.3 Planned Future Functionality

- Integration with Artificial Intelligence (AI) applications
- Integration with social media data mining applications
- License Management
- Docking
- Bulk import Evidence
- Table Cell Editing
- Financial Exhibits
- Omni-Defined Linking
- Document Viewer Annotation saving
- Advanced searching (Amazon style results)
- Spell Checking
- User accessible Audit History
- Canvas exporting/printing
- User Options
- Auto-Entity Identification in Evidence
- Timeline
- Tagging

- Document Viewer Search
- User/System Correct OCR Errors
- Highlighted Text To Entity/Fact/Action Item
- E-Discovery
- Geospatial data
- Map
- Custom Canvas Cards
- Client Server
- Compare Timelines
- Create objects via table
- Custom Accordion
- Custom bulk Excel import
- Custom Reports
- Determine and implement processes to manage external requirement compliance
- Enhanced Link Lines
- Enhanced Text Entry
- Live Collaboration
- Map Data Overlays
- Administrative Form Approvals and reviews
- Track Changes Compare
- Web accessible
- Phone App
- Split Audio/Video Files
- User creatable properties
- User creatable objects
- Outlook Plugin