Tom Sawyer SOFTWARE

Enhancing Law Enforcement Investigations: Building a National Repository of Criminal Justice Records

Background: Disparate systems hamper investigations

Across the United States, over 18,000 police agencies operate independently, often using disparate systems that make data sharing difficult. This lack of integration results in:

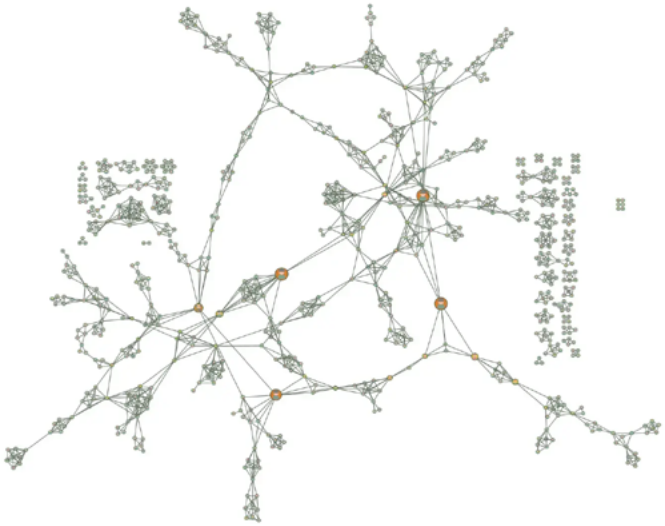
- limited visibility into criminal activities across jurisdictions,
- inefficiencies in linking related crimes,
- difficulty for investigators in obtaining a comprehensive picture of criminal networks, and
- proprietary systems and regulations that further complicate collaboration between agencies.

The inability to connect data across jurisdictions hampers efforts to solve crimes efficiently, see a full picture of suspects, and track down criminals operating in multiple locations.

To address the challenges law enforcement investigators faced, the FBI developed and launched the National Data Exchange (N-DEx) system in 2008, an unclassified national information-sharing platform that enables criminal justice agencies to search, link, analyze, and share information across jurisdictional boundaries.

Tom Sawyer Software has decades of experience helping the public sector and enterprises apply the power of graph technology to solve challenges such as these, and we were uniquely positioned to help the Federal Bureau of Investigation (FBI) in their mission.

This case study discusses the unique challenges faced by the FBI and how Tom Sawyer Software helped them in their mission.



Tom Sawyer Software's expertise in graph visualization and link analysis helped the FBI and police agencies around the country link related criminal activity and suspects to efficiently solve crime.

The inability to connect data across jurisdictions hampers efforts to solve crimes efficiently and track down criminals operating in multiple locations.

More than 18,000 police agencies use disparate systems for tracking crime, making sharing data difficult.

Building the solution

When the FBI sought to enhance its investigative capabilities, they sought out Tom Sawyer Software with our decades of experience solving complex data challenges using advanced graph technology. We combined our expertise with the power of Tom Sawyer Perspectives, our low-code platform for graph visualization and analysis, to meet the FBI's needs.

The result: a solution that provides the backbone of N-DEx, the FBI's national repository of criminal justice records. N-DEx enables agencies across the country to "connect the dots" between people, places, events, and objects—surfacing hidden relationships and linking investigations that might otherwise remain siloed.

Using our industry-leading graph layout and visualization capabilities—including features like advanced labeling, precise shape clipping, graph analysis, and incremental layout—investigators can better visualize complex criminal networks and gain a clearer, more complete view of ongoing cases.

Participation in N-DEx is voluntary, with data contributed by local, state, tribal, and federal agencies. Through a secure, web-based application managed by the FBI's Criminal Justice Information Services (CJIS) Division, N-DEx offers 24/7 access to comprehensive criminal justice records at no cost to participating agencies.

N-DEx serves as a national repository of criminal justice records submitted by agencies nationwide, allowing investigators to "connect the dots."

N-DEx enables criminal justice agencies to search, link, analyze, and share information across jurisdictional boundaries.

N-DEx empowers data-driven investigations

N-DEx provides interagency access to unique data located in incident report narratives that can be critical in investigations as it may shed light on additional associates, locations, or witnesses of a crime. The information includes pictures, drawings, handwritten notes, or witness statements.

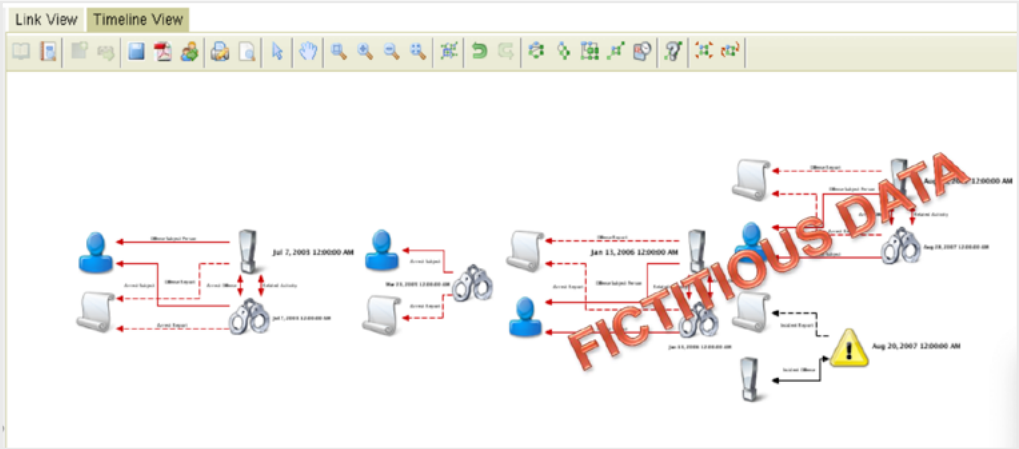
Other interactions relating to an investigation, such as inmate telephone call records, meetings between agencies to discuss a case, police impound records, and protection orders, can be recorded and shared in N-DEx. N-DEx has a keyword search feature that works like a search engine platform, combing through millions of records in the database and returning all records in seconds containing the queried keyword(s).

In addition to the unique narrative data housed within N-DEx, other records include incident reports; arrests; missing persons reports; service calls; bookings and incarcerations; pretrial, probation, and parole reports; warrants; citations and tickets; interviews; and field contacts and interviews.

Data is correlated about a subject and search results include more clearly indicated relationships between people or things producing a more comprehensive profile on an individual. All associated criminal justice records, phone numbers, addresses, known aliases, and images available via N-DEx are populated in one place resulting in a complete profile that often reveals two aliases belonging to the same individual.

Key Features of N-DEx

- **Keyword Search**: A search engine allowing users to query the database and retrieve all records containing specific keywords.
- **Association Determination**: Ability to identify relationships between seemingly unrelated entities, enabling investigators to uncover connections within the data.
- **Geo-Visualization**: Ability to set search parameters restricted by geographic areas, aiding in spatial analysis of criminal activities.
- **Batch Search**: Simultaneous querying of thousands of records, improving efficiency in large-scale investigations.
- **Collaboration Sites**: Ability to share files of any size or type across jurisdictional boundaries, facilitating inter-agency cooperation.
- **Data Integration**: Aggregates records from local, state, tribal, and federal agencies, offering a comprehensive repository of criminal justice information.
- **Graph Analytics and Link Analysis**: Ability to visualize and analyze networks, detect central figures, and uncover hidden relationships between entities using powerful graph-based insights.



Timeline graph visualization of a network in N-DEx is crucial in investigations.

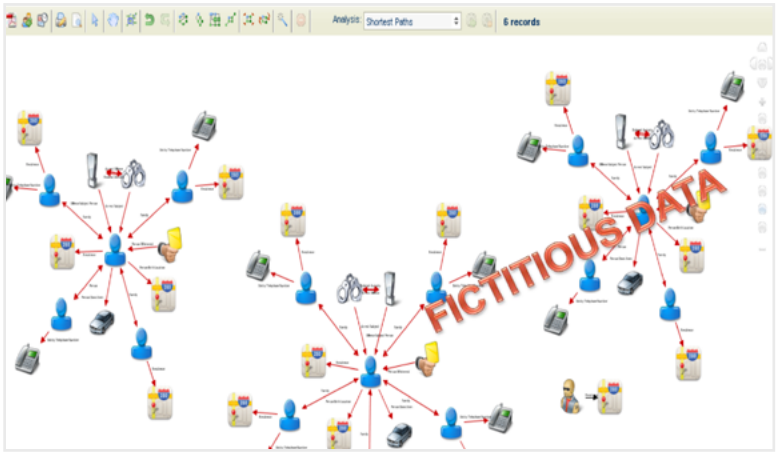
Tom Sawyer Perspectives empowers N-DEx visualizations and link analysis

Tom Sawyer Perspectives was chosen by the FBI as the graph visualization and link analysis components of N-DEx due to our decades of expertise and superior graph technology. Utilizing Tom Sawyer Perspectives graph technology, N-DEx enables law enforcement agencies to:

- Link criminals operating across multiple districts and states.
- Identify patterns based on related data.
- Connect people, locations, and events to uncover hidden relationships.
- Assist in tracking missing persons and cross-jurisdictional crimes.
- Search multiple entities at once to determine interconnections.

By integrating Tom Sawyer Perspectives graph and link visualization, investigators can visualize these connections clearly allowing for more intuitive analysis and decision-making.

> Graph visualizations of criminal networks are key to revealing patterns and connecting people, locations and events.



Advantages of graphs and graph visualization in fighting crime

Graph visualization plays a crucial role in fraud detection by enabling the identification and highlighting of criminal rings in graph and network data. It helps to identify crime networks, hidden connections, and relationships between data points, and provides a human-readable representation of data.

Represents data in a human-readable form

Graph visualization provides a human-readable representation of data, which is essential for crime analysis since the sheer amount of data obtained during investigations can be challenging to visualize.

Categorizes and groups related data

Graph visualization and analysis techniques including clustering and grouping aid investigations by categorizing large amounts of data enabling analysts to focus on key areas of the data.

Identifies hidden connections and relationships

Graph visualization is useful in identifying hidden connections and relationships between data points. Graph visualization can be used to represent the elements of the visualization in a way that is meaningful and enables users to identify different types of entities and relations in order to fight crime.

Identifies patterns through relationship analysis

Graph visualization helps analyze the relationships between entities to aid in the identification of criminal networks. Crime data often involves multiple entities, such as a suspects, victims, locations, crime types, and evidence, and graphs can identify patterns by analyzing the relationships between these entities.

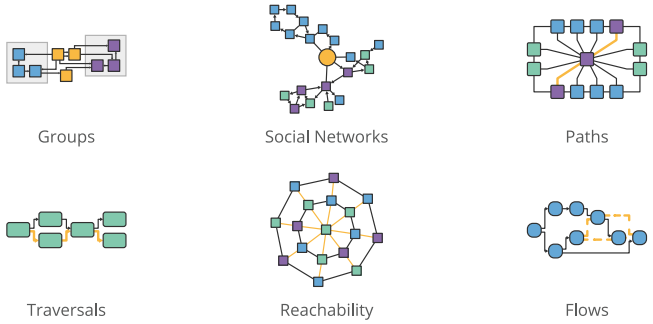
Supports analysis of large amounts of data

Graph visualization helps investigators to quickly analyze large amounts of data and spot patterns that indicate criminal activity. It allows investigators to target specific criminal patterns, find connections in real-time, and visualize complex relationships between entities.

Graph analysis aids criminal investigations

Graph algorithms enable data-driven analysis and are essential to analyzing crime. These analysis techniques can find dependencies and compute centrality measures in social networks among other things.

Perspectives provides the following graph algorithms most useful for use in fighting crime, plus many more.



Graph analysis techniques are crucial in fighting crime

Betweenness Centrality

Measures a node based on how many shortest paths the node is a member of and reveals the intermediaries or middlemen from the data.

Clustering Algorithm

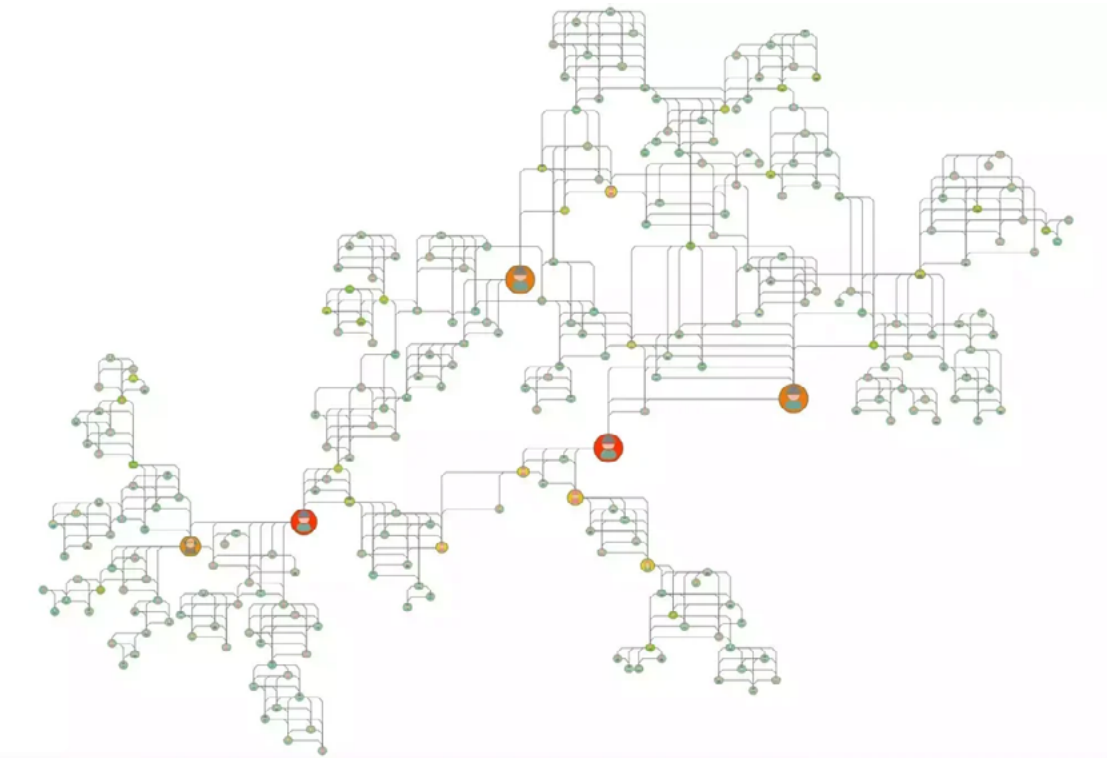
Groups nodes that share similar properties into sets called clusters. A cluster often represents parts of the graph topology that belong together, and therefore can help investigators focus their efforts.

Closeness Centrality

Measures how many steps a message would need to travel to reach all the other nodes in the network.

Shortest Path Detections

Calculates the path that uses the fewest edges between a specified start node and finish node to point the investigator to nearby nodes that may also be suspicious or involved in criminal activity.



Betweeness centrality algorithms reveal the intermediaries or middlemen in criminal networks.

About Tom Sawyer Perspectives

Tom Sawyer Perspectives is a low-code graph visualization and analysis platform that enables developers to build custom applications or incorporate graph technology into an existing application for exploring complex data relationships. Integrated design and preview interfaces and extensive API libraries allow developers to quickly create custom applications that intuitively solve complex data problems.

Key features of Perspectives include:

- Advanced visualization with nested drawings, precise labeling, and incremental layouts.
- Interactive exploration of crime data and networks.
- Comprehensive link analysis to identify connections within large datasets.
- Graph analysis algorithms such as centrality, clustering, and shortest path calculations.
- Flexible deployment options, including cloud-based, on-premise, and air-gapped configurations.
- Extensive API libraries for integration into existing applications.

Getting started

There are multiple ways to get started with Perspectives:

Start a free trial

Sign in to access a free, full-featured trial of Perspectives.

Explore free resources

Access our product documentation, tutorials, release notes, and more. Plus, gain access to the latest software downloads when you become an evaluator.

Contact us

Contact us for a demonstration and to discuss your project and determine the best path forward for you!

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