Justice information systems modernization, reimagined

January 2025

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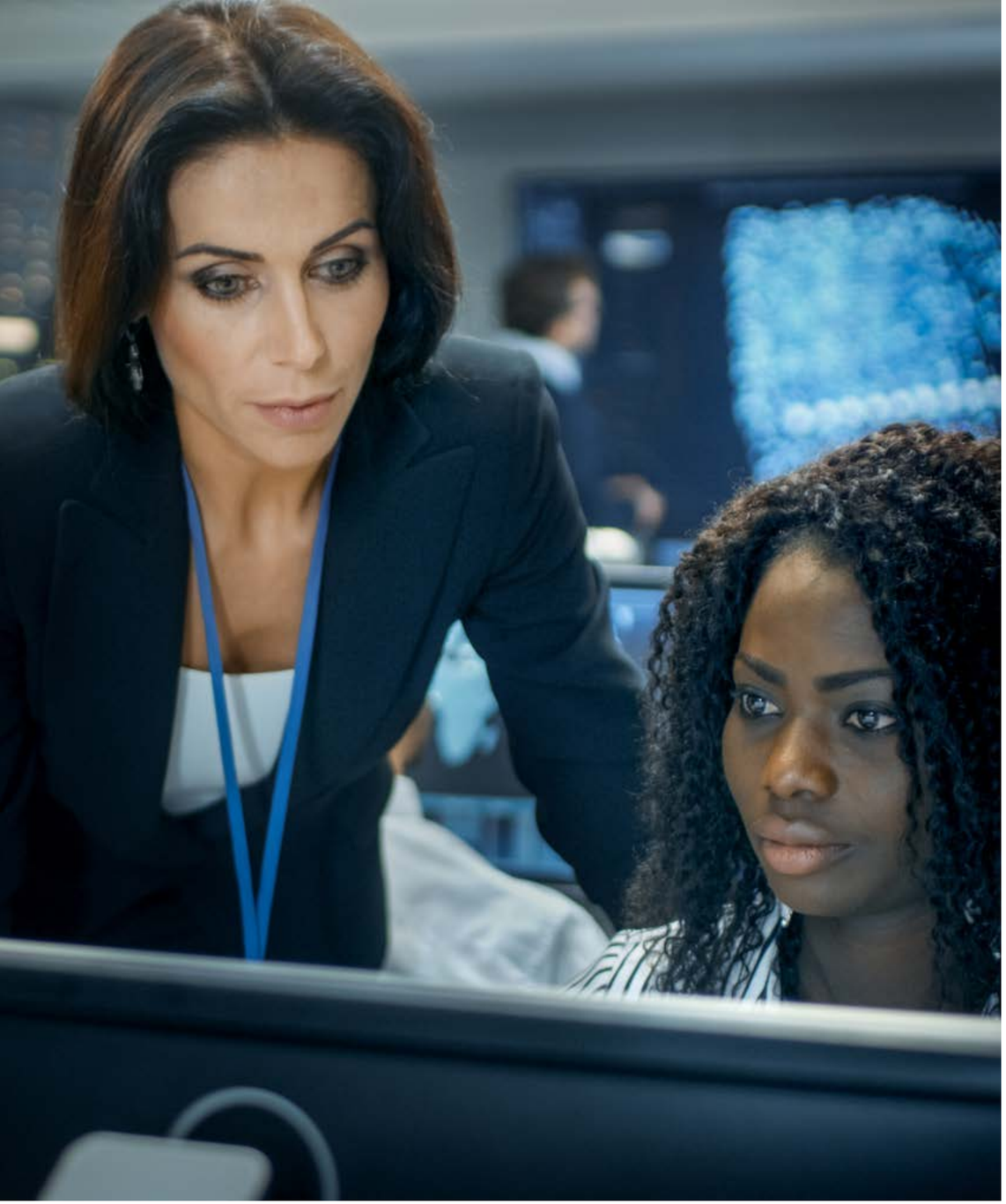

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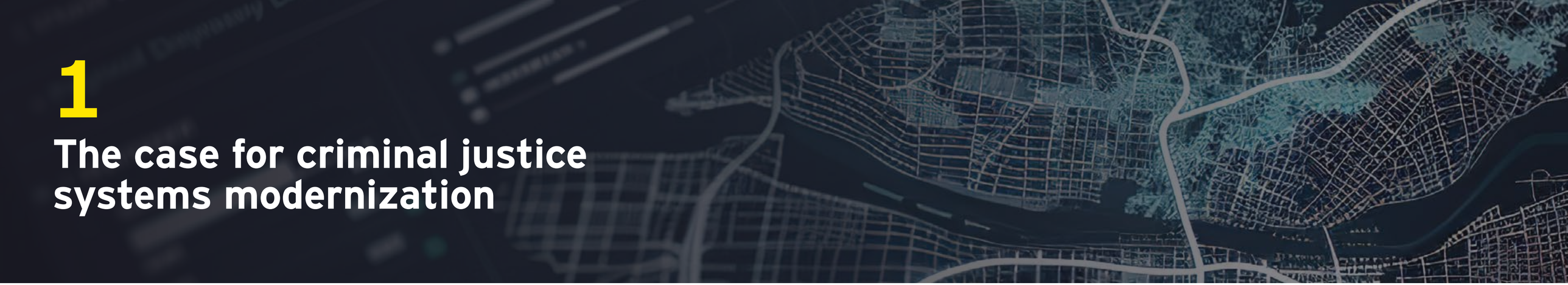

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The case for criminal justice systems modernization

The criminal justice system affects millions of Americans directly and hundreds of millions indirectly. Just like public health and education systems, an integrated and efficient criminal justice system is a hallmark of modern government; perhaps even more so, given that the system directly supports many of the rights bestowed upon us by the Constitution. Yet, this is what a 20 state review[a] says about criminal justice data in the United States: "After a decade's worth of data collection and engagement with county agencies and state courts, it's become abundantly clear to us that willing and motivated communities simply do not have enough access to their own data to start making sense of what's happening in their local criminal justice systems." The same report goes on to present some concerning details. In 17 out of 20 states examined, indigent status is not tracked, which makes it impossible to know how defendants who cannot afford their own attorney are faring, compared to wealthier defendants. Throughout the 20 states, cases involving violence are dismissed by the Courts at a much higher rate than cases that don't involve violence – a counterintuitive statistic that is difficult to understand given the current state of criminal justice systems. Because of the way offenses are counted and charges compiled, a basic question – is crime increasing or decreasing? – may not have an unequivocal answer.

The case for criminal justice systems modernization can be narrated from the following perspectives:

Operational

According to the model standards by case type developed by the National Center for State Courts (NCSC), a high performing court framework[b] is expected to meet certain time standards: 75% of felony cases dispositioned within 90 days; 75% of misdemeanor cases dispositioned within 60 days, etc. There are also expected time standards for interim events such as arraignment and trial. Justice systems modernization is needed to orchestrate workflows and share data across Justice partners Sheriff, Court, District Attorney, Public Defender and Probation – such that these time standards are met.

Intelligence

Justice systems modernization is needed to help investigators rapidly connect persons, cases and incident data to identify and apprehend suspects. County systems not only have to fulfill their jurisdictional needs, but must contribute to the national network, able to readily provide data in support of investigations originating elsewhere. Once the suspect is booked, the district attorney needs the system for evidence analysis and case preparation, while the Public Defender and Defense Attorneys look for exculpatory evidence. A modern justice system must be able to parse and analyze data from various sources, including audiovisual evidence from bodycam, dashcam, CCTV and drones.

Policy

Justice systems modernization is needed to serve high quality data following national standards that supports data-informed policy decisions. A broad array of data is required to evaluate if agency programs and practices are achieving the justice objectives of reducing and preventing crime and improving community safety. The data must support measures to determine racial and ethnic discrimination and analysis of how indigent defendants fare relative to the overall cohort of offenders. There is also the element of transparency and public trust, in that these metrics should be available to the public so they know the empirical basis of policy changes.

Collaboration

Justice agencies must collaborate with public health, human services, education and community based organizations to enable analysis of contributing factors to justice outcomes, including recidivism, and create collaborative processes that accomplish community safety goals. Justice systems modernization is needed to operationalize these collaborative processes. It is generally acknowledged that many offenders within the criminal justice system are better served through diversion programs for mental health and substance abuse. A modern justice system should be able to identify these individuals and route them to diversion programs through integrations with health and human services systems offering a continuum of care.

[a] "The Power and Problem of Criminal Justice Data: A Twenty-State Review," Measures for Justice, June 2021.

[b] "Criminal Case Management Basics: Data Elements, Performance Measures, and Data Presentation Strategies," National Center for State Courts, August 2020.

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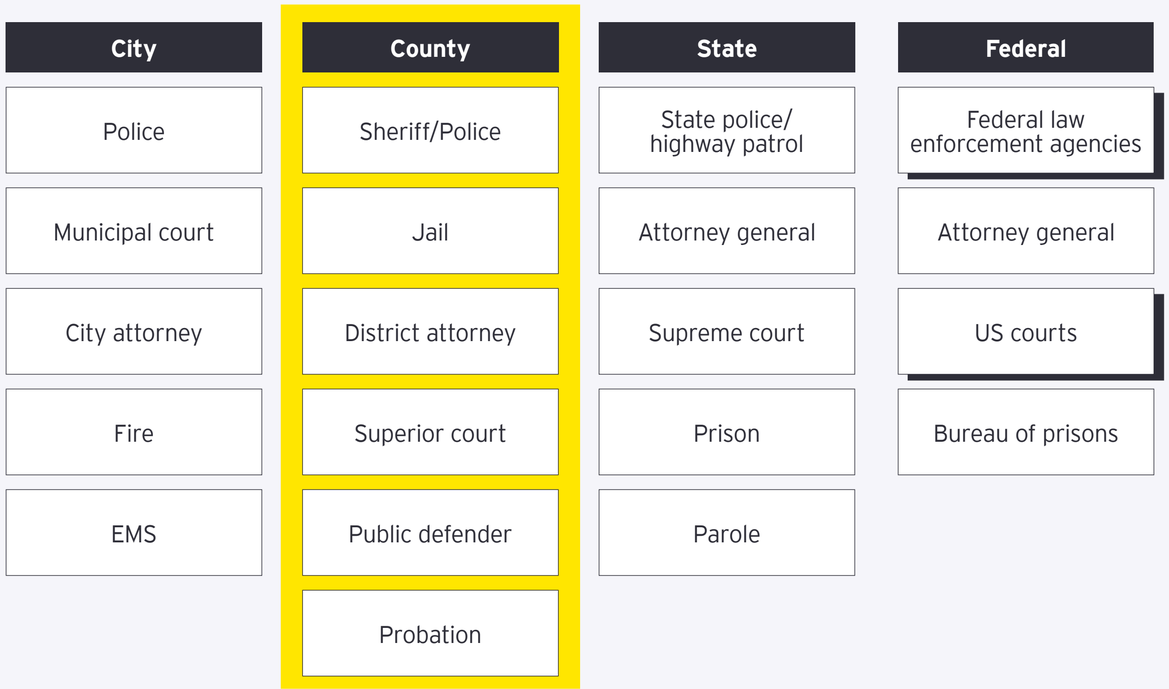
What are the special challenges in criminal justice systems modernization?

Figure 1
The criminal justice and public safety landscape. The EY Unified Justice Platform focuses on the county tier, but its constructs apply at the other tiers as well.



Legacy systems modernization is an established discipline. Technology vendors and system integrators have been working this space for decades with a fair amount of success and the occasional failure. The question then is: What's special about the justice domain that makes systems modernization particularly challenging?

Disconnected landscape

The justice ecosystem comprises of 27 federal agencies, multiple agencies in 50 states, and 3,000 counties, each with its several justice partners. Agencies share common concerns and overlapping jurisdictions, but exercise autonomy in technology acquisition, system design and operations. According to an expert roundtable on criminal justice modernization:[c] "The so-called criminal justice system is not a single system at all. Instead, it is a menagerie of many thousands of municipal, county, state and federal agencies, each with their own data systems. This extraordinary fragmentation makes it difficult to track what is going on."

Historical imperative

When modernizing an accounting system, the implementor can limit their concern to the current and past few fiscal years. In justice, the criminal record of an offender is relevant even if it is from 50 years ago. As such, the implementor is tasked to convert or handle data created in several generations of legacy systems, not just in the aggregate, but at full granularity.

High data complexity

Just the charges in a case can change multiple times as the case proceeds from arrest to DA filing, to amended filing, and then to final court sentencing. Court minutes have exceedingly complex nested structures, and each section is potentially consequential. Investigators, compliance administrators and attorneys have to process vast volumes of audio and video data from bodycam, dashcam, CCTV, drones and other surveillance methods. While these data sets lend themselves to AI processing, the AI must meet a high standard for fidelity; given what's at stake, there is no tolerance for error.

Complex data separation requirements

The constitutional justice operating framework requires the separation of district attorney and public defender functions and data. Juvenile offender data must be separated from that of adult offenders. Investigation data is highly protected and its disclosure is limited by privacy concerns. Some data sets, such as those pertaining to intelligence operations, are siloed by design. Modernization projects must respect and sustain these separations.

Process to get to cloud

Systems handling criminal justice data must meet the FBI Criminal Justice Information System (CJIS) security requirements, which the FBI has mapped to the NIST 800-53 control families. Before an agency can operate its system in the cloud, it needs to obtain an authority to operate in order to connect to FBI systems, which can take significant effort and time. Cloud providers have entered into CJIS agreements with the states, wherein they meet certain controls – at increasing levels for Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). But the residuals – security controls that the agency (tenant) must meet – remain substantial. Implementors have become used to leveraging the cloud for modernization projects, but the use of the cloud for justice systems modernization requires careful analysis and planning.

[c] "Campaign for Criminal Justice Data Modernization," recommendations from an expert roundtable hosted by Arnold Ventures, April 2021.

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Criminal justice systems modernization – approaches through the years

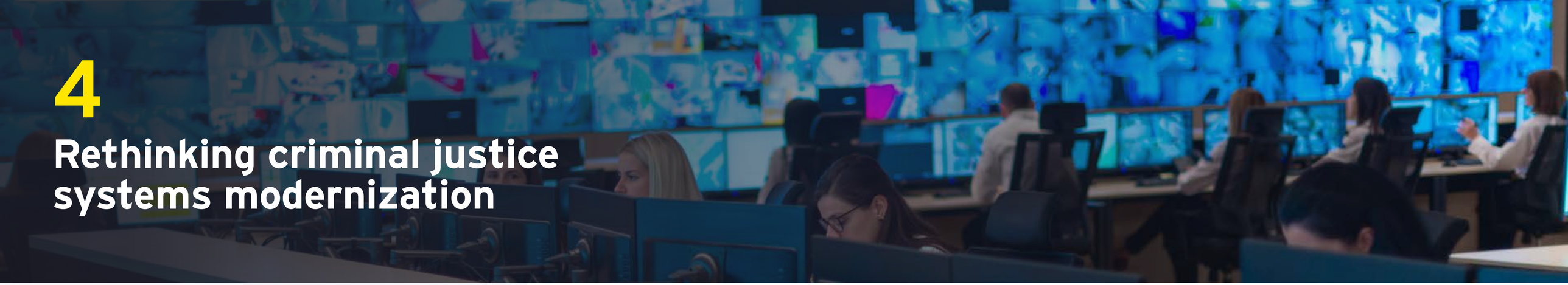
Justice systems modernization projects started in the last third of the 20th century and has been through several generations of approaches.

- The first generation of systems were focused on helping individual agencies – Sheriff, Courts, Probation, etc. – enter data and draw printed reports of transactions and aggregate statistics.
- The second generation was a messaging overlay, where files would be transmitted from one agency to another, printed out, the data reentered in that receiving agency system and consequent workflow initiated. Many jurisdictions still work like this.
- The third generation can be roughly described as data warehouse and portals, where data from various agencies was written to a central location under a data sharing agreement, and a portal stood up. Users would look up the portal, type transactions into their systems based on what's happened elsewhere, and proceed with the workflow. This is a common way of working in many jurisdictions today.
- The fourth generation is information exchanges, where transactions in one agency are transmitted to another agency in a machine readable form. Messaging protocols vary from columnar file layouts to bespoke XMLs, and transport is generally over SFTP or HTTP. The receiving agency uses some kind of integration broker to parse the transaction, write it into their system, and move forward with consequent workflows.
- Another way of thinking is that all agencies should use the same case management system (CMS), with RBAC demarcation between the different agencies. This way of thinking has become more prevalent with the advent of "low code/no code" systems, which appear to provide a simple path toward bringing all agencies on the same technology stack.

For the most part, these approaches failed to recognize the "system of systems" aspect of the criminal justice enterprise – the autonomous nature of agency operations, concerns around data protection, and the overall diversity of the systems portfolio.

- The data warehouse approach, for example, expected justice partners to pump all their data into a shared database. But given the highly sensitive nature of criminal justice information (CJI), justice partners were understandably reluctant to cede control of their data.
- The case management approach required all agencies to be on the same CMS, but that was a nonstarter in most jurisdictions: Justice agencies like their autonomy, are often led by elected representatives of the people, and don't like being told what CMS to use, rightfully so.
- Low code/no code platforms tried to force a conventional single stack solution: a data layer, and then an application layer, and then a services layer on top. These platforms were very limited in handling data not created or managed within the platform, so all agencies would have to buy expensive licenses and operate on the same platform for it to work.

These approaches can be a good fit for individual agencies, but cannot be an ecosystem solution for the diverse and variant criminal justice landscape. Information exchanges, while a step in the right direction, have taken a narrow view of ecosystem requirements. The focus has been on getting a message across, rather than on the meaningful integration of events into the overall workflow, or on the semantic content of the event payload.



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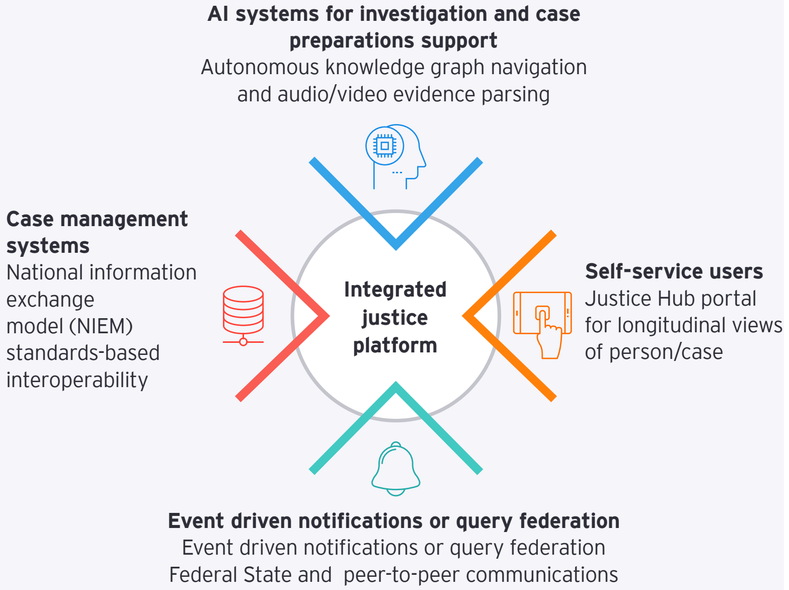
Rethinking criminal justice systems modernization

Figure 2
The EY Unified Justice Platform is the backbone of the SoS that underlie the county justice landscape. It also acts as a node on the national network, facilitating data exchange with state and federal agencies.



The term System of Systems (SoS) has been in the lexicon since 1989, when the US Government used it to describe the Strategic Defense Initiative. Since then, it has been a major research area, spearheaded by the U.S. Department of Defense but with use cases that span missile defense, air transportation, and water and energy resource management. Air transportation is actually a perfect and familiar example of SoS, where many autonomous systems come together to fulfill the mission: Airline operators, airports, air traffic control, radar systems, the TSA, and the aircraft itself. As we rethink criminal justice modernization, our thinking is inspired by SoS concepts, and draws on the extensive work that has already been done in this space. The characteristics of SoS that have influenced our thinking:

Autonomy

The several justice systems, at the local level and across the national landscape, not only operate autonomously, but also exercise autonomy in technology selection and roadmap development.

Decentralization

Justice systems are decentralized, with intentional data separation between the various parties.

Event awareness

Each system in the SoS needs to be aware of pertinent events in other systems. This is more than data sharing; each system must know, or be told by the SoS, what consequent events to generate when an event has occurred elsewhere. Importantly, the SoS must convey to each system a semantic, not just a syntactic, understanding of the event data.

Entity resolution

For true event awareness, each system in the SoS needs to have a common understanding of the subject of the event, i.e., the entity (usually the suspect or defendant) to which the event pertains. There should also be a common understanding of the network of such entities, given that crimes are often perpetrated in collusion.

Diversity

Different systems in the SoS use different technology stacks, often following from the agencies' budget capacity. There should not be a need to force everyone to use the same stack or CMS. Systems should be able to talk to each other using open protocols and loosely coupled integration.

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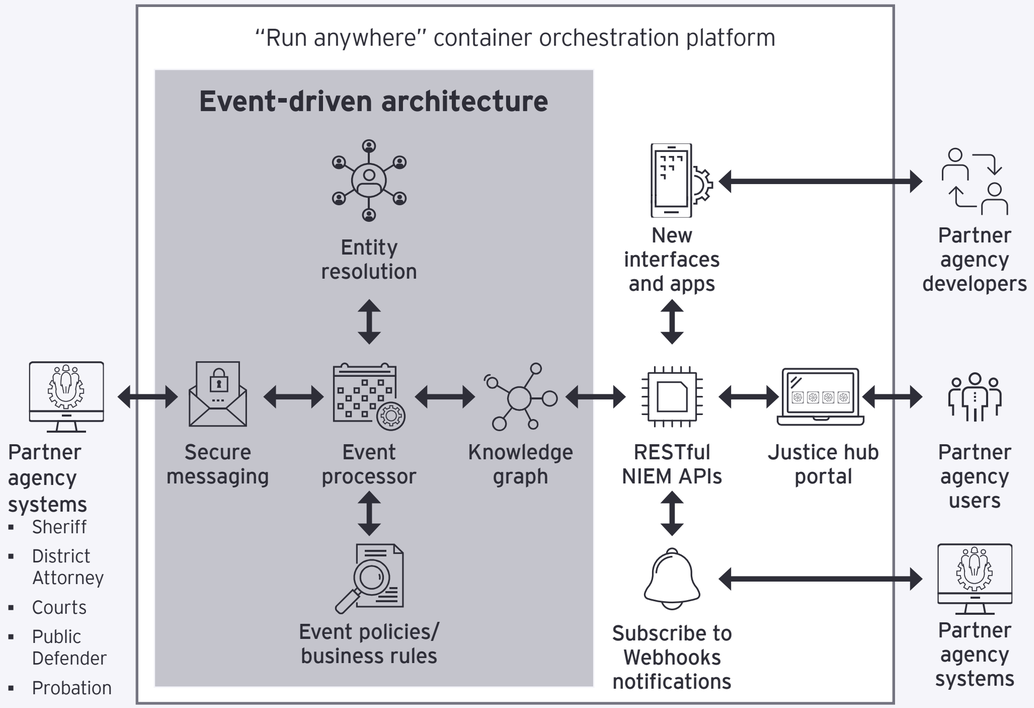
EY Unified Justice Platform

Figure 3
EY Unified Justice Platform architecture. The diagram shows how the different components of the platform are connected and work in conjunction.



The EY Integrated Justice platform embodies SoS principles and solves for the special challenges of the criminal justice domain. The platform provides the data and integration backbone to which various justice case management systems attach and conduct business. The platform performs a role analogous to the central nervous system in the human anatomy: listening to various connected systems (limbs and organs), and using its inbuilt event awareness and intelligent decisioning to send the next instruction to a connected system. **There are five essential capabilities in the EY Unified Justice Platform, which operate in conjunction:**

1. Knowledge graph

A knowledge graph represents data as we think about the world: Things (nodes) with connections (edges) to other things. The nodes can contain the data, or point to a remote data object, and is therefore endlessly extensible. The best example of a knowledge graph is probably the public internet. Navigation through the knowledge graph is intuitive for human and machine; the interaction is fundamentally different from programmers writing queries on thousands of tables in data warehouses. AI trained to navigate the knowledge graph can surface person and case summaries and answer complex questions on demand.

2. Entity resolution

The differentiating facet of the EY Integrated Justice Knowledge Graph is that in bakes in entity resolution at its core. Subject identities are matched and connected across the landscape, even in the absence of biometric identifiers. The knowledge graph, viewed through the entity resolution overlay, allows investigators and case workers to connect persons and cases across the criminal justice landscape and discern criminal networks, etc. This AI-based entity resolution is always learning and reevaluating past decisions. It supports sequence neutrality, a difficult thing to do at scale, where the final state of knowledge is the same regardless of the sequence in which events have taken place.

3. Event driven architecture (EDA)

This refers to a system of loosely coupled components and services wherein workflows in various connected systems are triggered by business events. We listen to events in connected CMS; each event is processed as per event policies or business rules, in context of the current state of the knowledge graph. The knowledge graph acts as an operational data store (ODS) for the EDA. Events crisscrossing the EDA leave their imprint on the knowledge graph, thereby enabling a longitudinal view of persons and cases, and various reporting and analytics. The EDA is endlessly extensible, in that new systems and event types can be easily added over time.

4. National Information Exchange Model (NIEM)

The knowledge graph is modeled using the NIEM ontology, which enables shared data semantics across connected systems. The system provides REST (Representational State Transfer) NIEM APIs on top of the knowledge graph, for read/write of common justice transactions: arrests, bookings, DA charges, court cases, hearings and other court events, court minutes, warrants, probation referrals, etc. Agency systems can easily leverage these NIEM APIs to integrate into the overall justice workflows. Agency systems can subscribe to webhooks notifications, which allow them to automatically process events of interest occurring in other systems, thus enabling a truly connected enterprise. The use of NIEM also facilitates information exchange with state and federal partners.[d]

5."Run anywhere" platform

The EY Unified Justice Platform can be deployed in any public/government cloud, or within the agency data center as a private cloud solution. Advanced container orchestration technology serves as a layer of abstraction between the application layer and the underlying infrastructure. Applications work the same even as the system is shifted from the data center to cloud (or shifted between clouds). This is of specific relevance in justice systems modernization, where migration to public/government cloud typically requires a CJIS Authority to Operate (ATO), a process with significant lead time. With the EY Unified Justice Platform, agencies need not wait for the CJIS ATO to start their modernization journey. They can start within their data center, and simply shift the system to the public/government cloud when the ATO comes through.

[d] "NIEMOpen," *NIEMOpen* website, www.niem.gov, accessed January 2025.

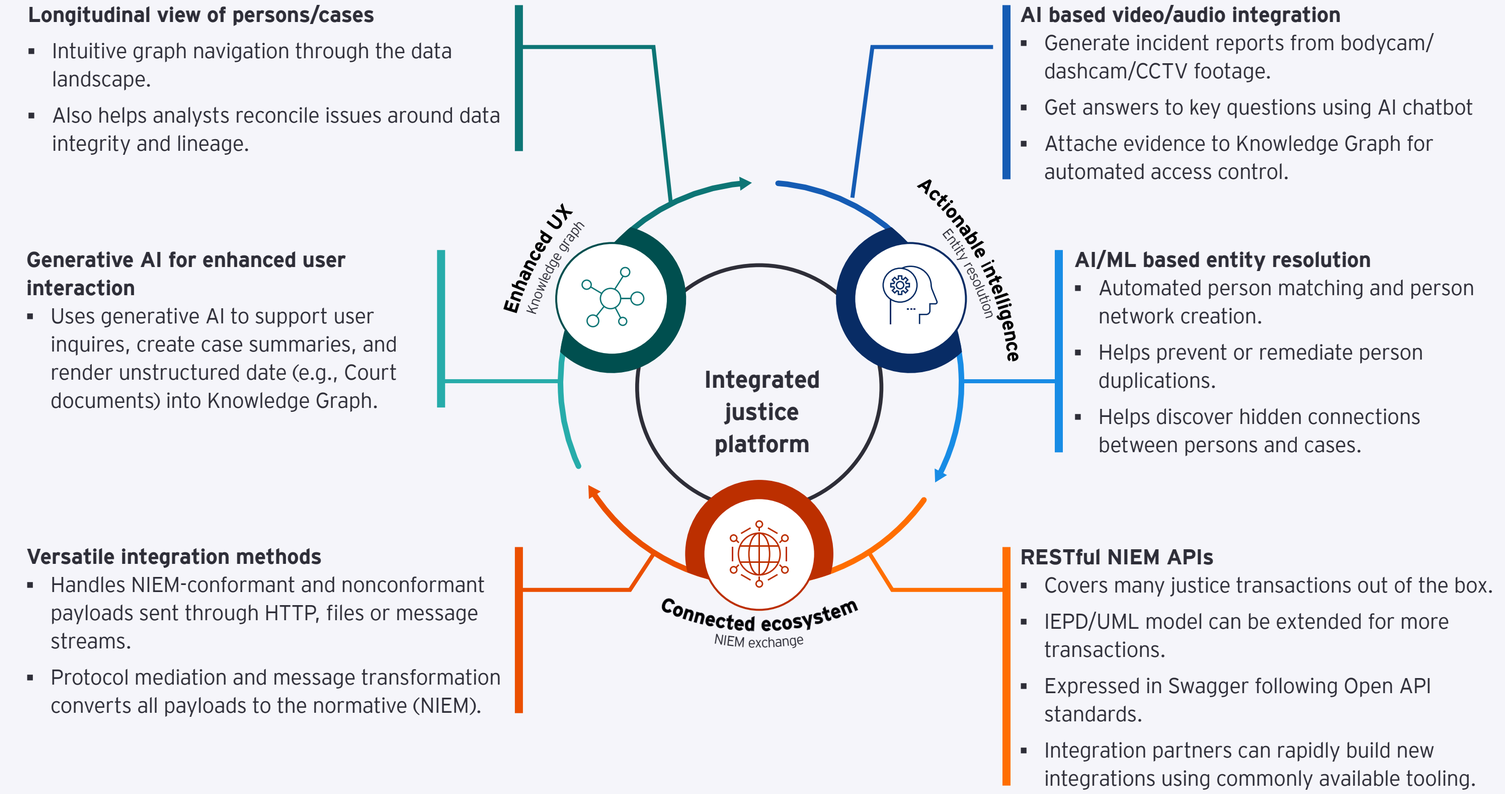
6 Key benefits to justice partners

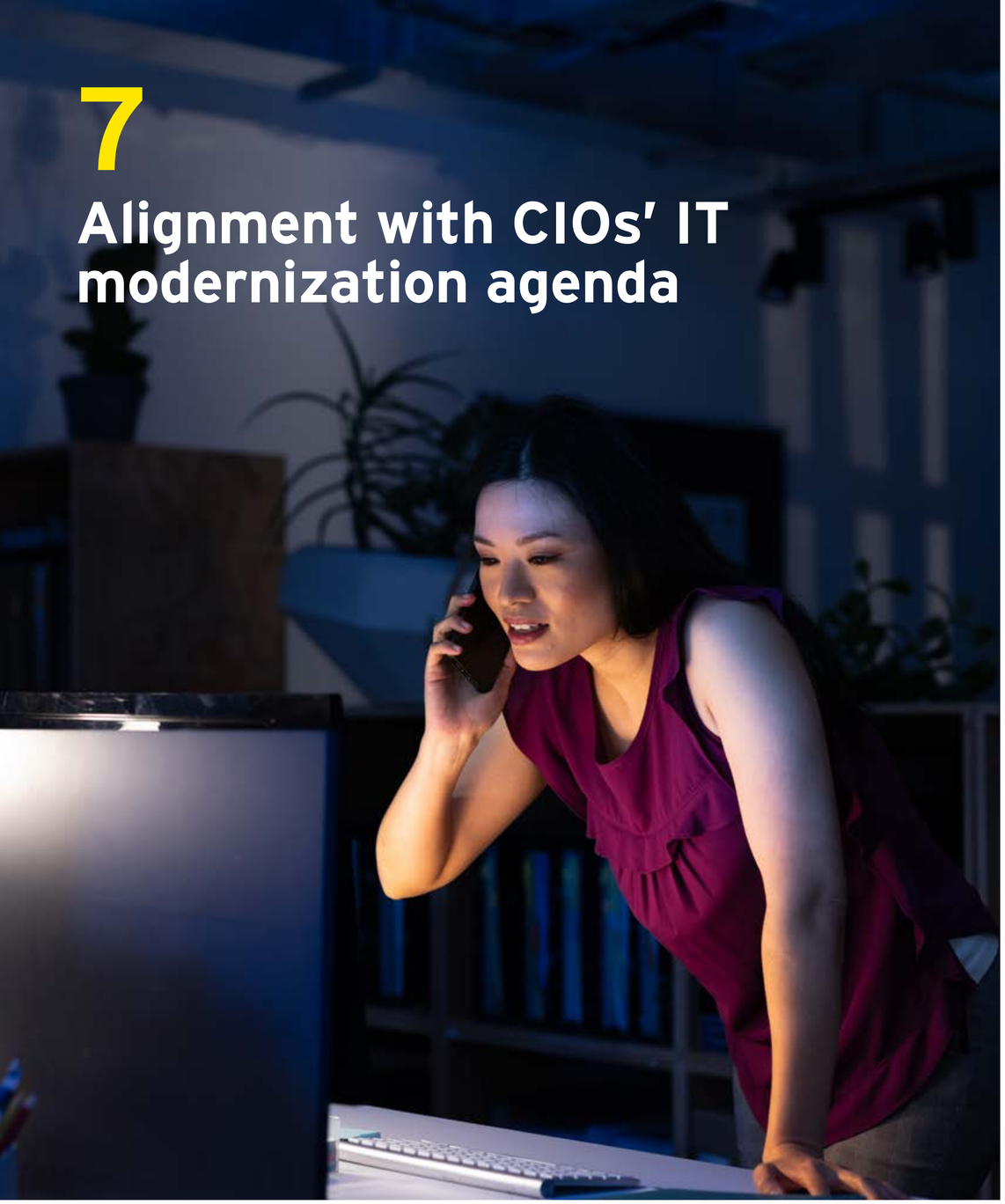
The EY Unified Justice Platform helps fulfill the operational, intelligence, policy and collaboration objectives of a modern justice ecosystem.

- **Automated workflows** across case management systems, helping achieve case processing time standards, meet deadlines and reduce administrative burden.
- **Unified data access across agency systems,** and an AI-driven user experience wherein users can use natural language to quickly make inquiries and generate reports.
- **Cost reductions** by eliminating redundant data entry and reducing data quality issues that need manual intervention.
- **Actionable business intelligence** for investigations and case preparation, including AI-powered processing of audio/video evidence, and AI-enabled "connecting the dots" (persons/cases) across the entire justice landscape.
- **Standards-based data sharing** across partner agencies and state/federal partners, as well as with public health, human services and other agencies.
- **Metrics and KPIs** that promote public transparency and enable the objective evaluation of agency programs and practices.

Figure 4

The EY Unified Justice Platform solves the hard challenges of the justice domain.





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Alignment with CIOs' IT modernization agenda

Justice CIOs have to critically examine each IT acquisition for alignment with the overall modernization agenda, and balance business value with budgetary constraints. Each component of the Total Cost of Ownership – acquisition cost, implementation cost, sustenance cost and the cost of lost opportunities – must be considered. These considerations are baked into the design of the EY Unified Justice Platform.

Capability	Description	Benefit
Leverage data in place	Knowledge graph approach avoids costly data conversion or redundant copies of sensitive data. Graph nodes can reference data in legacy databases and remote systems, respecting source system access controls.	Easier to gain stakeholder acceptance. Reduced implementation effort and risk. Inherently scalable and extensible.
Phased migration of workloads	The platform architecture is intended to support phased migration of workloads and allows agencies to modernize at their own pace.	Reduced implementation risk. Avoids overburdening agency resources.
Hardened to CJIS standards	Fine-grained RBAC, SIEM/SOC integration and comprehensive audit trails. Some cloud providers provide the underlying container platform as PaaS, and take care of many aspects of CJIS compliance. We provide CJIS security control templates for deployment to government cloud PaaS, which significantly reduce the effort and time involved in the ATO process.	Strong security posture; reduced compliance burden and risk.
Multiple cloud options	The system can be implemented in most public/government clouds, or in a hybrid cloud spanning cloud providers. Where a cloud ATO has not yet been obtained, or where workloads are especially sensitive, the system can run within the data center as a private cloud solution.	Flexibility, with no hard tie-in with a specific cloud provider. No need to wait for cloud ATO to start modernization journey.
Built to open standards	The various components of the system conform with W3C, Open Group and OASIS standards, and provide APIs and service interfaces that anyone can leverage.	Lower obsolescence risk; avoids single vendor dependence.
Sustenance resources easily available	The platform is built on mainstream OEM technologies with widespread developer ecosystems. The platform supports Java, .NET and Python programming frameworks, meeting developers where they are.	Lower sustenance cost and disruption risks. Helps leverage current IT staff.

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