



**IJIS Institute**

# Corrections Tech 2020



**Technological Trends in Custodial & Community Corrections**

***IJIS Institute***

**Corrections Advisory Committee**

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## INTRODUCTION

This white paper is a survey of technological trends, current and potential, which are likely to impact the corrections environment in the next 3-5 years. The aim is to provide a 'one-stop' high-level overview for the leadership of correctional agencies and their information technology (IT) organizations, to help understand how these capabilities are evolving, and anticipate where technology may be applied to address current and future business problems. We have attempted to include both existing technologies which could be adapted or extended to serve the correctional mission, and areas where new technologies may be needed to address gaps. Our definition of corrections includes any public or private entity engaged in both custodial and community supervision, at any level (federal, state, county, tribal and territorial), and touches on related developments across the criminal justice spectrum as a whole. Our primary focus is the United States, though we have also noted selected developments in other English-speaking countries.

Of course, it is impossible to predict precisely all the ways in which correctional agencies will apply technology in 2020 and beyond. However, we believe it is possible to take a "30,000-foot view" of current technical and market trends to make some basic predictions about where correctional agencies and their IT leadership may need to deploy resources in coming years. Every year the capabilities of technology platforms and computerized systems expand to offer faster processing, greater storage, improved hardware, more flexible tools for sharing information and collaborative work (within and between agencies), and more powerful analysis of large and complex data sets to support better decision-making. Every year the business needs of corrections become more complex, driven by ever-changing legislation and priorities, for which technological solutions are increasingly sought – yet these solutions must be malleable enough for modification to meet the next set of changes. Many public and private sector entities are making large-scale investments in technology for corrections, sometimes inventing new tools specifically for corrections, sometimes adapting innovations from other markets.

The net effect is an increase in opportunities for, and demands on, correctional agencies – new products, new ways to improve operating efficiency, new tools to deliver on the mission in financially-challenging times. Despite the importance of technology in corrections, it is very difficult to stay on top of all this diverse activity, and ensure that technology choices remain operationally relevant to business needs – a situation which we hope our white paper can help to address.

This document was produced by the IJIS Corrections Advisory Committee, one of several such committees organized by and supporting the IJIS Institute with membership drawn from IJIS member companies, government and constituent organizations. This Committee is focused on advancing information sharing standards among the jail, institutional and community corrections communities, in support of the IJIS Institute's mission to unite the private and public sectors to provide assistance, training and support for information exchange and technology initiatives in the realm of public safety and the administration of justice.

## EXECUTIVE SUMMARY

Correctional agencies in the United States are spending hundreds of millions of dollars annually on investments in technology. But the technological landscape is becoming more complex, with many competing demands on how best to invest those dollars, in the face of pressure on public sector budgets and growing costs to maintain legacy infrastructure. It is a growing dilemma for corrections agencies and their information-technology support. The corrections industry is going through a period of considerable business change, in which technology is acting as both a response to changing demands, and an innovative stimulus to further change. It

materially affects thousands of correctional staff and millions of persons who receive correctional supervision each year.

1. The most important long-term business driver is the search for alternatives to incarceration to control jail and prison populations through early release and diversion strategies.
2. Doing so in the safest and most cost-effective way is the focus of extensive continuous research into evidence-based population management, finding strategies and techniques with the best results in reducing recidivism and contributing more effectively toward creating safer, stronger communities.
3. Out of this has emerged a model of custodial/community collaboration, sometimes called continuity-of-care. The continuity-of-care relies on expanded information sharing of offender data across diverse agencies, and drives the collection of increasing amounts of data from both inside and outside the criminal justice system to assess impacts of sentencing and corrections policies and support further research.
4. This in turn puts new and escalating demands on corrections staff charged with responsibility for offender supervision and public safety, and the budgets of their agencies. Increasingly, they are seeking technological solutions for their diverse operational challenges, especially where direct benefit can be shown in controlling costs, reducing officer workloads, and generating new revenue.
5. One area of particularly rapid innovation and growing economy-of-scale involves the production of mobile devices which can be adapted for correctional use.
6. Another is the recent appearance of advanced “big data” and analytical tools which can help to manage and leverage larger, more complex data sets and real-time data flows, to help support staff in the field and allocate resources most effectively.
7. The evolution of alternative deployment options via online cloud-based services offers perceived benefits of cost savings, shortened timeframes from conception to deployment, and levels of reliability and resilience compared to in-house services, but must always be counterbalanced by the paramount need for cybersecurity of agency and offender data in cloud-based services.
8. Through it all, correctional agencies are required to demonstrate compliance with a growing body of standards and policy for staff, offenders and the community.

These eight bullets became the framework with which we analyzed current and potential developments in correctional technology: eight prominent technological trends in the corrections industry and a possible roadmap to what may be coming by 2020. Correspondingly, our report has eight sections, one for each of these trends, to present our “30,000-foot” view of where the industry may be headed:

Eight technology trends in corrections	
<b>Trend #1</b> <b>Alternatives to Incarceration</b> <b>[Page 8]</b>	As efforts continue to manage jail and prison populations through early release and diversion strategies, there will be growing demand for technological support of these strategies, particularly for sharing information on offenders across a wide range of public and private agencies, and wider use of electronic monitoring and surveillance.
<b>Trend #2</b> <b>Cost Avoidance and Reducing Workloads [Page 13]</b>	Emerging technological solutions will increasingly be embraced as opportunities to reduce officer workloads, control costs and generate ancillary revenue for correctional agencies, through such tools as inmate web applications and automation to ease officer overhead.

<p><b>Trend #3</b> <b>Increasing Mobility [Page 19]</b></p>	<p>The capabilities of mobile devices are continuously increasing even as their costs come down, providing many new options for managing current challenges in custodial and community corrections (reporting tools, surveillance technologies and body cams), some of which can be provisioned on the personal devices of offenders and staff.</p>
<p><b>Trend #4</b> <b>Big Data and Advanced Analytics [Page 24]</b></p>	<p>Business-intelligence and analytical tools will be increasingly applied to help the business in a wide range of areas including expanded biometric databases, social media surveillance, predictive modeling, video analytics and pattern recognition.</p>
<p><b>Trend #5</b> <b>Evidence-based Population Management [Page 30]</b></p>	<p>Technological support will be increasingly sought for delivery of evidence-based strategies (EBRs) and programs both inside and outside corrections, in such areas as risk and needs assessments, educational technology, and new tools for community supervision partners.</p>
<p><b>Trend #6</b> <b>Expanded Information Sharing [Page 35]</b></p>	<p>Correctional agencies will be central to expanded information sharing across the whole of the justice, public safety, emergency and disaster management, intelligence, and homeland security enterprise, within the U.S. and internationally.</p>
<p><b>Trend #7</b> <b>Cloud Services and Cybersecurity [Page 41]</b></p>	<p>Budgetary and procurement drivers are likely to result in increased demand for cloud-based correctional IT deployments, as vendors of online services respond to concerns about appropriate handling and security of criminal justice data</p>
<p><b>Trend #8</b> <b>Standards and Policy [Page 47]</b></p>	<p>Correctional agencies will continue to seek technological solutions to encourage and demonstrate compliance with a growing body of standards and policy for staff, offenders and the community.</p>



These trends are not hard-and-fast boundaries, and there is blending between them. Rather, they are different angles for looking at the whole picture. You will notice a lot of crossover between sections, and a particular technology may be mentioned in multiple places. The index at the back of the document gives the best snapshot of topics covered.

If there is one unifying theme, it is the rapid evolution of technology both within corrections and from other markets, through innovation fostered by correctional agencies and the active vendor community, many of whom are members of the IJIS Institute. Funding and support from the Department of Justice, National Institute of Corrections, and associations such as the American Correctional Association, American Probation and Parole Association, Corrections Technology Association, and American Jail Association, are driving the definition of national standards and improved methods of collaboration with other justice agencies and service providers. And general trends of the IT industry – buzzwords like “Nexus of Forces” (the convergence of mobile, social media, cloud computing and information patterns) and “Internet of Things” (IOT) (the network of physical devices with hardware, software and network connectivity to collect and exchange that information) – are accelerating the development and implementation of corrections technology with extended capabilities that could not have been anticipated only a few years ago.

A representative sampling of current activity could include the extensive industry research and investment underway into improved ‘big-data’ analytical tools; the appearance of private- and public- cloud providers offering secure services compliant with CJIS security policy; the Pay-For-Success (PFS) model for contracting services for offender supervision; national information sharing standards: (Global Reference Architecture (GRA), National Information Exchange Model (NIEM), Global Federated Identity and Privilege Management (GFIPM), etc.); and efforts to overcome information-sharing gaps between corrections, criminal justice, public health and other service providers such as the IJIS Institute’s Corrections Reentry Information Sharing Project. We touch on these and many other throughout the main body of our report.

We believe this report can support big-picture thinking which can help to navigate through these challenges. Though technology is evolving at an accelerating pace, we’ve tried to stay grounded in the needs of the business (it’s never technology for technology’s sake). Correctional agencies will need an IT infrastructure which can implement the appropriate technological solutions for each agency’s priorities, and we hope this paper can help agencies to develop their plans for acquiring new technical tools, skills and experience.

The team of authors includes both corrections professionals and representatives of member companies of the IJIS Institute and is presented in support of the IJIS Institute’s mandate of uniting public and private sectors to improve information sharing and safeguarding in public safety, justice and homeland security.



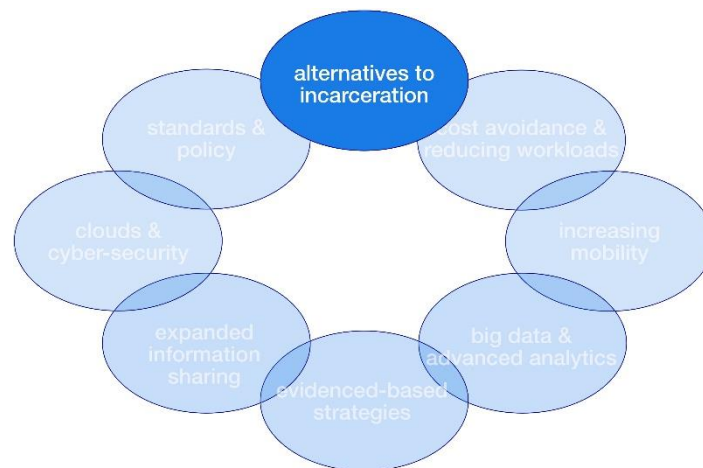
**TREND #1: ALTERNATIVES TO INCARCERATION**

**Definition** As efforts continue to control jail and prison populations through early release and diversion, there will be growing demand for technological support, particularly for sharing information on offenders across a wide range of public and private agencies.

- Applications**
- Wider use of **electronic monitoring and surveillance**
  - More **day reporting centers** with streaming cognitive programming
  - **Improved communication** with law enforcement prior/during/after release
  - Extensive real-time **data sharing** across the criminal justice spectrum

- Industry drivers**
- Continuing **research and cost incentives** for reducing jail/prison populations
  - **National Institute of Corrections (NIC)** - Transition from Jail/Prison to the Community (TJC and TPC) Initiatives
  - **Justice Reinvestment Initiative (JRI)**
  - **New hardware and software** capable of extending electronic monitoring

- Key themes**
- **Data sharing and collaboration** will increase between custodial/community corrections, courts, law enforcement, health care providers, re-entry facilitators, social service agencies and offenders
  - **Risk/needs assessment** models for recidivism will evolve, incorporate expanded variables, and be applied to improve diversion capability during the pre-trial phase as well as inmate re-entry
  - Devices with **electronic monitoring and GPS** capabilities will be ubiquitous and applicable for correctional supervision, for both offenders and staff (see Trend #3, Mobility)
  - Technology deployed in **day reporting centers and halfway houses** will help facilitate more widespread client access to programs, services and electronic monitoring applications



Efforts to control jail and prison populations through early release and diversion strategies are likely to intensify over the next five years, as evidence mounts that prison populations don't need to expand for crime rates to drop. According to a 2014 Pew analysis,<sup>1</sup> 32 states have recorded declines in both imprisonment and crime rates. These efforts will provide added incentives for lawmakers to pursue approaches to limit custodial populations such as revising mandatory sentencing laws and reclassifying minor offenses. Limiting the custodial population is the largest current area of business change within corrections, transforming how millions of persons are supervised. Technology will continue to be a vital support for agencies dealing with population reduction ramifications.

Community agencies are hard-pressed to accommodate the numbers of early releases falling under their supervision and have reacted by redistributing caseloads, applying less-intensive supervision for parts of the offender population such as DWI convictions, and diverting cases to specialized outside service providers such as mental health treatment.<sup>2</sup> In some states re-entry can involve transfer to a jail before full community release, meaning jails are now facing overcrowding issues of their own, and an influx of serious offenders into facilities never designed to house them. Jails are seeking technological assistance for decision-making and population management to maintain an acceptable degree of safety for everyone inside. We think it's possible to make the following projections:

- Data sharing and collaboration will increase between custodial/community corrections, courts, law enforcement, health care providers, re-entry facilitators, social service agencies and individual offenders.
- Risk/needs assessment models for recidivism will evolve, incorporate expanded variables, shared, and be applied to improve diversion capability during the pre-trial phase as well as inmate re-entry.
- Devices with electronic monitoring and GPS (Global Positioning Systems) capabilities will be ubiquitous and applicable for correctional supervision, for both offenders and staff (see Trend #3, Mobility).
- Technology deployed in day reporting centers and halfway houses will help facilitate more widespread client access to programs, services and electronic monitoring applications.

## DATA SHARING AND COLLABORATION

As prisoners are released to the community, and community agencies partner with specialist service providers, multiple entities can be simultaneously responsible for the supervision of an individual case. All parties require access to critical offender information on legal orders, assessments or program referrals, to make appropriate case planning decisions. Appropriate case planning decisions can be achieved by extending access to the agency's inmate- or case-management systems or integrating them to provide the necessary data exchange.

Custodial and community officers are working together to plan each inmate release, yet may never meet in person. Online collaboration tools will become more important especially for the period just before re-entry when an inmate is still in custody, but the community agency is already planning the handover, scheduling the first report-in, assigning a supervising officer, and making referrals to ensure continuity of programs received in jail or prison with minimal disruption.

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<sup>1</sup> *Most States Cut Imprisonment and Crime*, The Pew Charitable Trusts, November 2014. <http://www.pewtrusts.org/en/research-and-analysis/analysis/2014/11/12/most-states-cut-imprisonment-and-crime>

<sup>2</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections: Identifying High-Priority Technology and Other Needs for the U.S. Corrections Sector*, RAND Corporation/National Institute of Justice, 2015, p58. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

## RISK/NEEDS ASSESSMENTS

Over the past two decades, the use of risk/needs assessments has become standard corrections practice, to evaluate the risk of recidivism and potential for early release. Proprietary and non-proprietary assessment instruments are subject to extensive and continuous research to improve their predictive ability across an increasing range of ethnic, racial and gender factors.<sup>3</sup> However, there remains a perception in the field that more research is needed to improve both the assessments and the validation techniques used to evaluate their effectiveness. The 2015 RAND Corporation study *Fostering Innovation in Community and Institutional Corrections: Identifying High-Priority Technology and Other Needs for the U.S. Corrections Sector* (published on behalf of the National Institute of Justice) includes a call for “improved risk assessment models for recidivism that incorporate expanded variables and model types and can provide dynamic, near-real-time assessments of risk” and “case management systems that can dynamically update risk assessments and automatically validate and update [those] risk assessment models.”<sup>4</sup>

That will require further development of the assessment instruments and the software tools to deliver them, and we can expect frequent updates of both in the next five years. Other forms of technological support are also essential to fully realizing the vision of the RAND study: comprehensive information sharing among criminal justice applications to assemble relevant criminal justice data on an individual from any jurisdiction (see *Trend #6, Expanded Information Sharing*), and research access to the same data nationwide to support further refinement of the tools (see *Trend #4, Big Data and Advanced Analytics*).

It is also possible to foresee wider application of assessments as their capabilities improve, for instance in the court system to improve diversion capability during the pre-trial phase, and avoid sending offenders to jail when they could be identified as low risk. Technology can help to provide input and appropriate data to risk-based decision processes conducted by judges with the assistance of pre-trial staff.

## ELECTRONIC MONITORING AND GPS

There will be an appetite across the criminal justice spectrum for wider and more effective use of electronic monitoring (EM). Evidence indicates that offenders subject to EM are more likely to comply with their supervision conditions, and EM tools can reduce the amount of fieldwork required to monitor offender adherence to case plans and conditions.<sup>5</sup> The recognized cost benefit of monitoring versus imprisonment will drive strategies to divert offenders from prison sentences and keep community-supervised offenders from violating their conditions.<sup>6</sup> It’s also likely that the use of EM will expand beyond its traditional application in probation and parole. By 2020, it will be more common in pre-trial supervision, as a component of risk-based supervision plans and a standard tool for enforcement of bail conditions. It can also be a support tool for post-sentence

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<sup>3</sup> Michael Ostermann and Laura M. Salerno, *The Validity of the Level of Service Inventory—Revised at the Intersection of Race and Gender*, May 2016. <http://tjpi.sagepub.com/content/96/4/554.abstract>

<sup>4</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p57. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>5</sup> *Adjunctive Use of Surveillance and Monitoring Strategies*, Center for Sex Offender Management. [http://www.csom.org/pubs/cap/3/3\\_3.htm](http://www.csom.org/pubs/cap/3/3_3.htm)

<sup>6</sup> Bill Bales, et al., *A Quantitative and Qualitative Assessment of Electronic Monitoring*, College of Criminology and Criminal Justice, October 2010. [http://www.irsa.org/events/conference/presentations-10/Bill\\_Bales\\_2.pdf](http://www.irsa.org/events/conference/presentations-10/Bill_Bales_2.pdf)

assistance to end criminal behavior; in both the U.S. and the United Kingdom; ex-offenders are volunteering to wear monitoring devices as a way to resist peer pressure to re-offend.<sup>7</sup>

The capabilities of electronic monitoring devices are expanding rapidly above and beyond their historical usage for geospatial tracking (which is becoming more powerful in its own right). It's projected that by 2022 there will be 7 billion devices equipped with GNSS (global navigation satellite system) receivers in use worldwide – almost one for every person on the planet<sup>8</sup> - in cameras, watches, binoculars, and new devices not yet in widespread commercial circulation, such as clothing. The proliferation of devices is driving massive investment and innovation in GNSS applications, many of which will be adaptable to correctional operations.

- *Positioning (geospatial tracking):* The accuracy and reliability of GPS positioning has lately improved through autonomous GPS, assisted GPS, high sensitivity GPS, and AFLT (Advanced Forward Link Trilateration). It's now common to find various positioning technologies integrated into one device to optimize performance under a range of conditions. GNSS receivers are becoming more sensitive as chip technology and processing power improve, and High Sensitivity GNSS receivers have been able to receive satellite signals and determine 3D positions indoors.<sup>9</sup> Newer indoor positioning systems (IPS) can locate objects or people inside a building using radio waves, magnetic fields or acoustic signals collected by mobile devices, and which can be integrated with GPS. This technology may not be viable for hardened custodial facilities before 2020, but it may soon be feasible in community corrections to extend the enforcement of supervision conditions for geographical exclusion zones to indoor spaces.
- *Non-geographic technologies:* Courts will increasingly tailor conditions of supervision to mandate the use of newer EM capabilities for monitoring offender compliance with conditions, which include the consumption of alcohol or drugs; the level of hormones in the body, and online activity. Mobile devices such as smart watches will come with unique body monitoring functions built into their watch bands. Projecting further out, there is a possibility that polygraph assessment, now generally confined to the treatment of post-conviction sex offenders, could become more generally accepted as a way for probation/parole officers to assess the honesty of offender reports. Similar possibilities exist for voice stress analysis.
- *Technological expansion of electronic monitoring:* Hardware and software exists that *could* extend the use of EM for corrections and law enforcement. The hurdles are high implementation costs and reservations about the applicability of certain technologies such as radio-frequency identification (RFID). Certainly, EM tracking data has immense value in being shared with police, to compare information on prolific or high-risk offenders against reported crime, and technology exists that would permit offender tagging information to be accessible to police in real time. In Boston, Massachusetts, an application called ShotSpotter compares information in a police database with known movements and locations of offenders on GPS monitoring.<sup>10</sup> As stated in a recent report from the UK, "The logical way to realize the crime reduction potential of location-based electronic monitoring would be for offender's GPS tags to be linked directly to police emergency response and crime recording systems<sup>11</sup>..."

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<sup>7</sup> Rory Geoghegan, *Future of Corrections: Exploring the use of electronic monitoring*, September 2012. <https://policyexchange.org.uk/publication/future-of-corrections-exploring-the-use-of-electronic-monitoring/>, pp59-60

<sup>8</sup> Carmen Aguilera, *European GNSS Applications in H2020*, December 2013. [http://www.dlr.de/rd/Portaldata/28/Resources/dokumente/rp6/veranstaltungen/H2020\\_Brussels/d2-02-gnss/AGUILERA.pdf](http://www.dlr.de/rd/Portaldata/28/Resources/dokumente/rp6/veranstaltungen/H2020_Brussels/d2-02-gnss/AGUILERA.pdf)

<sup>9</sup> Andreas Teuber, et al.: *GNSS Indoors – Fighting the Fading*, Inside GNSS, March 2008. [http://www.insidegnss.com/auto/igm\\_043-052.pdf](http://www.insidegnss.com/auto/igm_043-052.pdf)

<sup>10</sup> <http://www.mass.gov/courts/probation/pr042711a.html>, accessed February 11, 2016

<sup>11</sup> Rory Geoghegan, *Future of Corrections: Exploring the use of electronic monitoring*, p17. <https://policyexchange.org.uk/publication/future-of-corrections-exploring-the-use-of-electronic-monitoring/>

Radio Frequency- (RF) enabled closed-circuit television (CCTV) installations, which register the presence of RF tags, could be developed to help aid tracking of offenders on tag where they have committed an offence or where they are suspected of having committed an offence.”<sup>12</sup>

## DAY REPORTING CENTERS AND HALFWAY HOUSES

Since the first one opened in the U.S. in 1986 in Hampden County, Massachusetts, day-reporting centers (also known as attendance- or transitional support centers) have become a common component of community supervision. Probationers, parolees and pretrial offenders report to a designated facility daily to receive programs and access services like counseling or job placement assistance. More of these facilities will be built in coming years, and many jurisdictions will eventually offer a mix of residential (halfway house) and non-residential (day reporting) services for individuals diverted from jail.

Both day reporting centers and halfway houses are hubs for providing direct offender access to technological services and monitoring within a controlled environment. Typical equipment includes kiosks for client report-ins, payments for fines/fees/restitution, and searches for available resources; workstations for delivery of individualized streaming cognitive programming; and classroom workstations for educational and treatment programs. Electronic monitoring capabilities are also becoming widespread. In many jurisdictions, some or all of the costs to install technology in day reporting centers is being offset by client fees, another incentive for their wider use. Provision of technological support for offering programming to residents can encourage higher levels of motivation with implications for successful reintegration.

## IMPLICATIONS FOR CORRECTIONS LEADERS

The ability to divert individuals from jail depends on the existence of alternative mechanisms for safe and comprehensive monitoring, which is possible only with extensive technological support. Demand will only grow in the future for new hardware and software, distributed across a wider range of public and private agencies, supported by efforts like the National Institute of Corrections (NIC) - Transition from Jail/Prison to the Community (TJC and TPC) Initiatives and the Justice Reinvestment Initiative (JRI).

The *IoT* ( see also *Trend #3, Mobility*) has the potential to revolutionize community corrections. Not that far in the future, supervision records for millions of probationers and parolees may be chronologically updated from a multitude of devices, tracking activities, locations and body-monitoring indicators with little or no intervention from officers. More than ever, persons under supervision will be active participants in their monitoring via applications for self-directed reporting by telephone, at kiosks, or their own personal devices for automated and involuntary compliance checks. Officers may be spending most of their time monitoring, or even responding to automated alerts, rather than compiling records, freeing up schedules for more intensive case planning and responding to significant developments in their caseloads when alerted. As new technologies and techniques gain acceptance, courts are likely to respond by tailoring conditions for their use and generating feedback loops which will drive wider usage.

Reliance on devices and applications leveraging the internet as a platform will help minimize startup costs (and in turn drive further adoption). Nonetheless, corrections IT departments will still be challenged to aggregate and safeguard the volumes of data which will be generated. Data collected by a community corrections agency may be sourced from tens- or hundreds- of thousands of devices, including those issued and maintained by an agency or a contracted partner, and clients’ own personal devices. CJIS security and audit policies

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<sup>12</sup> Rory Geoghegan, *Future of Corrections: Exploring the use of electronic monitoring*, p65. <https://policyexchange.org.uk/publication/future-of-corrections-exploring-the-use-of-electronic-monitoring/>



will apply (*see also Trend #7 – Cybersecurity*), and the identification of devices responsible for specific data points will remain pertinent. There will also be great interest in mining the volumes of data generated, for a deeper understanding of what works well or not so well in reducing recidivism and promoting the safest and most effective incarceration alternatives (*see Trend #4 – Big data*). There is an obvious and pressing need for data exchange standards to facilitate a dramatic increase in the degree of information sharing between corrections, law enforcement, and community-based organizations (*see Trend #6, Expanded Information Sharing, and Trend #8, Standards and Policy*).

## TREND #2: COST AVOIDANCE AND REDUCING WORKLOADS

**Definition** Emerging technological solutions will increasingly be embraced as opportunities to reduce officer workloads, control operational costs and generate revenue for correctional agencies.

### Applications

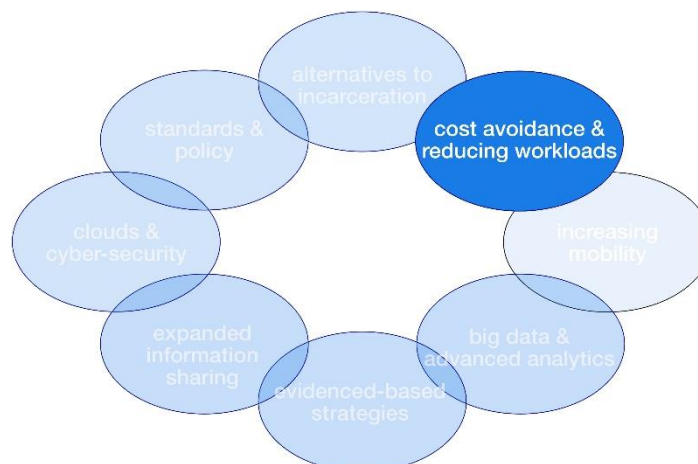
- **Inmate web applications** for programming and behavior incentives
- **Personal devices** for inmates to access permitted web services
- **Automation to ease officer workload** in areas like surveillance and documents
- **New officer tools** in areas like contraband detection and telephone monitoring
- **Cloud-based back-end services**

### Industry drivers

- Opportunities for offender fees from **new technological applications**
- Rapid evolution of **technology from other markets** adaptable to corrections
- Improvements in **educational technology** applicable to offenders and staff
- Continuous industry advances in **cloud computing** services and reliability

### Key themes

- There will be an increase in ancillary **revenue opportunities** for correctional agencies, through products and services which can be charged to offenders, delivered via social media platforms
- Increasing **technology in the hands of corrections staff** will reduce workloads and distractions, while improving access to essential information in real time
- More cost-effective technological approaches for **public interaction** with correctional agencies, like video visitation, are likely to transform large areas of correctional operations
- More cloud-based options for **the “back-office”**, like human resources and facility management, will help to reduce the cost of IT infrastructure support for correctional agencies



Budgetary pressures are behind many technological trends under review, including the interest in alternatives to incarceration discussed above. The belief persists that technology investment pays dividends down the road, and as advances bring down costs, return on investment can be realized faster. Agencies nationally and internationally are exploring how to apply technology to reduce officer workloads and avoid costs. We have identified at least three areas with potential for huge impact in the years ahead:

- There will be an increase in ancillary **revenue opportunities** for correctional agencies, through products and services which can be charged to offenders, delivered via social media platforms.
- Increasing **technology in the hands of officers** will reduce workloads and distractions while improving access to essential information in real time.
- More cost-effective technological approaches for **public interaction and ancillary activities** such as human resources and facility management will transform large areas of correctional operations.

## REVENUE OPPORTUNITIES

Corrections agencies will continue to search for opportunities to charge offender fees to offset supervision costs, despite ongoing legal and policy challenges to the practice.<sup>13</sup> It's now common for jails and prisons to charge for room and board, work release, clothing, hygiene items, medical care, prescriptions, and entertainment (music/video). Technology is required to administer these fees, and will provide new options for charging and collecting as custodial facilities further move to a "cashless" environment for inmate funds.

The recent growth of inmate e-messaging into an established revenue-generating activity illustrates how use of a new technology can be propelled by a convergence of factors, which could be replicated for other technologies. A strong business case exists for e-messaging's rehabilitative potential, as frequent contact with family and friends has been shown to contribute towards reducing recidivism. Security advantages over traditional mail include real-time monitoring, lower overhead, and elimination of a contraband entry point. Not least, operational costs can be recovered by charging inmate fees for access. (These advantages are so compelling that traditional inmate physical mail may virtually be phased out by 2020.) The same dynamic can be seen with video visitation, now used in more than 500 correctional facilities in the U.S.: cost-effectively increasing inmate contact with family and friends (in-person visits consume so many resources that visiting slots must be rationed); reducing contraband risk; and charging inmates by the minute.

Inmate e-messaging and video visitation operate on proprietary platforms that don't allow direct inmate access to the internet, which also holds for newer developments such as limited-function tablets accessing closed messaging systems, and recent patent applications for security-monitored closed "social networks" for use in prisons.<sup>14</sup> Most jurisdictions still restrict inmate access to the web and some states have statutes prohibiting it. However, we believe the question of internet access in custodial facilities will become increasingly pressing in coming years. One factor is simply that many functions of government, education and business are moving to on-line only, leaving inmates with no other way to access.

The big open question is whether inmates will gain access to other forms of social media (*see Trend #3, Mobility*). Advocates of criminal justice reform have been lobbying for this for years, arguing that banning social media is damaging to re-entry efforts. How to police it with social media companies to restrict improper or

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<sup>13</sup> Lauren-Brooke Eisen, *Paying for Your Time: How Charging Inmates Fees Behind Bars May Violate the Excessive Fines Clause*, Brennan Center for Justice, 2014. <https://www.brennancenter.org/analysis/paying-your-time-how-charging-inmates-fees-behind-bars-may-violate-excessive-fines-clause>

<sup>14</sup> Stephen Rahe, *You've Got Mail*, Prison Policy Initiative, January 2016. <http://www.prisonpolicy.org/messaging/report.html>



offensive content, present a host of challenges for corrections IT. But the same combination of potential rehabilitative benefit and revenue streams will provide incentives for agencies and vendors to work on the problem. If this becomes a reality, look for associated revenue opportunities to increase.

## TECHNOLOGY IN THE HANDS OF CORRECTIONAL STAFF

The impulse to make more technology available to corrections staff seems limited only by the ability to fund it, and successful experimentation or demonstration of new tools and techniques can lead to widespread acceptance very quickly. Prominent examples from recent years include the adoption by community corrections officers of the ability to upload data into Google Maps' geospatial data visualization tools to plan fieldwork and minimize travel, the extensive installation of coordinated surveillance (CCTV/recording systems) in custodial facilities, and the level of increased interest in document- or enterprise-content management systems, engaging clerical staff to scan the voluminous paper documents associated with individual cases in an effort to make it easier to find and use the information they contain.

Where next? The 2015 RAND Corporation study *Fostering Innovation in Community and Institutional Corrections*<sup>15</sup> (cited above in *Trend 1 – Alternatives to Incarceration*) published the findings of a research effort to assess and prioritize technology needs across the criminal justice sector. The study identified innovations that would be beneficial in the future and urged the development and improvement of various technologies to meet the specialized needs and performance requirements of corrections. The RAND study's set of prioritized needs, systematically assessed by a panel of 25 community and institutional practitioners, includes:

*Contraband detection:* enhanced technological capabilities envisioned by the RAND study to detect contraband include a small and affordable scanning portal suitable for detecting all types of contraband coming into facilities from visitors or incoming logistical shipments; more accurate video analytics technologies for fence line video monitoring, and tools to track contacts between inmate and staff phone numbers in response to contraband entering via employees. (Technology also enables business change to reduce opportunities for banned items to enter custodial facilities – video over physical visitation, and e-mail over 'snail-mail' – and body cameras will also become important in situations involving confiscation of contraband.) The National Institute of Justice (NIJ) is sponsoring several pilot programs to test new technology including airport security equipment in prisons, including a millimeter-wave scan of visitors at Graterford State Correctional Institution in Pennsylvania, which can detect contraband hidden under clothing.<sup>16</sup> According to Graterford's intel captain, the deterrent effect is so strong that "it's infrequent that people had anything concealed." NIJ is also funding development of electronic-field-tomography (EFT) which could detect contraband in body cavities.

The Washington Post has recently reported on the use of drones by inmates to smuggle goods into facilities.<sup>17</sup> The payload capacity of drones available today is in theory enough to carry not just traditional contraband like drugs and cellphones, but also weapons such as pistols. Start-up firms are selling anti-drone detection systems to correctional agencies, using thermal imaging, radio and audio scans to locate evidence of drones and

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<sup>15</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, pp61-64. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>16</sup> Philip Bulman, *Using Technology to Make Prisons and Jails Safer*, National Institute of Justice, March 2009. <http://www.nij.gov/journals/262/pages/corrections-technology.aspx>

<sup>17</sup> Michael Rosenwald, *Prisons try to stop drones from delivering drugs, porn and cellphones to inmates*, Washington Post, October 13, 2016. [https://www.washingtonpost.com/local/prisons-try-to-stop-drones-from-delivering-drugs-porn-and-cellphones-to-inmates/2016/10/12/645fb102-800c-11e6-8d0c-fb6c00c90481\\_story.html?wpisrc=nl\\_draw2andwpm=1](https://www.washingtonpost.com/local/prisons-try-to-stop-drones-from-delivering-drugs-porn-and-cellphones-to-inmates/2016/10/12/645fb102-800c-11e6-8d0c-fb6c00c90481_story.html?wpisrc=nl_draw2andwpm=1)

send alerts; and a radio transmitter that seizes control of nearby drones in mid-flight was demonstrated in October 2016.<sup>18</sup>

- Telephone monitoring: the labor intensity of monitoring calls means it is difficult for facilities to listen to more than a small percentage of inmate telephone conversations. The Rand study advocates for tools to transcribe inmate telephone calls, with keyword analysis and other pattern recognition.<sup>19</sup>
- Deception detection: community officers have a high-priority need for “affordable, portable, easy-to-use, and validated tools for determining whether a subject is being deceptive. Potential technologies... include recognizing microfacial expressions, remote biometrics sensors, and p200 (brain waves).”<sup>20</sup>
- Language assistance: there is a need for new and improved multi-language speech-to-speech translators, and (for custodial facilities) tools to translate inmate telephone calls in foreign languages.

The RAND study also focuses on *educational technology* tools and instructional techniques which could help to address staff and inmate training costs, and calls for “comprehensive video-based training (updated regularly) to train staff on needs, medication and other requirements to manage inmate mental health issues.” These demands are likely to increase due to emerging requirements for annual certification of staff such as those mandated by the 2003 Prison Rape Elimination Act (PREA).

Educational technology has enormous potential to reduce costs and workload in the delivery of programming to offenders. The onset of the virtual learning environment (VLE), simulating a real classroom using various technologies such as web conferencing, whiteboards and screencasts, can help solve logistical problems in jails and prisons in providing physical classroom space and moving inmates to and fro. Computer-based training (CBT) and Web-based training (WBT) programs for self-paced learning activities can be delivered into living units or even individual cells, provided the necessary infrastructure can be installed. Recently-developed collaborative apps, which allow students and teachers in different locations to interact, can be of obvious benefit in custodial facilities. Going further, new tools developed to connect schools across geographical boundaries – multi-user virtual environments (MUVes) sometimes referred to as “Classroom 2.0” – could be implemented in jurisdictions with multiple custodial facilities, and in theory, make it unnecessary to transfer an inmate to another institution to receive specific programming.

Of all the innovations happening now, telemedicine might be the one with the greatest fiscal impact. Texas, the state with the largest prison population (around 150,000 prisoners) has among the lowest per-capita spending on prisoner health (\$3,805 per prisoner in 2011, compared to the national average of \$6,047).<sup>21</sup> The University of Texas Medical Branch (UTMB), which provides health care to about 80% of prisoners in the state, conducts 127,000 telemedicine visits a year with inmates, handling all behavioral health care, about 20 percent of primary care appointments, and between 5 and 10 percent of specialist visits – providing faster delivery of care (thereby improving health care outcomes), and helping to apply the same standard of care across the 83 correctional facilities for which UTMB is responsible.

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<sup>18</sup> Dan Goodin, *There's a new way to take down drones, and it doesn't involve shotguns*, arstechnica.com, October 2016. <http://arstechnica.com/security/2016/10/drone-hijacker-gives-hackers-complete-control-of-aircraft-in-midflight/>

<sup>19</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, pp61-62. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>20</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p. xv [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>21</sup> Michael Ollove, *State Prisons Turn to Telemedicine to Improve Health and Save Money*, Government Technology, January 2016. <http://www.govtech.com/health/State-Prisons-Turn-to-Telemedicine-to-Improve-Health-and-Save-Money.html>

## PUBLIC INTERACTION

Many correctional agencies are pursuing technology initiatives to make systems easier for public and staff interactions. One with current momentum is the use of online booking and video technology for inmate visits, which can free up considerable staff and space resources compared with the overhead to operate a traditional in-person visiting room, with obvious security benefits such as removal of contraband entry points. In some jurisdictions, the majority of visits are now being booked via smartphones.<sup>22</sup>

Video technology is also changing how custodial facilities work with courts, enabling defendants, victims, witnesses or members of the public to participate via video or audio link. Courts have motivations to ease pressure on courtrooms by reducing the number of hearings which must be attended in-person, and custodial facilities can reduce time, effort and risks associated with physically transporting inmates to and from court. In community supervision as well, video could become a routine method of communication with probationers and parolees.

Correctional agencies have been maintaining web-based information portals for public information and resources for many years, and adding new services like visit booking to the network of online resources is common practice and will only increase. Important information and services typically accessible online includes queries to locate offenders; victim services; policy and procedures and health care manuals; EEO (Equal Employment Opportunity) and PREA reports; directories of rehabilitative programs and services; product information and ordering for merchandise manufactured by inmates; tools for staff development such as lesson plans or training requests; current population statistics for custodial and community supervision; and information on agency procurements.

## THE “BACK-OFFICE”

It may be a while yet before the much-touted cost-saving potential of the cloud will be fully felt across the core business of offender supervision (*see Trend #7, Cloud Services and Cybersecurity*). However, it's a different story for those aspects of correctional operations which do not directly affect supervision of persons within the criminal justice system, meaning they are not subject to security requirements for offender data under the Criminal Justice Information Systems (CJIS) Security Policy, or (for health data) the Health Insurance Portability and Accessibility Act (HIPAA). Many cloud-based options already exist for such “back-office” applications as human resource management (HRM), staff recruitment and talent acquisition, office and messaging software, finance and accounting (including payroll, invoicing and contract management), food services for custodial facilities, facility management, and utilities such as electricity, heating and cooling. Indeed, for some, the cloud is already the dominant delivery platform.

We believe that for most correctional agencies, the first widespread adoption of cloud-based applications will be for these “back-office” systems. There is extensive competition from many well-established vendors, and the business case for reducing the cost of IT infrastructure support and transferring spending from capital expenditure on equipment and software to operating expense will be compelling.

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<sup>22</sup> Angelica Mari, *CIO interview: Ben Booth on transforming IT at the National Offender Management Service*, Computer Weekly, March 2015. <http://www.computerweekly.com/news/2240241984/CIO-interview-Ben-Booth-on-transforming-IT-at-the-National-Offender-Management-Service>

## IMPLICATIONS FOR CORRECTIONS LEADERS

We don't see any looming change in the belief across the entire government sector that technology is a way for agencies to save money and improve efficiency. Studies such as the paper *Do CIO IT Budgets Explain Bigger or Smaller Governments?* published in *Management Science* in 2014, make the case that IT spending reduces government expenditures to the extent that "a one dollar increase in the IT budget of a state CIO is associated with a \$3.5 reduction in total state government expenditures."<sup>23</sup>

Corrections is doubly hit because the same actions that reduce cost (keeping people out of jail) make the business more complex (figuring out who how and when to keep out of jail). Technology is vital to both sides of this equation, making all the parts work together in the most cost-effective way. The business challenges are fostering innovation in agencies large and small, and technology is contributing to the rapid spread of new and effective techniques nationwide. Opportunities for offender fees from new applications, the rapid evolution of technology from other markets, continuous industry advances in web-based services... anything with the potential to reduce start-up and operational costs will be well-received. It will be very interesting to see how the technology landscape in corrections will have changed by 2020.

As legislation, policies and procedures affecting corrections are subject to continuous change, technological applications in corrections must be flexible and configurable to the greatest possible degree, to accommodate future business change.

In the rush to implement technological solutions to relieve cost and workload pressures, it will always pay to be mindful of concerns amongst agency personnel that reducing staff workload is ultimately about reducing staff, period. The authors are firm believers in the potential of technology to support but not supplant the efforts of correctional staff. Technology alone can never suffice to supervise offenders adequately, but it can be the crucial support for correctional staff entrusted with safeguarding the public. An engaged correctional staff will be the best source of good ideas on how and when to use technology in the field and the best advocates for its successful rollout.

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<sup>23</sup> Patrick Thibodeau, *\$1 spent on state government tech saves \$3.50, study finds*, Computerworld, December 24, 2014. <http://www.computerworld.com/article/2863157/1-spent-on-state-government-tech-saves-350-study-finds.html>

## TREND #3: INCREASING MOBILITY

**Definition** Costs for mobile devices are continuously decreasing, and their capabilities increasing, providing many new options for dealing with current challenges in custodial and community corrections.

### Applications

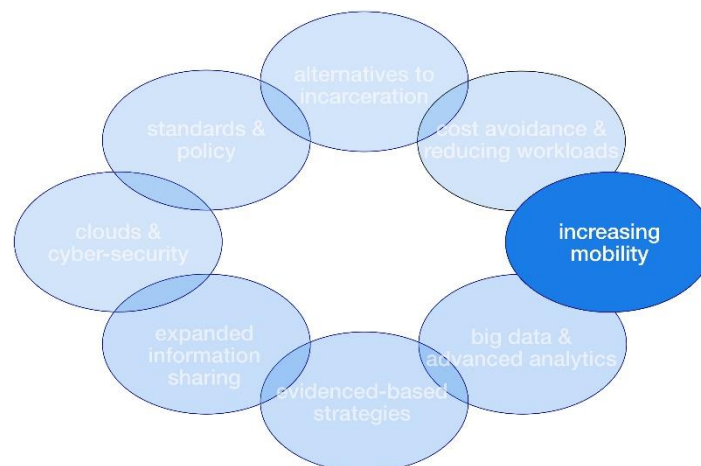
- **Inmate tablets and cell phones**
- **Reporting tools** for probationers and parolees
- **Telemedicine**
- **Surveillance technologies AND body cameras**
- **Tagging and tracking technologies (RFID)**
- **Screening devices** in custodial facilities
- **Speech translators**

### Industry drivers

- Rapid innovation and growing economies of scale in **production of mobile devices** which can be adapted to correctional use
- Massive industry investment in **mobile tools for health care professionals**
- Increasing interest in **video monitoring technologies to reduce inmate litigation**
- New **custodial facilities with wi-fi**

### Key themes

- **Mobility in community supervision:** the emerging capabilities of the *IoT* will be adopted to assist officers in managing caseloads
- **Mobility in jails and prisons:** if challenges of wireless access inside facilities can be overcome, many business processes like movements, counts and distribution of clothing could be streamlined
- **Applications and devices originally developed in other fields,** for example to monitor equipment or track merchandise, will increasingly be adapted for correctional supervision
- **High-tech custodial facilities:** wireless capability is becoming a standard specification for new



The astonishing proliferation of mobile internet-connected devices – variously labeled the *Internet of Things (IoT)*, *Internet of all Things* or *Internet of Everything (IoE)* – has transformed the consumer market and the hardware and software manufacturers chasing a share of it. Cisco IBSG predicts there will be 50 billion devices connected to the internet by 2020,<sup>24</sup> with 5.5 million new devices connected every day in 2016.<sup>25</sup> 92 percent of U.S. adults own at least one cellphone or smartphone,<sup>26</sup> and 66 percent of all email in the U.S. is now opened on smartphones or tablets.<sup>27</sup> The advent of “wearable” technology like watches and glasses<sup>28</sup> opens up “hands-free, heads-up” usage, something immediately attractive to corrections staff accustomed to keeping one eye on an inmate and another on a computer monitor. So, it’s not hard to envision rapid adoption of useful mobile apps by 2020 for staff and offenders to perform many activities.

- In **community supervision**, wider use of emerging capabilities of the IoT will be adopted to assist officers in managing caseloads
- In **jails and prisons**, the perceived value of mobile devices and applications for staff and inmates will continue to grow, along with challenges for controlling their use within a high-security environment.
- **Applications and devices originally developed in other fields**, for example, to monitor equipment or track merchandise, will increasingly be adapted for correctional supervision
- **Wireless capability in custodial facilities** is becoming a standard specification for new jails and prisons, and older facilities will be retrofitted where feasible, or closed where these costs are prohibitive

## MOBILITY IN COMMUNITY SUPERVISION

Community supervision is truly coming to rely on mobile access, capitalizing on the wide availability of commercial wireless access and phone networks. Without it, officers in the field would still be carrying big files of documents and photos, taking notes to be transcribed later back at the office, and without immediate access to real-time data on court orders, supervision records or recent violations.<sup>29</sup> We’ve already reviewed ways in which future devices with more capabilities may be deployed, to automatically update records with little intervention from officers (see *Trend #1, Alternatives to Incarceration*).

Unified-communications (UC) tools within mobile devices, featuring multiple integrated modes of communication and collaboration (including messaging, speech access, personal assistants, audio and video conferenc-

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<sup>24</sup> Dave Evans, *The Internet of Things*, Cisco, April 2011. [http://www.cisco.com/c/dam/en\\_us/about/ac79/docs/innov/IoT\\_IBSG\\_0411FINAL.pdf](http://www.cisco.com/c/dam/en_us/about/ac79/docs/innov/IoT_IBSG_0411FINAL.pdf)

<sup>25</sup> *Gartner Says 6.4 Billion Connected “Things” Will Be in Use in 2016*, Gartner, November 2015. <http://www.gartner.com/newsroom/id/3165317>

<sup>26</sup> Monica Anderson, *Technology Device Ownership: 2015*, Pew Research Center, October 2015. <http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015/>

<sup>27</sup> Greg Sterling, *Majority Of Emails Opened On Apple Devices, Android Users Pay More Attention*, Marketing Land, January 2015. <http://marketing-land.com/majority-emails-opened-apple-devices-android-users-pay-attention-115945>

<sup>28</sup> Shehryar Khan and Evangeline Marzec, *Wearables*, Deloitte University Press, February 2014. <http://dupress.com/articles/2014-tech-trends-wearables/>

<sup>29</sup> Winnie Webber And Robert Zastany, *Probation Officer Efficiency Through Mobility*, Corrections Technology Association, June 2015. <http://Correctionstech.Org/Meeting/2015/Cta%20summit%20-%20officer%20efficiency%20through%20mobility-Final-06012015.Pptx>

ing), could emerge as a tremendous aid for the many times when teams of officers, often from different offices, are assigned to one case. Potentially UC can increase their productivity while also reducing the cost of communications. Multiple vendors are now offering single-platform integrated communication and collaboration tools, and their full potential for corrections has yet to be explored.

Another effect of the *IoT* in community supervision is bound to be “bring your own device” methods for probationers and parolees to provide updates themselves with their smartphones and tablets. The flip side will be common or standard conditions for probationers and parolees to allow searches of computers and phones without a warrant, as already occurs in California.<sup>30</sup>

## MOBILITY IN JAILS AND PRISONS

The rapid mobile transformation of community corrections raises interest into how similar benefits could be gained for custodial staff if challenges of wireless access inside facilities can be overcome. Equipping officers with portable devices equipped with cameras, radio-frequency identification (RFID) and biometrics could transform the tracking of inmate and staff movements, inmate counts, distribution of clothing and medications, and also streamline business processes like inmate disciplinary hearings or re-entry planning.

More problematic is the question of inmate access to mobile technology. Despite security concerns and legal restrictions, vendors are racing to resolve issues of access and content control that stand in the way of general acceptance, such as customized tablets pre-loaded with revenue-generating applications which can be sold or lent to inmates.<sup>31</sup> Some agencies provide inmate devices with secured wireless access to programming and communications with family, friends and legal counsel, and at least two companies offer inmate web services including banking.<sup>32 33</sup> The authors believe that inmate tablets will become so common that kiosks will be largely phased out by 2020 (but perhaps they’ll never completely go away).

If that prediction holds, it will magnify the most controversial issue: should inmates have access to social media. The idea is not easy for long-time participants in the corrections industry (including the authors) to accept, and the degree of public concern is very high, as shown by dozens of news articles about inmate behavior on apps like Facebook, Twitter and Instagram.<sup>34</sup> But arguments in favor include rehabilitation (nowadays everyone requires internet skills, and denying it makes it harder for released inmates to reintegrate); litigation (staving off lawsuits from inmate advocacy groups); discipline (as part of incentives and sanctions for inmate behavior); and economics (revenue-generating opportunities through access to content). Whether or not laws banning internet use by prisoners are constitutional has yet to be decided.<sup>35</sup> We, therefore, make the cautious prediction that by 2020 inmates in many places will have limited and controlled access to social media. That is also the conclusion of the 2015 RAND Corporation study we have referenced elsewhere, which urges

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<sup>30</sup> Dana Littlefield, *Does digital privacy extend to criminals on probation?*, San Diego Union Tribune, January 15, 2016. <http://www.sandiegouniontribune.com/news/2016/jan/15/court-waiver-cellphone-passwords-search-privacy/>

<sup>31</sup> <http://www.prnewswire.com/news-releases/jpay-introduces-the-ip5mini-a-highly-customized-android-tablet-for-inmates-300110638.html>

<sup>32</sup> <http://www.prisonerassistant.com/information-for-prisons/credit-building/>, accessed February 11, 2016.

<sup>33</sup> Seth Ferranti, *How Prison Inmates Get on Facebook, Twitter, and Instagram*, Vice, February 2015. [http://www.vice.com/en\\_ca/read/how-convicts-get-on-facebook-twitter-and-instagram-in-prison-211](http://www.vice.com/en_ca/read/how-convicts-get-on-facebook-twitter-and-instagram-in-prison-211)

<sup>34</sup> Dave Maass, *California Prisons Are Deleting Records of Social Media Censorship*, Electronic Frontier Foundation, March 2016. <https://www.eff.org/deeplinks/2016/03/california-prison-officials-are-deleting-records-inmate-social-media-censorship>

<sup>35</sup> Jeff John Roberts, *Should convicts be on social media?* Fortune, June 2015. <http://fortune.com/2015/06/05/facebook-prison-social-media/>



the use of “stringent, already-available web filtering software” and “automated tools for social media analysis of inmate activity” to police an appropriate level of access.<sup>36</sup>

Similar advances with cell phones are forcing a re-evaluation of long-standing practice to ban them from inmates, on the rationale that controlled distribution could reduce demand for phones smuggled in from outside (and make money besides). Since 2010 Texas, Maryland, California, Georgia and Missouri have experimented with managed access systems that intercept cellular calls before they are sent to carrier towers.<sup>37</sup> “In prisons equipped with these systems, cell phones with white-listed numbers can operate normally, while voice, text, and data connections from contraband phones are blocked.” Patents have been issued for a device that control, monitor, and record inmate phone calls, with security features to ensure the device is authentic and not compromised.<sup>38</sup> This is over and above the outcome of ongoing legal challenges to inmate telephone systems (on hold as of March 2016 pending appeal).

#### CORRECTIONAL ADAPTATION OF APPLICATIONS AND DEVICES FROM OTHER FIELDS

- *Radio-frequency identification (RFID)* has had limited adoption due to short battery life and interference with guard alarms,<sup>39</sup> but the technology is becoming more powerful and miniaturized. (Currently, the smallest RFID chip is 0.05 mm × 0.05 mm<sup>40</sup>, dust-sized, though the read range is also still small.) Newer technologies which may be viable by 2020 include nano, dyna dots, and implants.<sup>41</sup> RFID in conjunction with biometric identification systems will eventually replace traditional mechanically locked security gates and allow entry by specific staff and prisoners at set times, and full “prisoner location monitoring... allowing prisoner movement and location to be centrally tracked and recorded.”<sup>42</sup>
- *Body cameras* are on the way to custodial facilities (and likely community offices too), due to litigation over use-of-force incidents.<sup>43</sup> In California, San Francisco, Santa Clara and Tulare counties were equipping jail officers with body cams as of late 2015.<sup>44</sup> Prince George County (Maryland) has issued body cams to emergency response teams, and observed that “inmates are beginning to show a little

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<sup>36</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p61. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>37</sup> Kevin Roose and Pendarvis Harshaw, *Inside the prison system’s illicit digital world*, Fusion, February 2015. <http://fusion.net/story/41931/inside-the-prison-systems-illicit-digital-world/>

<sup>38</sup> <http://prisoncellphones.com/blog/tag/mobile-device/>, December 2015.

<sup>39</sup> <http://prisoncellphones.com/blog/2012/06/21/prisoner-tagging-system-dropped/>, June 2012.

<sup>40</sup> [https://en.wikipedia.org/wiki/Radio-frequency\\_identification](https://en.wikipedia.org/wiki/Radio-frequency_identification), accessed February 11, 2016.

<sup>41</sup> Richard Silberglied, et al.: *Visions of Law Enforcement Technology in the Period 2024–2034*, Rand Corporation, 2015, p55. [http://www.rand.org/pubs/research\\_reports/RR908.html](http://www.rand.org/pubs/research_reports/RR908.html)

<sup>42</sup> Max Chambers, *Future Prisons: A radical plan to reform the prison estate*, Policy Exchange, June 2013, p30. <https://policyexchange.org.uk/publication/future-prisons-a-radical-plan-to-reform-the-prison-estate/>

<sup>43</sup> <http://www.lbc.co.uk/crackdown-on-prisoner-compensation-claims-126308>, accessed February 11, 2016.

<sup>44</sup> Tracey Kaplan, *Santa Clara County opts for body cameras on jail guards after inmate beating death*, The Mercury News, September 15, 2015. [http://www.mercurynews.com/crime-courts/ci\\_28816528/santa-clara-co-discuss-jail-fixes-after-inmate](http://www.mercurynews.com/crime-courts/ci_28816528/santa-clara-co-discuss-jail-fixes-after-inmate)

<sup>45</sup> <http://www.tularecounty.ca.gov/sheriff/index.cfm/media/news-releases/sheriff-awarded-grant-for-body-worn-cameras-in-the-jails/>



more restraint in their interactions with officers.”<sup>46</sup> Real-time sharing of body-cam video could improve situational awareness for outside response teams coming to incidents at jails and prisons.<sup>47</sup>

- *Telemedicine*, based on mobile sensors and video feeds, is ideal for correctional health care (see *Trend #2, Cost Avoidance and Reduction of Workloads*). A 2015 Economist survey reviewed its potential for “enabling patients to participate proactively in their care,” “reducing the cost of health care delivery” and “improving personal awareness through self-monitoring.”<sup>48</sup> By 2020, available devices should include wearable sensors for monitoring heart rhythms, blood pressure, glucose levels and other vital signs, plus apps from pharmaceutical companies to help manage complex conditions like diabetes. Telemedicine will improve prisoner access to doctors and specialists while reducing overhead on transportation and guarding.<sup>49 50</sup> Tighter integration of electronic health records (EHR) with inmate records will optimize benefits in areas like housing and work assignments affected by health issues.

Also worth mention is the potential of commercial and government-developed surveillance technologies. Perimeter security at custodial facilities could be served by unmanned aerial vehicles (drones), infrared-sensor-based fencing (for instance, the FLIR Thermal Fence),<sup>51</sup> and Military Imaging and Surveillance Technology (MIST), “new optical ISR capability [for] high-resolution 3-D images to locate and identify a target at much longer ranges.”<sup>52</sup> Initiatives at DARPA (Defense Advanced Research Projects Agency) include Content-Based Mobile Edge Networking<sup>53</sup> (content correlation and data transfer on military networks) and Visi-building (3D maps of buildings locating persons and weapons inside).

## HIGH-TECH CUSTODIAL FACILITIES

A tipping point is coming soon at which access to a secure high-speed network infrastructure and capability to deploy mobile devices inside a jail or prison will essentially become mandatory. New facilities like San Diego’s Las Colinas Detention and Re-entry Facility incorporate “evidence-based design ... combined with holistic, treatment-focused programming”<sup>54</sup> (see *Trend #5, Evidence-based Practices*), with ample space for video visitation and programming rooms fitted with necessary infrastructure. The United Kingdom is planning new large

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<sup>46</sup> Lynh Bui, *Maryland county equips some detention officers with body cameras*, Washington Post, February 23, 2016. [https://www.washingtonpost.com/local/public-safety/maryland-county-equips-some-detention-officers-with-body-cameras/2016/02/22/374ed9e6-c39b-11e5-8965-0607e0e265ce\\_story.html?utm\\_term=.c500a845190f](https://www.washingtonpost.com/local/public-safety/maryland-county-equips-some-detention-officers-with-body-cameras/2016/02/22/374ed9e6-c39b-11e5-8965-0607e0e265ce_story.html?utm_term=.c500a845190f)

<sup>47</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p62. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>48</sup> <http://www.economistinsights.com/sites/default/files/HowMobileisTransformingHealthcare.pdf>, accessed February 11, 2016, p9

<sup>49</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p61. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>50</sup> Maria Schiff, *Examining State Prison Health Care Spending: Cost Drivers And Policy Approaches*, Health Affairs Blog, November 2014. <http://healthaffairs.org/blog/2014/11/04/examining-state-prison-health-care-spending-cost-drivers-and-policy-approaches/>

<sup>51</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p61. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>52</sup> Stephen Griggs, *Military Imaging and Surveillance Technology*, [www.darpa.mil](http://www.darpa.mil), accessed January 5, 2017. <http://www.darpa.mil/program/military-imaging-and-surveillance-technology>

<sup>53</sup> Walter Hickey, *14 Advanced Military Projects that Could Change The World Forever*, Business Insider, August 2012. <http://www.businessinsider.com/14-advanced-military-projects-that-could-change-the-world-forever-2012-8?op=1>

<sup>54</sup> James Krueger and John Macallister, *How To Design A Prison That Actually Comforts And Rehabilitates Inmates*, Co.Exist, April 2015. <http://www.fastcoexist.com/3044758/how-to-design-a-prison-that-actually-comforts-and-rehabilitates-inmates>

multi-purpose prisons “with technology-driven security used to provide closer or less intrusive control as required,”<sup>55</sup> and the camera system at Massachusetts’s Souza-Baranowski Center (developed by the Massachusetts Institute of Technology) can record “every conceivable angle in the facility,” 24 hours a day.<sup>56</sup> And to meet the ideal that “no inmate should be transported out (of the prison or jail) for anything that can be accomplished through telemedicine”<sup>57</sup> requires overcoming the “inadequate access to high-speed internet connection that is a common barrier to the use of telehealth in prisons.”<sup>58</sup> Our belief is that wireless will become a standard specification for new jails and prisons, and older facilities will be retrofitted where feasible, or closed where costs are prohibitive, accelerating the retirement of many historic old facilities.

## IMPLICATIONS FOR CORRECTIONS LEADERS

Legal and technological developments around mobile devices and applications should be followed closely over the next few years. There will be new overhead on corrections IT services, and agencies will have to examine how best to scale them up. Fortunately, there should be no shortage of vendors and community partners offering pragmatic and cost-effective means to equip correctional officers with the best tools available. CIOs should take special interest in any local plans to build or renovate physical plant, to make sure that building specifications take expanding requirements for technological infrastructure into account.

There is still much to learn about effective use of mobile tools, for instance how to optimize unified communications for teams of community officers assigned to one case. There are big predictions from UC vendors about the emergence of a “boundary-less organization [in which] anyone that is relevant can be included in your business processes via a trusted inter-company network.”<sup>59</sup> How to make it work in practice will take creative collaboration between correctional field and IT staff, but there will be nationwide interest in their innovations.

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<sup>55</sup> Max Chambers, *Future Prisons: A radical plan to reform the prison estate*, Policy Exchange, June 2013, p30. <https://policyexchange.org.uk/publication/future-prisons-a-radical-plan-to-reform-the-prison-estate/>

<sup>56</sup> Sammy Said, *Top 10 High-Security Prisons in the World*, TheRichest, March 2013. <http://www.therichest.com/business/technology/top-10-high-security-prisons-in-the-world/?view=all>

<sup>57</sup> Eric Wicklund, *South Carolina’s Prison Telehealth Deal is About More Than Healthcare*, mHealthIntelligence, July 2016. <http://mhealthintelligence.com/news/south-carolinas-prison-telehealth-deal-is-about-more-than-healthcare>

<sup>58</sup> Ellyon Bell, et al.: *Managing Prison Health Care Spending*, The Pew Charitable Trusts, October 2013, revised May 2014. [http://www.pewtrusts.org/~media/legacy/uploadedfiles/pew\\_assets/2014/pctcorrectionshealthcarebrief050814pdf.pdf](http://www.pewtrusts.org/~media/legacy/uploadedfiles/pew_assets/2014/pctcorrectionshealthcarebrief050814pdf.pdf)

<sup>59</sup> Padmasree Warrior, *5 Predictions for the Future of Collaboration*, Cisco Blogs, April 2009. [http://blogs.cisco.com/news/5\\_predictions\\_for\\_the\\_future\\_of\\_collaboration\\_-\\_4](http://blogs.cisco.com/news/5_predictions_for_the_future_of_collaboration_-_4)

## TREND #4: BIG DATA AND ADVANCED ANALYTICS

**Definition** Business-intelligence and analytical tools will be increasingly important for managing larger, more complex data sets and real-time data flows, to support staff in the field and allocate resources most effectively for officer, public and offender safety.

### Applications

- Expanded biometric databases
- Social media surveillance
- Predictive modeling
- Risk/need assessments
- Tools to reduce probation/parole officer caseloads
- Video analytics
- Pattern recognition across incidents

### Industry drivers

- The *Nexus of Forces* (convergence of mobile, social, cloud and information)
- Massive industry research and investment into improved 'big-data' analytical tools
- White House Big Data Initiative
- Real Time Crime Centers (RTCC)
- Intelligence Led Policing (ILP)
- Projected scarcity of qualified personnel

### Key themes

- Continuous availability and exponentially-increasing volumes of data will drive **demand for analytical tools** to make sense of all that data
- **Evidence derived from mining and analysis of correctional data** will support ongoing efforts to streamline operations and improve the effectiveness of programming
- Big data tools and cloud computing infrastructure are fueling enormous investment into **artificial intelligence**, teaching computers to improvise solutions to problems
- There is and will continue to be a **shortage of storage, computing, and personnel resources** necessary to leverage big data for efficiency gains and better decision making



If corrections and criminal justice are keeping pace with the rest of the world, the amount of data on offenders will be doubling every two years.<sup>60</sup> The vast increase of data generated by the *Nexus of Forces*<sup>61</sup> (the convergence of mobile, social, cloud and information) is now measured in petabytes and zettabytes and accompanied by a vast expanse of computing infrastructure to store, find and analyze it. The volume, variety and velocity of information (the 3 Vs) all growing exponentially: while all the printed material in the world amounts to less than 20 petabytes, Google alone was processing 24 petabytes per day by 2013. The estimated size of the digital universe in 2011 was 1.8 zettabytes; by 2020 this is projected to be over 40 times larger and growing by 35 zettabytes per year. (For these figures and other content in this section, we are indebted to a 2013 presentation of the IJIS Institute’s Emerging Technologies and Corrections Advisory Committees, entitled *Big Data Analytics in Corrections*).

Technological capabilities to analyze “big data” are increasing at the same time following the well-known prediction of Moore’s law that computational power is doubling every 18 months. Advanced analytics will be crucial in coming years to find a deeper understanding of the vast aggregations of criminal justice information: better early warning, real-time awareness and feedback for officers, and evidence in support of evidence-based strategies and decision making in custodial and community supervision: (see *Trend #5, Evidence-based Population Management*). The application of advanced analytics to correctional “big data” is vital to the implementation and optimization of many ideas examined in this report:

- Continuous availability and exponentially increasing volumes of data will drive **demand for analytical tools** to make sense of all that data;
- **Evidence derived from mining and analysis of correctional data** will support ongoing efforts to streamline operations and improve the effectiveness of programming;
- Big data tools and cloud computing infrastructure are fueling enormous investment into **artificial intelligence**, teaching computers to improvise solutions to problems; and
- There is and will continue to be a **shortage of storage, computing, and personnel resources** necessary to leverage big data for efficiency gains and better decision making.

#### DEMAND FOR ANALYTICAL TOOLS FOR EXPONENTIALLY-INCREASING CRIMINAL JUSTICE DATA

Criminal justice and corrections generate masses of both structured data (with a high level of organization, such as found in a relational database) and unstructured data not well-organized in a pre-defined manner. Structured corrections data, of the type, generally well-organized into data models and relational databases are prevalent in traditional offender, case management and electronic health records, and support systems such as asset management, consumables or payroll. Unstructured, or semi-structured data, includes biometrics; text as found in case notes, documents or email messages, and digital media including images, video and audio files. The enormous proliferation of devices with cameras, GPS, audio capture and sensors (the *IoT*, see *Trend #3, Mobility*) is generating exponential increases in the quantity of unstructured data across correctional operations, from such wide-ranging business processes as surveillance video, visits, and inmate tele-

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<sup>60</sup> John Gantz and David Reinsel, *The Digital Universe in 2020*, EMC Corporation, December 2012. <https://www.emc.com/collateral/analyst-reports/idc-the-digital-universe-in-2020.pdf>

<sup>61</sup> Gartner Special Report, *The Nexus of Forces: Social, Mobile, Cloud and Information*, accessed February 13, 2016. <http://www.gartner.com/technology/research/nexus-of-forces/>

phone conversations. This is not unique to corrections - “Increasingly, organizations are looking to extend [operational data collected during the normal course of business] with additional sensors”<sup>62</sup> - and the need for tools to absorb and extract from vast pools of data are themselves in increasing demand.

*Data mining* and *analytics* are buzzwords for automated or semi-automated analysis of large quantities of unstructured data, looking for patterns or groups of records (cluster analysis), unusual records (anomalies) and dependencies (association rule mining).<sup>63</sup> Other tools that have evolved to cope with large quantities of unstructured data are document or content management systems, which can impose structure around unstructured data in electronic documents, and search engines designed to index and search such data.

Recent research and investment have generated significant developments in technology and techniques. Hadoop, a framework for processing data in the cloud, “allows for the distributed processing of large data sets across clusters of computers using simple programming models,” and can “scale up from single servers to thousands of machines, each offering local computation and storage.”<sup>64</sup> “Big Data lakes” assemble large amounts of data from many sources in a somewhat unstructured or “flat” model (unlike the structure typical of a traditional data warehouse), for analysis with advanced analytical tools; in other sectors they can have pitfalls around performance and data quality<sup>65</sup>, but they may prove valuable for criminal justice data where all participating agencies theoretically meet a certain data quality threshold. The reduced cost of computational power has led to advances in predictive analytics, now that large-scale resources can be directed to solve problems,<sup>66</sup> though progress is still needed in techniques to reduce noise-to-signal.<sup>67</sup> Further out on the horizon is “deep learning” which aims to deduce relationships in large quantities of data without specific programming instructions, for instance, to recognize objects in a video, as famously occurred in 2012 when a Google neural network detected the presence of a cat in an image.<sup>68</sup>

Data collected by corrections agencies must be distributed outside the agency to be analyzed alongside external data. Criminal justice data on one individual may exist in as many as a 100,000 separate software applications operated by corrections, police, courts and other government agencies. The federal government and its agencies are sponsoring many initiatives to aggregate and disseminate this data (see also Trend #6, Expanded Information Sharing, and Trend #8, Standards and Policy).

- *Biometrics*: The FBI’s \$1 billion Next Generation Identification (NGI) system will “combine fingerprints, iris scans, facial recognition, voice data and other biometrics into a multimodal database, greatly expanding the amount of [searchable] data.” Existing biometric databases such as NDIS (the National DNA Index System) may be interoperable with the completed system.<sup>69</sup>

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<sup>62</sup> Douglas Laney, et al.: *Answering Big Data’s 10 Biggest Vision and Strategy Questions*, Gartner, August 2014. <https://www.gartner.com/doc/2822220?refval=andpcp=mpe>

<sup>63</sup> [https://en.wikipedia.org/wiki/Data\\_mining](https://en.wikipedia.org/wiki/Data_mining), accessed February 12, 2016.

<sup>64</sup> <http://hadoop.apache.org/>, accessed February 14, 2016.

<sup>65</sup> *Gartner Says Beware of the Data Lake Fallacy*, Gartner press release, July 28, 2014. <http://www.gartner.com/newsroom/id/2809117>

<sup>66</sup> Robert Mitchell, *8 big trends in big data analytics*, Computerworld, October 2014. <http://www.computerworld.com/article/2690856/big-data/8-big-trends-in-big-data-analytics.html>

<sup>67</sup> Andrew Wheeler, *Big data problems for Criminal Justice*, blog post, November 2014. <https://andrewpwheeler.wordpress.com/2014/11/11/big-data-problems-for-criminal-justice/>

<sup>68</sup> John Markoff, *How Many Computers to Identify a Cat? 16,000*, New York Times, June 25, 2012. [http://www.nytimes.com/2012/06/26/technology/in-a-big-network-of-computers-evidence-of-machine-learning.html?pagewanted=all&\\_r=1](http://www.nytimes.com/2012/06/26/technology/in-a-big-network-of-computers-evidence-of-machine-learning.html?pagewanted=all&_r=1)

<sup>69</sup> datacivilrights.org, *A New Era of Policing and Justice*, conference event materials, October 2015. <http://www.datacivilrights.org/2015/>

- *Social media surveillance:* In 2014 “80 percent of federal, state, and local law enforcement professionals use social media platforms as an intelligence gathering tool,” though “most lack policies governing the use of social media for investigations....”<sup>70</sup>
- *Predictive modeling:* The “use of analytical techniques to make statistical predictions about potential criminal activity [may provide the ability to] forecast when/where crimes may be more likely to occur,” and persons who may be more likely to be victims or perpetrators.<sup>71</sup> Within jails and prisons, modeling could help to predict when and where problems are most likely to occur.
- *Public pressure:* Calls for openness and transparency about the actions of criminal justice agencies now include an expanding awareness of the scale and scope of data being collected, how it’s used and what is done with its findings. Big Data has caught the attention of civil rights groups: “many issues central to the civil rights community – including criminal justice, education, employment, finance, health, and housing – are being affected by ‘Big Data’ dynamics,”<sup>72</sup> and the first conference on Data and Civil Rights was hosted by the Data and Society Research Institute, the Leadership Conference on Civil and Human Rights, and New America’s Open Technology Institute in October 2014. Police are under particular scrutiny at present, and as of late 2015 “26 police departments... have signed on to the Police Data Initiative (PDI) pilot program, pledging to release more than 100 previously unshared data sets on police-citizen interactions.”<sup>73</sup>

A common definition of Big Data is gradually emerging, for criminal justice, public safety and homeland security, but it is not yet definitive. By 2020 there will be more established privacy policies and legislation targeting problems introduced by big data, and privacy policy automation to handle large-scale policy application. Data marking and classification will assist management of public, internal and external data.

#### EVIDENCE DERIVED FROM MINING AND ANALYSIS OF CORRECTIONAL DATA

Just a few examples of ongoing efforts to apply analytics to real-life correctional business problems:

- *Caseloads and workloads in community supervision:* Big data being analyzed to evaluate how reduced probation caseloads improve outcomes in agencies using evidence-based practices (EBP), and if changes can be observed over time as EBP are introduced.<sup>74</sup> (See also *Trend #2, Cost Avoidance and Reduction of Workloads* and *Trend #5, Evidence-based Strategies*.)
- *Risk/needs assessments:* Predictive algorithms are being used by over 80 percent of parole boards to crunch data (age at first arrest, education, nature of crime, behavior in prison, etc.) to estimate the likelihood of re-offending.<sup>75</sup> (See also *Trend #5, Evidence-based Strategies*.)

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<sup>70</sup> Ibid.

<sup>71</sup> Ibid.

<sup>72</sup> datacivilrights.org, *Why “Big Data” is a Civil Rights Issue*, conference event materials, October 2014. <http://www.datacivilrights.org/2014/>

<sup>73</sup> datacivilrights.org, *A New Era of Policing and Justice*, conference event materials, October 2015. <http://www.datacivilrights.org/2015/>

<sup>74</sup> William Rhodes, *Multi-Site Evaluation of Reduced Probation Caseload Size in an Evidence-Based Practice Setting in Oklahoma City, Oklahoma, Polk County, Iowa, and Colorado, 1997-2010* (ICPSR 31961), National Archive of Criminal Justice Data, February 2014. <http://www.icpsr.umich.edu/icpsrweb/NACJD/studies/31961>

<sup>75</sup> *Prison breakthrough – Big data can help states decide whom to release from prison*, The Economist, April 19, 2014. <http://www.economist.com/news/united-states/21601009-big-data-can-help-states-decide-whom-release-prison-prison-breakthrough>

- *Incident patterns:* There is great interest in developing new automated data analysis tools to rapidly identify trends in data systems within jails and prisons, for instance in medical cases, inmate complaints or grievances, and disciplinary incidents.<sup>76</sup>
- *Health care:* Medical big data, most prominently DNA sequencing and analysis of human genomes, is yielding information on many public health issues with direct ramifications for corrections: tracking the spread of disease, finding the best and most cost-effective treatments for hundreds of conditions.
- *Video analytics:* The RAND study *Fostering Innovation in Community and Institutional Corrections* calls for the development of improved video analytics to cope with increased volume of camera data, better distinguish important events and reduce false-alarm rates, possibly with the integration of biometrics.<sup>77</sup>
- *Targeting services to communities:* Big data on crime and offenders is being studied to direct mental health, family and program resources to geographical areas where they are needed.
- *Operational costs of correctional facilities:* Cost-based rationales (reducing costs/resources/inputs) are one of two very common justifications for BI (business intelligence) tools and data warehousing (the other being performance-based rationales – increasing production/customers/quality). Population trends in jails and prisons can be analyzed to project costs for inmate room-and-board, facility management, supplies or program delivery, and identify opportunities to control or reduce these expenditures (See also *Trend #2, Cost Avoidance and Reduction of Workloads.*)

## ARTIFICIAL INTELLIGENCE

The emergence of big data tools and datasets, and the increase of cloud computing infrastructure is also fueling enormous investment into artificial intelligence (AI) teaching computers to improvise solutions to problems. 2015 has been cited as a “landmark year” for artificial intelligence,<sup>78</sup> with Google alone carrying out more than 2,700 projects, and high-profile research underway in a wide range of applications, including autonomous vehicles (drones and self-driving cars), medical diagnosis, search engines, image recognition, language translation; even prediction of judicial outcomes at the European Court of Human Rights using recent advances in Natural Language Processing and Machine Learning.<sup>79</sup> In June of last year, the White House’s Office of Science and Technology Policy urged the assistance of AI expertise and technologies to lower incarceration numbers through better analytical tools,<sup>80</sup> and their AI-based innovations in the correctional environment can be expected, in such areas as risk/needs assessments and individualized/self-guided program delivery.

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<sup>76</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p61. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>77</sup> Ibid.

<sup>78</sup> Jack Clark, *Why 2015 Was a Breakthrough Year in Artificial Intelligence*, Bloomberg, December 2015. <https://www.bloomberg.com/news/articles/2015-12-08/why-2015-was-a-breakthrough-year-in-artificial-intelligence>

<sup>79</sup> Nikolaos Aletras, et al.: *Predicting judicial decisions of the European Court of Human Rights: a Natural Language Processing perspective*, PeerJ Computer Science, October 2016. <https://peerj.com/articles/cs-93/>

<sup>80</sup> Dyllan Furness, *White House asks AI experts to help with America’s prison overcrowding problem*, Yahoo Tech, June 2016. <https://www.yahoo.com/tech/white-house-asks-ai-experts-174024411.html>

## SHORTAGE OF STORAGE, COMPUTING, AND PERSONNEL RESOURCES

As quoted in an online article from the Harvard School of Public health: “Our ability to generate data has moved light-years ahead of where it was only a few years ago, and the amount of digital information now available to us is essentially unimaginable.”<sup>81</sup> Big data analysis ultimately requires big infrastructure, which requires big levels of spending in both tools and new levels of management and analysis to turn that data into valuable knowledge.<sup>82</sup> Investment in big data infrastructure and management was projected at \$28 billion in 2012 and \$34 billion in 2013, with 10 percent of new spending each year influenced by big data in some way.<sup>83</sup>

The recruitment of qualified data scientists and analysts is a growing concern across the information-technology industry. As reported in a 2012 report entitled the Big Data Gap, cited in the IJIS Institute’s 2013 presentation *Big Data Analytics in Corrections*: “IT professionals estimate that they have less than half of the storage, computing, and personnel resources necessary to leverage big data for efficiency gains and better decision making.” In the assessment by the management consulting firm Booz Allen Hamilton: “Despite the proliferation of software tools and other technologies, much of what constitutes cybersecurity still involves “eyes on glass” – individuals monitoring network activity in real-time. With the advent of the *Internet of Things*... demand for individuals to monitor, analyze and react to each threat will expand to the breaking point. However, the availability of this talent can be sparse... the shortfall in candidates needed to fill critical information security positions will rise to 1.5 million in five years... This explosion in data will compel organizations to update their approach to advanced analytics and necessitate the hiring of personnel capable of interpreting this data and deriving value...”<sup>84</sup>

## IMPLICATIONS FOR CORRECTIONS LEADERS

There’s no getting around that Big Data requires big infrastructure, which takes big investment. And innovations in analytics are coming so quickly from so many directions that just keeping up appears to be a monumental challenge. The nature of the correctional business itself imposes additional pressures and complexities around public safety issues and the difficult compromises of security versus transparency.

The surface appeal of concepts like “big data lakes” lies in the hope that, if all the data can somehow simply be gathered together, then technical skills, clever analysts, and raw computing power will be able to make sense of it all. There’s some truth in that; faster large-scale data processing engines and query languages are on the way, but it’s unlikely that they can completely solve the problem. “SQL on Hadoop isn’t going to replace data warehouses... but it does offer alternatives to more costly appliances for certain... analytics.”<sup>85</sup>

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<sup>81</sup> Elaine Grant, *The promise of big data*, Harvard School of Public Health news magazine, Spring/Summer 2012. <https://www.hsph.harvard.edu/news/magazine/spr12-big-data-tb-health-costs/>

<sup>82</sup> Arthur Cole, *Big Hardware Investments Needed for Big Data*, itbusinessedge.com, October 2012. <http://www.itbusinessedge.com/blogs/infrastructure/big-hardware-investments-needed-for-big-data.html>

<sup>83</sup> Nathan Eddy, *Big Data to Drive \$28 Billion in IT Spending in 2012: Gartner*, eweek.com, October 2012. <http://www.eweek.com/enterprise-apps/big-data-to-drive-28-billion-in-it-spending-in-2012-gartner.html>

<sup>84</sup> Booz Allen Forecasts Hottest Technology Trends That Will Dominate Business in 2016, businesswire.com, December 2015. <http://www.businesswire.com/news/home/20151203005617/en/Booz-Allen-Forecasts-Hottest-Technology-Trends-Dominate>

<sup>85</sup> Robert Mitchell, *8 big trends in big data analytics*, Computerworld, October 2014. <http://www.computerworld.com/article/2690856/big-data/8-big-trends-in-big-data-analytics.html> (Section 5: *SQL on Hadoop*)





It's also necessary to assemble a highly-skilled team possessing capabilities that are in high demand and short supply. Correctional agencies need to recruit both highly-skilled technical resources and business resources with an intimate understanding of corrections, and create conditions for the team to experiment; in the words of one chief technologist, "you need a way to evaluate, prototype and eventually integrate some of these technologies into the business."<sup>86</sup> The challenge is not just about learning from big data, but doing it quickly enough that it can bring value to the core business of supervision soon enough to make a difference regarding public safety.

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<sup>86</sup> Ibid.

## TREND #5: EVIDENCE-BASED POPULATION-MANAGEMENT

**Definition** Technological support will be increasingly sought for evidence-based strategies and programs both inside and outside corrections, seeking to reduce offending and contribute more effectively towards creating safer, stronger communities.

### Applications

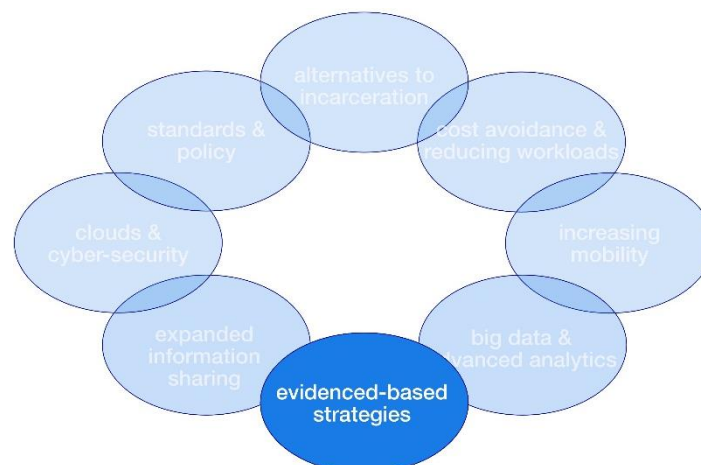
- **Risk and Needs Assessments (RNAs)**
- **educational technology** – offender and instructor resources
- New tools for **community supervision partners**
- **Data sharing** with social services agencies
- **Contract management tools** to oversee third-party NGOs and service providers

### Industry drivers

- **Justice Reinvestment Initiative (JRI)**
- **NIC Evidence-Based Decision Making Initiative** emphasizing collaboration with other justice agencies and service providers
- **U.S. Department of Education advocacy** for educational technology in corrections
- **Pay-For-Success (PFS) model** for contracting services for offender supervision

### Key themes

- **Analysis of data about offending and re-offending** will drive increased strategic decision-making on how and where to allocate public funds to reduce crime (see Trend #4 Big Data and Analytics)
- **Electronic communication and collaboration tools** will be vital as correctional agencies partner with community agencies supporting health, housing, employment, education and child welfare
- Correctional agencies will be collecting increasing amounts of **data from inside and outside the criminal justice system** to assess impacts of sentencing and corrections policies
- **Evidence-based prison design** is incorporating the technological needs of facilities within an ambitious program to build better jails and prisons with rehabilitation in mind



There has been extensive research over the past ten years to identify programs and techniques which are most effective at reducing the risk of recidivism and using these findings to inform and guide decisions across the justice system. We expect these activities to escalate in coming years, with extra emphasis on how to implement best practices in light of low agency budgets, and supported by “continued federal efforts to research and evaluate criminal justice programs that work and can be broadly implemented.”<sup>87</sup> One example is the Justice Reinvestment Initiative (JRI) of the Bureau of Justice Assistance (BJA), which seeks “data-driven approaches to criminal justice reform... to generate cost savings that can be reinvested in high-performing public safety strategies.”<sup>88</sup> At least seventeen states with JRI policies have reduced prison populations. And since 2008, the National Institute of Corrections (NIC) and Center for Effective Public Policy (CEPP) have collaborated on the Evidence-Based Decision Making Initiative (EBDM), initially focused on local/county level, in 2015 expanded to state level. Currently, NIC and CEPP are working with 21 teams in 3 states to develop system-wide change strategies, which are planned to be piloted in 2017.

Several components of EBDM directly impact corrections:<sup>89</sup> validated risk/needs assessments to identify individualized risk reduction strategies; re-entry programs at jails and prisons (see *Trend #1, Alternatives to Incarceration*); and targeted delivery of services for community supervision designed to reduce the risk of reoffending. This will drive continuous evolution of business practices in corrections between now and 2020. Ultimately funding will be directed to programs shown to be effective, and ineffective programs will be phased out. Technological support will be vital, to help provide the most efficient tools for delivering services and minimizing officer workloads (see *Trend #2, Cost Avoidance and Reduction of Workloads*), and supply data for further research into what programs are more effective than others (see *Trend#4, Big Data and Advanced Analytics*). Here’s what we believe will be high-profile in this area in the next few years:

- Analysis of offending and reoffending will drive increased strategic decision-making on how and where best to allocate public funds to reduce crime;
- Electronic communication and collaboration tools will be vital as correctional agencies partner with community agencies supporting health, housing, employment, education and child welfare;
- Correctional agencies will be collecting increasing amounts of data from inside and outside the criminal justice system to assess impacts of sentencing and corrections policies; and
- Evidence-based prison design is incorporating the technological needs of facilities within an ambitious program to build better jails and prisons with rehabilitation in mind.

## ANALYSIS OF OFFENDING AND REOFFENDING

The evolution of technical means to capture and store vast quantities of data from a very large number of sources (see *Trend #3, Mobility*) means many more source points for information and analytics than were available only a few years ago, fostering intensive worldwide study of offending and reoffending. The past two decades have seen the development of increasingly sophisticated risk/needs assessments (RNAs) attempting to predict who is most suitable for re-entry programming based on the assessed risk of reoffending, and many specialized program options aimed at modifying offending behavior in custody and in the community. There is

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<sup>87</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p62. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>88</sup> Nancy LaVigne, et al.: *Justice Reinvestment Initiative State Assessment Report*, BJA/Urban Institute, January 2014. <http://www.urban.org/UploadedPDF/412994-Justice-Reinvestment-Initiative-State-Assessment-Report.pdf>

<sup>89</sup> *Evidence-Based Decision Making in Local Criminal Justice Systems*, National Institute of Corrections. <http://info.nicic.gov/ebdm/>, accessed February 15, 2016.

no one technological application on which everything depends; rather, large and small jurisdictions are innovating and experimenting with anything that offers promise, which often includes new forms of technological support.

RNAs originally evolved from some of the earliest applications of data analytics in corrections (see *Trend #4, Big Data and Analytics*). Among validated and peer reviewed RNAs, current research suggests that for predictive performance no single risk instrument is superior to any other, with most AUC values falling in a narrow range of 0.68 to 0.74 with only minor variations based on gender, race, crime type, etc. Concern lingers about “lack of effective validation techniques... limiting confidence in their use,”<sup>90</sup> and there has been a backlash against evidence-based sentencing for fears of perpetuating racial bias.<sup>91 92</sup>

Two of the most well-known proprietary RNAs are COMPAS (the Correctional Offender Management Profile for Alternative Sanctions), and the LSI (Level of Service Inventory) Revised (LSI-R) and Case Management Inventory (LS/CMI). A study of COMPAS’ predictive accuracy in 57 New York probation agencies shows it is effective for estimating the general risk of re-arrest, though not necessarily the risk for specific offense types.<sup>93</sup> LSI-R and LS/CMI were used in 775,000 parole applications in 2012, with reports that it contributed to “reduce parolee recidivism by about 15%”.<sup>94</sup> Non-proprietary RNAs, developed by individual agencies and academic institutions, include well-used tools such as ORAS<sup>95</sup> (U of Cincinnati Center/Ohio Department of Rehabilitation and Correction) which flags low-risk criminals whose likelihood of reoffending increases the longer they are locked up alongside violent criminals. Some jurisdictions use a screening tool to determine if a full RNA is warranted and supplement with other specialized assessments (alcohol/drug use, mental health, sex offenders, domestic violence). In one study, the NCSC (National Center for State Courts) counted two dozen separate instruments in use in ten jurisdictions.<sup>96</sup>

The sheer number of RNAs in use is a challenge, as is the range of information from criminal and clinical histories that typically are input into RNAs. Several states have centralized databases to pull relevant data from probation, parole, court and service provider sources. Integration of RNA applications with case- and inmate-management systems is common, and vendors are aware of the value in building integrated RNAs into their offerings. The American Probation and Parole Association (APPA) has been working with, the Association of State Correctional Administrators (ASCA) and others to pilot functioning reentry information exchanges in Maryland, Rhode Island and Hampden County, Massachusetts, which include an Offender Risk Assessment

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<sup>90</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, pp57-58. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>91</sup> Jessica Pishko, *Punished for Being Poor: The Problem With Using Big Data in the Justice System*, Pacific Standard, August 2014. <http://www.psmag.com/politics-and-law/punished-poor-problem-using-big-data-justice-system-88651>

<sup>92</sup> Massimo Calabresi, *Attorney General Eric Holder to Oppose Data Driven Sentencing*, Time, July 31, 2014. <http://time.com/3061893/holder-to-oppose-data-driven-sentencing/>

<sup>93</sup> Sharon Lansing, *New York State COMPAS-Probation Risk and Need Assessment Study: Examining the Recidivism Scale’s Effectiveness and Predictive Accuracy*, New York State Division of Criminal Justice Services, September 2012. [http://www.northpointeinc.com/downloads/research/DCJS\\_OPCA\\_COMPAS\\_Probation\\_Validity.pdf](http://www.northpointeinc.com/downloads/research/DCJS_OPCA_COMPAS_Probation_Validity.pdf)

<sup>94</sup> *Prison breakthrough – Big data can help states decide whom to release from prison*, The Economist, April 19, 2014. <http://www.economist.com/news/united-states/21601009-big-data-can-help-states-decide-whom-release-prison-prison-breakthrough>

<sup>95</sup> Edward Latessa, et al.: *Creation and Validation of the Ohio Risk Assessment System - Final Report*, University of Cincinnati School of Criminal Justice, July 2009. [http://www.ocjs.ohio.gov/ORAS\\_FinalReport.pdf](http://www.ocjs.ohio.gov/ORAS_FinalReport.pdf)

<sup>96</sup> Addiction Severity Index, Adult Substance Use Survey, Simple Screening Inventory, Substance Abuse Evaluation, Substance Abuse Questionnaire Adult Probation III, Substance Abuse Subtle Screening Inventory, Texas Christian University Drug Screen, Driver Risk Inventory, Global Appraisal of Individual Needs, Ohio Solutions to Quality Improvement and Compliance, Beck Anxiety Inventory, Beck Depression Inventory, Brief Jail Mental Health Screen, Mental Health Screening Form-III, Arizona Sex Offender Assessment Screening Profile, Stable-2007, Static-99, Vermont Assessment for Sex Offender Risk, Domestic Violence Offender Matrix, Domestic Violence Screening Instrument, Spousal Abuse Risk Assessment, University of Rhode Island Change Assessment, Criminal Thinking Scale.

IEPD (Information Exchange Package Documentation) created to standardize data exchange on offender assessments including the level of risk calculated by the source RNA (see also Trend #6, Expanded Information Exchange).

Hundreds of millions of dollars are spent every year in the U.S. on programs and services intended to reduce recidivism. This funding is distributed across the public and private sectors, to community and faith-based organizations, companies and nonprofit entities, as well as correctional agencies. As reported by the Council of State Governments' Justice Center, research indicates that "programs that are effective at reducing recidivism have three core elements in common: they target people who are most likely to reoffend (who); they use practices rooted in the latest research on what works to reduce recidivism (what), and they regularly review program quality and evaluate how closely the program adheres to its established model (how well)." <sup>97</sup> Determining which programs are best meeting these goals at any given time remains one of the biggest analytical challenges in corrections, and "government officials overseeing significant investments in recidivism reduction often do not have the necessary information to ensure the latest research and best practices are well executed in their state."

Technological tools are essential for measuring the efficacy of programs, ensuring compliance with service level agreements, and supporting research. Program evaluations require data on the curriculum, how it is delivered, staff training and leadership, and interviews with staff and participants. The end goal is a reliable way to evaluate service providers on comparative effectiveness in delivering programs, following Pay-For-Success (PFS) models like that of the California Board of State and Community Corrections financing program for 2016-2019. <sup>98</sup> Results with individual offenders will be exported to case and inmate management systems, and to support further research into new capabilities to "dynamically update risk assessments... automatically validate and update risk assessment models, [and] identify anomalies... such as signs of risk-score manipulation and anomalous churn"<sup>99</sup> (see *Trend #1, Alternatives to Incarceration*).

One area of programming has been singled out for a perceived shortfall of available technological resources. In response to the 2015 RAND study, which found that individuals receiving education and training during custodial supervision were less likely to return to custody, the U.S. Department of Education published a policy brief, *Educational Technology in Corrections*, which advocates advanced technologies to encourage the development of offender computer and digital literacy skills, expand access to online assessments (high school equivalency tests, certification exams) and instructors; provide more professional development resources, and expand the reach of education services to more incarcerated individuals. <sup>100</sup> A significant element of the re-entry process involves building an education continuum for inmates via data sharing and aligning programs with those in the community.

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<sup>97</sup> *Three Core Elements of Programs that Reduce Recidivism: Who, What, and How Well*, Council of State Governments Justice Center, July 2015. <https://csgjusticecenter.org/jr/posts/three-core-elements-of-programs-that-reduce-recidivism-who-what-and-how-well/>

<sup>98</sup> *The Pay For Success Grant Project, Request for Proposals*, California Board of State and Community Corrections (BSCC), September 2015. [http://govlab.hks.harvard.edu/files/siblab/files/california\\_pay\\_for\\_success\\_rfp\\_9-18-15.pdf?m=1443443372](http://govlab.hks.harvard.edu/files/siblab/files/california_pay_for_success_rfp_9-18-15.pdf?m=1443443372)

<sup>99</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*; Rand Corporation, p57. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

<sup>100</sup> Michelle Tolbert et al.: *Educational Technology in Corrections 2015*, U.S. Department of Education policy brief, June 2015. <http://www2.ed.gov/about/offices/list/ovae/pi/AdultEd/policybriefedtech.pdf>

## ELECTRONIC COMMUNICATION AND COLLABORATION

The NIC Evidence-based Decision-Making model stresses collaboration with other justice agencies, NGOs and service providers taking up supervision responsibilities (see *Trend #1, Alternatives to Incarceration*).<sup>101</sup> The requirements of community partner agencies for real-time access to offender information and security warnings are no different than those of corrections agencies, and the activities of community partners must be detailed in supervision records and communicated across the criminal justice spectrum for reporting and research. In effect, the service locations of community partners need the same access to the central case management system as any probation or parole office, and indeed many jurisdictions will prefer contractual terms that mandate the use of that system. New collaborative tools like messaging, audio and video conferencing (see *Trend #3, Mobility*), also have great potential to foster closer working relationships between correctional staff and community partners in coming years.

## COLLECTING DATA FROM INSIDE AND OUTSIDE CRIMINAL JUSTICE

In 2020, correctional agencies will be handling more data from more sources, inside and outside traditional agency boundaries, with a high degree of scrutiny across the criminal justice spectrum and the public at large for what it can tell about the impacts of evidence-based practices and policies. Preliminary findings of the BJA's Justice Reinvestment Initiative (JRI), published in 2014, are a case in point, emphasizing both the promise of evidence-based practices in the 17 JRI states and the need for more study: "Early results indicate that enacted reforms have the potential to reduce or limit the growth of justice system populations and, in doing so, produce savings. Indeed, if the savings and reinvestments projected for JRI states materialize fully, they will represent a massive return on the federal investment of \$17 million. However, a long-term assessment will be necessary to determine the full extent of JRI's impacts on state justice systems, as well as how these impacts align with projected population reductions and cost savings."<sup>102</sup>

The next few years will see expanding requirements to share data with social service agencies and collaborate with local employers, to help clients with job searches and certifications, and even source specialty work gear. Technological support for these efforts will range from client workstations in community offices to full two-way integration of multiple third-party databases with the agency's central case management system, supported by data exchange projects undertaken by NIEM (see *Trend #6, Expanded Information Sharing*). Data mining will help target services to communities, correlating needs and directing program resources to geographical areas where offenders are from (see *Trend #4, Big Data and Analytics*).

## EVIDENCE-BASED PRISON DESIGN

One last topic worth a brief mention, with implications for provision of technology in jails and prisons, is the emerging architectural interest in evidence-based design of custodial facilities with rehabilitation in mind. This is mostly about designing physical structures with lessons from educational and health care design involving

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<sup>101</sup> *Reducing Offender Risk*, National Institute of Corrections. <http://nicic.gov/reducingoffenderrisk>, accessed February 11, 2016.

<sup>102</sup> Nancy LaVigne, et al.: *Justice Reinvestment Initiative State Assessment Report*, BJA/Urban Institute, January 2014.

<http://www.urban.org/sites/default/files/alfresco/publication-pdfs/412994-Justice-Reinvestment-Initiative-State-Assessment-Report.PDF>

lighting and acoustics,<sup>103 104</sup> but it is also concerned with effective treatment-focused program spaces, and secure high-speed network infrastructure that can support the use of RFID devices and body cams to promote security and ease of supervision<sup>105</sup> (see High-tech jails and prisons, *Trend #3, Mobility*).

## IMPLICATIONS FOR CORRECTIONS LEADERS

Technology resources can support evidence-based practices by broadening access to critical data systems, enhancing or replacing as needed to support an increased breadth of data needs, and improving integration between systems to the greatest possible degree, even (if possible) merging databases.

As third-party NGOs and service providers take on more offender supervision, more resources will be needed for contract management. “It will be necessary... for [corrections agencies] to devolve an appropriate allocation of its resources for management and leadership to... purchase the training, contract management and governance skills required.”<sup>106</sup> Many cloud-based software options are now available.

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<sup>103</sup> James Krueger and John Macallister, *How To Design A Prison That Actually Comforts And Rehabilitates Inmates*, Co.Exist, April 2015. <http://www.fastcoexist.com/3044758/how-to-design-a-prison-that-actually-comforts-and-rehabilitates-inmates>

<sup>104</sup> Sara Fernandez Cendon, How Architects Can Improve Justice Facilities, American Institute of Architects, October 2014. <http://www.aia.org/practicing/AIAB104773>

<sup>105</sup> Marayca Lopez, How to build for success: prison design and infrastructure as a tool for rehabilitation, Penal Reform International, July 2014. <https://www.penalreform.org/blog/build-success-prison-design-infrastructure-tool-rehabilitation/>

<sup>106</sup> House of Commons Justice Committee: *The role of the Probation Service*, p32. <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmjust/519/519i.pdf>

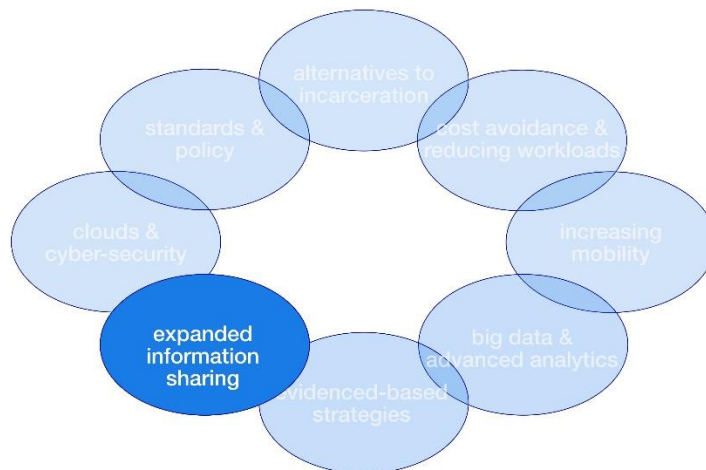
**TREND #6: EXPANDED INFORMATION SHARING**

**Definition** Correctional agencies will be central to expanded information sharing across the justice, public safety, emergency and disaster management, intelligence, and homeland security enterprise, within the U.S. and internationally.

- Applications**
- **Gateways** that can translate/exchange corrections data between systems
  - **Enhanced communication with law enforcement** prior/after inmate release
  - **Enhanced communication with prosecutors and victims**
  - **Criminal history information** for employment background checks

- Industry drivers**
- Emerging **national information sharing standards**: GRA, NIEM, GFIPM
  - **ISA (Interoperability Solutions for European Public Administrations)**
  - **National Strategy for Information Sharing and Safeguarding** (White House)
  - **IJIS Corrections Reentry Information Sharing Project**

- Key themes**
- **Continuity-of-care (custodial/community collaboration)** depends on timely and detailed access to offender data across diverse agencies
  - Initiatives such as the Corrections Reentry Information Sharing Project (led by IJIS) will provide direction for agencies and vendors to **lower integration costs** (see Trend #8, Standards)
  - As a mechanism for **increased interoperability** of IT systems, standards-based data exchange will help to prolong the life of legacy systems, and will be a mandatory specification for new systems
  - In an era of globalized crime, terrorism and human trafficking, **international information-sharing** efforts will expand based on adoption of NIEM or similar equivalents





The public-safety mandate of criminal justice requires the closest possible co-operation among corrections, law enforcement, courts, public and private community services, and effective information sharing is at the root of other trends discussed in this paper.<sup>107</sup> Alternatives to incarceration (Trend #1) works best with close collaboration of criminal justice and health agencies before re-entry, and after re-entry sharing data with community partners. Efficient dissemination of critical data to those who need it is often key to avoiding costs and reducing workloads (Trend #2). Evidence-based Practices (Trend #5) are identified from the study of data aggregations at the largest scale using advanced analytics (Trend #4). Data from new web-based and mobile devices (Trend #3) must be stored, protected and audited correctly (Trend #7) in compliance with stringent standards and policies (Trend #8) with their data sharing requirements.

For all that (and because of it) improving the capabilities of information exchange mechanisms may be the most difficult of all to advance. It requires co-operation and strong interagency partnerships among government, nonprofit, and private sector technology agencies; and the only way to maximize its effectiveness is through technical and data exchange standards accepted in every jurisdiction. Although it's an objective that everyone in the industry can support, its pragmatic implementation is still very difficult, because the requirements for nationwide standards are by nature more complex and comprehensive than the local needs of any one agency. What is most cost-effective locally, for instance, the simplest-possible point-to-point integration of two local systems, may not conform with the greater goal.

The enhancement of information sharing in every aspect of public safety is a priority at the highest levels of government. The Intelligence Reform and Terrorism Prevention Act of 2004 (Sec 1016, Information Sharing<sup>108</sup>) mandates very demanding requirements for direct continuous online access to data in a format useful for analysis and operations, with no single point of failure between systems, strong authentication and access controls (to data, not just systems and networks) across all levels of security, subject to continuous real-time audit, integrating all legacy technologies and internet-based services to enable connectivity for all required users. The 2007 National Strategy for Information Sharing provides a policy framework for the 2004 Act, including a national network of fusion centers and adoption of NIEM to standardize data exchanges through reusable data definitions and repeatable processes. The National Strategy for Information Sharing and Safeguarding (2012)<sup>109</sup> sets goals for enhanced enterprise-wide data correlation, use of information sharing standards, and greater protection of privacy and civil liberties within the development of information sharing operations.

As agencies entrusted with a public-safety mandate in this complex environment, we see correctional information-sharing efforts taking the following shape in years ahead:

- **Continuity-of-care (custodial/community collaboration)** depends on timely and detailed access to offender data across diverse agencies;
- Initiatives such as the Corrections Reentry Information Sharing Project (led by IJIS) will provide direction for agencies and vendors to **lower integration costs** (see Trend #8, Standards);
- As a mechanism for **increased interoperability** of IT systems, standards-based data exchange will help to prolong the life of legacy systems and will be a mandatory specification for new systems; and

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<sup>107</sup> For an overview of corrections data and how it may be leveraged throughout the criminal justice spectrum, see the IJIS white paper *Value of Corrections Information: Benefits to Justice and Public Safety* [March 2016] at [https://c.ymcdn.com/sites/www.ijis.org/resource/collection/93F7DF36-8973-4B78-A190-0E786D87F74F/ijis\\_wp\\_value\\_corrections\\_info\\_sharing\\_2e\\_20160321.pdf](https://c.ymcdn.com/sites/www.ijis.org/resource/collection/93F7DF36-8973-4B78-A190-0E786D87F74F/ijis_wp_value_corrections_info_sharing_2e_20160321.pdf)

<sup>108</sup> Full text of Section 1016 is posted at the ISE (Information Sharing Environment) website, <http://www.ise.gov/intelligence-reform-and-terrorism-prevention-act-2004-sec-1016-information-sharing>

<sup>109</sup> *National Strategy for Information Sharing and Safeguarding*, December 2012. [https://www.whitehouse.gov/sites/default/files/docs/2012sharingstrategy\\_1.pdf](https://www.whitehouse.gov/sites/default/files/docs/2012sharingstrategy_1.pdf)

- In an era of globalized crime, terrorism, and human trafficking, **international information-sharing** efforts will expand based on adoption of NIEM or similar equivalents

#### CONTINUITY-OF-CARE (CUSTODIAL/COMMUNITY COLLABORATION)

All diversion strategies aimed at keeping people out of custody are concerned with strengthening collaboration between criminal justice agencies (courts and law enforcement as well as community and custodial corrections), and the building of community support networks to take up and supplement community supervision efforts (see *Trend #1, Alternatives to Incarceration*, and *Trend #5, Evidence-based Practices*). The most effective diversion programs would have at their core the most effective information sharing mechanisms for all participating entities, which could include virtually any public or private organization which plays some role in public service.

The NIEM program includes a “Best of NIEM” award to recognize implementation projects of note, described on the NIEM website,<sup>110</sup> and several recent winners were nominated for specific initiatives to expand the scope of information sharing among criminal justice and community partners to improve the efficacy of community care and contribute to reducing recidivism. One of the 2014 winners is a Justice–Health Integration Project in Pima County, Arizona, which automated the transfer of offender behavioral health treatment histories with the regional behavioral health authority (RHBA), using NIEM to establish a standard vocabulary of health and criminal justice terminology. Besides improving the seamless provision of health services, it is projected to save \$300,000 and 20,000 hours of personnel time per year.

Another winner from 2013 was selected for its progress on closing another critical information-sharing gap for inmate re-entry that between corrections and law enforcement. (Often there is little communication with law enforcement before and after release, meaning police are not always fully informed of inmate releases, and probation or parole officers may not learn of subsequent re-arrests for days or weeks.) The Hawaii Integrated Justice Information Sharing (HIJIS) program created an automated information exchange between the state’s police booking, probation and parole case management systems, which provides near-real-time notification to probation and parole officers when one of their supervisees is arrested anywhere in the state. The state of Vermont was subsequently able to deploy Hawaii’s program in less than a month thanks to both states’ participation in the Open Justice Broker Consortium (OJBC).

There are also many NIEM-based projects underway within the bandwidth of social services, such as the Families Accessing Services Through Technology program of the North Carolina Department of Health and Human Services in conjunction with 100 county departments of social services (a 2014 winner). However, there are still large gaps between criminal justice, social services agencies, and other community partners, and we’re sure to see initiatives in coming years to close them.

We should also mention one more important information gap which may not directly pertain to active supervision, but still, impacts the lives and rehabilitative prospects of millions of released inmates. Criminal history information is incomplete and fragmented. The U.S. has criminal records for 75 million individuals, held across many public and private databases. According to the National Employment Law Project (NELP), of 17 million FBI background checks conducted in 2012, over 10% (1.8 million) contain faulty or incomplete information, and that an estimated 600,000 people are denied employment annually because disposition data is not included in FBI rap sheets.<sup>111</sup> The assembly of complete and authoritative criminal history records from the

<sup>110</sup> *Best of NIEM*, at the NIEM website: <https://www.niem.gov/about-niem/success-stories/best-of-niem>, accessed January 7, 2017.

<sup>111</sup> Madeline Neighly and Maurice Emsellem, *Wanted: Accurate FBI Background Checks for Employment*, National Employment Law Project, July 2013. <http://www.nelp.org/content/uploads/2015/03/Report-Wanted-Accurate-FBI-Background-Checks-Employment.pdf>

many thousands of source systems maintained by criminal justice agencies will be advanced in the years ahead, in part due to the advocacy of groups such as NELP.

#### LOWER INTEGRATION COSTS VIA STANDARDS

We are expecting an exponential increase in demand for sharing information between corrections, law enforcement, and community-based organizations by 2020, and significant investment to better integrate disparate systems, such as between corrections, law enforcement and electronic monitoring (see *Trend #1, Alternatives to incarceration*). Data exchange standards are meant to encourage wider and faster dissemination of information by providing support tools for corrections technologists to effectively integrate diverse computer systems. When everyone has the same model to follow, system enhancement can be accelerated while at the same time lowering the risks and costs incurred by each agency.

Data exchange standards can contribute to lower integration costs as a component of gateways that can translate corrections data between local, state and nationwide databases. They also contribute to the use of tools to query and analyze data held across local, state and federal databases (see *Trend #4, Big Data and Analytics*). Under the guidance of the IJIS Institute's Corrections Re-entry Information Sharing Project Advisory Board, which includes industry member companies and practitioners from corrections, parole, probation, law enforcement and the courts, the IJIS Institute developed a Corrections Information Sharing (CIS) Service Specification building on the work of three previous reentry information sharing pilots. The IJIS CIS Project Board mapped out the continuum as an offender moves through from Arrest and Intake to Release from Supervision. Exchanges identified in the CIS Service Specification include Intake; Release Planning; Release Disposition Decision; Justice Reentry; Individual Release; Law Enforcement Contact; Treatment Provider Reporting; and Reentry Suspension/Termination. The Tennessee Department of Correction has implemented the CIS SSP and is now exchanging reentry information with the Shelby County, Tennessee Reentry Center in Memphis. Also underway, is an implementation to share information between the Illinois Department of Correction and Winnebago County, Illinois.<sup>112</sup>

A 2014 Best of NIEM winner at the Wisconsin Department of Corrections showcases the integration of computer systems to solve immediate business problems, with evolving information exchange standards contributing to lowering costs in both the development project and subsequent operations. With funding from the National Crime Information Center Information Sharing Act, the DOC completed two projects to identify offenders better and share real-time information with the Department of Justice (previously the data in batch files sent to DOJ once a day was up to 36 hours old).

#### INCREASED INTEROPERABILITY

Data exchange standards can also serve as a mechanism for increasing the interoperability of aging legacy information technology systems, deferring or minimizing their replacement costs. Interoperability problems greatly hamper cross-agency data sharing among and within agency IT systems.<sup>113</sup> Resolution of these problems makes it possible to extend the life of legacy systems, by permitting them to participate in the evolving nationwide corrections IT infrastructure fully.

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<sup>112</sup> *Corrections Initiatives*, IJIS Factor Blog, <http://www.ijis.org/?page=Corrections>, accessed March 13, 2016.

<sup>113</sup> Brian A. Jackson, et al.: *Fostering Innovation in Community and Institutional Corrections*, Rand Corporation, p57. [http://www.rand.org/pubs/research\\_reports/RR820.html](http://www.rand.org/pubs/research_reports/RR820.html)

In recent years, the quest for effective counterterrorism strategies has fueled a broad effort called Project Interoperability, in support of White House National Strategy for Information Sharing and Safeguarding, which will have an impact on overall national information sharing and safeguarding efforts. Project Interoperability is a collaboration of the Standards Coordinating Council (SCC) and the Program Manager for the Information Sharing Environment (PM-ISE), with the involvement of the IJIS Institute, to promote the development of Information Sharing Environments (ISEs) in government and the private sector, in the interests of national security and public safety.<sup>114</sup> This flows directly from the 9/11 Commission’s recommendation to “create a trusted information network across the whole of government.”<sup>115</sup>

Project Interoperability is a startup guide for information interoperability. Information interoperability is the ability to transfer and use information in a consistent, efficient way across multiple organizations and information technology (IT) systems to accomplish operational missions. From a technical perspective, interoperability is developed through the consistent application of design principles and design standards to address a specific mission problem. Project Interoperability can be used to access, improve, and use information sharing tools and resources. It uses some of the existing, well-known enterprise architecture frameworks and the principles of service-oriented architecture to suggest standards, tools, and methodologies to link existing systems. It also specifies the development of common documents and products that will enable disparate departments’ and agencies’ architectures to make the full framework operational. Another goal of Project Interoperability is to provide a framework to agencies like corrections and its mission partners to stand-up an information sharing environment promptly reusing the current standards, technology, and investments.

Part of Project Interoperability is ICIF – the Information Sharing and Safeguarding (IS&S) Core Interoperability Framework – a set of tools, resources, standards and methodologies designed to make it easier to link existing systems. Among them is the IS&S Playbook<sup>116</sup>, developed by the IJIS Institute, essentially a how-to guide for successful information sharing projects, assembling insights, lessons learned and best practices from past projects. We would encourage every agency to read and understand this playbook before embarking on any project involving the exchange of data between systems.

Another important initiative, currently being piloted by the nonprofit Georgia Tech Research Institute (GTRI), is a Trustmark framework<sup>117</sup> of common security, privacy, and identity assurance elements with which agencies could build “trust interoperability profiles.” The goal is to minimize the current need for separate information sharing and access agreements (ISAAs) between any two participants sharing data.

The rapid evolution of APIs (application programming interfaces) is adding more tools for developing shareable and reusable data-exchange components. APIs publish datasets in machine-readable versions, built on an established web-based architectural style (Representational state transfer (REST) or RESTful web services), and using standards such as NIEM for a commonly-understood data format. It’s now possible to imagine libraries of APIs serving the needs of multiple agencies across the criminal justice spectrum for an entire county or state. Many agencies and vendors are of course already creating APIs, but the full potential is only beginning to be realized. It will take an enhanced level of collaboration between agencies, but the business case is sound, and the benefits would be widespread.

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<sup>114</sup> *Project Interoperability*, Standards Coordinating Council. [http://www.standardscoordination.org/project\\_interoperability](http://www.standardscoordination.org/project_interoperability), accessed Dec. 18, 2016.

<sup>115</sup> 9/11 Commission Report, Chapter 13.3, “Unity of Information in Information Sharing,” as quoted in <https://icif.standardscoordination.org/the-challenge/the-iss-landscape-today/>

<sup>116</sup> *IS&S Playbook*, Standards Coordinating Council. <http://www.standardscoordination.org/iss-playbook>, accessed Dec. 18, 2016.

<sup>117</sup> *Using Trustmarks...* <http://www.standardscoordination.org/content/using-trustmarks-enable-more-agile-information-sharing-and-access-agreements-within-ise>, accessed Dec. 18, 2016.

We expect the use of NIEM IEPDs to become an important (the authors hope mandatory) specification of integration projects in the future and to be considered in the design of new criminal justice applications so that long-term interoperability of systems can be sustained as a matter of course. For that vision to come true, there is a critical need to expand the use of NIEM IEPD guidelines, extend their capabilities and better incorporate vendor requirements. We project an escalating level of interest in this topic and much work will be done between now and 2020, when corrections IT will have many more options at its disposal.

#### INTERNATIONAL INFORMATION-SHARING

In an era of globalized crime, terrorism and human trafficking, international information-sharing efforts will expand based on the adoption of agreed data exchange standards. Many nations have put effort into interoperability frameworks for government applications, and NIEM is showing indications of international adoption with several countries launching pilot projects using NIEM for data sharing across borders. The U.S., Canada and Mexico have launched pilot projects to adopt NIEM for data sharing across borders, and other countries including Australia and Japan are observing or adapting NIEM for their purposes. One of these projects was a 2013 Best of NIEM winner: the Temporary Resident Biometrics Project (TRBP) for identification and screening of foreign nationals at Canadian borders, delivered through a partnership of Citizenship and Immigration Canada (CIC), Royal Canadian Mounted Police (RCMP), Canada Border Services Agency (CBSA), and the United States Citizenship and Immigration Services (USCIS). Central to the project is an information exchange platform between partner systems to receive biometrics from other governments. The use of NIEM shortened delivery time and reduced the project cost.

#### IMPLICATIONS FOR CORRECTIONS LEADERS

Use of NIEM and similar data exchange standards is still an issue in the field, held back by substantial and expensive-to-remedy barriers. These barriers are the lack of adequate funding for cross-agency interoperability between or replacement of “stove-piped” (agency-specific and nonaccessible) systems, limited awareness of the wealth of data in correctional and other criminal justice databases, mistrust over the currency and accuracy of information received via exchange, and limited support for the perceived priority of investment into expediting information sharing with other agencies. Overall, in the words of one consulting firm, there is a “cacophony of competing databases, confusing acronyms, conflicting and overlapping federal initiatives, and the development of new tools and technologies rapidly replacing legacy old ones...”<sup>118</sup>

Nonetheless, the overriding business imperative for more and faster exchange of data will continue to propel the entire industry forward in search of ways to ease their implementation. As NIEM becomes more widely adopted in adjacent sectors like health care, more vendors will be motivated to provide standardized APIs as part of their product offerings, and as the available set of reusable data terms and definitions and repeatable processes increases over time, we should start to see real and significant reductions in interface costs (see *Trend #8, Standards and Policy*).

Grants from a number of sources will continue to be available to support correctional agency investments that align with the overarching goals of consolidated information sharing nationwide. Funds available through the Federal Emergency Management Agency (FEMA) can be used to support NIEM-based information exchange activities including the purchase of tools to ease development.<sup>119</sup> For Bureau of Justice Assistance

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<sup>118</sup> Russ Nichols and Susan Laniewski, *Collaboration Trail – how Corrections information is shared*, presentation at the Corrections Technology Association, June 2014. <http://correctionstech.org/meeting/2014/Presentations/AC7.pdf>

<sup>119</sup> NIEM HSGP Guidance, at the NIEW website: <https://www.niem.gov/about-niem/grant-funding/HSGP-Guidance>, accessed January 7, 2017.



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(BJA) grants from the U.S. Department of Justice's Office of Justice Programs, an implementation guide<sup>120</sup> provides details on eligibility rules for NIEM conformance for BJA grantees.

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<sup>120</sup> *Grant Funding*, at the NIEW website: <https://www.niem.gov/about-niem/grant-funding>, accessed January 7, 2017.

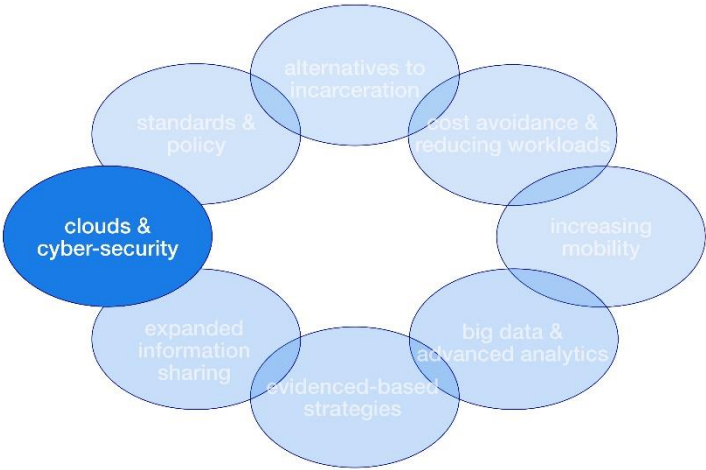
**TREND #7: CLOUD SERVICES AND CYBERSECURITY**

**Definition** Budgetary and procurement drivers are likely to result in increased demand for cloud-based correctional IT deployments, as vendors of online services respond to concerns about appropriate security of criminal justice data.

- Applications**
- **Human resource management (HRM)**, staff recruitment/talent acquisition, payroll
  - **Office and messaging software**
  - **Offender and case management systems**
  - **Finance and accounting**
  - **Facility management**
  - **Content management** and file sharing
  - **Collaboration software**

- Industry drivers**
- **Large investment of public cloud providers** to provide secure services compliant with CJIS Security Policy
  - **Emergence of private cloud networks** to provide IT services to government agencies
  - **Commercial cloud providers joining IJIS**
  - **FBI Recommendations for Implementation of Cloud Computing Solutions**

- Key themes**
- We expect an **increased level of acceptance for cloud-based services** in 2020, driven by a shift in procurement and budget approaches that will encourage greater use of online services
  - If concerns about **entrusting agency and offender data to cloud-based services** can be overcome, they will look more attractive for perceived cost savings, shortened timeframes from conception to deployment, and levels of reliability and resilience compared to in-house services
  - **Cybersecurity** itself (SIEM, threat intelligence) will increasingly be performed by cloud providers
  - However, there is still likely to be a point of diminishing returns on value/cost savings depending on size of entity and services desired



The perception that cloud-based services save money in terms through lower startup and operational expenses is now so pervasive that the federal government has developed policies and directives favoring cloud computing solutions.<sup>121</sup> Cloud services also figure prominently in the prioritized rankings of state CIO priorities for 2016 (priority strategies and technologies):<sup>122</sup>

- Priority Strategies, Management Processes and Solutions: #2 Cloud Services: “...scalable and elastic IT-enabled capabilities provided ‘as a service’ using internet technologies, governance, service management, service catalogs, platform infrastructure, security, privacy, data ownership...”
- Priority Technologies, Applications and Tools: #2 Cloud Solutions: “software as a service.”

The sensitivity of criminal justice information has delayed adoption of cloud-based options in the core business of offender supervision. Steve Ambrosini, Executive Director of the IJIS Institute, has written: “executives in justice and public safety have some general skepticism for the concepts embedded in this powerful new infrastructure approach. Some of the more rational skepticism is well-founded, and stories of implementation problems are always present in the introductory stages of any new technology.”<sup>123</sup> This may finally be changing, though we still predict that the earliest widespread adoption of cloud-based applications will be for “back-office” systems such as human resources and finance which do not manage data subject to the Criminal Justice Information Systems (CJIS) Security Policy, and for which many cloud-based products already exist (see *Trend #2, Cost Avoidance and Reduction of Workloads*). The authors believe that by 2020 many if not all of the concerns about hosting criminal justice data in the cloud will be resolved thanks to concentrated efforts from government and industry stakeholders. To that end:

- We expect an increased level of acceptance for cloud-based services in 2020, driven by a shift in procurement and budget approaches that will encourage greater use of online services;
- If concerns about entrusting criminal justice data to cloud-based services can be overcome, they will look more attractive for perceived cost savings, benefit to project timeframes, and reliability;
- Cybersecurity itself, Security Information and Event Management [(SIEM), threat intelligence] will increasingly be performed by cloud providers; and
- However, there is still likely to be a point of diminishing returns on value/cost savings depending on the size of entity and services desired.

#### INCREASED LEVEL OF ACCEPTANCE FOR CLOUD-BASED SERVICES

In 2020, we expect that cloud-based correctional deployments will be commonplace, and many or all of the reservations which now exist surrounding the cloud will have been resolved through the efforts of agencies and cloud service providers. The FBI has already published *Recommendations for Implementation of Cloud Computing Solutions* to provide guidance to make informed decisions: “Cloud Computing has evolved to a mature state and offers distinct cost-saving opportunities by consolidating and restructuring information technology services. The Federal government has developed policies and directives that mandate migration to

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<sup>121</sup> Vivek Kundra (U.S. Chief Information Officer), *Federal Cloud Computing Strategy*, The White House, February 8, 2011. [https://www.whitehouse.gov/sites/default/files/omb/assets/egov\\_docs/federal-cloud-computing-strategy.pdf](https://www.whitehouse.gov/sites/default/files/omb/assets/egov_docs/federal-cloud-computing-strategy.pdf)

<sup>122</sup> NASCIO *Top Ten Priorities*, November 10, 2015. <http://www.nascio.org/TopTen/ArtMID/659/ArticleID/295/State-CIO-Top-Ten-Policy-and-Technology-Priorities-for-2016>

<sup>123</sup> Paul Wormeli, *Mitigating Risks in the Application of Cloud Computing in Law Enforcement*, IJIS Institute/IBM Center for The Business of Government, 2012, p7. [http://c.ymcdn.com/sites/www.ijis.org/resource/collection/232074EF-6453-4014-BC4E-018BF818D291/Mitigating\\_Risks\\_in\\_the\\_Application\\_of\\_Cloud\\_Computing\\_in\\_Law\\_Enforcement.pdf](http://c.ymcdn.com/sites/www.ijis.org/resource/collection/232074EF-6453-4014-BC4E-018BF818D291/Mitigating_Risks_in_the_Application_of_Cloud_Computing_in_Law_Enforcement.pdf)



cloud computing solutions as a means of reducing information technology infrastructure service costs... The desired end state is for CJIS community members to be able to adopt cloud solutions, provided that prudent security measures are implemented.”<sup>124</sup>

Another useful document is *Mitigating Risks in the Application of Cloud Computing in Law Enforcement*<sup>125</sup> by Paul Wormeli, Executive Director Emeritus of the IJIS Institute. Though directed at police agencies, this paper has general applicability to corrections. It responds to several issues cited by law enforcement executives about using cloud computing for mission-critical applications such as CAD and RMS:

- 1) The risk of unauthorized individuals using the internet and remote computing resources to degrade or abscond with sensitive law enforcement data. [*“Commercial public cloud and private cloud providers have made extremely strong provisions against hacking into their data centers... Cloud computing infrastructure is, in nearly every respect, more secure than its premise-based equivalent.”*]
- 2) Cloud computing may not provide the availability required for mission-critical applications—particularly CAD systems. [*“The availability offered by most professional cloud providers is much higher than is normally computed for stand-alone enterprise servers, particularly where a small number of servers and disks constitute the production configuration of the enterprise system.”*]
- 3) Cloud computing may not match performance requirements for mission-critical systems. [*“Cloud computing should be able to offer consistent sub-second response time for operation of a CAD system... the whole premise of cloud computing is the ability to provision additional resources on demand...”*]
- 4) Migration costs in equipment, software, data migration and training. [*“The experiences of other agencies at the federal level, as well as the state and local levels, is that, once the full analysis is done, there will emerge a distinctive cost savings and a positive ROI from moving to the cloud.”*]
- 5) Risks associated with the remote storage of data in installations that may be damaged, destroyed, seized, bankrupt or otherwise no longer accessible. [*“Protecting against the primary causes of data loss that might be incurred during a natural disaster or even an attack on a data center is the objective of geographically separated, secure, duplicate, redundant computing services.”*]
- 6) Companies selling services that rely on the cloud will not comply with CJIS rules for the management control of law enforcement systems. [*“There is no reason that smaller companies focused on the law enforcement market cannot provide cloud computing services totally in accord with CJIS rules.”*]

## ENTRUSTING CRIMINAL JUSTICE DATA TO CLOUD-BASED SERVICES

The Criminal Justice Information Services (CJIS) Security Policy<sup>126</sup> (CSP), which defines the standards by which criminal justice data including offender information can be accessed and disseminated, does not preclude the use of cloud-based services. But the current version (5.4, 10/2015) puts the onus on criminal justice agencies

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<sup>124</sup> *Recommendations for Implementation of Cloud Computing Solutions*, FBI Technical Report, August 2012, p1. [https://www.fbi.gov/file-repository/cjis-cloud-computing-report\\_20121214.pdf](https://www.fbi.gov/file-repository/cjis-cloud-computing-report_20121214.pdf)

<sup>125</sup> Paul Wormeli, *Mitigating Risks in the Application of Cloud Computing in Law Enforcement*, IJIS Institute/IBM Center for The Business of Government, 2012 [http://c.yvcdn.com/sites/www.ijis.org/resource/collection/232074EF-6453-4014-BC4E-018BF818D291/Mitigating\\_Risks\\_in\\_the\\_Application\\_of\\_Cloud\\_Computing\\_in\\_Law\\_Enforcement.pdf](http://c.yvcdn.com/sites/www.ijis.org/resource/collection/232074EF-6453-4014-BC4E-018BF818D291/Mitigating_Risks_in_the_Application_of_Cloud_Computing_in_Law_Enforcement.pdf)

<sup>126</sup> *CJIS Security Policy* version 5.5, DOJ/FBI, June 1, 2016. <https://www.fbi.gov/about-us/cjis/cjis-security-policy-resource-center>

to “make informed decisions on whether or not the cloud provider can offer service that maintains compliance with the requirements of the CJIS Security Policy” [section 5.10.1.5]. Appendix G.3 of the CSP offers guidance to determine if a provider complies, as follows:

- Will there be remote access to CJI? (5.5.6 – restricted access via external/uncontrolled network)
- Will advanced authentication be required? (5.6.2.2 – access from outside a physically secure location)
- Are the data center(s) physically-secure locations? (5.9.1 - “physical and personnel security controls”)
- Are encryption requirements being met? (5.10.1.2 – CJI outside physically secure location)
- What are the cloud service provider’s incident response procedures? (5.3)
- Does the provider meet personnel screening requirements for handling CJI? (5.1.1.5)
- Will the provider allow the CSA and FBI to conduct compliance and security audits? (5.11.1 /2)
- How will event and content logging be handled? (5.4)

Public cloud providers have a strong incentive to provide secure services, and some are now making public pronouncements about intent to comply with CJIS standards and objectives, in order to be accepted as a legitimate host of criminal justice data and services. For several years, smaller companies focused on the criminal justice sector have provided CJIS-compliant cloud solutions; Datamaxx Applied Technologies Inc. and Caliber Public Safety (formerly InterAct), both IJIS members, have been cited as “cloud companies that use secure data centers staffed by people who have undergone the requisite FBI background checks.”<sup>127</sup> More recently, very large vendors including Amazon and Microsoft have indicated commitments to deliver CJIS-compliant services. Amazon Web Services states that it “complies with the CJIS standard. We sign CJIS security agreements with our customers, including allowing or performing any required employee background checks according to the CJIS Security Policy.”<sup>128</sup> (Amazon has also joined the IJIS Institute.) Microsoft “will sign the CJIS Security Addendum in states with CJIS Information Agreements. Microsoft has assessed the operational policies and procedures of Microsoft Azure Government, Microsoft Office 365 U.S. Government, and Microsoft Dynamics CRM Online Government, and will attest to their ability in the applicable services agreements to meet FBI requirements for the use of in-scope services.”<sup>129</sup> In similar fashion, some familiar proprietary tools are being revamped with cloud data storage options to lower capital investment and ongoing IT maintenance costs; one example is COPLINK, now available in a subscription-based SaaS (Software as a Service) deployment.

As cloud providers pursue these major investments to address perceived risks and shortcomings of the cloud solution, in the near term, it’s likely that the cloud will become a fully viable option for applications hosting criminal justice data, not just “back-office” systems. This does not mean it can meet every need of every agency, but it can be a legitimate candidate when taking a comparative view of the risks and shortcomings of a local solution (the simple fact that just because a computer is physically located on-premise does not automatically prevent a system malfunction or data loss).

The key point is probably this: a secure cloud from a major provider (especially “enterprise”-oriented companies who already do secure clouds for governments and the private sector) can provide the same or better service as a local data center for *most* aspects of data security, including redundancy and prevention of

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<sup>127</sup> Jaikumar Vijayan, *FBI declares cloud vendors must meet CJIS security rules*, Computerworld, February 2012. <http://www.computerworld.com/article/2501156/cloud-computing/fbi-declares-cloud-vendors-must-meet-cjis-security-rules.html>

<sup>128</sup> *CJIS Compliance*, at Amazon website. <https://aws.amazon.com/compliance/cjis/>, accessed January 7, 2017.

<sup>129</sup> Microsoft CJIS Security Policy, at Microsoft website: <https://www.microsoft.com/en-us/TrustCenter/Compliance/CJIS>, accessed January 7, 2017.

data loss. Cloud providers have well-trained staff, economies of scale, ample hardware redundancy, and resources to invest as needed. The one major exception is *loss of the network link between the correctional facility and the cloud*. This risk can be mitigated through multiple network links from different telecom providers, but even so, it can't be completely mitigated. (To be totally fair, even many in-house systems don't work well if the outside internet connection has dropped.) Ultimately we expect that many correctional agencies will opt to utilize an internal private cloud operated on government premises or utilize a private government cloud provider. Both options would follow high-security standards, meet compliance requirements, centralize costs, and make data available to stakeholders via secure VPN connections.

## CYBERSECURITY

The full range of cyber threats and responses that could emerge between now and 2020 is well beyond the scope of this paper. Suffice it to say that criminal justice systems will remain a prime target and criminal justice agencies will be highly-focused on the unceasing, ever-changing demands of "cybercrime," "hacktivism," and the skills gap of scarce information security professionals.<sup>130</sup>

Security is very much a hot topic at present, with many vendors and commentators advocating various opinions or solutions on a range of ideas, trends and opportunities (though no one single answer or complete pre-packaged solution has emerged). Ideas which currently have traction include:

- trusted identity (blocking impostors and intruders using stolen credentials);
- single source of truth (because secondary copies of data values may be less protected and managed than the primary copy);
- end-to-end encryption (the device-to-server channel should be encrypted end-to-end even if it's running over VPN or secure network link); and
- "Next Generation Firewall" (NGFW – supplementing the traditional device controlling a designated network point, with application awareness, identity awareness, and an Intrusion Protection System (IPS).

Generally speaking, the industry has good answers on the server and network side, especially when dealing with major reputable vendors with enterprise experience, but end-user devices (PCs, phones, tablets) remain vulnerable, especially so in a correctional environment with its added risks of inmate theft or take-over. Concerns have also been expressed about the quality of many devices and applications in the *IoT (Trend #3, Mobility)*. There are concerns about the risk that new and sometimes inadequately-tested technology could be exploited with malicious intent. There are also legitimate worries that manufacturers under intense market pressures and slim profit margins will "sacrifice security and thorough testing in favor of speed of delivery and low cost, resulting in poor quality products more easily hijacked by criminals or hacktivists."<sup>131</sup> (The best solution would be improved industry-wide manufacturing standards; see also *Trend #8, Standards and Policy*). There are no easy answers here, and the optimal approach must include a range of strategies such as working with experienced hardware vendors and controlling access policies where possible to restrict sensitive functions to computers installed in a secure location.

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<sup>130</sup> *The 2017 Threatscape*, Information Security Forum webinar, December 6, 2016. <https://www.securityforum.org/events/webinars/isf-webinar-the-2017-threatscape/>

<sup>131</sup> Thor Olavsrud, *5 information security trends that will dominate 2016*, cio.com, December 2015. <http://www.cio.com/article/3016791/security/5-information-security-trends-that-will-dominate-2016.html>

That said, humans and "inside jobs" remain the highest risk to IT security. Every individual device has the components to be a security threat: a network interface, software, and a person who may use it in a way other than intended. (An "inside job" could be an intentional intrusion, or simply a careless employee who shares passwords or allows a PC to be infected by malware, without malicious intent.) This recognition can lead to pragmatic recommendations – a single “source of truth” for critical information (be careful about saving the same data in several places, because secondary systems may not be as secure as primary ones), enterprisewide role-based security access (regular review of appropriate access rights for all staff), and authentication/authorization procedures that do not tolerate password or account sharing.

Any agency maintaining its computer infrastructure will have to contend with spiraling costs associated with protecting their systems. That and a general shortfall of qualified information security personnel (expected to reach 1.5 million by 2020)<sup>132</sup> will contribute to more efforts for multiple agencies to pool or contract for defensive resources. If, as discussed earlier in this section, there is an increase of confidence and trust in cloud-based services for criminal justice applications (which is plausible), costs related to cybersecurity will become one more contributing factor to general acceptance and reliance on the cloud for criminal justice agencies. Cloud providers for their survival must develop capabilities in SIEM and threat intelligence which can be leveraged by agencies.<sup>133</sup> Internet service providers are in a position to play an increased role in detecting cyber intrusions as they occur, using network traffic analysis and distributed control points, as already takes place via partnership with law enforcement to deny distribution of child pornography.<sup>134</sup> Private, government clouds will also be vigorously pursued in many places as a controlled way for agencies to combine efforts, share costs and perhaps reduce the number of interfaces and required standards (see *Trend #6, Expanded Information Sharing*). The FedRAMP<sup>135</sup> program, which provides assistance for federal agencies to acquire cloud services-ISP security through procurement, maintains a list of service providers which have certified compliance with the FedRAMP Security Assessment Framework.

#### POINT OF DIMINISHING RETURNS?...

The “Jevons’s paradox,” from environmental economics, occurs when technological progress increases the efficiency with which a resource is used, but the rate of consumption of that resource rises because of increasing demand.<sup>136</sup> At what point is increased affordability of devices and applications offset by increased costs to manage the complexity? The question of diminishing returns from cloud computing has been discussed in some detail: “For organizations looking to get substantial ROI from virtualization and cloud computing initiatives, the true costs of managing an exploding number of applications—spanning multiple sites and sometimes outside of corporate control—can lead to diminished returns. Flexibility comes at the cost of complexity and an inability to maintain control of applications and data.”<sup>137</sup>

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<sup>132</sup> Michael Suby and Frank Dickson, *The 2015 Global Information Security Workforce Study*, Frost and Sullivan white paper, April 2015. [https://www.isc2cares.org/uploadedFiles/wwwisc2caresorg/Content/GISWS/FrostSullivan-\(ISC\)%C2%B2-Global-Information-Security-Workforce-Study-2015.pdf](https://www.isc2cares.org/uploadedFiles/wwwisc2caresorg/Content/GISWS/FrostSullivan-(ISC)%C2%B2-Global-Information-Security-Workforce-Study-2015.pdf)

<sup>133</sup> Todd Fitzgerald, *Super CISO 2020*, RSA conference presentation, March 2016. <https://www.rsaconference.com/events/us16/agenda/sessions/2388/super-ciso-2020>, accessed January 7, 2017.

<sup>134</sup> Richard Wortley and Stephen Smallbone, *Child Pornography on the Internet*, Center for Problem-Oriented Policing, 2006. [http://www.popcenter.org/problems/child\\_pornography/1](http://www.popcenter.org/problems/child_pornography/1)

<sup>135</sup> fedramp.com, Federal Risk and Authorization Management Program, General Services Administration. <https://www.fedramp.gov/>

<sup>136</sup> [https://en.wikipedia.org/wiki/Jevons%27s\\_paradox](https://en.wikipedia.org/wiki/Jevons%27s_paradox), accessed February 11, 2016.

<sup>137</sup> WestconGroup, Inc. <http://westconsolutions.com/content/vendors/f5-networks/virtualization-and-cloud-computing-solutions>

The effect of the paradox on benefits of cloud computing are not fully understood, and the variables for each agency and project will be different, but in some scenarios, the cost-benefit analysis of an in-house solution may be better than that of an external cloud deployment. Christopher Yoo in his book *Cloud Computing: Architectural and Policy Implications*, states: “Given the risk premium that cloud computing firms must charge, it is quite possible that a large firm may find its traffic large enough by itself to achieve the necessary reduction in peak variability.... This is particularly important because of the indivisibilities and long lead times that are associated with expansions of data center capacity.”<sup>138</sup>

## IMPLICATIONS FOR CORRECTIONS LEADERS

If concerns about entrusting criminal justice data to cloud-based services can be overcome (still not a foregone conclusion), they will look more attractive for perceived cost savings, shortened project timeframes, and levels of reliability and resilience compared to in-house services. Many agencies will opt for private cloud resources for segregated computing, storage, and networking, in conjunction with other criminal justice and government agencies, as a reasonable compromise to preserve and control performance, security and data sovereignty.

For critical decisions such as this, and much more, all corrections agencies need a CISO (Chief Information Security Officer) to oversee security risk management, privacy, managed security services, threat intelligence and analytics, and data governance.<sup>139</sup> The CISO must also be concerned with the shortfall of skilled cyber security professionals, and with building a general level of awareness and training for all agency staff to understand and properly react to day-to-day information security challenges.

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<sup>138</sup> Christopher S. Yoo, *Cloud Computing: Architectural and Policy Implications*, University of Pennsylvania Law School, Faculty Scholarship, Paper 358, 2011. [http://scholarship.law.upenn.edu/faculty\\_scholarship/358](http://scholarship.law.upenn.edu/faculty_scholarship/358)

<sup>139</sup> Todd Fitzgerald, *Super CISO 2020*, RSA conference presentation, March 2016. <https://www.rsaconference.com/events/us16/agenda/sessions/2388/super-ciso-2020>, accessed January 7, 2017.

## TREND #8: STANDARDS AND POLICY

**Definition** Technological solutions will continuously be sought by correctional agencies to encourage and demonstrate conformance with a growing body of standards and policy for staff, offenders and the community.

### Applications

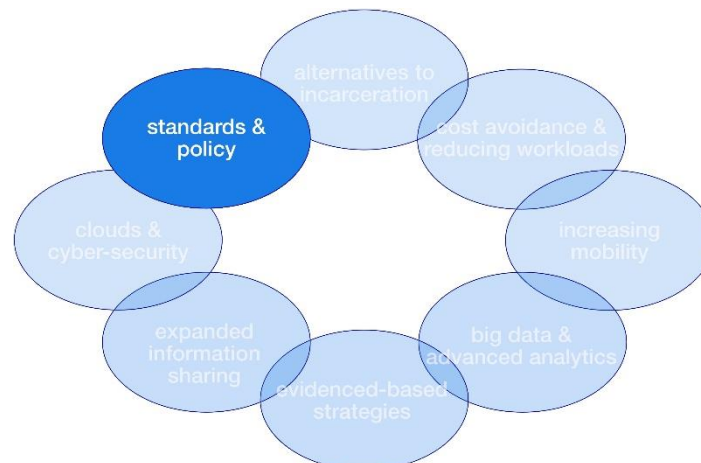
- Lower-cost/wider use of **biometrics**
- **Health Information Exchanges (HIE)**
- **Standardized tools** for chronos, case plans, victim notification
- **Radios** adhering to reinforced interoperability standards
- **Mobile devices tested and certified for cybersecurity**

### Industry drivers

- **National standards reporting**
- **ACA and NCCHC accreditation**
- **PREA Data Specification**
- **Reentry Information Sharing Specification**
- **Project Interoperability**
- **OASIS Emergency Management Standards**
- **OSHA**
- **National Identity Exchange Federation**
- **Global Privacy Technology Framework**

### Key themes

- The continuous evolution of **operational and technical standards** in such fields as cybersecurity, biometrics and radio interoperability will impact correctional operations
- **National interoperability standards** will see ongoing emphasis in support of statistical reporting and systems interoperability
- Technological tools will make it easier to meet **accreditation standards** of the American Correctional Association (ACA) and National Commission on Correctional Health Care (NCCHC)



The last of our eight primary trends is a brief survey of how standards and policies affecting corrections may evolve by 2020, with a view to their technological implications. There are two main themes: the continuous evolution of technical standards to improve the reliability and effectiveness of equipment which will be relied on by correctional agencies; and a growing body of business standards, legislation and accreditations for facilities, staff, offenders and the community, for which technological solutions will continuously be sought by correctional agencies to demonstrate compliance.

- The continuous evolution of **operational and technical standards** in such fields as cybersecurity, biometrics, and radio interoperability will impact correctional operations.
- **National interoperability standards** will see ongoing emphasis in support of statistical reporting and systems interoperability.
- Technological tools will make it easier to meet **accreditation standards** of the American Correctional Association (ACA) and National Commission on Correctional Health Care (NCCHC).

#### OPERATIONAL AND TECHNICAL STANDARDS

As noted earlier (see *Trend #7, Cybersecurity and Cloud Services*), cybersecurity threats will continue to magnify due to the proliferation of web-based services and devices. In the words of the Georgetown Journal of International Affairs: “Anyone can build an Internet-connectable device, there are no standards, and these devices can, in turn, affect other devices on the Internet. There is no lab or certification process for Internet-connected devices to determine their readiness or level of security, nor any stamp of approval suggesting they were tested... IoT devices are increasingly produced by known brands that did not grow up as IT companies... These next-generation devices will now have some or many network connections: Ethernet, wireless (cellular, 802.11x, ZigBee), Bluetooth, or proprietary wireless. These devices will be vulnerable, unable to have built-in security protections sufficient to the task, if any at all.”<sup>140</sup>

The Georgetown article advocates for the creation of an Internet Underwriters Laboratory (IUL) to impose independent and manufacturer testing of products against cybersecurity requirements,<sup>141</sup> and for Internet Service Providers (ISPs) to collaborate in the development of new security tools leveraging their global view over network traffic. “ISPs, using more advanced technologies, could also stop a portion of malicious activity before it reaches an organization by invoking upstream security controls deployed at key choke points within the Internet traffic flows (established by an ISP).” That ideal would require government-industry collaboration to build a policy and legal framework which is not in place today, and we believe correctional agencies should support any such initiatives.

Governments are considering incentives for market adoption of improved cybersecurity. The Georgetown article again: “Many governments have determined that normal market forces are insufficient for the development of effective cybersecurity. Therefore, governments are increasing... regulation and law.”<sup>142</sup> However, “frameworks such as NIST CyberSecurity Framework v1.0, British Standards Institute (PAS-555-2013), Cyber Security Risk-Governance and Management Specifications, and ISO 27001/2 are too complicated and detailed to be reasonably applied and adopted at scale. ISO27001/2... has over 110 controls, while NIST CyberSecurity Framework v1.0 has 23 categories and over 90 subcategories.”

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<sup>140</sup> Melissa Hathaway and John Stewart, *Taking Control of our Cyber Future*, Georgetown Journal of International Affairs, July 2014. <http://journal.georgetown.edu/cyber-iv-feature-taking-control-of-our-cyber-future/>

<sup>141</sup> Ibid.

<sup>142</sup> Ibid.

A number of proposals exist for refining standards to encourage their practical application and develop actionable frameworks to safeguard against the cyber threat. The ISO 27001/2 information security management standard (latest edition ISO/IEC 27001:2013<sup>143</sup>) may be updated by 2020 to reflect the expanded threat from cloud-based and mobile devices. Proposed amendments already tabled include a simplified audit report that could help demonstrate a commitment to proper information security.<sup>144</sup> The Center for Internet Security's Critical Security Controls,<sup>145</sup> created by the National Security Agency and Department of Energy, is intended to focus a small number of actions with high pay-off results and is regularly updated based on new attacks.<sup>146</sup> The Cyber Readiness Index (CRI) measures a country's level of preparedness for cybersecurity risks, evaluating "national strategy, incident response, e-crime and law enforcement, information sharing, investment in R&D, diplomacy and trade, and defense and crisis response."<sup>147</sup> The Securities and Exchange Commission (SEC) and Federal Communications Commission (FCC) have been urged to require companies to attest to cybersecurity risk controls.<sup>148</sup> Correctional agencies will benefit as government and industry find ways to put these initiatives to practical effect.

We should also touch on these evolving technical standards which could impact correctional operations:

- **Radio interoperability:** The APCO (Association of Public-Safety Communications Officials) Project 25 (P25) standard sets interoperability standards for digital public safety radio communications. However, recently manufacturers have produced proprietary non-P25-compliant systems. There are calls to discourage sales of non-P25-compliant radios to public safety agencies including corrections, for instance by mandating compliance for radios purchased with DHS or other federal grants.<sup>149</sup>
- **Biometrics:** By 2022 the biometrics market will reach \$32 billion,<sup>150</sup> with 4.8 billion biometric devices in use, and likely becoming the primary method for verifying personal identification in banking.<sup>151</sup> "The increasing use of biometric technology in e-commerce and the cloud computing platform ... [and] government initiatives to adopt biometrics in various fields, increased demand for biometric technologies in smartphones, and the introduction of e-passports, implementation of biometric technology in election administration and criminal identification are propelling the growth of the biometrics system market."<sup>152</sup> New methods currently being researched<sup>153</sup> include anatomical (palm and ear prints), physiological (pulse, heart rate and respiration), cognitive (measuring responses to stimuli

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<sup>143</sup> ISO/IEC 27001:2013 *Information security management systems – Requirements*, International Organization for Standardization, October 2013. [http://www.iso.org/iso/home/store/catalogue\\_ics/catalogue\\_detail\\_ics.htm?csnumber=54534](http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=54534)

<sup>144</sup> John Verry, *One Way to Improve ISO 27001: Better Audit Reports for Your Clients and Prospects*, Pivot Point Security, November 2013. <http://www.pivotpointsecurity.com/blog/iso-27001-audit-reports/>

<sup>145</sup> *CIS Controls for Effective Cyber Defense*, Center for Internet Security, <https://www.cisecurity.org/critical-controls/>, accessed January 7, 2017.

<sup>146</sup> *CIS Critical Security Controls*, SANS Institute. <https://www.sans.org/critical-security-controls/>, accessed February 15, 2016.

<sup>147</sup> *Cyber Readiness Index*, Potomac Institute for Policy Studies. <http://www.potomac institute.org/academic-centers/cyber-readiness-index>

<sup>148</sup> *Cybersecurity Roundtable*, U.S. Securities and Exchange Commission, March 2014. <https://www.sec.gov/spotlight/cybersecurity-roundtable.shtml>

<sup>149</sup> John Johnson, *The Effects of Non-P25 Digital Systems on Interoperability*, Mission Critical Communications magazine, July 2013. <http://www.mccmag.com/Features/FeaturesDetails/FID/395>

<sup>150</sup> *Biometric System Market – Global Forecast to 2022*, Markets and Markets report, November 2016. <http://www.marketsandmarkets.com/Market-Reports/next-generation-biometric-technologies-market-697.html>, accessed January 7, 2017.

<sup>151</sup> Justin Lee, *Biometrics will be main banking identity authorization method by 2020, says report*, biometricupdate.com, June 2015. <http://www.biometricupdate.com/201506/biometrics-will-be-main-banking-identity-authorization-method-by-2020-says-report>

<sup>152</sup> *What Will Biometric Authentication Look Like In 2020?*, Entrust IdentityOn blog, August 2015. <https://www.entrust.com/what-will-biometric-authentication-look-like-in-2020/>

<sup>153</sup> Eli Gorski, *Mobile pushes changes in biometric identifiers*, FCW magazine, June 2015. <https://fcw.com/articles/2015/06/11/evolving-biometrics.aspx>



such as text and stylometry of writing and speech), behavioral (measuring browsing habits and device and application use), and “emerging biometric sensors that rely on an individual’s pulse, skin texture, or other yet unknown metrics will evolve rapidly, especially on wearables. This in addition to biometric apps, such as facial or eye based recognition, that will leverage the camera or other built-in device features.”<sup>154</sup> All of this should benefit corrections, as biometrics become more cost-effective, provided they meet acceptable levels of accuracy and their potential impact on infrastructure can be contained.

## NATIONAL INTEROPERABILITY STANDARDS

Large quantities of important information on offenders are aggregated as a normal course of correctional operations, and moves to a standardized, universally accepted format might spur information-sharing efforts. Three such high-profile candidates are chronological case notes, case supervision plans, and victim notifications – performed by all correctional agencies but using a wide variety of techniques and data formats which have evolved locally over time. It is possible to imagine, for example, a standard case note format which, if globally implemented, could greatly simplify the electronic transmission of case note records between the case management systems of different agencies. The authors would certainly advocate for the value of such initiatives, and we hope to see some of them taking shape in the near future.

There may be changes coming to the data collected for the National Corrections Reporting Program<sup>155</sup> (NCRP), administered by the Bureau of Justice Statistics (BJS), which compiles offender-level data to look for trends related to re-entry, recidivism, and demographic characteristics. One area of potential change reflects the extensive growth in the number of foreign-born Americans, and what trends for criminal behavior and re-offending may arise from increasing diversity in the population. (This question is taken up in an article for the National Institute of Justice entitled *Preparing for the Future: Criminal Justice in 2040*.<sup>156</sup>) This may impact the content of reports that agencies are requested to submit.

Industry and business imperatives are driving the greater acceptance of information sharing standards, as is the White House National Strategy for Information Sharing and Safeguarding, which has spurred the development of Project Interoperability. Project Interoperability is a series of initiatives which will have an impact on overall national data sharing and safeguarding efforts (see *Trend #6, Expanded Information Exchange*). Project Interoperability aims to provide a framework which correctional agencies can use to implement an information sharing environment with current standards, technology, and investments.

Adherence to data sharing standards will be a normal requirement of RFPs, and more tools such as open APIs will exist to reduce the burden. NIEM-funded exchanges such as those for SAVIN (Statewide Automated Victim Information and Notification) and PREA will play a continuing part in practical information sharing efforts. The IJIS Institute has created a National PREA Data Standard which defines the essential elements required to report occurrences and identify potential PREA perpetrators or victims. The Standard was developed to improve the quality, communication and analysis of PREA data, and raise overall awareness by identifying critical gaps that may exist in information sharing or current business processes. It can assist agencies in providing an

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<sup>154</sup> Stephen Mayhew, *4.8 billion biometric devices predicted by 2020*, biometricupdate.com., December 2014. <http://www.biometricupdate.com/201412/4-8-billion-biometric-devices-predicted-by-2020>

<sup>155</sup> Bureau of Justice Statistics data collections are indexed at <http://www.bjs.gov/index.cfm?ty=dca>, accessed January 7, 2017.

<sup>156</sup> Nancy Ritter, *Preparing for the Future: Criminal Justice in 2040*, National Institute of Justice Journal, No. 255. <http://www.nij.gov/journals/255/pages/2040.aspx>, accessed February 14, 2016.

enhanced level of protection for staff and inmates, and ensure a prompt and accurate response to PREA-related situations, while saving valuable staff time expended in the collection of data and managing paper forms.

## ACCREDITATION AND TRAINING

Technological tools will make it easier to meet accreditation standards of the ACA and NCCHC. The increased use of mobile devices in jails and prisons will make it easier to document adherence to standards and policy, and otherwise, demonstrate a ‘good faith’ effort to improve conditions of confinement as a defense against litigation (a primary objective of ACA accreditation.)<sup>157</sup> The increased use of mobile devices will show compliance with regulations such as California’s Title 15 (Crime Prevention and Corrections), which establishes minimum standards for detention facilities. Widespread use of technological devices such as cameras will help lower the amount of staff overhead required to record compliance with all standardized activities manually, and ideally, the provision of these devices will be factored into infrastructure planning within custodial facilities.

The biggest impact in this regard over the next five years will probably be in correctional health care. Across the entire medical industry, there is projected to be an 80- to 120-fold increase in the volume of electronic health records from 2010 to 2020.<sup>158</sup> Also, the ACA and the Health Information Technology for Economic and Clinical Health Act (HITECH) have fostered the development of health information exchanges (HIEs) to circulate this data. HIEs could perform a vital service for correctional agencies to transfer health records for released inmates to community health care providers. As stated in a 2014 paper in the online journal *Perspectives in Health Information Management*, “With the expansion of Medicaid under the ACA, many of the individuals leaving jail will have access to health insurance for the first time.” Community-based providers to the newly insured will want to know about the care that was provided in the jail. The developing technological infrastructure would seem to offer the best way to access this information.”<sup>159</sup> Another 2014 paper from the National Center for Biotechnology Information (NCBI) discusses how “regulatory alignments and policy guidance are also needed to ensure the appropriate transfer of information between the criminal justice and community health care domains. As standards governing the implementation and use of electronic health records continue to be developed, careful attention should be paid to the implications of such criteria in correctional and transitional settings.”<sup>160</sup>

The NCCHC continues to review and revise its standards and position statements on a regular basis.<sup>161</sup> It has also initiated a Healthy Inmates 2020 pilot program for correctional health care,<sup>162</sup> adapted from the U.S. Health and Human Services Healthy People 2020 project, intended to develop new data collection resources, audit tools and intervention strategies. Sample objective: “Increase the proportion of inmates with IFG, “pre-

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<sup>157</sup> Alex Friedmann, *How the Courts View ACA Accreditation*, Prison Legal News, October 2014. <https://www.prisonlegal-news.org/news/2014/oct/10/how-courts-view-aca-accreditation/>

<sup>158</sup> Lorraine Fernandes and Richard Steen, *HIE Standards Circa 2020... from a 2010 Perspective*, IBM, February 2011. <http://www.interoperabilityshow-case.org/himss11/docs/P119.pdf>

<sup>159</sup> Ben Butler, *Health Information Exchange between Jails and Their Communities: A Bridge That Is Needed under Healthcare Reform*, *Perspectives in Health Information Management*, January 2014. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3995481/>

<sup>160</sup> Kavita Patel, et al.: *Integrating Correctional And Community Health Care For Formerly Incarcerated People Who Are Eligible For Medicaid*, *Health Affairs*, May 2014. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4028698/>

<sup>161</sup> National Commission on Correctional Health Care Standards: <http://www.ncchc.org/standards>, accessed February 11, 2016.

<sup>162</sup> *Healthy Inmates 2020 Project Guide*, <http://www.healthyinmates.org/upload/Healthy%20Inmates%202020%20Project%20Guide.pdf>, accessed March 8, 2016.

diabetes,” or multiple diabetes risk factors that are engaged in diabetes prevention behaviors.” Along the same lines, a Pew Charitable Trusts’ 2013 report, *Managing Prison Health Care Spending*, has proposed new national guidelines for medical and geriatric parole by an independent panel of palliative medicine, geriatrics, and correctional health care experts.<sup>163</sup> These efforts will require technological support through additional data capture and business processes in both offender management and electronic health record systems.

## IMPLICATIONS FOR CORRECTIONS LEADERS

There is no technological panacea for correctional agencies working to comply with operational standards and policies, or seeking accreditation as a means of measuring performance and reducing litigation. Compliance with operational standards such as those of the ACA cannot be automated, but technology can help to reduce the burden on staff tasked with manually recording evidence of compliance in the course of their daily activities. In the custodial facility of the future, a fully-integrated network of cameras and sensor within cells and staff equipment could serve to demonstrate compliance as a matter of course.

## NEXT STEPS

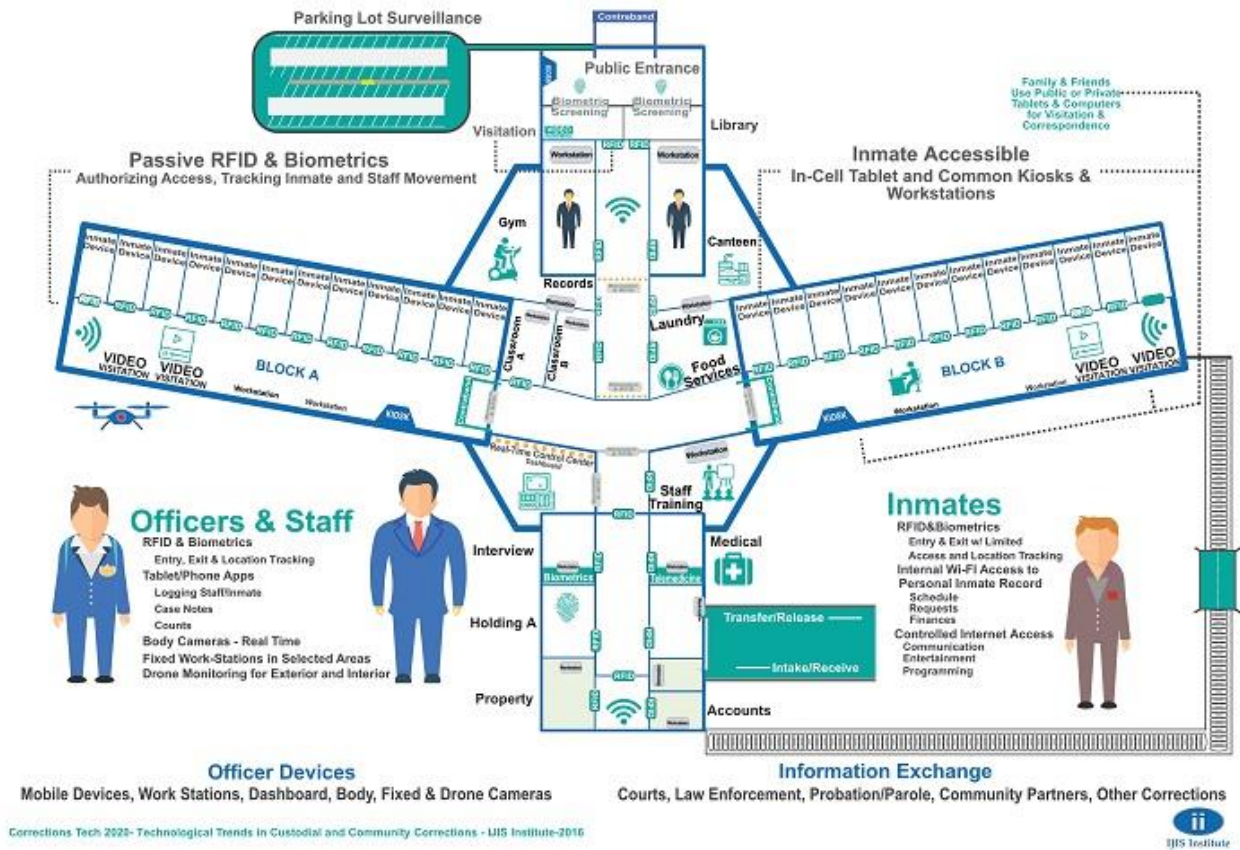
If some or all of these trends come to fruition, in a practical and affordable way, correctional supervision could look quite a bit different in the next decade. Significant elements of both custodial and community supervision could be somewhat or entirely taken up by technological applications, freeing up staff resources and enhancing rehabilitative prospects. The cutting-edge jail or prison of the near future may be equipped with thousands of devices running hundreds of applications from dozens of vendors:

- sensors throughout the facility continuously tracking the physical location of inmates, staff and visitors;
- video visitation and telemedicine reducing the need for inmate movements to the outside;
- automated video and audio records showing compliance with standards;
- contraband control via improved scanning devices and the replacement of inmate mail with email;
- inmate-accessible devices in-cell for self-reporting and individualized programming; and
- improved metrics for managers, and enhanced information sharing with justice agencies and partners.

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<sup>163</sup> Ellyon Bell, et al.: *Managing Prison Health Care Spending*, The Pew Charitable Trusts, October 2013. [http://www.pewtrusts.org/~media/legacy/uploadedfiles/pcs\\_assets/2014/pctcorrectionshealthcarebrief050814pdf.pdf](http://www.pewtrusts.org/~media/legacy/uploadedfiles/pcs_assets/2014/pctcorrectionshealthcarebrief050814pdf.pdf)

# A Vision of Custodial Supervision in the 2020's?



Probation and parole supervision could be fundamentally transformed – it’s already well on the way to virtually complete mobility for field operations, and the growing wireless infrastructure in the community at large offers the prospect of fully integrating supervision into ordinary life:

- probationers and parolees using their own personal devices to report in, at home, work and school;
- advanced electronic monitoring automatically updating supervision records and triggering alerts;
- officers planning their workdays and accessing all the data they need, in real time, while in the field;
- community partners and program providers able to access and update supervision records directly;
- law enforcement helping to monitor the whereabouts of probationers and parolees; and
- all dependent on enhanced information sharing between justice agencies and community partners.



e've concluded each section of this paper with *implications for corrections leaders*, and in the following list we've tried to summarize what the authors considered to be important factors for agencies thinking about how to apply technology within their operations:

- Demand for new correctional hardware and software will keep growing, though technology alone can never adequately supervise offenders or ensure compliance with standards and policy (but it can be the crucial support for correctional staff entrusted with safeguarding the public,)
- The *Internet of Things* will revolutionize community corrections, and persons under supervision will be active participants in their own monitoring using their own devices. More third-party NGOs and service providers will need to access criminal justice data as they become directly involved in supervision.
- Reliance on devices and applications leveraging the internet as a platform will help minimize startup costs (and in turn drive further adoption). Legal and technological developments around mobile devices should be followed closely, as vendors and community partners compete to offer pragmatic and cost-effective tools for officers.

- Corrections IT departments will be aggregating greater volumes of data, from many more devices than is the case today, and mining it for a deeper understanding of how to improve supervision and public safety. Big data “lakes,” faster data processing engines and query languages will help, though they still won’t replace data warehouses.
- Requirements for data exchange between corrections, law enforcement, and community-based organizations will not diminish, but as NIEM and similar data exchange standards gain acceptance, we should start to see real and significant reductions in interface costs.
- Many resources and strategies are becoming available for agencies carrying out information sharing projects. Especially valuable: Project Interoperability, and the IS&S Playbook developed by the IJIS Institute as part of ICIF (Information Sharing and Safeguarding Core Interoperability Framework).
- An engaged correctional staff will be the best source of good ideas on how and when to use technology in the field and the best advocates for its successful rollout. The market for qualified personnel will be tight, and the staffing profile for information security, in particular, will likely grow.
- Agile methodologies have become the most common framework for developing IT applications, and correctional agencies will need to be comfortable with this approach in taking on projects and attracting qualified staff.
- When planning to build, or renovate physical plant, make sure that building specifications take expanding requirements for technological infrastructure into account.
- Cloud-based deployments will be common, and many or all of the reservations which now exist surrounding the cloud will have been resolved through the efforts of agencies and cloud service providers.
- Corrections agencies should have a CISO to oversee security risk management, privacy, managed security services, threat intelligence and analytics, and data governance.

The ideal next step for the industry as a whole would be to evolve a workable technology blueprint or body-of-knowledge spanning the technology landscape of corrections. This blueprint could be applied by agencies to develop and “litmus-test” their technology plans – how to find and deploy the most appropriate technological solutions for each agency’s priorities, taking advantage wherever possible of the tools and skills acquired by agencies and vendors across the nation and beyond, and validated through real-world experience. The authors are enthusiastic advocates, and we hope to see progress on this front in coming years. The IJIS Institute is already working toward this in its area of primary focus of standards-based corrections information sharing and is well-placed as a community of connected members and stakeholders to help further this goal.

In the meantime – to find out more information, for assistance, or to participate in the discussion – the IJIS Institute and the authors welcome any queries. Please feel free to contact us at the following email address:

[CorrectionsTech2020@ijis.org](mailto:CorrectionsTech2020@ijis.org)

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## ABOUT THE IJIS INSTITUTE

The IJIS Institute unites the private and public sectors to improve mission-critical information sharing and safeguarding for those who protect and serve our communities. The IJIS Institute provides training, technical assistance, national scope issue management, and program management services to help government fully realize the power of information sharing.

Founded in 2001 as a 501(c)(3) nonprofit corporation with national headquarters on The George Washington University, Virginia Science and Technology Campus in Ashburn, Virginia, the IJIS Institute has grown to over 400 member companies and individual associates from government, nonprofit, and educational institutions from across the United States.

The IJIS Institute thanks the IJIS Institute Corrections Advisory Committee for their work on this document. The IJIS Institute also thanks the many companies who have joined as Members that contribute to the work of the Institute and share in the commitment to improving justice, public safety and homeland security information sharing.

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## ABOUT THE IJIS INSTITUTE CORRECTIONS ADVISORY COMMITTEE

The purpose of the IJIS Institute Corrections Advisory Committee is to focus on advancing information sharing standards among the jail, institutional and community corrections communities.