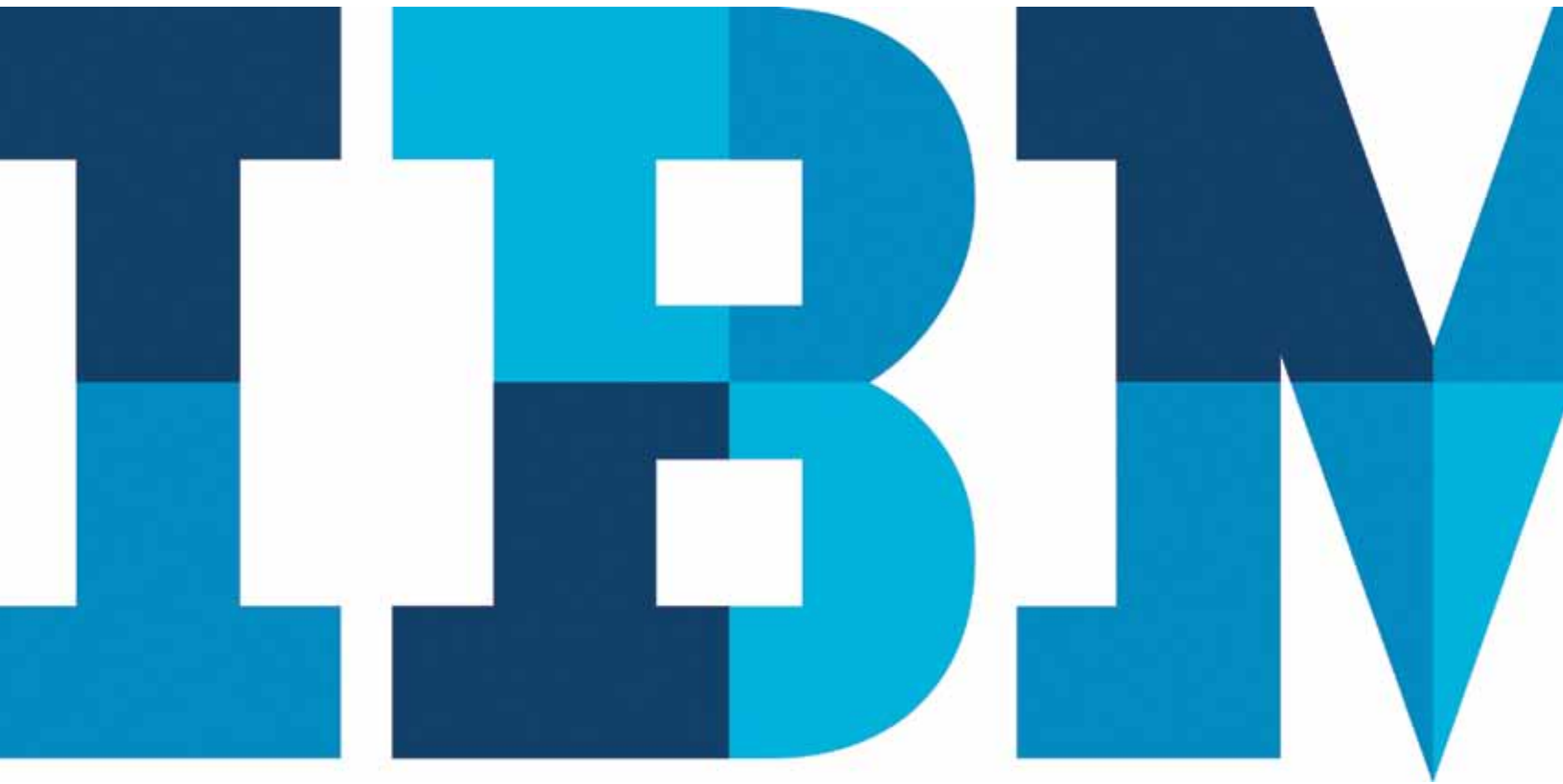


## Think outside the cell

*Reduce recidivism, improve public safety and maximize resources using predictive analytics*



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## Overview

Correctional systems around the world have been operating under increased pressure. Faced with overcrowded prisons, shrinking operational budgets and an unprecedented amount of parolees, the need to curb recidivism—the rate at which offenders re-offend—is greater than ever.

A number of solutions have been proposed to aid in reducing recidivism rates, including education, vocational training and drug, alcohol and mental health counseling. Some in the corrections community have also proposed decreasing the construction of new prisons and designing more programs that incorporate probation and parole. But in light of the large and growing number of repeat offenders, placing emphasis and funding on rehabilitation programs designed specifically to change criminal behavior may succeed where other programs have failed.

Predictive analytics is a very effective means of managing prison populations. It enables correctional systems to use the wealth of available offender data to identify individuals who are returning to prison as the result of new crimes or parole violations, and determine the appropriate services and support programs to change their behavior and ensure a successful return to the community.

This paper explores the relationship between prison overcrowding and recidivism, and describes how predictive analytics can help to address these concerns. It also includes examples of successful analytics-based approaches, and highlights IBM SPSS solutions that can assist correctional, probation and juvenile service agencies in managing offenders both inside and outside the prison wall.

## Introduction

America's prison population has grown dramatically over the last 30 years. In 2008, one in 100 American adults was behind bars. A year later, it was reported that one in 31 adults—or 7.3 million Americans—was either incarcerated or on probation or parole.<sup>1</sup>

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**In the US the number of incarcerated individuals quintupled between 1980 and 2006, jumping from 320,000 to more than 1.5 million in prisons and from 190,000 to 766,000 in local jails.**

**- US Bureau of Justice Statistics, 2008**

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The costs associated with this growth are enormous. According to a report from the Pew Center on the States, a nonprofit public policy research organization, total state spending on corrections is now about \$52 billion, the bulk of which is spent on operating prisons. State corrections spending quadrupled

during the past two decades, making it the second fastest growing area of state budgets after Medicaid. Similar statistics have been reported worldwide. In the United Kingdom, for instance, it is estimated that each new prison space costs £119,000 and that the annual average cost for each prisoner exceeds £40,000.<sup>2</sup> The rising cost of operating jails and prisons is especially challenging in a global economy where revenues have declined sharply and budget shortfalls are common.

Despite increases in spending, corrections systems have made few performance improvements. In addition, the number of inmates sent to prisons for new crimes has decreased, while admission for violations of probation or parole increased for the fifth year in a row. The Pew Center report estimates that reducing recidivism rates in the more than three dozen states it studied by just 10 percent could collectively save those states more than \$635 million a year in averted prison costs. California alone could save \$233 million.<sup>3</sup> These numbers clearly illustrate the value of developing more effective rehabilitation and treatment programs.

Many states have responded to the problem by liberalizing sentencing guidelines, thereby increasing the number of criminals who are placed in community service, probation or paroled earlier. But supervising large numbers of individuals in the community presents its own set of challenges. Preventing offenders from committing more crimes once they are released is not the primary goal of the correctional system, but it is a critical one, both in terms of public safety and ensuring that taxpayer dollars are spent responsibly. For this reason, correctional and probationary departments are actively looking for low-risk, cost-effective ways to supervise offenders in the community.

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Only Medicaid spending grew faster than state corrections spending, which quadrupled over the past two decades.

- Pew Center on the States, 2011

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## Overcrowding strains prison systems and taxpayers

The United States has the highest incarceration rate in the world, with 730 prisoners for every 100,000 people. The US prison system is at 110 percent of its capacity overall, with federal prisons at 162 percent of capacity. Other countries are experiencing similar overcrowding issues, including Italy (147 percent); Spain (138 percent); Belgium (120 percent); UK and France (112 percent); Australia (105 percent); India (123 percent); and Brazil (166 percent).<sup>4</sup>

Major contributors to overcrowding include unanticipated results associated with sentencing guideline changes, and high recidivism rates associated with large numbers of repeat offenders—many of whom have violated the terms of their community supervision programs. The severity of the crisis is compounded by the fact that states are hindered by funding guidelines and are forced to incarcerate offenders that typically would be rehabilitated through a lesser degree of sentencing, such as probation or community service. In some cases, funding for community-based, education and substance abuse treatment programs has been completely eliminated.



*Figure 1:* A comprehensive state-by-state survey conducted by the Pew Center on the States in conjunction with the Association of State Correctional Administrators (ASCA) found that 43.3 percent of offenders sent home in 2004 were reincarcerated within three years, either for committing a new crime or for violating conditions governing their release.<sup>5</sup>

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Research has indicated that prisons operating over capacity provide less meaningful interaction between criminals and staff, resulting in less effective rehabilitation. Overcrowded prisons are more costly to run, making them more expensive for taxpayers. They also experience more violence among inmates, and are forced to stretch staff and other resources further. Many states have explored building new prisons as a solution to overcrowding, but with a price tag of as much as several hundred million dollars per facility, this is a costly option. And with more than four out of 10 adult American offenders returning to prison within three years of their release, the system designed to deter them from continued criminal behavior may not be the most effective one.

As corrections and probation systems grow more aware of the link between these issues and recidivism, they are committing to exploring proven technologies and strategies such as sophisticated risk assessments, meticulous reentry planning and post-release supervision carefully tailored to each offender's circumstances. These approaches are much less expensive than the \$20,000 to \$60,000 per year it takes to house an inmate at the taxpayers' expense, and can have better results.

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### Sentencing guidelines enable repeat offenders

A 19-year-old Tennessee woman was arrested seven times in one year on charges that ranged from drug possession to domestic assault and theft. In her most recent crime, she wrenched open the door of a parked car, pointed a gun at a woman changing her 13-month-old daughter's diaper in the back seat, and demanded cash.

This is just one example of several violent crimes committed by ex-convicts on probation or parole in Tennessee — a situation state prosecutors and law enforcement leaders say is all too common because of how the state sentences its convicted criminals.

-The Tennessean

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### Use inmate data to keep offenders out of prison

Correctional systems are collecting massive amounts of inmate data, including demographic information, health/mental health records, behavior assessments, and prison intake surveys. Correctional facilities also frequently monitor prisoner behaviors and relationships to determine potential concerns upon their release into society. Suspicious Activity Reporting (SAR) initiatives are underway in many states, enabling this information to be aggregated for analysis and future intelligence.

Governments are beginning to realize that all of this data may hold the key to keeping criminals out of the prison system and functioning as productive members of society. Through comprehensive data analysis, they can identify strategies for slowing prison population growth while generating savings to reinvest in community supervision and treatment programs.

Predictive analytics technology focuses on the prediction of future probabilities and trends. The central element of predictive analytics is the predictor, a variable that can be measured for an individual or other entity to predict future behavior. This technology is successfully applied to improve outcomes in many research areas, including education, economics, healthcare, marketing, social science and the public sector.

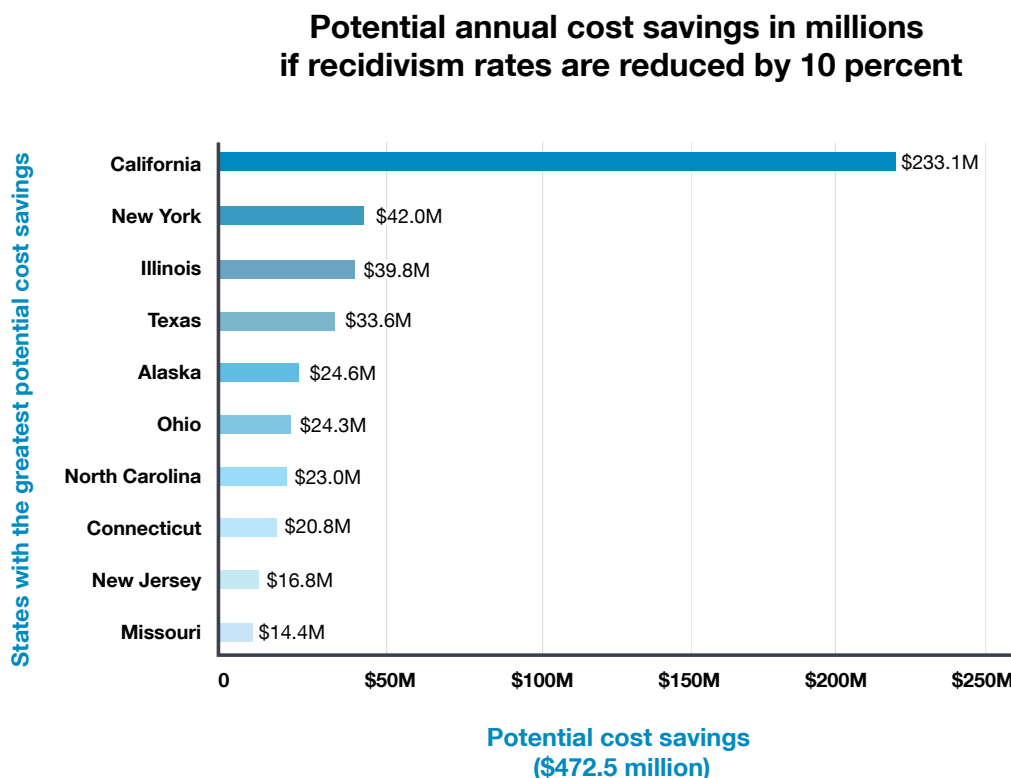


Figure 2: The Pew Center on the States estimates that if just the 10 states with the greatest potential cost savings reduced their recidivism rates by 10 percent, they could save more than \$470 million in a single year. <sup>6</sup>

In the criminal justice system, predictive analytics provides governments and corrections systems with the ability to draw insights from the wealth of data they collect. By looking at historical data and using statistical algorithms and predictive models, these agencies can gain a greater understanding of which interventions are likely to prevent recidivism and contribute to their overall mission of preserving public safety.

This insight enables them to answer essential questions, such as:

- Which offender is most likely to reoffend, and what can we do now to prevent this from happening?
- Which offenders will respond best to which program?
- How can we cost effectively focus resources on the most high-risk offenders to ensure they don't commit new crimes?
- Are education and treatment programs reducing prison cycles and by how much?
- What are the most critical or key characteristics that attribute to an individual criminal reoffending or not?
- How can we determine the level of risk that specific offenders pose to the public?
- How can we smooth an offender's transition from prison back to the community so they don't reoffend?

### **Develop more effective intervention and treatment programs**

The Florida Department of Juvenile Justice (FDJJ), for example, strives to increase public safety through effective prevention, intervention and treatment services. It continually looks for new ways to maximize the impact of its services and programs while operating within tight budgetary restrictions.

FDJJ's Research and Planning team uses IBM® SPSS® Statistics and IBM SPSS Modeler to analyze delinquency at every level, ranging from state-wide overviews down to an individual's rehabilitation program. The IBM SPSS solutions are capable of processing enormous amounts of current and historical data, covering every case of delinquency in the state of Florida from 2000 to the present day. Last year its 4,200 employees handled approximately 121,000 delinquency referrals, helping 75,000 children start to turn their lives around.

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*“The robust statistical support we were able to provide in our report helped guide some important changes in the law, and as a result we have seen a 34 percent reduction in school-based delinquency since 2004.”*

– Mark Greenwald, Chief of Research and Planning, FDJJ

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As this example illustrates, agencies can use data they already collect to determine rehabilitation effectiveness by incorporating predictive analytics into the policy-setting and decision-making processes. By understanding the criminal and the training or treatment that he or she received, policy makers and program managers can develop optimal plans for current and future offenders. Those with similar traits can be grouped and treated accordingly. Corrections departments can begin to make predictions, based on scoring, placing criminals into specific rehabilitation programs that will have the greatest chance of successfully changing their future behavior.

Officials at the UK Ministry of Justice sought a technology solution that could analyze vast amounts of crime and offender data and help them understand which proactive measures would most likely prevent recidivism.

The Ministry turned to IBM SPSS predictive analytics software—specifically SPSS Statistics and SPSS Modeler Premium, which analyzes both numeric and textural data—to analyze millions of prisoner files. The analysis is helping them develop sentence-long, continuous treatment targets for prisoners to reduce the probability those individuals will commit crimes upon re-entry into society.

The Ministry of Justice now has more accurate crime prediction rates: violent crime recidivism prediction improved from 68 to 74 percent, and general offenses recidivism prediction improved from 76 to 80 percent.

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*“In the UK, reoffending is higher among criminals who are locked up than among those who do community sentences—with 74 percent of ex-inmates at one prison convicted again within a year.”<sup>7</sup>*

– The Guardian

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#### **Stretch limited budgets and resources**

Governments or agencies faced with shrinking budgets can use the success of a program that reduces recidivism to evaluate, forecast and model the financial feasibility and success of other programs prior to their implementation, maintain or increase funds for existing programs, as well as demonstrate the failure of an unsuccessful program and support the reallocation of funds.

Residential drug treatment programs in the UK, for example, offer a £200,000 net benefit over prison over the lifetime of an offender. This is because drug treatment programs are cheaper to run than incarceration systems and because they deliver lower re-offending rates. Similarly, using surveillance instead of prison cells saves £125,000 per offender.<sup>8</sup> Predictive analytics can help governments identify programs like these that can deliver optimal results while reducing the burden on taxpayers.



Predictive analytics solutions can also support and accelerate other corrections reform initiatives, such as security and parole training, offender movement within the system, population trending, staffing projects and resource allocation—delivering an even greater return on investment.

#### **Measure program performance**

Performance measurement provides agencies with the feedback that keeps the focus on executing at the highest levels. Program directors in corrections systems can apply analytics to criminal enrollee feedback about programs into decision-making processes. Such feedback can help identify goals and priorities among competing programs and help make the most of limited resources.

Program evaluation data also enables corrections departments to confidently route criminals through the justice system and place them in the programs that have been the most successful in preventing the repetition of an illegal activity, based on characteristics of the criminal, the crime they committed and the rehabilitation programs available. This data is critical for establishing policies for treatment in real time as criminals serve out their sentences.

In the case of FDJJ, predictive analytics helps determine whether the department is making the right decisions for certain youths through comparative analysis. If individuals with certain behaviors (or within certain behavioral groups) performed better in one program than another, the IBM SPSS solution helps the department identify that trend so that can begin sending more youths to the program that yields a better outcome.

Feedback can also be collected from key stakeholders, including employees, to create an environment that leads to more motivated and satisfied staff, which indirectly leads to more successful programs or policies.

#### **Improve reporting**

Agencies can apply predictive analytics techniques to help them comply with regulations and standards set by legislative bodies, quality institutes, regulatory bodies and central/federal governments in a cost-effective and efficient method. By enabling organizations to capture and keep all data relevant to recidivism, including both quantitative and qualitative data, analytics provides a more dynamic, complete picture of what defines a program's success.

This information can be exported directly into a variety of formats and visualizations, such as graphics, tables or maps. You can even integrate it into your existing technology stack, supplementing the investments you have already made in reporting or business intelligence tools. All of which shorten the time and decrease the effort it takes to share this powerful insight with top leadership.

## IBM Predictive Analytics Solutions for Recidivism

IBM is a recognized world leader in predictive analytics. IBM SPSS Predictive Analytics solutions for recidivism can help agencies capture recidivism statistics, evaluate current programs, and predict which criminals will respond best to a specific program, so that they are less likely to commit a new crime.

These solutions deliver powerful statistical analysis, text analytics, data collection and predictive modeling techniques to help corrections departments gain maximum value from their data.

- **IBM SPSS Statistics** - Provide timely, actionable results throughout the program lifecycle and evaluation process, including access to real-time results, on-demand reporting, in-progress analytics, data cleansing, unstructured feedback, and integration with DBMS and operational systems.
- **IBM SPSS Text Analytics for Surveys** - Save time and uncover complex insight into thoughts, attitudes and opinions of employees, therapists and offenders within the unstructured text of your survey responses. Utilize natural language processing specifically designed for survey text.
- **IBM SPSS Modeler** - Find the hidden patterns in your data that lead to high recidivism rates and build models that are used to accurately predict who is at risk of becoming a repeat offender, enabling organizations to prescribe targeted and individualized rehabilitation programs.
- **IBM SPSS Modeler Premium** - Build more complex predictive models by including unstructured text data (surveys, documents, case notes, or criminal profiles/records) to determine which criminals should go through a particular rehabilitation process or program.
- **IBM SPSS Data Collection** - Quickly and easily create surveys to gather data on program success from staff, including corrections officers and therapists, then analyze the results with SPSS Statistics and SPSS Modeler.
- **IBM SPSS Decision Management** - Combine predictive models and business rules to help with point of impact decision making in real-time and incorporate all data to achieve analytic insight, so an individual can take action. For example: a judge can receive a suggested and appropriate punishment, prior to sentencing the criminal.
- **IBM Cognos® Insight** - Easily access and understand key agency information in the format of dashboards and scorecards, and work with the data on your desktop without programming or IT assistance.

## Conclusion

The US alone spends hundreds of billions of dollars annually to house more than 7 million prisoners in municipal, state and federal prisons. Prisons and jails are operating at or over capacity, and the offender population continues to grow. As governments continue to rely on community service, probation and parole to control the prison population, and as concern about associated public safety risks and costs increases, it has become increasingly important to be able to predict which offenders are likely recidivists.

Predictive analytics provides a powerful means of focusing on the individuals most at risk of committing new crimes and returning to prison. By employing this and other evidence-based interventions, governments and corrections departments can improve the odds that released offenders will not pass through the prison door again.

To learn more about how IBM SPSS solutions can be utilized to help your agency or department reduce recidivism, visit: [ibm.com/software/analytics/spss](http://ibm.com/software/analytics/spss).

## About IBM Business Analytics

IBM Business Analytics software delivers actionable insights decision-makers need to achieve better business performance. IBM offers a comprehensive, unified portfolio of business intelligence, predictive and advanced analytics, financial performance and strategy management, governance, risk and compliance and analytic applications.

With IBM software, companies can spot trends, patterns and anomalies, compare “what if” scenarios, predict potential threats and opportunities, identify and manage key business risks and plan, budget and forecast resources. With these deep analytic capabilities our customers around the world can better understand, anticipate and shape business outcomes.

### For more information

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