



Report to the Ranking Member,
Subcommittee on Oversight, Committee
on Science, Space, and Technology,
House of Representatives

October 2015

ELECTRONIC MONITORING

Draft National
Standard for Offender
Tracking Systems
Addresses Common
Stakeholder Needs

GAO Highlights

Highlights of [GAO-16-10](#), a report to the Ranking Member, Subcommittee on Oversight, Committee on Science, Space, and Technology, House of Representatives

Why GAO Did This Study

OTS is an electronic monitoring technology consisting of hardware, such as an ankle bracelet, used for collecting Global Positioning System (GPS) signals to determine an individual's location, and software for analyzing data collected from the hardware device. While demand for GPS-based electronic monitoring devices has increased, there are currently no standards that OTS devices are required to meet. In 2009, NIJ initiated development of a voluntary OTS standard and companion guide, which is expected to be published no later than March 2016. GAO was asked to review NIJ's approach for developing the OTS standard.

This report examines the extent to which (1) NIJ collaborated with stakeholders in developing the standard, and (2) the standard and guide address stakeholder needs and challenges. GAO analyzed NIJ's draft OTS standard, companion guide, and standard development process. To obtain perspectives on the standard development process and OTS needs and challenges, GAO interviewed stakeholders including NIJ officials, practitioners and experts who developed the standard, criminal justice and victims' associations, manufacturers, and officials from a nongeneralizable sample of 10 criminal justice agencies that employ OTS. GAO selected the 10 criminal justice agencies based upon a combination of factors, including ensuring a range of federal, state, and local jurisdictions, among other things.

View [GAO-16-10](#). For more information, contact David C. Maurer at (202) 512-8777 or maurerd@gao.gov.

October 2015

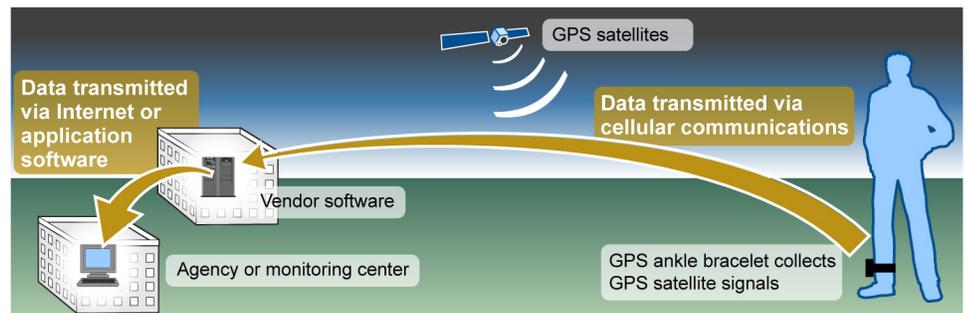
ELECTRONIC MONITORING

Draft National Standard for Offender Tracking Systems Addresses Common Stakeholder Needs

What GAO Found

The National Institute of Justice (NIJ) collaborated with a variety of criminal justice and technical experts to develop a draft standard for offender tracking systems (OTS), but earlier involvement of manufacturers could have expedited its development. For example, the committee that developed the draft standard included practitioners spanning all levels of government and program areas such as pretrial, probation, and parole services and technical experts with backgrounds in developing test methods for performance standards. NIJ invited manufacturers to provide input through a workshop held in May 2011 and two subsequent public comment periods. GAO found that earlier and ongoing involvement of OTS manufacturers could have better informed and facilitated development of the OTS standard by, for example, providing insights on OTS capabilities and limitations at the outset. Coordination has improved since 2012, and manufacturers' major concerns have been addressed.

Global Positioning System (GPS) Offender Tracking System



Source: GAO analysis of National Institute of Justice and Center for Criminal Justice Technology information; Art Explosion (clip art). | GAO-16-10

NIJ's draft OTS standard and guide address many common stakeholder needs and challenges. The draft standard includes requirements for common operational and circumvention detection needs. For example, requirements for location accuracy and the ability to provide alerts when an offender tries to remove the device or is at a prohibited location are included in the standard. In addition, the draft guide provides information and guidance related to challenges identified by the criminal justice agencies GAO met with as well as other considerations for implementing an OTS program. These challenges include

- misconceptions among the public and victims that OTS allows agencies to prevent bad behavior before it happens;
- developing appropriate protocols to respond to OTS alerts, such as those for tampering with the tracking device; and
- workload issues, such as whether there is sufficient staff or resources to respond to OTS alerts 24 hours a day, 7 days a week.

In recognition of the range of agencies, resources, and objectives of offender tracking, the guide provides information and guidance, and does not offer "one size fits all" solutions.

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Abbreviations:

ANSI	American National Standards Institute
AWG	Advisory Working Group
BJS	Bureau of Justice Statistics
DOJ	United States Department of Justice
GPS	Global Positioning System
NIJ	National Institute of Justice
NIST	National Institute of Standards and Technology
OJP	Office of Justice Programs
OMB	Office of Management and Budget
OTS	Offender Tracking System
PMBOK®	
Guide	<i>A Guide to the Project Management Body of Knowledge</i>
STC	Special Technical Committee

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October 26, 2015

The Honorable Donald S. Beyer, Jr.
Ranking Member
Subcommittee on Oversight
Committee on Science, Space, and Technology
House of Representatives

Dear Mr. Beyer:

Since 1996, criminal justice agencies have been monitoring the location of individuals with mobile devices. Prior to the advent of electronic monitoring with Global Positioning System (GPS) technology, criminal justice agencies' methods for supervising individuals were limited to selected site location tracking (e.g., house arrest) and manual methods such as in-person visitation. Demand for and use of GPS-based electronic monitoring devices for tracking criminal offenders, also known as offender tracking systems (OTS), has increased in large part because of numerous legislative mandates, according to the Department of Justice's (DOJ) National Institute of Justice (NIJ). For instance, NIJ reports that by 2010, 33 states had enacted legislation requiring OTS to track the location of sex offenders. According to 2012 Bureau of Justice Statistics (BJS) surveys of probation and parole agencies in the 50 states, the federal system, and the District of Columbia, over 31,600 adults on probation or parole were supervised with GPS technology.¹

¹See Department of Justice, Bureau of Justice Statistics (BJS), *Annual Parole Survey 2012*, (Ann Arbor, Michigan: Inter-university Consortium for Political and Social Research, October 2014); and Department of Justice, Bureau of Justice Statistics, *Annual Probation Survey 2012*, (Ann Arbor, Michigan: Inter-university Consortium for Political and Social Research, September 2014). This reflects the number of probationers or parolees that were tracked by GPS from January 1 through December 31, 2012, which is the most recent data reported by BJS. States in which the number of probationers supervised with GPS was not known include Alaska, Delaware, Idaho, Illinois, Kansas, Maine, Maryland, Minnesota, Nebraska, New Mexico, New York, Oklahoma, Pennsylvania, Rhode Island, Texas, and Utah. States in which the number of parolees supervised with GPS was not known include Alaska, Delaware, Idaho, Maryland, New Mexico, Oklahoma, Pennsylvania, and Utah. Also, not included are types of individuals who are supervised with GPS, such as pretrial defendants and juvenile offenders.

While demand for GPS-based electronic monitoring devices has increased, there are currently no standards that OTS devices are required to meet. For example, while users expect OTS devices to report location information, there is currently no minimum performance requirement for how accurate the location information must be. Absent a standard with minimum performance requirements, criminal justice agencies across the nation have relied on vendor assertions on performance and, at times, their own field testing of equipment to inform purchases.

In fiscal year 2006, a technology working group sponsored by DOJ's NIJ identified the development of a standard for OTS technology as a high priority. The purpose of the OTS standard is to ensure OTS devices meet certain minimum performance requirements. In fiscal year 2009, NIJ directed funding to develop an OTS standard and a companion guide.² Development of the standard and guide remains an ongoing effort. NIJ estimates that it will publish the standard by the end of calendar year 2015, and no later than March of 2016. Use of the OTS standard is to be on a voluntary basis. OTS device manufacturers are to independently decide whether to comply with the voluntary standard by submitting their devices for testing and certification. Likewise, stakeholders, such as criminal justice agencies across the United States, are to individually decide whether to require compliance with the standard when acquiring new OTS technologies.

You asked us to review NIJ's approach for developing the OTS standard and expressed questions about public safety. This report addresses the following questions:

1. To what extent has NIJ collaborated with stakeholders in developing the OTS standard?
2. To what extent have the OTS standard and companion guide incorporated stakeholder needs and addressed potential challenges?

To assess the extent to which NIJ collaborated with stakeholders in developing the OTS standard, we reviewed federal laws such as the National Technology Transfer and Advancement Act of 1995. The act

²NIJ also produced two additional companion documents: (1) *OTS Certification Program Requirements*, specifying requirements that must be satisfied to act as a product certification body; and (2), *OTS Refurbishment Service Program Requirements*, specifying requirements for certification bodies certifying refurbishing services performed on OTS.

generally states, with certain exceptions, that all federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standard bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.³ In addition, we reviewed Office of Management and Budget Circular A-119, which establishes policies consistent with the act to improve the internal management of executive branch agencies.⁴ In addition, we reviewed NIJ procedures on the development and use of standards. We examined the OTS standard development process NIJ has implemented by obtaining its records of activity and meeting with program officials involved in the development process. We compared NIJ's development process for the OTS standard as applicable against the American National Standard Institute's (ANSI) *Essential Requirements*, to understand whether NIJ's process was consistent with accepted practices. ANSI is a well-established organization that accredits leading standard development organizations, such as Underwriters Laboratories Incorporated, and determines approval of individual standards. We further looked at *A Guide to the Project Management Body of Knowledge's* stakeholder and collaboration practices to assess whether NIJ had followed practices for effectively involving stakeholders.⁵

We reviewed the timing, duration, and level and nature of stakeholder involvement. We also interviewed individuals appointed by DOJ to serve on the Advisory Working Group (AWG), which is charged with reviewing the standard. More specifically, we interviewed AWG members from the following organizations: the American Probation and Parole Association, American Correctional Association, National Sheriffs' Association, and the U.S. Department of Homeland Security.⁶ Additionally, we interviewed

³Pub. L. No. 104-113, 110 Stat. 775 (1996).

⁴Office of Management and Budget (OMB), Circular No. A-119: *Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities*, (Washington, D.C.: February 10, 1998).

⁵American National Standards Institute, *ANSI Essential Requirements: Due process requirements for American National Standards*, (New York: January 2015). Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*, Fifth Ed. (2013). PMBOK is a trademark of the Project Management Institute, Inc.

⁶We were not able to identify and interview any involved official(s) with the International Association of Chiefs of Police, the remaining AWG member according to the draft OTS standard.

members of the Special Technical Committee (STC), which is charged with writing the standard and includes criminal justice practitioners from federal, state, and local levels of government as well as technical experts with experience in developing laboratory testing methods.

Given its role in federal standard development and level of technical expertise, we met with officials from the National Institute for Standards and Technology to assess their interaction with NIJ, involvement in the development process, and their perspective on NIJ's process. In addition, we met with victims' groups and OTS manufacturers to understand their perspectives on the likely effects of the standard and their involvement in the standard's development process. Specifically, we met with representatives from the National Center for Victims of Crime, the National Coalition Against Domestic Violence, the National Organization for Victim Assistance, and the National Sexual Violence Resource Center. We selected the victims' groups based upon recommendations from the American Probation and Parole Association, in response to our request to identify groups that represent communities' concerns over the safety and protection of individuals affected by sexual and violent criminal offenses. We also met with representatives from the following OTS manufacturers: BI Incorporated, Satellite Tracking of People LLC, and Sentinel Offender Services LLC. We selected these manufacturers based upon their having submitted comments on the draft OTS standard. Further, these manufacturers provide equipment and services to the agencies that we interviewed, which included a range of jurisdiction types and sizes as discussed further below. The information we obtained from these organizations cannot be generalized, but provides perspectives and insights on NIJ's process for developing the OTS standard.

To address the second objective, we selected a nonprobability sample of 10 criminal justice agencies and analyzed the extent to which their OTS needs and challenges were addressed in NIJ's draft OTS standard and the draft companion document, the *Criminal Justice Offender Tracking System Selection and Application Guide* (the guide).⁷ In recognition that the standard is meant to address a range of criminal justice OTS uses,

⁷See Department of Justice, National Institute of Justice, *Criminal Justice Offender Tracking System Standard*, NIJ Standard-1004.00, Draft for Public Comment (December 2013); and Department of Justice, National Institute of Justice, *Criminal Justice Offender Tracking System Selection and Application Guide*, NIJ CR-1004.00.00 Draft for Public Comment (December 2013).

we selected the 10 agencies based upon a combination of factors, including ensuring a range of federal, state, and local jurisdictions; geographic location; size; and types of offenders monitored. The 10 agencies are the California Department of Corrections and Rehabilitation; Colorado Department of Corrections; DeKalb County, Georgia, Sheriff's Office; Denver Community Corrections; Florida Department of Corrections; Leon County [Florida] Office of Intervention and Detention Alternatives; Georgia Department of Corrections; Los Angeles County California Probation Department; the Department of Homeland Security's Immigration and Customs Enforcement agency; and the U.S. Courts' Probation and Pretrial Services System. To identify the selected agencies' OTS needs, we reviewed their OTS contractual documents, such as statements of work, and OTS program procedures. At the time of our review, 1 of the 10 selected agencies was in the process of documenting its OTS needs. We therefore omitted this agency from the analysis of OTS performance requirements. We identified the range of performance requirements across the remaining 9 agencies and compared them against selected requirements in the draft OTS standard to determine the extent to which the draft standard addressed their needs. We also interviewed program officials and criminal justice officers responsible for supervising offenders from all 10 selected agencies to discuss their needs and identify any challenges they experience.⁸ The information we obtained from these agencies cannot be generalized to all criminal justice agencies, but offers insight into the range of OTS needs and challenges agencies may have.

We conducted this performance audit from October 2014 to October 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

⁸We asked officials open-ended questions about challenges they experienced in order to get their unprompted opinions about the challenges their agencies faced. However, we did not ask the officials with each agency if they had experienced a specific challenge. We therefore do not know the extent to which all of the selected agencies experienced any given challenge.

Background

Purposes and Methods for Offender Monitoring

Numerous agencies at the federal, state, and local levels with varying missions monitor or supervise individuals. Criminal justice agency missions that require monitoring include pretrial and post-trial services, probation and parole services, and immigration enforcement. For pretrial services, judicial agencies monitor defendants at the discretion of the court for a period of time preceding a scheduled court date. Other criminal justice agencies monitor offenders as an alternative to detention. For instance, probation agencies typically monitor offenders whom courts place on supervision in the community, in lieu of incarceration. The Department of Homeland Security's Immigration and Customs Enforcement agency monitors certain aliens prior to adjudication hearings or deportation.⁹ With regard to post-trial monitoring, parole agencies monitor offenders who are conditionally released from prison to serve the remaining portion of their sentences in the community.

There are many supervisory and monitoring methods, manual and electronic, used by criminal justice agencies. See figure 1 for several of these methods.

⁹For additional information on the Immigration and Customs Enforcement agency's monitoring program, see GAO, *Alternatives to Detention: Improved Data Collection and Analyses Needed to Better Assess Program Effectiveness*, [GAO-15-26](#) (Washington, D.C.: Nov. 13, 2014).

Figure 1: Methods for Supervising and Monitoring Offenders



Source: GAO analysis of criminal justice agencies' supervisory and monitoring methods. | GAO-16-10

Manual methods are routinely used to supervise offenders, including employment verification, compliance searches, narcotic testing, clinical treatment, home or field contact visits, and stakeholder collaboration.¹⁰ There are various programs that require close supervision of individuals, most predominantly state and local probation or parole agencies' monitoring of selected offender populations (e.g., gang-related and sex offenders). Therefore, as a supplement to the traditional manual methods, many criminal justice agencies use electronic monitoring technologies. Electronic monitoring includes technologies that track individuals' physical location to help supervise compliance with program requirements designed to ensure public safety. These technologies are not designed to

¹⁰The supervisory, monitoring method of stakeholder collaboration refers to the sharing of GPS printed or recorded data among law enforcement personnel for the purposes of investigating incidents, assisting the prosecution, or when responding to a subpoena.

replace manual methods. Rather, they are one tool used in concert with other methods for monitoring offenders.

Electronic monitoring technologies include voice verification, radio frequency monitoring, and GPS. Voice verification refers to voice recognition technology that can verify the identity of an individual. Applications include low-risk offenders self-reporting their status by telephone. Radio frequency monitoring involves a device that detects a signal connected to a home telephone (landline), so that authorities can ensure that an offender is at home. However, authorities will not know the location of the offender if he/she leaves. GPS is a U.S.-owned utility that provides users with positioning, navigation, and timing services. The frequency with which GPS data are collected and reported can vary. Passive tracking technology collects and stores location and status data, which are reported retrospectively. Active tracking technology can accomplish near-real-time collection and reporting of location and status data.

**National Institute of
Justice Standard
Development**

DOJ's Office of Justice Programs (OJP) works in partnership with the justice community to provide information, training, coordination, and strategies for addressing crime-related challenges. NIJ is an office of OJP that acts as the research, development, and evaluation agency of DOJ. NIJ's mission is to provide objective and independent knowledge and tools to reduce crime and promote justice, particularly at the state and local levels. The NIJ Policy, Standards and Grant Management Division develops and publishes voluntary consensus equipment standards that specifically address the needs of law enforcement, corrections, and other criminal justice agencies.

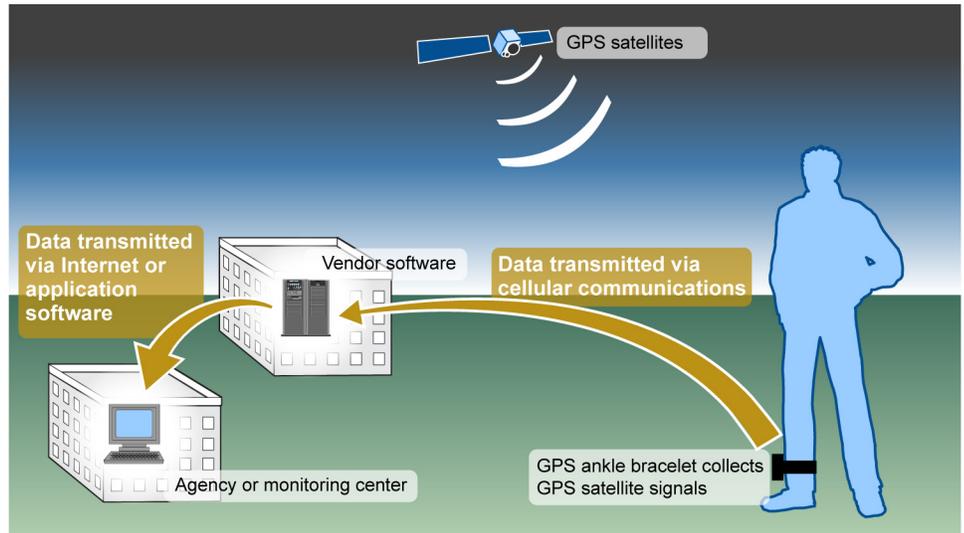
Figure 2: Example of an Offender Tracking System Ankle Bracelet



Source: Department of Justice. | GAO-16-10

OTS is an electronic monitoring technology consisting of hardware, such as an ankle bracelet (see fig. 2), used for collecting and transmitting data on an individual's location, and software for analyzing data collected from the hardware device. As written in the current draft, the OTS standard pertains to devices using passive tracking or active tracking technology, such as GPS. See figure 3 for a graphical depiction of how the components of GPS-based OTS interact to collect and transmit location data.

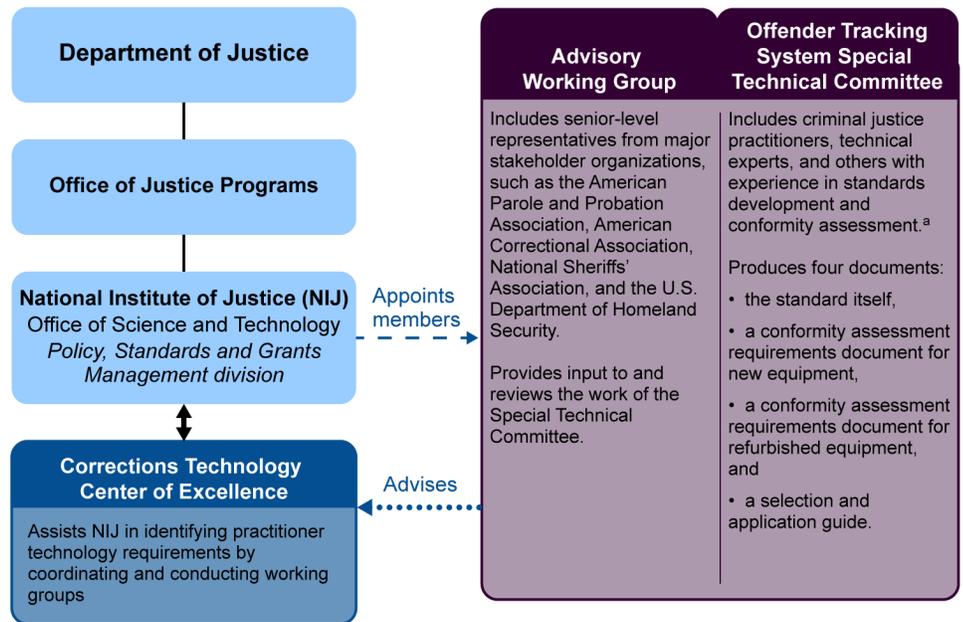
Figure 3: Global Positioning System (GPS)–Based Offender Tracking System



Source: GAO analysis of National Institute of Justice and Center for Criminal Justice Technology information; Art Explosion (clip art). | GAO-16-10

To develop the OTS standard, NIJ established the Advisory Working Group and the Special Technical Committee (STC). The AWG reviews the work of the STC and provides high-level guidance on issues that affect users, service providers, and manufacturers. It is composed of senior-level representatives from selected stakeholder groups and individuals experienced in standards development. The STC's role is to identify requirements for OTS technology, consult with leading manufacturers, and develop minimum performance requirements and associated testing methods for equipment certification. The STC is composed of criminal justice practitioners and subject matter and technical experts. See figure 4 for NIJ's organization that supports the development of the OTS standard.

Figure 4: DOJ Organization for OTS Standard Development



Source: National Institute of Justice. | GAO-16-10

^aConformity assessment(s) are conducted to help ensure that products, materials, services, systems or people meet specifications of a relevant standard.

In addition to the OTS minimum performance requirements documented in the draft standard, the STC has drafted companion documents to provide guidance on implementing offender tracking programs and OTS equipment certification programs. Specifically, the *Criminal Justice Offender Tracking System Selection Application Guide* provides guidance about the functionality, selection, use, and maintenance of OTS.¹¹ *The Criminal Justice Offender Tracking System Certification Program Requirements* and the *Criminal Justice Offender Tracking System*

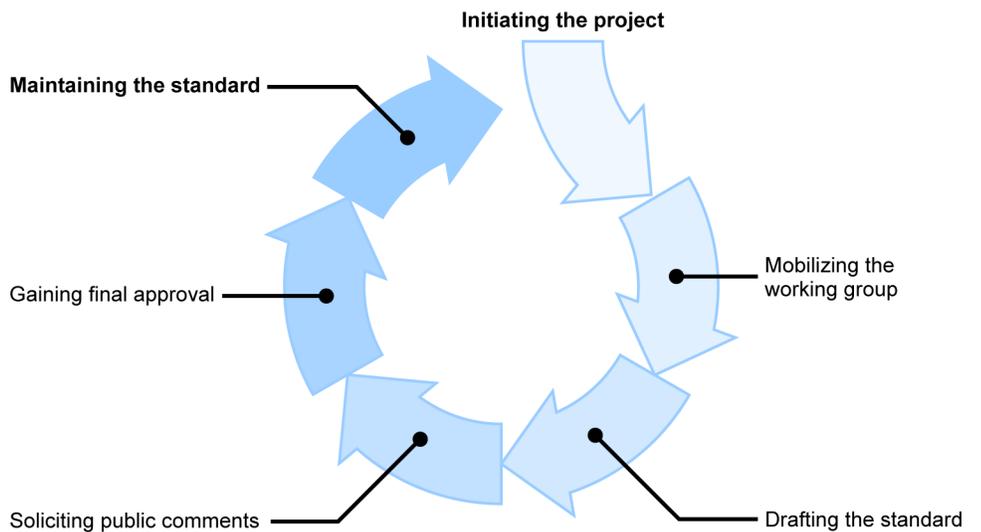
¹¹See Department of Justice, National Institute of Justice, *Criminal Justice Offender Tracking System Selection and Application Guide*, NIJ CR-1004.00.00 Draft for Public Comment (December 2013).

Refurbishment Service Program Requirements addresses accreditation requirements for certification bodies.¹²

Standard Development Process

There are numerous accredited national and international standard development organizations that have published thousands of equipment standards in use today. ANSI, which has accredited over 200 standard development organizations, requires adherence to a general approach displayed in figure 5 when developing American standards.

Figure 5: Standard Development and Maintenance Process



Source: GAO analysis of American National Standards development process. | GAO-16-10

¹²See Department of Justice, National Institute of Justice, *Criminal Justice Offender Tracking System Certification Program Requirements*, NIJ CR-1004.00 Draft for Public Comment (December 2013); and *Criminal Justice Offender Tracking System Refurbishment Service Program Requirements*, NIJ-RP 1004.0 Draft for Public Comments (December 2013).

NIJ Collaborated with a Variety of Stakeholders, but Earlier Manufacturer Involvement Could Have Expedited Development of the OTS Standard

NIJ collaborated with stakeholders by leveraging expertise from a broad variety of criminal justice and technical experts. However, earlier and continued collaboration with OTS manufacturers could have better informed and facilitated development of the OTS standard. Coordination between NIJ and manufacturers has since improved, and manufacturers' major concerns have been addressed.

NIJ's process for developing the OTS standard is consistent with ANSI criteria for accrediting organizations.¹³ For instance, NIJ sought and involved participants from diverse backgrounds with the objective of achieving a balance of interests. Participants in the OTS development process include criminal justice practitioners from all levels of government representing parole, probation, and pretrial services agencies. NIJ also made efforts to leverage any national or international standards that apply, and solicited and incorporated feedback on the draft standard and companion documents through two public comment periods. In particular, NIJ formed working groups by appointing members who represent the OTS user community, relevant fields of technology, and affected professional associations. For example, NIJ created the STC and the AWG to inform the development of the OTS standard.

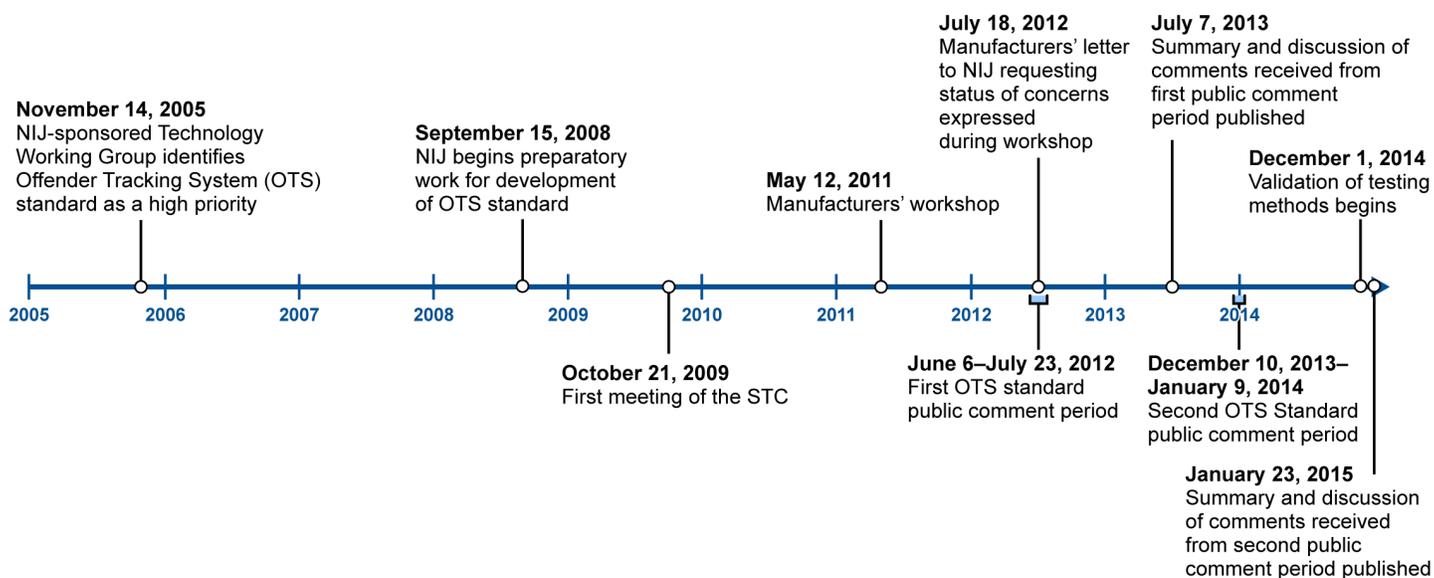
In addition, NIJ efforts extended to collaborating with subject matter experts such as ones in the U.S. Air Force and the National Institute of Standards and Technology (NIST)—leveraging both organizations' technological backgrounds. For example, the Air Force contributed information on GPS for the STC's consideration so that the STC could more fully understand the technology. Similarly, NIST also contributed its technical expertise related to its ongoing work with location and tracking systems.

While the standards development process NIJ employed for developing the OTS standard is consistent with the process outlined by ANSI, earlier and ongoing inclusion of OTS manufacturers could have expedited development of the OTS standard. See figure 6 outlining selected events throughout the OTS standard development process. The *Guide to the Project Management Body of Knowledge* emphasizes the importance of

¹³The ANSI due process requirements for American National Standards, *ANSI Essential Requirements*, is employed by approximately 200 accredited standards development organizations, including the U.S. government's National Institute of Standards and Technology.

considering stakeholder equities and ensuring their ongoing involvement throughout the entire project life cycle. It recognizes that stakeholders' views and interests can be varied, and states that overlooking the views of a stakeholder that will be negatively affected can result in an increased likelihood of failure, delays, or other negative consequences to a project.

Figure 6: Development Timeline



Source: NIJ. | GAO-16-10

NIJ's approach for developing the OTS standard is described by agency program officials and STC members as practitioner-driven. Practitioners are those who use OTS equipment when tracking the location of individuals. Initially, STC practitioners created a list of criminal justice needs that they sought to be addressed through OTS technology. Subsequent to this assessment of needs and the development of corresponding equipment performance requirements, the technical experts on the STC were tasked with developing corresponding test methods.

In May 2011, approximately 1-1/2 years after the development process began, manufacturers, who are to voluntarily ensure their equipment conforms to the standard, had a means to formally provide their input. Specifically, on May 12, 2011, NIJ held a manufacturer's workshop to seek manufacturer input on the standard. According to manufacturer

representatives with whom we met, manufacturers expressed significant concerns related to the feasibility of many requirements and associated testing methods in the OTS standard. For example, two manufacturers we met with reported that it was unlikely that existing OTS equipment in the market could pass performance requirements in the draft standard as written, since current technology did not meet the expressed need. This is particularly important to the manufacturer community, as the manufacturers are the ones that ensure their equipment meets requirements in the standard and bear any related costs and market consequences if their equipment does not meet the standard. Similarly, NIJ had not identified the need for refurbished equipment certification program requirements. This is significant, as refurbished equipment is routinely provided by OTS manufacturers as part of their service agreements with government agencies.

Approximately 1 year after the manufacturers' workshop, NIJ had not provided feedback to manufacturers regarding their concerns. Therefore, OTS manufacturers were not aware that NIJ had taken action to incorporate their concerns into the draft OTS standard based on their review of the draft standard circulated during the first public comment period. On July 18, 2012, in a joint letter to NIJ nearing the conclusion of the first public comment period, a group of manufacturers wrote the following, "The Manufacturers are very concerned that we have received absolutely no feedback regarding the information we provided to the [Special Technical Committee], and that nothing has been incorporated into the standard."

NIJ officials we met with reported that they considered manufacturer input. Specifically, they reviewed manufacturer comments received at the 2011 workshop as well as those received on the first OTS standard draft during the public comment period from June 6 through July 23, 2012. However, at the time, NIJ officials told us that they were focused on working to address comments from all stakeholders and, therefore, did not immediately communicate to manufacturers if or how their comments were being addressed.

We reviewed revisions made to the OTS standard since the first draft and formal comments submitted in response to both the first and second comment periods along with NIJ's responses, and met with STC members and selected manufacturers. According to our review, earlier and ongoing involvement of OTS manufacturers in the standard development process could have better informed and expedited the OTS standard development process. OTS manufacturers could have

contributed to NIJ's overall understanding of the technology at the forefront of the process since they act as both developers and service agreement providers to numerous government agencies. For example, OTS manufacturers could have better informed and facilitated development of the OTS standard by providing insights on OTS capabilities and limitations at the outset. Manufacturers could have further clarified whether existing OTS technology could meet each performance requirement and testing method shortly after being conceived by the STC members rather than after the first draft of the OTS standard had been developed. For instance, the detection of certain methods used by offenders to avoid location monitoring are either not fully developed or available to all manufacturers.

While the OTS standard and associated testing methods remain under development, coordination between NIJ and manufacturers has improved since 2012. For example, through the second public comment period for the draft standard, NIJ has communicated to the manufacturers that their major concerns related to minimum performance requirements and testing methods have been addressed. In addition, according to NIJ officials, at the end of the public comment periods, NIJ reached out to each manufacturer that provided comments. On the basis of our analysis, the current draft OTS standard and changes proposed in response to the second public comment period generally reflect input manufacturers have provided NIJ. For instance, as a result of stakeholder input, the STC has developed refurbishment service program requirements, and it has also revised certain performance areas in the draft standard as optional based on available technology. NIJ is currently in the final stages of OTS standard development and plans to issue the standard by March 2016. As NIJ works to finalize the standard, it has invited manufacturers to participate in assessing the viability of test methods to be used when validating whether an OTS meets requirements set forth in the standard. Specifically, it has asked manufacturers to provide samples of their equipment. At least one manufacturer we met with is participating in this process by providing its OTS equipment for testing, and NIJ reports that an additional two manufacturers have as well.

Draft OTS Standard and Companion Guide Address Many Common Needs and Challenges Identified by Stakeholders

Draft OTS Standard Addresses Common Needs; Performance Requirements Vary by Agency

NIJ's draft OTS standard sets minimum performance standards that address common operational and circumvention detection needs identified by the 9 criminal justice agencies from which we collected procurement and policy documents.¹⁴ Agencies' specific performance requirements varied and were sometimes more or less rigorous than the draft standard, based on factors such as the type of offender supervised and environmental conditions in their jurisdictions. Furthermore, these agencies did not always define performance requirements corresponding to their needs, such as specific location accuracy requirements. By setting minimum requirements for a range of commonly identified offender tracking system needs, the standard could help agencies more thoroughly consider and develop contractual requirements and help ensure their needs will be met. Officials from all of the ten agencies we selected stated that implementing a standard would be beneficial because, among other things, it could provide objective information on performance that could inform their procurement processes. Agencies we reviewed, at times, also defined additional requirements specific to their circumstances that are not in the draft standard, such as a two-way communication feature that allows the offender and officer to speak to each other. NIJ officials stated the standard is meant to address performance needs that are common to a broad range of agencies.

Common Operational and Circumvention Detection Needs

The draft standard addresses common operational and circumvention detection needs, such as location accuracy, the ability to obtain an offender's location on demand, programming "zones"—geographical areas an offender is or is not to enter— and alerts to report device

¹⁴We met with a total of 10 agencies that had offender tracking programs, but 1 agency had not yet finalized its performance requirements. Therefore, information collected from this agency was omitted from our performance needs analysis.

tampering, among others. Some of these operational and circumvention detection needs are discussed below. See appendix I for additional information on specific requirements in the draft standard and summary data on the extent to which the requirements met stakeholder needs.

Testing Conditions

Environmental factors, such as cloud cover, could affect the performance of offender tracking systems. To help ensure replicable and fair testing, the draft standard defines specific conditions for testing each performance requirement. For example, the outdoor location accuracy test is to be performed when a minimum cellular speed is achieved, there is a clear view of the sky, and there is limited cloud cover, among other conditions.

Source: GAO summary of National Institute of Justice Information. | GAO-16-10

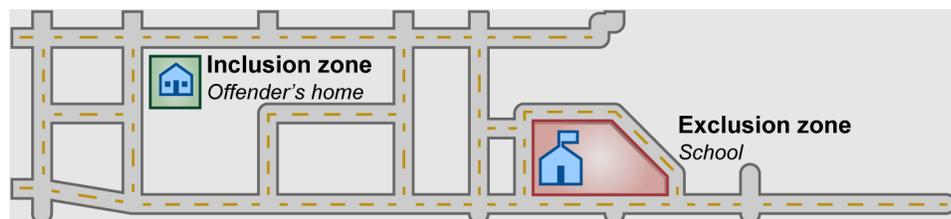
Location accuracy. One of the primary objectives of OTSs is to continuously track the location of offenders. NIJ's draft standard includes performance requirements for both indoor and outdoor location accuracy. Specifically, it calls for OTS to provide a location that is accurate within 10 meters 90 percent of the time in an open air environment with no obstructions. It also calls for OTS to provide a location that is accurate within 30 meters 90 percent of the time when placed in an 8-foot by 8-foot single-story structure. The nine agencies we reviewed identified location accuracy as important, but none of the agencies had developed a specific accuracy requirement. The officials from the agencies we interviewed also noted that they must track offenders in a variety of settings, such as urban areas with high-rise buildings, which are not accounted for in the draft standard. However, the NIJ and STC members responsible for developing the standard stated that adding additional types of indoor environments would increase the cost of testing. NIJ and manufacturers agreed that it is important that the tests not be too costly so that manufacturers would voluntarily participate in the standard and consumer prices would not be significantly affected, since the cost of testing could be passed down to users. Furthermore, as discussed later in this report, there are inherent limitations to the GPS technology that prevent it from always providing accurate location data in certain conditions, and NIJ's guide provides additional information on addressing these challenges.

On-demand location. On-demand location allows agencies to determine the most recent location of an offender. The draft standard calls for OTSs to be able to provide an on-demand location within 3 minutes of a request. Five of the nine agencies we reviewed defined an on-demand location requirement, with two of the five agencies specifying that they require the ability to instantly receive an offender's location and status. Representatives from all three manufacturers with whom we met stated that their OTSs cannot provide "instant" location updates because of limitations including GPS and cellular technology, and that while quicker response times are possible, the 3-minute time frame is a reasonable requirement for the minimum performance standard. More specifically, these representatives emphasized that the 3-minute time frame is appropriate because of the number of steps that must occur to obtain an offender's location. Such steps include, for example, the software calling out to the tracking device through a cellular network to acquire data, the

device collecting the GPS satellite signals to acquire location data, calculating location data, and transmitting the location data back to the agency.

Zones. An important feature of OTSs is the ability to develop zones. As shown in figure 7, inclusion zones are geographic areas where an offender is scheduled to be, such as home or work; exclusion zones are geographic areas where the offender is not permitted to visit, such as a victim's home, schools, or outside the state or county border. The draft standard calls for OTSs to configure zones in the shapes of circles, rectangles, and arbitrarily shaped polygons, as well as be able to have zones within zones. Officials from one agency explained, for example, that it was important that they be able to draw precise exclusion zones around areas such as schools to prevent the system from alerting when the offender is driving by the location. The draft standard also calls for OTSs to generate zone templates that store a minimum of 50 predefined inclusion or exclusion zones, which agencies can apply to any offender. Officials from one agency explained that zone templates are useful when common exclusion zones such as county and state borders or schools need to be applied to many offenders. The zone shape and zone template requirements in the draft standard are more comprehensive than any of the requirements established by the nine agencies we reviewed. For example, eight of the nine agencies we reviewed did not define specific zone shape requirements.

Figure 7: Example of Inclusion and Exclusion Zones



Source: GAO analysis of National Institute of Justice and Center for Criminal Justice Technology information; MapInfo (map). | GAO-16-10

Alert notifications. Another important feature of OTSs is to provide alerts to notify an agency of a number of different events. These events include, among others, occasions when an offender tampers with the tracking device by cutting it off or trying to remove it by stretching it over his or her foot, an offender violates zone rules by crossing the border of an exclusion or inclusion zone, the GPS location is lost; cellular

communication is lost; and when the tracking device battery is low. Alerts for tampering with the device and low battery are particularly important because cutting the device off and letting the battery die were the most common circumvention methods reported by officials at eight of the nine agencies we reviewed.¹⁵

- *Tamper and zone violation alerts:* The draft standard calls for the OTSs to provide alerts within 3 minutes of an ankle strap being cut and within 4 minutes of ankle strap stretching and zone violations. The tamper alert requirements in the draft standard are consistent with the requirements established by five of the nine agencies we reviewed. Similarly, the zone violation alert requirements are consistent with the requirements established by four of the nine agencies we reviewed. The remaining agencies established requirements for immediate notification of tamper events and zone violations, though they did not define a time parameter for “immediate.” Representatives from the three manufacturers we met with stated that as with the on-demand location feature, instantaneously sending alert status information is not currently feasible with their OTSs. Rather, the 3- to 4-minute maximum time frame in the draft standard for producing an alert was feasible and would sufficiently test for the OTSs’ ability to provide a near real-time alert. NIJ officials explained that this time frame was determined by the practitioners on the STC and balances their performance needs with the state of the technology.
- *Loss of GPS and cellular alerts:* The draft standard requires an alert within 4 minutes of loss of GPS or cellular communication. This time period was consistent with the requirements established by all of the agencies we reviewed that had defined such requirements. Officials from one agency we met with explained that GPS and cellular communications are lost frequently in their jurisdiction, in areas such as subways, large office buildings, and basements. Therefore, this agency required an alert notification after a number of hours without GPS or cellular communications to avoid overwhelming officers with alerts. Another agency we met with did not require any alerts for loss of GPS or communications because it supervised offenders who were not on probation or parole. In recognition that agencies may wish to

¹⁵Officials from the selected agency that had not yet finalized its performance requirements also agreed that cutting off the device and letting the battery die were the most common circumvention methods.

delay alert notifications in areas where offenders often lose cellular communications, the draft standard also calls for OTSs to have the ability to alert after communications have been lost for 1 hour. NIJ officials explained that STC members included the 1-hour alert requirement in the draft standard to reflect a more typical time frame used by practitioners. They further stated that agencies could continue to request shorter or longer notification requirements from their OTS vendors based on their individual needs.

- *Low battery alert:* The draft standard calls for OTSs to provide a low battery alert prior to the battery completely discharging, but it does not specify exactly when this alert is to occur. Eight of the nine agencies we reviewed required a low battery alert, but the time period for when they wanted to receive the alert varied. The draft standard also addresses other battery performance needs, such as battery life. For more information see appendix I.

Jammers

Jammers are electronic devices that can be used to prevent offender tracking systems from receiving cellular and Global Positioning System (GPS) signals. Federal law prohibits the operation, marketing, or sale of cellular or GPS jammers. The photograph below shows an example of a jammer.



Source: GAO analysis of National Institute of Justice information; Department of Homeland Security (photograph). | GAO-16-10

Optional circumvention requirements. Metallic shielding is the use of metallic material to block GPS signals. Jamming is the use of an electronic device to block GPS or cellular signals. Both of these circumvention methods can prevent agencies from tracking an offender's location. The draft standard includes optional performance requirements for the detection of metallic shielding and jamming. According to members of the STC, these requirements are optional because only one manufacturer offered jamming detection capabilities and had developed and patented shielding detection capabilities at the time the standard was being drafted. Further, they believe it is important to have a standard with performance requirements in which several manufacturers would voluntarily participate. According to our review, one of the nine agencies required metallic shielding and GPS jamming capabilities as part of its procurement process. Officials from eight of the nine agencies reported that shielding and jamming were not considered common circumvention methods.¹⁶ However, officials from one agency explained that jamming may be occurring, but they did not have evidence, such as recovered jammers or alert data, to support that it is a common occurrence. Officials from the nine agencies generally agreed that making shielding and jamming detection optional performance requirements is reasonable. While one of the nine agencies established a shielding or jamming requirement, officials from five of the eight agencies that had not established such a requirement stated that these circumvention detection capabilities are or could be useful.

Historical data. OTSs generate a considerable amount of data on each offender. The draft standard calls for historical location data, status of all alerts, and offender identifiers to be exported into a defined comma-delimited text file, a widely used format. All nine agencies we reviewed had established a requirement to have access to historical data. Officials from these agencies stated that accessing historical data is important because the data could be needed as evidence in an investigation, for example. In addition to the requirement to make historical data available, some agencies also specified particular business practices, such as record retention time frames. For example, one agency required that the OTS data be retained for 7 years. NIJ's guide also provides further guidance on retaining offender tracking data, including taking into account

¹⁶Officials from the selected agency that had not yet finalized its performance requirements also agreed that shielding and jamming were not common circumvention methods.

federal, state, and local laws or policies that require certain data be maintained for a specific number of years.

Robustness. OTS devices are worn on the body and may be subject to wear and tear and a number of different environmental conditions, depending on factors such as where the offender lives and works. The draft standard calls for OTSs to function properly after being exposed to extreme temperatures ranging from -4 degrees Fahrenheit to 122 degrees Fahrenheit, immersed in 2 meters of water, undergoing different shock tests, and exposure to vibration, among other things. One agency we reviewed had not defined any robustness requirements and none of the remaining eight agencies had established as many or as specific robustness requirements as those in the draft standard. For example, seven agencies required the OTS device to be shock resistant, but did not define what this meant. In addition, none of the agencies had established vibration exposure requirements. However, four agencies established robustness requirements that were more rigorous in certain areas. For example, one agency required the device to be waterproof up to 50 feet, while another agency called for the device to function in conditions up to 135 degrees Fahrenheit.

Individualized Needs Not Considered Minimum Performance Requirements in the Draft Standard

In addition to the performance areas identified as part of the draft OTS standard, the 9 agencies we reviewed also had a variety of individualized needs. These needs were not, however, consistent across agencies. For example, 3 agencies required the OTS to have motion detection. Officials from 1 agency explained that a no-motion alert could indicate that the offender is experiencing a medical emergency or has removed the ankle bracelet. In addition, 1 agency required an OTS with two-way communication that would allow the offender and officer to speak to each other. Officials from this agency said that this has been a useful tool that has enhanced offenders' compliance. One agency also required victim support tools such as beepers or cell phones to notify victims of pertinent alerts from their offenders' tracking systems.

Further, agencies had different analytical requirements. For example, 1 agency required the ability to automate crime scene correlation analysis. Crime scene correlation analysis involves comparing offenders' location data against the locations of crimes to identify potential suspects or witnesses. Another agency required analysis tools to identify common places at which each offender spends time. Officials from this agency explained that they use the analysis to help find offenders in the event that they abscond.

NIJ and STC members stated that the standard is meant to establish minimum performance requirements that would be common to a broad range of criminal justice uses. Further, they stated that agencies could continue to specify additional requirements beyond those in the standard as part of their individual procurement processes. In addition, the technical experts on the STC with whom we met stated that as OTS technology advances, the common needs of agencies may also change. It would, therefore, be important to periodically reassess the minimum performance requirements in the standard to determine if they are still valid or if they should be changed to address changes in practitioners' needs or advances in technology. This is consistent with NIJ's standard development process, which calls for standards to be reevaluated every 3 to 5 years.

The OTS Standard's Draft Companion Guide Addresses Potential Challenges and Other Considerations

Officials from the 10 criminal justice agencies we met with also identified programmatic challenges with implementing offender tracking programs, such as managing public expectations of what the technology can achieve, as well as technical limitations that could affect the success of their offender tracking programs.¹⁷ NIJ's draft guide provides information and guidance on these challenges and other considerations. In recognition of the range of agencies, environments, resources, and objectives of offender tracking, the draft guide does not offer "one size fits all" solutions.

Programmatic Challenges

Challenges commonly cited by officials from the 10 agencies we met with included public expectations, establishing response protocols, and managing workloads. The draft guide discusses these and other programmatic considerations that can affect the success of an electronic monitoring program.

Public expectations. One of the challenges officials cited was misconceptions among the public about how offender tracking programs operate. According to officials, common misconceptions include the beliefs that (1) officers are stationed at computers and watch the live

¹⁷We included information on challenges provided by officials from all 10 criminal justice agencies we met with that had OTS programs. We asked officials open-ended questions to get their unprompted opinions about challenges their agencies had experienced. However, we did not ask the officials with each agency if they had experienced a specific challenge. Therefore, we were able to identify different challenges agencies faced, but not the extent to which all of the selected agencies had experienced any given challenge.

movement of offenders 24 hours a day, 7 days a week, and (2) offender tracking technology allows officers to prevent bad behavior before it happens.

Investigating Crimes

Global Positioning System (GPS) data from offender tracking systems (OTS) can be used to help investigate and solve crimes. For example,

- Officials from 1 agency we met with reported that two sex offenders were identified as suspects in the killing of four women in California based upon the GPS data collected from the OTS, which placed them at the crime scenes.
- OTS data can also help eliminate offenders as suspects. In Florida, the mother of an abducted boy pointed to a sex offender who lived in the vicinity as a suspect. The GPS data collected by the OTS showed that the offender had not been at the boy's location and helped law enforcement exclude the offender as a suspect.

Source: GAO analysis of criminal justice agency information. | GAO-16-10

Agency officials reported that officers are rarely stationed at computers watching the live movement of offenders. Instead, as one of many supervisory and monitoring methods, practitioners commonly rely on OTS devices collecting location information and developing alerts that notify them when offenders may be violating restrictions imposed upon them. While OTS devices do collect data on offenders' location, the information is not sufficient for officers to make definitive conclusions regarding offenders' behavior. As officials from 1 agency noted, offenders can commit crimes without setting off any alerts. In addition, some offenders may purposely keep the device on to prevent alerting authorities prior to or while they commit a crime. Furthermore, even if an offender sets off an alert, an agency may not respond immediately. Response time depends on the alert protocols established by the agency and factors such as staffing and resources, as discussed later in this report. Although OTSs may not deter or prevent all offenders from recidivating, officials from 1 agency emphasized the important role GPS location data can play in providing evidence to solve crimes.

Understanding key aspects of how offender tracking programs operate is particularly important for victims. Representatives from the victims' rights organizations we met with explained that victims should understand the limitations of the technology so they do not develop a false sense of security. The draft guide contains a section on managing media relations to inform the public of the agency's mission, policies, and practices. It advises agencies to provide proactive updates on the program and have a plan to communicate to the media in the event that a critical incident occurs.

Response protocols. Officials from the agencies we met with told us that it was challenging to develop appropriate response protocols that balance the likelihood of risk to public safety with available resources. Officials reported that alerts for loss of GPS, cellular communications, and low battery can occur frequently, even when the offender has no intention of circumventing tracking. Responding to all such alerts can overwhelm officers, according to officials with whom we met. To help reduce officers' alert workload, 1 agency we met with set up its OTS to generate an exclusion zone alert only after multiple consecutive location points were collected within an exclusion zone. The officials explained that this reduced the number of alerts caused by inaccurate location data and

situations where the offender was driving by an exclusion zone. On the other hand, reducing the number of alerts officers receive may increase the risk that an offender will be able to circumvent tracking or commit a new crime. One victims' rights group representative noted that an agency can have the best OTS technology available, but it will not help protect the public if the agency does not use or respond to the data it generates.

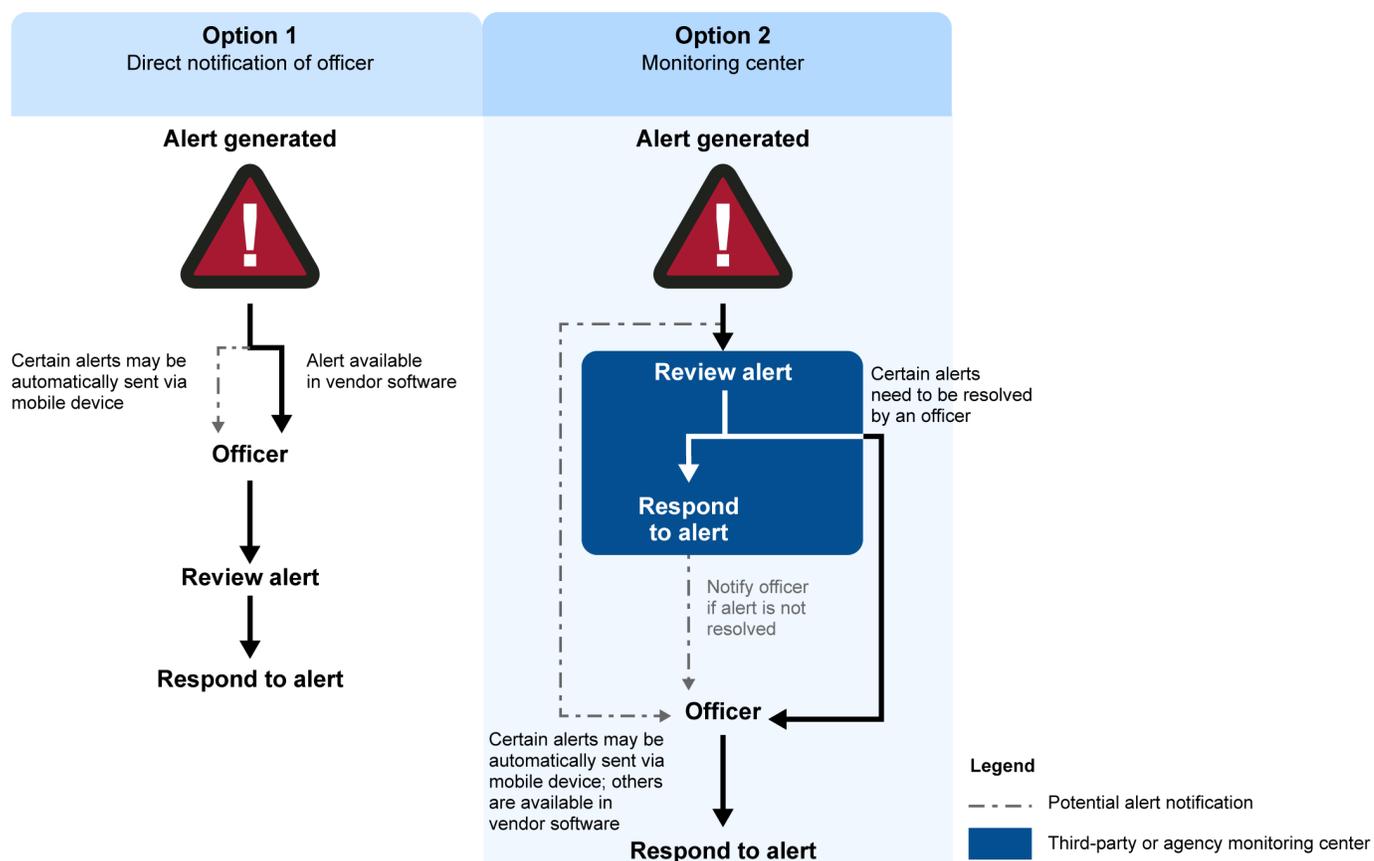
Critical incidents in which offenders with a GPS tracking device have committed serious crimes, including rape and murder, have caused some agencies to reassess how they respond to alerts and oversee their programs. For example, officials from 1 agency's regional office decided to receive tamper alert notifications only after the device had been in a tamper status for 5 minutes. The 5-minute time period was chosen to help prevent alerts not indicative of a violation, such as frequent impact to the device as a result of the offender's work environment. However, this delayed notification was inconsistent with the agency's national policy and resulted in one offender being able to generate a series of tamper alerts over several weeks that lasted less than 5 minutes. In this case, an officer did not receive alert notifications and did not investigate the matter.¹⁸ This offender subsequently pleaded guilty to raping a child and killing the child's mother after removing his tracking device. Following this incident, the agency's national office investigated the supervision of the offender and reaffirmed the importance of receiving immediate notifications for and responding to all tamper alerts.

In recognition of the importance of establishing appropriate response protocols, the draft guide includes examples for an inclusion zone violation and a low battery alert. The draft guide also highlights a number of factors that agencies should take into consideration when determining how to respond to alerts. For example, the draft guide advises agencies to consider the offender's conviction type, level of risk, and whether there are victims who should be notified. The draft guide also advises agencies to consider their available resources when determining who will be notified of alerts and when. Specifically, agencies should determine if they are able to respond to alerts 24 hours a day, 7 days a week, and whether they can use a vendor to monitor or respond to alerts prior to agency staff

¹⁸The tamper events were also recorded on the vendor's website and were to be reviewed daily in accordance with the agency's national policy. However, the agency's regional office did not review the tamper event records and were thus unaware of the alerts attributable to the offender.

being notified. Figure 8 shows examples of two alert response approaches—one in which all alerts are received by an officer and one in which a monitoring center reviews alerts to determine whether an officer should be notified.

Figure 8: Examples of Different Alert Response Models



Source: GAO analysis of National Institute of Justice and Center for Criminal Justice Technology information. | GAO-16-10

Workload. Implementing an OTS program can create workload challenges. For example, officials we met with said that they have experienced high or unpredictable officer caseloads and the need for overtime to respond to alerts 24 hours a day, 7 days a week. The draft guide asserts that OTS programs need to have sufficient staffing to meet the increased workload demands. It also states that failing to adequately staff an OTS program can lead to officer burnout, unanticipated overtime expenses, high turnover rates, and protests from collective bargaining

groups. The draft guide provides information on the multiple new duties that OTS programs may require and that agencies should consider when making decisions about the size and objectives of their program. These duties may include, for example, offender orientation to instruct the offender of program rules and conditions, installation of offender tracking equipment, routine inspection of offender tracking equipment to ensure the offender has not tampered with it, responding to alerts, and reviewing location tracking data.

The draft guide also provides information on different approaches and considerations for addressing workload issues. For example, if there is a large enough offender population, the draft guide states that a specialized workforce for offender tracking could result in efficiencies. Hours of operation are another consideration. According to the draft guide, agencies should determine whether OTS alerts should be responded to 24 hours a day, 7 days a week, or if passive tracking is a viable alternative part or all of the time. Data review requirements can also affect officers' workloads. Reviewing all offender tracking data takes a significant amount of time, but can help officers identify patterns and deviations that warrant further investigation. Thus, the draft guide states that agencies should determine whether a review of all offender tracking data is needed or if responding to alerts is sufficient to achieve program goals. Further, agencies can contract with vendors to provide various levels of services including training, installing and inspecting equipment, responding to certain alerts, dispatching alerts to criminal justice officers, and data analysis. The draft guide advises agencies to take into account both program objectives as well as stakeholder expectations when determining what approach to take.

Other considerations. In addition to addressing the challenges raised by officials from the agencies with whom we met, the draft guide also discusses a number of other issues agencies should consider when implementing an offender tracking program. For example, the draft guide provides information on common procurement processes and what to look for in a vendor. It also addresses training issues and provides information on establishing contractual requirements for the vendor to provide training, as well as considerations for training content, format, and frequency. Furthermore, the draft guide discusses several OTS data considerations, including managing data that are evidence related to a crime and data retention issues, such as the data format, how long the data will be kept, and who will have access to the data. Another consideration is measuring offender tracking program outcomes. The draft guide advises that the appropriate approach to measuring success

will be determined by the objectives of the program, which can range from reducing overcrowding in correctional institutions to enhancing public safety.

Technical Limitations

Cellular and GPS reception can affect the OTSs' location accuracy or ability to report location and alerts. Officials from the 10 agencies with whom we met all experienced challenges with cellular and GPS signal reception in certain areas of their jurisdictions. The draft guide provides information and guidance for how to mitigate these challenges.

Suggested Field Tests

The draft companion guide suggests agencies test offender tracking systems (OTS) prior to making a selection decision to evaluate how they perform in their jurisdictions. Since local factors, such as cellular coverage and the environment, can affect OTSs' ability to accurately track an offender's location or transmit location data, the draft guide advises agencies to test OTSs in the following areas:

- urban areas with high-rise structures,
- wooded areas,
- residential settings, and
- inside a large building or shopping mall

Source: GAO summary of National Institute of Justice information. | GAO-16-10

Cellular coverage. OTSs rely on cellular communications to transmit location data; thus an agency will not be able to determine an offender's location in near real time while he or she is in an area with insufficient cellular coverage. Officials from all 10 criminal justice agencies stated that there are areas in their jurisdictions that lack sufficient cellular coverage to allow devices to perform as designed. The draft guide suggests that agencies inquire about the cellular providers that vendors use for their equipment and test the devices prior to making a final procurement decision. If cellular coverage is limited, the draft guide states that one option is to use passive tracking, where the location and alert status data are transmitted to the agency through a landline at a predetermined interval, usually once a day.

GPS signal reception. Signals from a minimum of three GPS satellites are required to calculate location, and the greater number of satellite signals received, the more accurate the location will be. As with cellular coverage, officials from all 10 criminal justice agencies we met with stated that there are areas in their jurisdictions where their OTSs lose or have compromised GPS signal reception. The draft guide provides information on factors that can affect GPS signal reception and cause inaccurate location data—often referred to as GPS drift—to help agencies understand the limitations of OTSs. Specifically, the draft guide notes that structures, foliage, cloud cover, and natural land formations such as canyons can block GPS signals. In addition, buildings or bodies of water can create a phenomenon known as multi-path, where the GPS signal is reflected off one or more surfaces prior to reaching the tracking device. Because GPS calculations usually assume that a signal follows a straight line to the tracking device, multipath reflections can significantly affect the accuracy of the location data.

The draft guide also provides information on OTS features that can help mitigate GPS signal reception issues that agencies can consider and test when making equipment selection decisions. For example, OTS with

antennas that can track more satellite signals will be less subject to drift and will have greater location accuracy. Table 1 provides further information on different OTS features discussed in the draft guide that can help mitigate GPS signal reception issues.

Table 1: Offender Tracking System (OTS) Features to Mitigate Global Positioning System (GPS) Signal Reception Issues

Feature	Description
Antenna	A well-placed antenna that receives more location signals can enhance location accuracy.
Assisted GPS	Some OTSs use assisted GPS to help enhance location accuracy. Assisted GPS uses strategically positioned ground stations with GPS antennas. Because the exact locations of the ground stations are known, the system will be able to determine exactly how accurate the GPS-derived location calculation is at those stations, and then take this information into account when calculating the location of nearby GPS tracking devices.
Advanced Forward Link Trilateration	Advanced Forward Link Trilateration uses cellular signals, which are stronger than GPS signals, from a minimum of three cellular towers to calculate a location. This is usually a secondary location methodology used when GPS signals are not available. In areas served with numerous cell towers, this methodology is generally accurate within 50 meters.
Beacons	Beacons are auxiliary devices that can be used in conjunction with OTSs to help with indoor tracking. Beacons are generally installed at a participant’s home or workplace and can enhance location tracking in areas with poor GPS reception, as well as conserve battery power. They use radio frequency communications to determine if the offender tracking device is within range. If the offender tracking device is within range, the beacon can turn off the GPS on the tracking device, and instead the beacon will communicate to the agency that the offender is within range of the beacon.
Precision algorithms	Some OTSs have precision algorithms that take into account an offender’s previous location and use statistical probabilities to produce an estimated location that tends to be more accurate than locations based on raw GPS data.

Source: GAO analysis of National Institute of Justice Information. | GAO 16-10

Agency Comments and Our Evaluation

We provided a draft of this report to DOJ, DHS, and AOUSC for their review and comment. None of the agencies provided written comments. DHS and AOUSC provided technical comments, which we incorporated as appropriate.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Attorney General, the Director of the Administrative Office of the U.S. Courts, the Secretary of the Department of Commerce, the Secretary of the Department of Homeland Security, and other interested parties. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-8777 or maurerd@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'D. Maurer', with a long horizontal flourish extending to the right.

David C. Maurer
Director
Homeland Security and Justice Issues

Appendix I: Operational and Circumvention Detection Needs Addressed in NIJ's Draft Offender Tracking Standard

The National Institute of Justice's (NIJ) draft standard addresses common operational and circumvention detection needs. Table 2 summarizes some of the operational and circumvention requirements in the draft standard. The agencies' requirements were sometimes more or less rigorous than those in the standard.¹ Furthermore, in some instances, agencies did not define a performance requirement for a specific operational or circumvention detection need.

Table 2: Comparison of Selected Operational and Circumvention Detection Needs to Draft Offender Tracking System Standard Minimum Performance Requirements

Need	Summary of draft standard minimum performance requirement	Draft standard versus selected agencies' requirements
Location accuracy	The offender tracking system (OTS) shall provide a location that is accurate: <ul style="list-style-type: none"> • within 10 meters, 90 percent of the time in an open air environment with no obstructions, and • within 30 meters 90 percent of the time when placed in a 8-foot by 8-foot single-story structure. 	Agencies that did not define a requirement: 9 agencies
Data collection rate	The OTS shall have an adjustable data collection rate that ranges from at least one location point per minute to one location point every 15 minutes.	Standard is as rigorous: 6 agencies Standard is not as rigorous: 2 agencies Agencies that did not define a requirement: 1 agency
Data upload rate	The OTS shall have the capability to upload data points at a minimum of once every 15 minutes.	Standard is as rigorous: 4 agencies Standard is not as rigorous: 1 agency Agencies that did not define a requirement: 4 agencies
On-demand location	The OTS shall be able to provide an on-demand location and status update within 3 minutes of the request.	Standard is as rigorous: 2 agencies Unclear: 2 agencies ^a Standard is not as rigorous: 1 agency Agencies that did not define a requirement: 4 agencies
Battery charging	The OTS shall complete the charging process, from a discharged state, within 2 hours for a one-piece system or within 4 hours for a multipiece system, and hold a charge for the remainder of the day.	Standard is as rigorous: 4 agencies Standard is not as rigorous: 1 agency ^b Agencies that did not define a requirement: 4 agencies

¹We met with a total of 10 agencies that had offender tracking programs, but 1 agency had not yet finalized its performance requirements. Therefore, information collected from this agency was omitted from our performance needs analysis.

**Appendix I: Operational and Circumvention
Detection Needs Addressed in NIJ's Draft
Offender Tracking Standard**

Need	Summary of draft standard minimum performance requirement	Draft standard versus selected agencies' requirements
Battery life expectancy	Batteries shall be capable of 365 cycles of charging and discharging. ^c	Standard is as rigorous: 6 agencies Agencies that did not define a requirement: 3 agencies
Tamper alert	The OTS strap shall generate a time-stamped tamper event after no longer than 5 seconds of being cut and provide an alert within 3 minutes of the time stamp. On application of an "inside out" force sufficient to cause the strap to either separate from the body-attached device or stretch in excess of 5 percent, an alert shall be generated and received within 4 minutes.	Standard is as rigorous: 5 agencies Unclear: 4 agencies ^d
Zone violation alert	The OTS shall generate a "zone violation" alert within 4 minutes of crossing the boundary of an exclusion zone (an area the offender is not to be in, such as a victim's home) or an inclusion zone (an area the offender is to be in, such as work or home).	Standard is as rigorous: 4 agencies Unclear: 5 agencies ^e
Loss of location alert	The OTS shall demonstrate detection and alerting for loss of location (e.g., loss of GPS) incidents within 4 minutes.	Standard is as rigorous: 6 agencies Unclear: 1 agency ^f Agencies that did not define a requirement: 2 agencies
Loss of communications alert	The OTS shall demonstrate detection and alerting for incidents in which communications (e.g., cellular communication) have been lost for a period of at least 1 hour. Further, the OTS shall be capable of providing an alert within 4 minutes when communications have been lost.	Standard is as rigorous: 7 agencies Unclear: 1 agency ^g Agencies that did not define a requirement: 1 agency

Source: GAO analysis of National Institute of Justice (NIJ) and selected criminal justice agency information. | GAO 16-10

^aTwo agencies required an immediate on-demand location feature, but did not define a time parameter for immediate. As discussed in this report, the current technology from the manufacturers we met with does not allow for instantaneous on-demand location requests.

^bOne agency required the OTS to charge within an hour. However, the manufacturer that was awarded this agency's contract stated that while 1 hour would fully charge its OTS's battery during regular daily use, it could take up to 2 hours to charge if the battery was completely discharged, as required in the standard.

^cFor purposes of comparison, we assumed the OTS would be subject to one charging cycle per day.

^dFour agencies required immediate tamper alert notifications, but did not define a time parameter for immediate. As discussed in this report, the current technology from the manufacturers we met with does not allow for instantaneous alerts.

^eFive agencies required immediate zone violation alert notifications, but did not define a time parameter for immediate. As discussed in this report, the current technology from the manufacturers we met with does not allow for instantaneous alerts.

^fOne agency required the OTS to be able to detect and alert when there was both a loss of Global Positioning System (GPS) and motion was detected, rather than just a loss of GPS alone. Agency officials explained that this combination alert could be indicative of an offender purposefully trying to block GPS while he or she moved around.

^gOne agency required the OTS to alert when a scheduled data upload was missed because of a loss of communications, rather than when cellular communications had been lost for a certain amount of time.

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

David C. Maurer, (202) 512-8777 or maurerd@gao.gov.

Staff Acknowledgments

In addition to the contact named above, Joseph P. Cruz (Assistant Director), Pamela Aker, David Alexander, Willie Commons III, Susan Czachor, Dominick Dale, Eric Hauswirth, Heather May, Linda Miller, and Michael Tropauer made key contributions to this report.

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