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Smart Medicaid

Leveraging cognitive technologies to improve health and program efficiencies

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Medicaid is ready for a "smart" revolution

The digital revolution is here. It's brought us smartphones, social media, and the sharing economy, and has fundamentally changed the way we live, work, and play.

BUSINESSES are aggressively leveraging smart technologies to create products that are making goods and services cheaper and more convenient. Examples include ridesharing apps, crowdsourced GPS navigation that suggests the quickest route given traffic conditions, and targeted advertisements that know what we want to watch, hear, and wear . . . sometimes before we know ourselves.

Some sectors that may have the most to gain from smart technology continue to lag behind in adoption. State Medicaid programs are a prime example of government agencies that don't appear to be fully realizing the benefits of these new technologies. Given the size, scope, and cost of the Medicaid program, states and the federal government are constantly looking to improve health outcomes for Medicaid members and achieve greater program efficiencies. Smart technologies could provide that possibility through the application of intelligent programs that can process vast amounts of data to understand patterns and make predictions about a member's future health outcomes or health care utilization, use remote patient monitoring (RPM) data to help patients live independently, and improve access to care through geospatial information systems (GIS) that can assess network adequacy in managed care.

Why isn't Medicaid further ahead when it comes to smart technology adoption? Part of the answer may lie with the types of technology *platforms* still used by most state Medicaid programs. These legacy Medicaid management information systems (MMIS) are large, hard-coded, and monolithic. Making small upgrades or adopting new functionality is typically expensive and time-consuming, and often requires an entire system overhaul. As a result, upgrades often go undone.

This is changing. The Centers for Medicare & Medicaid Services (CMS) and states are taking significant steps to modernize Medicaid systems. Instead of re-procuring the large monolithic solutions we have seen in the past, they're requesting and implementing replacement solutions as *modules* that are *interoperable*, thus paving the way for more technology vendors to participate, and opening up technical flexibility. (See the sidebar, "Understanding modular and interoperable Medicaid platforms.") Moreover, these systems have a common security infrastructure that allows information to be more securely exchanged between Medicaid modules

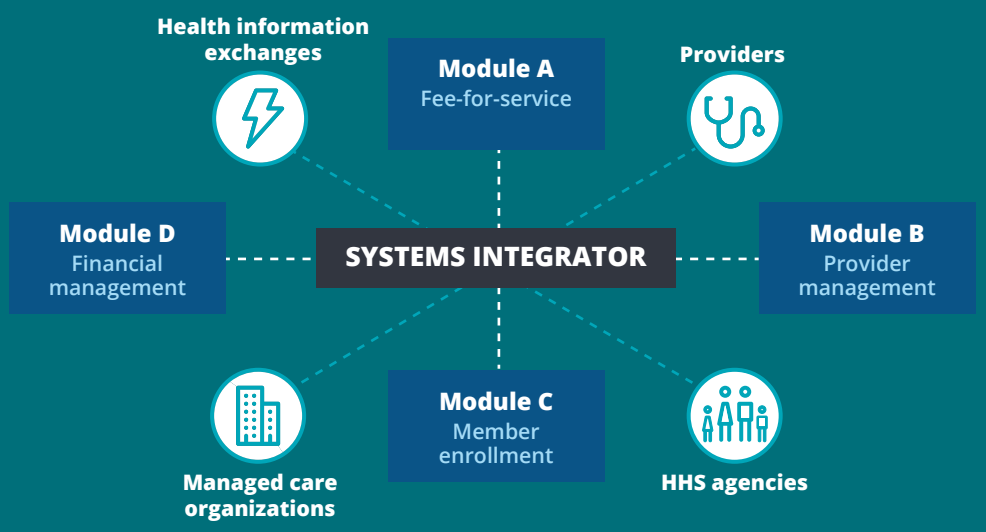
UNDERSTANDING MODULAR AND INTEROPERABLE MEDICAID PLATFORMS

A module is a packaged, functional business process or set of processes implemented through software and data capabilities and interoperable interfaces.[1] Examples of interoperable modules include financial management, provider management, member eligibility, and fee-for-service.

Interoperability refers to the ability of these modules to communicate and share data and functionality with each other and with outside systems such as health information exchanges (HIX), providers' electronic health records, managed care organizations (MCOs), and other health and human services (HHS) agencies. (See figure 1 for an example of interoperable modules in a Medicaid system.)

It might be helpful to think of a modern Medicaid platform as a smartphone, and the modules as smartphone apps. Just like apps, modules can be added, deleted, or updated as needed without upgrading the entire smartphone. Also like apps, these modules could draw on the latest technologies through a single, robust integration system (like the smartphone) and communicate with one another and with outside systems like electronic health records (EHRs) and social services agencies in real time, the same way that apps communicate with one another or the phone's GPS chip to extract data and become more personalized and predictive.

Figure 1. Example of a modular and interoperable Medicaid system



Note: In this system, all modules are interoperable with one another and with outside systems.
Source: Deloitte analysis.

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States that are first to upgrade their Medicaid platforms will likely be the first to implement "smart Medicaid" systems—and reap the benefits.

and outside systems. Several states are also moving their platforms to the cloud, allowing agencies to store large volumes of data and use cloud-based applications such as artificial intelligence without having to individually acquire or build those apps.

Platforms that harness smart technologies have the potential to transform the way Medicaid agencies work. States that are first to upgrade their Medicaid platforms will likely be the first to implement "smart Medicaid" systems—and reap the benefits.

A Medicaid system built using current technologies will inherently have numerous technical and functional upgrades and improvements over those systems built 15 or 20 years ago. Technologies are constantly evolving and improving at what feels like the speed of light, particularly those that have increased the processing power and expanded the channels through which we can access and use technology. However, when we refer to *modernized* Medicaid platforms in this report, we are focused on those that take advantage of two significant architectural evolutions that enable us to move from an *incrementally better* "modern" Medicaid platform to a truly "smart" Medicaid platform:

1. **Open application programming interfaces (APIs):** An API allows one piece of software to interact with another piece of software. When an API is "open," the owner of the software can give secure access to other authorized users. For example, the ability to create an account on an external site or app using one's Facebook credentials is made possible using Facebook's open API. Currently, legacy Medicaid systems don't have the capability to expose APIs, which means it can be time- and cost-intensive to share Medicaid data with external systems because doing so would require establishing a unique point-to-point interface. In contrast, modular and interoperable Medicaid platforms must contain open APIs to communicate with other modules, according to CMS' Final Rule (CMS 2392-F).[2] With open APIs, Medicaid systems can easily share data with other systems. In this report, we'll discuss various ways in which Medicaid agencies can use shared data sets to improve service delivery and augment predictive analytics to deliver targeted preventive care.

2. **Cloud computing:** As Medicaid agencies upgrade to modular and interoperable platforms, some are also moving their systems to the cloud.[3] Among other things, migration to the cloud allows states to use inexpensive cloud-based solutions such as machine learning from major public cloud providers such as Google, IBM, and Microsoft. Machine learning *can* be applied to data stored on premise; however, the cost of these systems in terms of hardware and software is typically out of reach for Medicaid agencies and many do not have the in-house expertise required to design the predictive models. With their systems in the cloud, Medicaid agencies can use these inexpensive, cloud-based, machine learning-enabled applications to deploy chatbots that improve customer service and detect important patterns in member data that can inform patient care.[4]

Applying smart technologies in Medicaid

TECHNOLOGY adoption is not a panacea for the breadth and depth of challenges that Medicaid agencies face, but it can help the program run more efficiently and effectively. And this isn't just theory—as we discuss in this paper, a number of health care organizations (and some Medicaid programs) are already starting to use smart technologies, allowing them to save money and better serve their populations. Smart technologies implemented in silos don't constitute a smart Medicaid *system*—for that, they need to be integrated into a cohesive framework to provide a comprehensive set of solutions that can help solve some of the challenges associated with running a program that is as large and complex as Medicaid.

In this paper, we describe how the *Internet of Things (IoT), machine learning*, and *GIS* can help Medicaid programs in four key areas (see the sidebar, "Four key areas in which smart technologies can help Medicaid agencies improve"). We then address *financing* and *data security issues* that states may want to consider before implementing a smart Medicaid system, and close with practical tips for states on *how to get started*.

A number of health care organizations and some Medicaid programs are already starting to use smart technologies, allowing them to save money and better serve their populations.

FOUR KEY AREAS IN WHICH SMART TECHNOLOGIES CAN HELP MEDICAID AGENCIES IMPROVE

- **Promotion of independent living.** Over the years, Medicaid agencies and members have begun to rebalance the delivery of long-term services and supports toward home and community-based services (HCBS) and away from care in institutional settings. In this report, we describe how the IoT can be used to help promote independent living through RPM supported by intelligent agents.
- **Customer service.** Medicaid can be a complicated program to navigate. Below, we discuss how technologies such as chatbots, enabled by machine learning, can offer quick answers to routine questions and help facilitate more complex tasks.
- **Targeted interventions.** Machine learning and GIS, which draw on multiple data sets in real time, can help program administrators identify patient populations who are at risk of costly or adverse health outcomes, and develop personalized and localized interventions.
- **Program operations.** The size, scope, and complexity of the Medicaid program is remarkable. In addition to acting as payers of health care services and prescription drugs, Medicaid agencies also provide important services to eligible members, including transportation to and from their health care providers. In this report, we discuss how GIS can help Medicaid agencies enforce network adequacy to promote better access to care, and how the IoT can integrate ridesharing technology into Medicaid platforms to improve non-emergency medical transportation (NEMT) services.

The Internet of Things (IoT)

WHAT IS THE IOT?

The Internet of Things (IoT) refers to the interconnectivity via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data.

The Federal Trade Commission (FTC) estimates that 50 billion devices will be connected to the Internet by 2020—from refrigerators and toasters, to cars, home thermostats, pet monitors, and infusion pumps.[5] Most of these devices will likely be connected to a smartphone, tablet, or personal computer and, through open APIs, would allow users to personalize services, use analytics to detect patterns, and send information to remote locations.

The IoT is at work all around us, from smart meters that can detect an open parking space to airplanes that relay telematics data. And consumers are already using it on a regular basis, as people control their home thermostats, light bulbs, and slow-cookers from the convenience of their phones.

A host of connected devices that modern Medicaid platforms could leverage is already in the market. The most universal of such devices is the smartphone itself, which is used by approximately 70 percent of Medicaid members.[6] Below are two ways smartphones and connected devices can be used in Medicaid.

USING IOT TO PROMOTE INDEPENDENT LIVING

Remote patient monitoring (RPM)

Health care providers, plans, and states are under increased pressure to better manage their populations and reduce preventable and costly health care utilization. However, much of what helps prevent utilization is determined by individual behavior, which often takes place outside a clinical setting—often in homes.

Hospitals across the country have begun to experiment with RPM, generally with simple devices that measure weight, glucose levels, and blood pressure, which can then be reviewed by a health care provider. With the advent of IoT technology, RPM can now include motion sensors at homes, which can be analyzed by intelligent agents to detect patterns and respond to member needs.

IoT-enabled RPM can play a major role for elderly Medicaid members or those with disabilities who want to continue living independently and without an in-home caregiver while still having access to the help they need, when they need it. A motion sensor can sense where a person is in the home and whether a person is taking their medication, exercising, or has fallen and needs help getting up. The sensor readings can then be collected by a computer network and stored in a database that an intelligent agent can analyze.

The Medicaid agency's open API platform would allow the network to access data about the member, including demographic and EHR data, and can combine this with RPM data to detect patterns and trends, and make predictions about a member's risks and utilization. The agency or MCO can then take suggested actions, such as contacting the member or member's caregiver to see if they need immediate assistance.[7] If, for example, data suggests that a member's risk of an adverse event or fall reaches a certain threshold, the machine might suggest that the member have an in-home caregiver present all or part of the time.

With the advent of IoT technology, RPM can now include motion sensors at homes, which can be analyzed by intelligent agents to detect patterns and respond to member needs.

SMART PILLS: A NEW FRONTIER FOR RPM

Medication non-adherence is estimated to cause nearly 125,000 deaths a year. It accounts for 10 percent of hospitalizations, and costs the US health care system more than $100 billion annually.[8]

In order to monitor medication adherence among its patients, Chicago's Rush University Medical Center is inserting a sensor into pills. The sensor is the size of a grain of sand and is made up of trace amounts of minerals that naturally occur in the body. When a patient swallows a pill, the sensor is activated by stomach acid and sends out a signal picked up by a thin, Bluetooth-enabled patch the patient wears on his or her abdomen. If the patch fails to receive the signal, the system sends out a text warning of a missed dose. The sensor can also track average heart rate, sleep, and other health markers, and send reports and alerts via an iPad or smartphone app.[9]

To the extent that RPM can reduce or delay the need for an in-home caregiver, decrease the number of visits to a health care provider, and keep patients actively involved in their care management in between doctor's visits, it has the potential to bend the health care cost curve. Different tools have been proposed to calculate the return on investment (ROI) on RPM,[10] and each health care entity would need to customize these tools to reflect the unique elements of their RPM initiative in order to measure ROI.

USING IOT TO IMPROVE PROGRAM OPERATIONS

Optimize non-emergency medical transportation (NEMT) services

NEMT is a required Medicaid benefit generally available to people who have no other means of transportation to medical services.[11] Members are often required to schedule their transportation at least 24 hours in advance, which can be a problem for transportation that can't be anticipated that far in advance, such as hospital discharge or appointments that are booked on the same day. Missed appointments can be costly for the health care system. As a result, states are continually looking for more cost-effective and convenient ways to deliver NEMT.[12]

Some Medicaid agencies deliver NEMT on a fee-for-service basis where drivers are paid for each trip. Other agencies rely on transportation brokers, managed care plans, or a mixed model that varies by the needs of the beneficiary.[13] But most of today's models contain some inefficiencies because they lack the technology to anticipate demand and ensure that drivers pick up patients on time and take them to the right place. Patients often wait too long for their ride and miss appointments, which can lead to adverse health outcomes and higher costs.[14]

To remedy this issue, some hospitals, MCOs, and transportation brokers have begun partnering directly with ridesharing apps, which leverage GPS and smartphone connectivity, to deliver NEMT.[15] Other stakeholders have built the technology directly into their own dispatch platform.

Medicaid platforms that are secure and interoperable can plug into a seamlessly integrated platform such as Circulation (see sidebar "Circulation: The first all-in-one, on-demand NEMT platform") to deliver on-demand NEMT services to their members with the objective of providing better customer service, reducing late and missed appointments, and lowering costs. The agency's connectivity into the platform would allow it to monitor the performance of NEMT vendors, as well as instances of fraud, waste, and abuse.

Medicaid platforms that are secure and interoperable can plug into a seamlessly integrated platform.

CIRCULATION: THE FIRST ALL-IN-ONE, ON-DEMAND NEMT PLATFORM

Circulation launched in 2016 as the nation's first NEMT transportation platform with built-in connectivity between hospital information systems and the Uber API. The platform is secure and compliant with the Health Insurance and Portability and Accountability Act (HIPAA) to protect the privacy and security of patient health information.

Through the integrated platform, patient contact and health information is autopopulated into the system. The platform asks patients if they require wheelchair assistance or help getting in/out of the vehicle, and about other needs in order to determine the best vehicle for deployment. Ride reminders and real-time notifications can be sent to patients and their caregivers via phone, text, or email. Billing and payment reconciliation with Uber and health care organizations are seamlessly handled at the back-end of the system. The company boasts of an on-time rate of 95 percent, and cost savings of up to 70 percent on ride costs relative to traditional NEMT.[16]

Machine learning

WHAT IS MACHINE LEARNING?

Machine learning describes the ability of computers to automatically apply complex algorithms to big data—quickly and iteratively—to uncover new insights and make decisions. Subfields of machine learning include deep learning, natural language processing, and computer vision. Deep learning is a function that imitates the workings of a human brain ("neural networks") in processing data and creating patterns for use in decision-making, while natural language processing and computer vision allow computers to understand and interpret human language and digital images or videos, respectively.

Social media, search engines, and live-stream media sites all continuously collect data on individuals to learn preferences, tastes, and patterns so that they can accurately predict and sometimes even influence future behavior. This type of machine learning is what's at work when Netflix recommends a new series for you or when your Google map app starts calling the place you live "home."

Nationally, 19 percent of the US population is enrolled in Medicaid—ranging from a low of 10 percent in Wyoming, to a high of 29 percent in West Virginia.[17] That means Medicaid agencies have a large volume of data on various entities, including their members, providers, and managed care plans. Some of the data is quantitative while the rest is unstructured notes and documents. Machine learning is an example of a cognitive technology that can help Medicaid agencies find patterns in structured and unstructured data in order to potentially help agencies automate certain customer service inquiries, help members fill out applications, and anticipate adverse events before they happen. Cognitive technologies that are openly and cheaply available are largely cloud-based, meaning Medicaid data needs to be in the cloud to effectively make use of it. As agencies update their Medicaid platforms and move their data to the cloud, they would be able to access these technologies at a low cost rather than spending additional money to purchase them in-house.

Machine learning is an example of a cognitive technology that can help Medicaid agencies find patterns in structured and unstructured data in order to potentially help agencies automate certain customer service inquiries, help members fill out applications, and anticipate adverse events before they happen.

BOSTON-AREA HOSPITALS ARE USING MACHINE LEARNING TO PREDICT HOSPITALIZATIONS

A team at Boston University's Center for Information and Systems Engineering is applying machine learning techniques to predict which patients will be hospitalized for conditions related to diabetes or heart conditions . . . a year in advance. The team uses an algorithmic approach to analyze as many as 200 factors available through EHRs from Boston-area hospitals. The records are de-identified so that patient privacy is protected. The accuracy rate of these predictions is 82 percent—far surpassing the 56 percent accuracy rate generated from well-accepted 10-year risk-scoring systems that are widely used by hospitals today. With this information, hospitals can reach out to patients at risk for hospitalizations and intervene to manage their conditions and avoid hospitalizations.[18]

USING MACHINE LEARNING FOR TARGETED INTERVENTIONS

Anticipate hospital admissions, high emergency room use, and substance use dependence

Medicaid programs already have a lot of data about their members. If Medicaid programs could combine this data with other relevant information systems (such as hospital data from electronic health records (EHR) and data from social services agencies) through interoperable modules stored in the cloud, they could apply machine learning techniques to potentially predict which members are most at risk of being hospitalized, which members are most likely to develop substance dependencies, and which members are likely to use the emergency room frequently. Once these patients are identified, appropriate measures can be taken to provide them with the education, treatment, or services they need to prevent these adverse events.

USING MACHINE LEARNING TO IMPROVE CUSTOMER SERVICE

Chatbots can offer answers to routine questions and help with more complex tasks

Chatbots use neural networks that mimic human conversation to respond to a request or help users complete a task. As Medicaid agencies look for places to cut costs, call centers that respond to routine questions about providers, benefits, eligibility, and enrollment may be one of the first places to look. Through cloud computing, Medicaid agencies can access off-the-shelf chatbot programs and integrate them into their systems so that the chatbot can learn Medicaid rules in order to respond to queries about eligibility, benefits, enrollment, and MCOs.

Chatbots can also help members with more complex tasks. Through natural language processing, a chatbot could speak to a Medicaid member and process the member's response to help them locate and complete the form or forms they need to apply for additional Medicaid benefits. If the member is having trouble understanding a question, the chatbot could explain it to the member in layman's terms and can complete the form to accurately and effectively reflect the member's eligibility for that benefit. It can then automatically send the form out to the necessary office on behalf of the member. Unlike the web portals of today, a chatbot avoids data entry by the end user and can reduce challenges to accessing needed services.

A BRITISH CHATBOT TO HELP APPLY FOR GOVERNMENT HOUSING ASSISTANCE

Joshua Browder, a British undergraduate student at Stanford University, created a chatbot to help homeless people in the United Kingdom apply for government housing. Working with homeless non-profit organizations and lawyers in Britain, he implemented automated tools to complete and file claims for government housing. The chatbot can assess the needs of those who have been evicted by asking a few standard questions, including when they became homeless, whether they are pregnant, and whether they have mental or physical disabilities. If an individual has a physical disability, for example, the bot would rearrange the application to focus on that condition. It could then compile the answers and automatically produce a completed application, which it can then submit on behalf of the applicant.[19]

Geographic information system (GIS)

WHAT IS GIS?

A GIS is an important tool used by organizations all over the world to visualize, analyze, and interpret data to understand geographic relationships, patterns, and trends. Coupled with this data is usually additional information about each of the spatial features, called attribute data. For example, the residence of a Medicaid member is the spatial data, whereas the member's demographic characteristics, health care utilization patterns, and health outcomes would make up the attribute data. By layering these kinds of data on a map, GIS can function as an effective problem-solving tool.

Public health agencies have used GIS to track the spread of disease. City police forces have used it to understand how crime clusters. Just as other agencies have used GIS to glean insights into the causes of a particular condition or to determine where a certain activity tends to "hotspot," so too can Medicaid programs. By geospatially overlaying data sets that contain beneficiary and provider network information, programs can use GIS to more effectively enforce network adequacy among their MCOs and learn more about their populations to deploy services where they are needed most. Here are two examples of how GIS can be used in Medicaid.

USING GIS TO IMPROVE PROGRAM ADMINISTRATION

Ensure access to care through network adequacy

One way in which states can ensure access to care for their Medicaid members is by monitoring and enforcing MCO provider networks. An adequate provider network requires an appropriate ratio between providers accepting Medicaid members and the number of members within a given travel time or distance, but it must go much further to ensure that member needs are being met. For example, members that require specific language, or physical/behavioral disability accommodations must be within a certain travel time or distance of a general practitioner and various specialists that can provide that accommodation.

But many states currently lack the technology to efficiently and effectively verify these standards. Instead, many rely on direct tests such as secret shopper calls and in-person visits to providers listed in plan directories to see if those directories are accurate. In fact, direct tests were a key recommendation from the Office of the Inspector General in 2014 when it evaluated Medicaid managed care provider network adequacy in 33 states.[20]

With open APIs and advanced analytics made possible through cloud computing, states would no longer need to rely on these manual tests. Instead, Medicaid agencies could data-mine thousands of claims to assess whether providers really are accepting new Medicaid patients and which services are being rendered.

By spatially mapping the areas where members live and where an MCO's providers are located,

By spatially mapping the areas where members live and where an MCO's providers are located, states can determine whether an MCO's provider networks are ensuring access to care for their members.

along with specific attributes about members and providers, states can determine whether an MCO's provider networks are ensuring access to care for their members. If not, states can use GIS to identify providers outside an MCO's network who could help address the gaps.

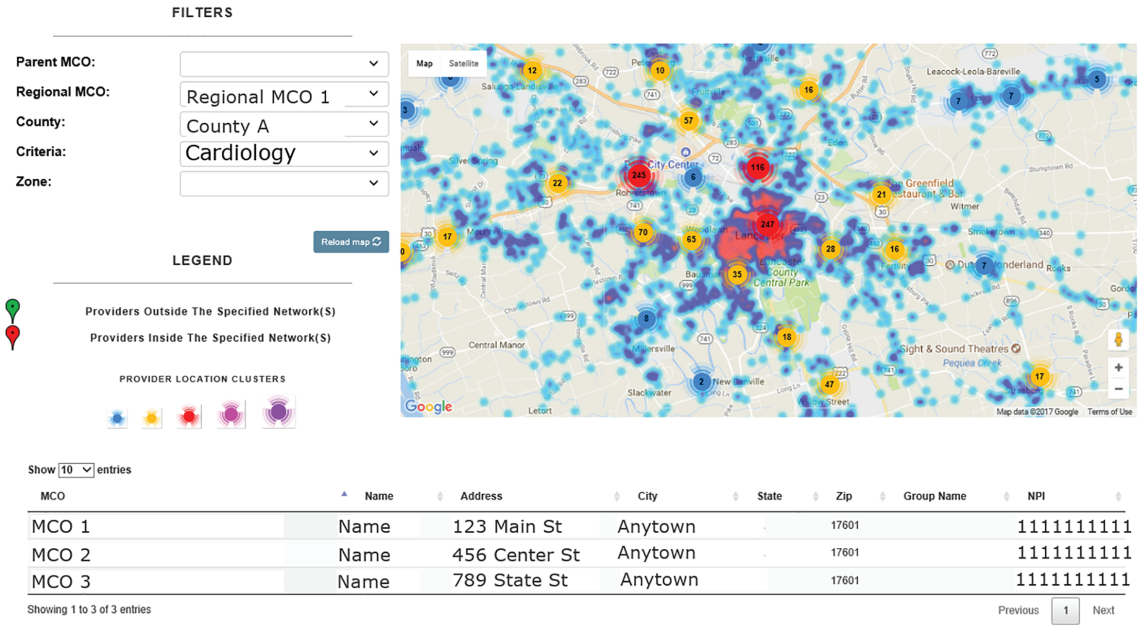
Figure 2 is an example of what such a tool might look like: The criteria is cardiology, and the color spectrum ranges from light blue to dark red, with the light blue areas indicating low rates of network inadequacy, and dark red indicating areas with high rates of network inadequacy. As one drills down into a specific area of the map, one can see whether there are cardiologists in the area that can fill the gap, and exactly where they are located.

USING GIS FOR TARGETED INTERVENTIONS

Five percent of Medicaid enrollees account for nearly 50 percent of the program's costs.[21] Medicaid members who are known as "super utilizers" of the emergency department (ED)[22] are more likely than the general Medicaid population to have three or more chronic conditions.[23] Among hospital super utilizers with Medicaid,[24] mood disorders, schizophrenia and other psychotic disorders, and diabetes were the three most common reasons for hospitalizations.[25] If managed correctly, visits to the emergency room for these conditions generally can be avoided or greatly reduced.

With GIS, states have the ability to map Medicaid super utilizers by health condition (for example, diabetes), health behavior (for example, smoking), or high health care utilization to try and determine the factors associated with the high utilization of health care services and poor health outcomes. Again, open APIs make it possible for Medicaid systems to exchange data with EHRs, the health information exchange, and other social welfare programs such as the Supplemental Nutrition Assistance Program (SNAP) and Temporary Assistance for Needy Families (TANF) to add more layers to

Figure 2. Sample GIS Medicaid managed care network adequacy tool



Source: Deloitte Network Adequacy Tool.

THE UNIVERSITY OF FLORIDA FAMILY DATA CENTER USES GIS TO DEPLOY SERVICES IN AREAS WITH HEALTH CARE DISPARITIES

The University of Florida Family Data Center created "hotspot" density maps with data from a variety of government agencies and community partners to map teen births, low birth weight babies, domestic violence incidents, child maltreatment reports, unexcused school absences, and juvenile justice referrals. Maps were widely shared with community partners, including local elected officials, law enforcement, educators, child welfare agencies, health care providers, and service organizations. The insights gleaned from the density maps resulted in the building of a family resource center in the neighborhood of greatest need, and a mobile clinic staffed by clinicians and volunteers.[26]

the map and strengthen the analysis. In trying to determine which factors drive high ED utilization, states can assess whether super utilizers live closer to EDs than to urgent care centers or clinics accepting Medicaid patients, or whether there are other factors at play to develop a tactical response.

In addition, mental health services can be targeted to areas with high rates of mental health conditions, pre-diabetes interventions can be targeted in areas where diabetes tends to cluster, and Medicaid agencies can work hand-in-hand with schools and clinics to extend the reach of family planning services in areas with high rates of unplanned pregnancies. With the time capabilities available through GIS, program managers can assess the effectiveness of their interventions by comparing and visualizing changes in the target variable over time.

Overcoming the barriers

Security

ANY discussion about smart technologies and open APIs in Medicaid would be incomplete without a discussion about data privacy and security. This includes compliance with the Health Insurance Portability and Accountability Act (HIPAA), which requires the safeguarding of medical information.

A key feature of modular and interoperable MMIS systems is a common security infrastructure that allows data to be safely exchanged between modules and with external entities. But there are actions agencies can take beyond the adoption of a common security infrastructure that can help safeguard member data, including regularly changing passwords, installing firewalls, and encrypting data streams.

In addition, patients and caregivers should be educated about the data that is collected through these platforms, how it will be used, and who will have access to it. Limiting access to the fewest number of data elements, and the fewest authorized users, while requiring informed consent from patients can help mitigate privacy risks.[27]

Financing

Financing can be another barrier to the adoption of smart technologies and the underlying MMIS infrastructure that supports them. Fortunately, CMS is committed to supporting states in their effort to develop, upgrade, and maintain MMIS systems through enhanced federal matching funds.[28] States should inquire about which specific costs could be offset by federal contributions.

How to get started with your smart Medicaid system

IN this paper, we've covered a number of ways in which smart technologies are transforming a variety of industries, including health care, and how they can be used within Medicaid programs. (See table 1 for a summary of the concepts covered.)

For Medicaid agencies looking to get started with a smart Medicaid system, consider the following:

Upgrade your Medicaid platform. As we've noted, legacy Medicaid systems lack the open APIs and cloud computing capabilities required to bring smart technologies into Medicaid platforms. Upgrading to a modular and interoperable platform with open APIs and transferring Medicaid data to the cloud could be important first steps for any state looking to develop a smart Medicaid system.

Start small. While the ultimate goal of a smart Medicaid system is to have multiple technologies working together in a cohesive framework, it may be wise to adopt one smart technology at a time and select a project that is not overly complex when you are first getting started. Once smart technologies have further matured, and your agency has developed a track record of successful deployments, you can decide to undertake more complex projects.

Develop a cohesive framework for your smart technologies. As you adopt additional smart technologies, take the time to create a blueprint for how these technologies would not only perform discreet projects, but also how they would communicate with one another to create a truly smart Medicaid system. (See the sidebar, "How individual smart technologies can come together to create a smart Medicaid system.") While doing so, consider working with other health care stakeholders such as providers, plans, and human services agencies to collaborate on data-sharing initiatives

Table 1. Applications and use cases for smart technologies that can be used in Medicaid

Technology	Application in Medicaid	Use case
Internet of Things	• **Promote independent living** (remote patient monitoring) • **Program operations** (managing NEMT)	• Smart pills from Chicago's Rush University Medical Center • Circulation: The first all-in-one, on-demand NEMT transportation platform
Machine learning	• **Target interventions** (predicting health care utilization) • **Customer service** (chatbots)	• Boston University's Center for Information and Systems Engineering • UK chatbot for government housing application
Geospatial information systems	• **Program operations** (ensuring network adequacy) • **Targeted interventions** (geographic hotspots)	• Pennsylvania Medicaid • University of Florida Family Data Center

Source: Deloitte analysis.

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that can improve population health and drive efficiencies.

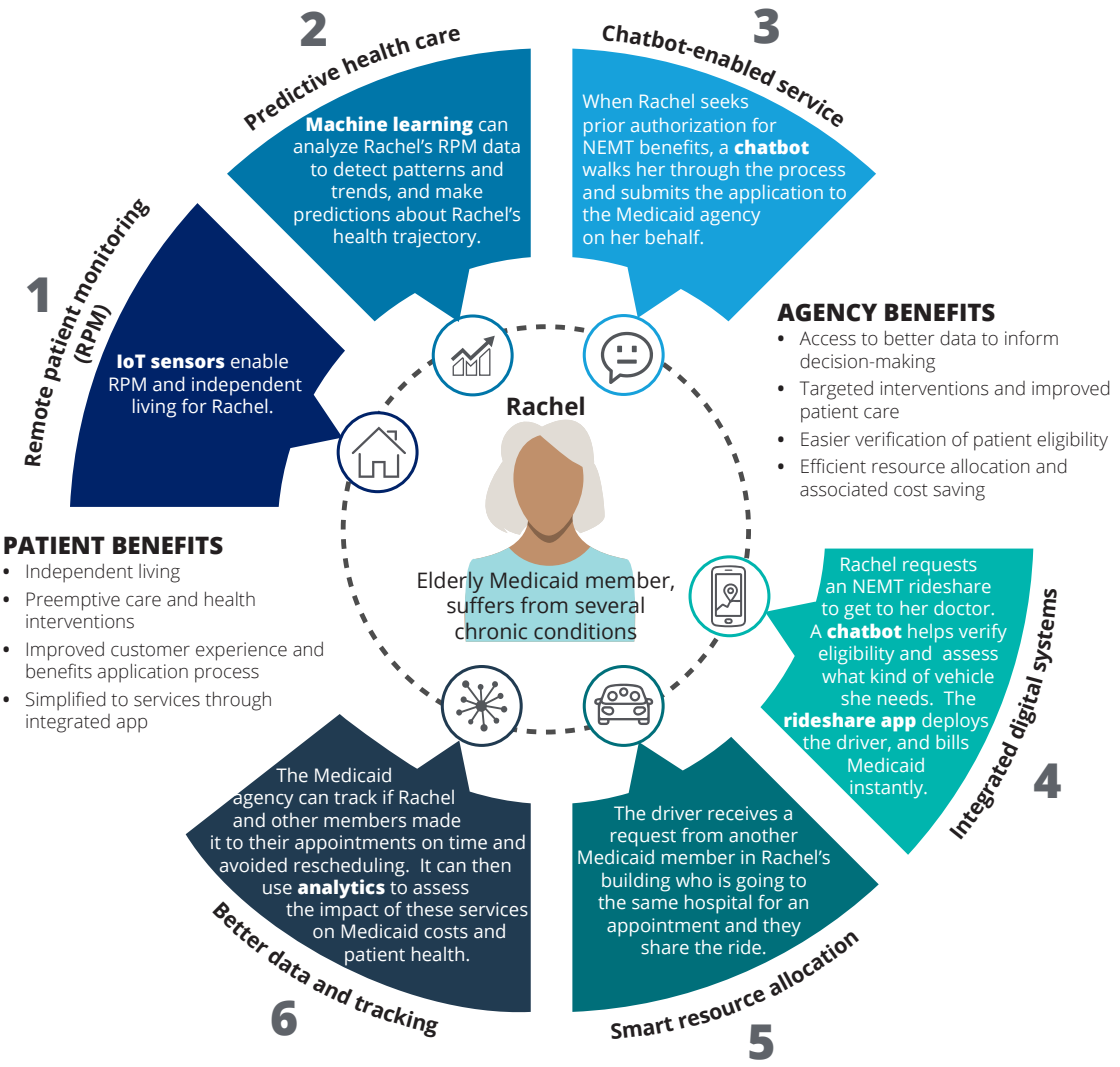
Use analytics to monitor outcomes and return on investment (ROI). Going from a traditional Medicaid system to a smart Medicaid system will require upfront investment with a view to future returns. Evaluating outcomes and ROI will require good data and analytics.

Establish a process for continually evaluating new technologies. Smart technologies keep improving, with vendors frequently adding new capabilities. Agencies should track these developments in the market regularly to evaluate whether new technologies can further improve Medicaid operations and population health.

HOW INDIVIDUAL SMART TECHNOLOGIES CAN COME TOGETHER TO CREATE A SMART MEDICAID SYSTEM

- Rachel is an elderly Medicaid member who has a number of chronic conditions. She has opted to have IoT sensors installed in her home for RPM so that she can continue living independently and without a home attendant.
- Rachel's Medicaid agency collects data on her and other members who receive RPM services, and uses machine learning to detect patterns and trends, and make predictions about Rachel's health trajectory. If the machine suspects that Rachel may be at an increased risk of a fall, needs more exercise, or is likely to be hospitalized within the next year, she'll receive targeted outreach that aims to prevent these adverse events.
- Rachel seeks prior authorization for NEMT benefits because she can no longer drive. A chatbot talks her through the process through an interactive voice system and submits the paper work to the Medicaid agency on her behalf.
- Once approved, Rachel uses her phone to request an NEMT rideshare to get to her health care provider. A chatbot asks her a series of questions to make sure the visit is eligible for NEMT services and to assess the kind of vehicle she needs for pick-up based on her physical condition. The rideshare app verifies her eligibility, deploys the driver, and bills Medicaid instantaneously. On the way to her home, the rideshare app driver receives another request from another Medicaid member, a man in Rachel's building who is going to the same hospital for an appointment that begins 20 minutes after Rachel's. The driver picks them both up and drops them both off at the same time.
- The Medicaid agency is able to track the ride and ensure the members have both arrived at their appointments on time. It also collects quality of service feedback from the patients. With this data, the agency can use analytics to assess the impact of these services on Medicaid costs and patient health.

Figure 3. Applications of cognitive technologies for a Medicaid member, across the life cycle



Source: Deloitte analysis.

Looking ahead

SMART technologies are already making a profound impact on our daily lives. Applied to Medicaid agencies, these technologies can help promote independent living, improve customer service and program administration, and target interventions where they are needed most.

It may sound unusual for an entity to enhance quality and reduce costs at the same time, but smart technologies offer that possibility. A smart Medicaid system could help programs make use of the vast amounts of data they are already collecting, and combine forces with other health-related entities to better serve their populations.

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