AI-augmented human services

Using cognitive technologies to transform program delivery

I N THE CONSUMER realm, technologies based on artificial intelligence (AI) are slowly changing the way we manage everyday tasks. Take the driving app Waze, for example. Waze uses crowdsourced data, social networking conversations, and cognitive learning to help shave time off daily commutes by providing the most efficient route based on current conditions and individual driving preferences.

Or consider products like Nest. Gone are the days of paying to heat or cool your house while no one's home. When people are at home, Nest learns what temperature household occupants prefer at different times of the day, automatically adjusting

home thermostats to help users save money on their energy bills.[1]

Meanwhile, intelligent personal assistants, such as Siri®[2] and Alexa, have helped reduce the time required to carry out routine tasks such as turning off the lights or ordering dinner, enabling their users to refocus limited attention on higher-order tasks.[3]

Similar AI technologies can be put to use in human services, to help agencies cut costs, improve decision-making, free up significant labor hours for more critical tasks, and deliver better, faster services.

Understanding AI and its application in human services

To better understand AI's potential application in human services, it is critical to learn about some of the key automation and AI-based technologies that are impacting our lives. These technologies include robotic process automation (RPA), rule-based systems, machine learning, computer vision, speech recognition, natural language processing, and robotics (figure 1).

Government entities are putting these technologies to work today in an effort to reduce the administrative burden on caseworkers, address long wait times, triage high caseloads based on risk, and free up staff time to deal with more complex cases (figure 2).

REDUCING APPLICATION PROCESSING TIME THROUGH RPA

Often caseworkers must manually verify the eligibility of beneficiaries by fetching data from multiple systems. Take San Diego County, for example. County caseworkers use two different systems for eligibility verifications. The first system stores all the required documents to verify eligibility. The second system has 500 different application forms, and each form or combination of forms requires different documents. The problem is that the two systems do not communicate with each other. As a result, caseworkers open forms from one system and then look for supporting documents in the other system. Since there are 500 forms, these requirements create hundreds of business rules, which a caseworker has to verify manually. The process is complex and consumes huge amounts of caseworkers' time.[4]

To automate the process and connect both systems, the county deployed RPA software. The software automatically looks at the open forms on a caseworker's screen, sifts through the verification fields, identifies relevant documents, and then pulls up those documents from the other system.

FIGURE 1

Robotic process automation and other cognitive technologies are becoming more common

RULES-BASED SYSTEMS	**Rules-based systems** capture and use experts' knowledge to provide answers to tricky problems that are governed by fixed rule-sets.
SPEECH RECOGNITION	**Speech recognition** transcribes human speech automatically and accurately. The technology improves as machines collect more examples of conversation.
COMPUTER VISION	**Computer vision** is the ability to identify objects, scenes, and activities in naturally occurring images.
MACHINE LEARNING	**Machine learning** takes place without explicit programming. By trial and error, computers learn how to learn, mining information to discover patterns in data that can help predict future events.
NATURAL LANGUAGE PROCESSING	**Natural language processing** refers to the task of organizing and understanding language in a human way. Combined with machine learning, a system can scan websites for discussions of specific topics.
ROBOTICS	**Robotics** is the creation and use of machines to perform automated physical functions. Examples include drones, robots used for disaster response, and robot assistants in home health care.
ROBOTIC PROCESS AUTOMATION (RPA)	**RPA** robots are software programs designed to automate transactional, rules-based tasks by mimicking human interactions.

Source: Deloitte analysis.

FIGURE 2

Human services can use AI to address multiple pain points

CASEWORKERS	
USE CASES ···▶	PAIN POINTS ADDRESSED
Automating verification	Compliance with myriad integrated eligibility rules
Automating documentation and reporting	Large, unmanageable workload
Predicting children at high risk of abuse	Huge caseloads; confusion over which cases to prioritize
Outcome-based targeted programs based on machine learning algorithms	Lack of integrated data to solve clients' problems holistically

CITIZENS	
USE CASES ···▶	PAIN POINTS ADDRESSED
Auto-filling application forms	Tedious application process
Addressing queries via chatbot	Long wait times to resolve issues
Real-time language translation	Language issues for non-English speakers
Personalized service delivery through machine learning	Noncustomized solutions

Source: Deloitte analysis.

The entire manual task was replaced with a single keystroke. As a result of using RPA, the time it takes to approve a Supplemental Nutrition Assistance Program (SNAP) application was cut from 60 days to less than a week.[5]

USING VIRTUAL ASSISTANTS TO REDUCE WORKLOADS

Australia's Department of Human Services (DHS) is using cognitive technologies to help reduce its staff workload. The department deployed an internal virtual assistant called Roxy to answer queries from case-processing officers related to the rules and regulations of the department's programs. Roxy uses machine learning and natural language processing to understand human language and respond to requests.[6] Roxy is currently responding to more than 78 percent of the questions being put to it.[7] Prior to Roxy, DHS staff would call human experts for assistance. Now human experts only get involved in complex queries.[8] According to former DHS chief technology officer Charles McHardie,

"It's been quite successful at reducing their workload."[9]

FLAGGING CHILD WELFARE CASES AT HIGH RISK FOR CHILD FATALITIES

Oklahoma's Department of Human Services has used cognitive technology to help identify child welfare cases most likely to lead to child fatalities. The department partnered with Eckerd Kids, whose software uses machine learning to predict cases with a high probability of child fatalities. Factors such as a child under the age of three, intergenerational abuse, young parents, mental health problems, and a history of substance abuse tend to be correlated with a high risk of child fatalities.[10] Once high-risk cases get flagged, they go through a detailed review, and the input is shared with front-line staff so that they can establish a course of action that abates risk and improves outcomes.[11] This helps field staff target investigations based on risk rather than relying on random sampling.

Potential savings from automation

Today, typical human services employees allocate their labor among a "basket" of tasks. By breaking jobs into individual activities and analyzing how suitable each is to automation, we can project the number of labor hours that could potentially be freed up by investing in AI-based technologies. Our analysis of human service agencies in a large Midwestern state found that automation could yield time savings of up to 34 percent. This amounts to 3 million hours freed up, yielding potential annual savings of US$73 million (figure 3). At the low end of the investment spectrum, automation could still save 305,000 hours annually, with potential savings of US$7 million.

AI-based technologies are already having a profound impact on consumers. These technologies could be further applied to human services programs to help reduce backlogs, cut costs, overcome resource constraints, free caseworkers to spend more time with families, inject intelligence into scores of processes and systems, and handle many other tasks humans can't easily do on our own.

It's highly unusual for a business improvement to increase speed, enhance quality, and reduce costs at the same time, but AI-based technologies offer that possibility. For human services workers, it could mean a future where vast amounts of their time are freed up thanks to automation, their effectiveness is enhanced, and their capabilities extended with machine learning.

FIGURE 3

Potential savings from AI
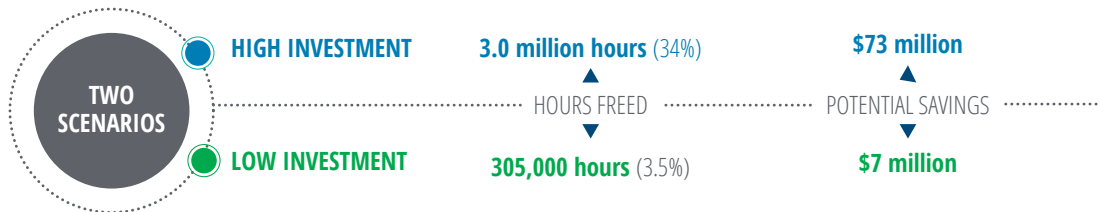
Investment scenarios:
• High investment (AI-assisted tasks AI speed up by 200% on average)
• Low investment (AI-assisted tasks AI speed up by 20% on average)

Methodology: The data is for a large US Midwestern state. The analysis considered tasks as the unit of analysis. The automation potential of each task was calculated based on task importance, skill requirement, work volume, and technological barriers. Then Monte Carlo simulation was used to describe two different scenarios for the likely effects of automation on these tasks. The two scenarios represent a high and low level of government investment in automation.

Source: Deloitte analysis.

Endnotes

1. Google Nest, "Google Nest Learning Thermostat," accessed on October 10, 2019.

2. *The HHS Innovator's Playbook: AI-augmented human services* by the Deloitte Center for Government Insights is an independent publication and has not been authorized, sponsored, or otherwise approved by Apple Inc. Apple and Apple Watch are registered trademarks of Apple Inc.

3. Please note that *AI-augmented human services* is an independent publication and has not been authorized, sponsored, or otherwise approved by Apple Inc.

4. Automation Anywhere, "San Diego County—Health and human services agency," September 29, 2014.

5. Automation Anywhere, "Webinar: How to deploy robotic process automation at scale," May 14, 2015.

6. Microsoft News Center, "Australia embraces cloud and AI to deliver a new class of intelligent solutions says Microsoft CEO, Satya Nadella," November 16, 2016.

7. Australian Government Digital Transformation Agency, "Address to the AIIA: Gavin Slater," August 3, 2017.

8. Allie Coyne, "DHS new front-line will be virtual assistants," iTnews, December 19, 2016.

9. Ibid.

10. Kathleen Hickey, "Saving children, one algorithm at a time," GCN, July 26, 2016.

11. Ibid.

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