# MEMORANDUM

February 17, 2023

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

To: Beth A. Niblock
Chief Information Officer, Q

From: Brian T. Pattison
Assistant Inspector General for Evaluation, Office of Inspector General, G

Subject: Final Report – HUD's Robotic Process Automation Program Was Not Efficient or Effective, 2021-OE-0007

Please see the attached final report on our evaluation of the U.S. Department of Housing and Urban Development's (HUD) robotic process automation (RPA) activities. It contains one main finding, four recommendations, and four opportunities for improvement, with only the recommendations being formally tracked by our office. Our objective was to assess the maturity of HUD's RPA activities and determine whether HUD had implemented related controls to address technology and program management risks.

We found that HUD lacked adequate controls and capacity to operate the program efficiently and effectively. HUD had achieved notable progress in multiple areas, yet approximately 3 years since its inception, HUD's RPA program maturity was low. HUD had not established a clear vision for the RPA program or set measurable metrics to define program success. HUD also did not maintain adequate oversight of "bot" development and operations to ensure that limited RPA program funds were used efficiently. Finally, HUD lacked important information technology (IT) controls related to the security and auditability of its RPA system. As a result of these weaknesses, HUD missed opportunities to capitalize on the potential benefits of RPA and expended IT resources inefficiently on projects that provided minimal value.

We encourage the Office of the Chief Information Officer (OCIO) to develop a corrective action plan for each recommendation and allocate the personnel and resources needed to make the recommended improvements. We look forward to working with OCIO to reach a management decision on the unresolved, open recommendations in this report.

**Office of Inspector General**
**Office of Evaluation**
451 7th Street SW, Washington, DC 20410
Phone (202) 708-0430, Fax (202) 401-2505
www.hudoig.gov

I appreciate the assistance you and your staff provided throughout the evaluation. Please contact Director John Garceau at 202-603-8410 or jgarceau@hudoig.gov if you have any questions.

Enclosure: HUD's Robotic Process Automation Program Was Not Efficient or Effective (2021-OE-0007)

cc:
Christopher Webber, Principal Deputy Chief Information Officer, Q
Vinay V. Singh, Chief Financial Officer, F

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**U.S. Department of Housing and Urban Development**

Office of Inspector General

**Office of Evaluation**

# HUD's Robotic Process Automation Program Was Not Efficient or Effective

Information Technology Evaluations Division

Washington, DC Report Number: 2021-OE-0007 February 17, 2023

# Executive Summary

## HUD's Robotic Process Automation Program

Report Number: 2021-OE-0007 February 17, 2023

### Why We Did This Evaluation

The U.S. Department of Housing and Urban Development (HUD), like many agencies across the Federal Government, has begun to implement robotic process automation (RPA) technology. HUD initiated its RPA program in 2018.

RPA is a software technology used to emulate human actions on a computer. RPA software programs, referred to as "bots," can complete repetitive tasks quickly and consistently, freeing up employees to work on other, higher value activities. RPA has the potential to increase business process efficiency, improve the effectiveness and consistency of mission services, and lower costs. However, because RPA interacts with HUD information technology (IT) systems and can be used within important agency business processes, it can introduce new technology and operational risks for HUD programs.

We conducted this evaluation to assess the maturity of HUD's RPA activities and determine whether HUD had implemented related controls to address technology and program management risks.

### Results of Evaluation

Approximately 3 years since its inception, HUD's RPA program maturity was low, and HUD lacked adequate controls and capacity to operate the program efficiently and effectively. HUD reported that as of March 2022, 14 bots were in production, saving an estimated 13,644 labor hours annually. However, the actual program achievements were significantly less than HUD estimated. Based on information HUD program offices provided, only seven distinct bots were in use, and annual labor hour savings totaled approximately 1,015, or 7 percent of the amount HUD estimated.

HUD's RPA program maturity was low, and results were limited because HUD lacked adequate internal controls and staffing capacity to effectively oversee and manage the program. HUD had not established a clear vision for the RPA program or set measurable metrics to define program success. HUD also did not maintain adequate oversight of bot development and operations to ensure that limited RPA program funds were used efficiently. Finally, HUD lacked important IT controls related to the security and auditability of its RPA system.

As a result of these weaknesses, HUD missed opportunities to capitalize on the potential benefits of RPA and expended IT resources inefficiently on projects that provided minimal value. For example, HUD developed a bot that was initially expected to save 2,100 labor hours annually, effectively accomplishing the work of a full-time employee. However, the bot ultimately saved only 24 hours annually, or 1 percent of HUD's planned amount. Although HUD did not track total costs for each bot developed or for the program as a whole, it was evident that costs were excessive relative to the results achieved. For example, HUD reported spending at least $489,885 to develop a bot that was expected to save only 100 labor hours annually. At least nine bots in various development stages were never completed, and at least two bots reported as in production were inoperable and never used. HUD discontinued funding for its primary RPA program contract in March 2022, leaving the program without critical resources for continued bot development. Due to the lack of contract funding, HUD was reevaluating its approach for managing the RPA program.

### Recommendations

Our evaluation report includes four recommendations for HUD to implement new internal controls and further develop its internal capacity to manage and oversee the RPA program. Appendix A of the report includes opportunities for improvement that will not be tracked as formal recommendations but are noted as general suggestions to improve HUD's RPA program effectiveness.

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# Introduction

## Objective

To assess the maturity of the U.S. Department of Housing and Urban Development's (HUD) robotic process automation (RPA) activities and determine whether HUD had implemented related controls to address technology and program management risks.

## Background

RPA is a software technology used to automate repetitive, rules-based tasks. RPA makes it relatively easy to build, deploy, and manage software robots or "bots" that emulate human actions on a computer. RPA performs tasks that employees would otherwise have to perform, such as moving files and folders, copying and pasting data, filling in forms, signing into applications, responding to emails, and analyzing data. A bot can consistently and accurately complete tedious and time-consuming tasks, allowing employees to focus on higher value work. When effectively implemented, RPA can significantly increase business process efficiency, improve the effectiveness and consistency of mission services, reduce processing errors, and lower costs. Although RPA technology has potential to add significant value, it can introduce new technology and operational risks.

Agencies across the Federal Government have begun using RPA technology, and many have reported substantial progress and results. For example, based on information provided by the Federal RPA Community of Practice (RPA CoP),[1] the General Services Administration RPA program, started in 2018, has reportedly built more than 100 bots that have saved an estimated 430,000 cumulative hours annually. The Bureau of the Fiscal Service of the U.S. Department of the Treasury initiated a pilot RPA program in 2018 and has since built and maintained nearly 100 bots that have saved more than 65,000 cumulative labor hours across a wide range of services.[2] Although results across Federal agencies would understandably differ due to variables, such as the nature of work to be automated, available funding levels, and staffing, these results demonstrate that agencies can potentially achieve significant benefits and efficiencies by effectively implementing RPA technology.

HUD initiated its RPA program in October 2018 and reported that its first bot was deployed into production in February 2020.

Before March 2021, HUD's RPA services were provided under broad financial services and business process reengineering contracts that did not reference RPA services or associated funding amounts. HUD entered into a separate contract starting in March 2021, which was designed specifically for RPA services. The first-year cost for this contract was approximately

[1] The RPA CoP is a governmentwide initiative led by the U.S. General Services Administration and Technology Transformation Services program offices to facilitate collaboration and problem solving among Federal agencies that are interested in implementing RPA. The CoP shares information and resources and provides guidance for RPA implementation and operations.

[2] We did not independently test or validate the CoP's reported program results for other agencies.

$1.2 million. HUD's RPA services contract expired in March 2022, and HUD decided not to execute its contract renewal option. HUD officials stated that they intended to maintain licenses to support existing bots. HUD employees will attempt to support existing bot operations with limited contractor support.

**Organization and Responsibilities**

HUD's RPA program was started and initially maintained by HUD's Office of the Chief Financial Officer (OCFO). In December 2020, responsibility for the RPA program transitioned to HUD's Office of the Chief Information Officer (OCIO). OCIO's Chief Digital Services Officer had primary responsibility for managing the RPA program. When this position became vacant in April 2022, responsibility for the RPA program was transferred to OCIO's Office of the Chief Technology Officer.

OCIO is responsible for overseeing HUD's information technology (IT) environment and providing IT solutions and services. As cited in its delegation of authority, OCIO is responsible for managing HUD's IT resources and promoting the effective design and operation of HUD's major IT processes, including improvements to work processes departmentwide. OCIO is also responsible for monitoring and evaluating the performance of HUD IT programs based on associated performance measurements. OCIO played a critical role in HUD's RPA development, which included designing and overseeing formal security protocols, credentialing standards, privacy processes, technology procurement, and program governance. OCIO was responsible for prioritizing processes to be automated and had primary responsibility for developing and managing the RPA program. Program offices generally participated as clients and were responsible for describing processes that OCIO could consider for automation. Program offices also played a limited role by assisting with bot project planning and testing.

## Scope and Methodology

We conducted this evaluation under the authority of the Inspector General Act of 1978, as amended, and in accordance with the Quality Standards for Inspection and Evaluation, issued by the Council of the Inspectors General on Integrity and Efficiency (January 2012). Those standards require that we plan and perform the evaluation to obtain sufficient, appropriate evidence to provide a reasonable basis for our results and conclusions based on our evaluation objective. We believe the evidence obtained provided a reasonable basis for our results and conclusions.

**Scope**

Our initial evaluation scope generally included HUD's most recent policies and operating procedures and bots that had been released in production as of November 1, 2021. HUD reported that only two bots were released during calendar year 2021, and because our intent was to review HUD's recent RPA program operations, we expanded our scope to include bots that had a planned release date after November 1, 2021. HUD issued a revised version of its RPA program governance policy in January 2022, which we considered during our evaluation.

The evaluation scope included assessing the sufficiency of IT supporting HUD's RPA activities and HUD's policies and procedures for bot development and oversight. The evaluation included RPA program activities across all HUD business units that participated in HUD's RPA program. These units included HUD's OCFO, OCIO, Office of the Chief Human Capital Officer, Federal Housing Administration (FHA), Office of Community Planning and Development (CPD), and Office of the Chief Procurement Officer.

The evaluation assessed the maturity of HUD's RPA activities, including technology and management controls. This measurement of program maturity was intended to characterize HUD's program performance.

**Methodology**

To accomplish our objective, we

- Determined criteria applicable to the evaluation objective, including HUD policies and related Federal internal control standards.

- Obtained and reviewed information HUD provided regarding bots that were in development and production stages.

- Interviewed HUD employees who had direct knowledge or involvement with HUD's RPA program, including management and staff from OCIO, OCFO, and various HUD program offices. Interview information was used to assess the status and estimated labor hour savings for each of the 14 bots that HUD reported as in production.

- Reviewed detailed documentation for five bots to determine whether HUD complied with its defined policies and procedures for bot development and operations. Because our evaluation was intended to review HUD's recent operating procedures, we selected bots with a release date or planned release date that was after January 1, 2021. Six bots met this criterion, including at least one bot from each HUD program office that reportedly had a bot in production. One program office had two bots that met this criterion, and of these, we selected the bot with the highest reported labor hour savings for review.

- Reviewed information collected to assess the overall maturity level of HUD's RPA program and whether HUD appropriately addressed IT and program management risks. For this assessment, we considered the RPA Program Playbook, issued by the RPA CoP, which was created to provide Federal agencies detailed, accessible guidance for initiating a new RPA program or evolving an existing program. The RPA Playbook suggests aspects of RPA technology and program management to consider when gauging agency RPA implementation progress and capabilities. The RPA Playbook was intended for use as a guide and does not represent authoritative criteria that Federal agencies are required to follow.

# Results of Review

## HUD Did Not Operate Its RPA Program Efficiently and Effectively

### HUD's RPA Program Maturity Was Low

Based on our evaluation results detailed below, we assessed the overall maturity of HUD's RPA program as low. In addition to general factors, such as the number of bots in production and number of labor hours saved, we assessed HUD's progress in the areas of RPA technology and program management. HUD had achieved notable progress in multiple areas. For instance, it had implemented an enterprise platform model for RPA that provided capability for centralized bot management. HUD had also successfully completed an authority to operate for the RPA system,[3] which included an assessment of IT system security requirements and risks. However, after 3 years since it was initiated, HUD's RPA program had not progressed beyond basic performance levels. OCIO officials acknowledged that RPA activities remained in a "pilot" phase and that additional staffing and resources would be needed to effectively sustain and scale the program.

HUD's RPA program was in a state of transition at the time of our evaluation. HUD depended heavily on contractors for bot development and ongoing operations, yet it discontinued funding for its RPA program contract in March 2022, leaving the program without critical resources. According to OCIO officials, without contractor support, HUD did not have the capacity to effectively continue RPA program development and operations. HUD staff had limited RPA training and did not have the capacity to develop new bots or properly maintain existing bots if the bots stopped working or required modification. HUD reported that at least nine bots in various stages of planning and development were no longer planned for implementation. Due to the lack of contract funding, HUD was considering new approaches for continuing program operations and had discussed potentially adopting a decentralized, or "federated," model for RPA services that would allow individual program offices to develop their own bots with limited OCIO oversight.

### HUD's RPA Program Results Were Limited

HUD began its RPA program in 2018 and had successfully automated a limited number of business processes across multiple program offices. However, after more than 3 years since its inception, HUD's program had achieved only minimal progress and results. During our evaluation, HUD's OCIO reported that 14 bots were used in production and saving 13,644 labor hours annually as of March 2022. However, these results were significantly overstated. Based on information provided by HUD's program office bot users, only seven distinct bots had been used in production, and the total estimated savings achieved was only 1,015 labor hours

[3] HUD's RPA system used virtual machines to host and deploy bots. A separate server hosted HUD's "Orchestrator" software, which allowed for centralized management and control of automation resources.

annually, or 7 percent of OCIO's estimated amount.[4] Of the remaining seven bots that OCIO reported as being used in production,

- two bots were never used in production and had been abandoned by program offices,[5]
- three bots were reported as finished but had not yet been used in production, and
- two bots were effectively double counted because they ran as part of a single process along with another bot and were considered as a single bot by the program office user.

HUD developed three bots that appeared to be mostly finished and could potentially generate additional labor hour savings yet had not been used in production. We estimated that if HUD were able to use these bots in production and achieved the projected results estimated by program office officials, the total potential labor hour savings for HUD's RPA program would be approximately 2,091 hours, or 15 percent of the total amount reported by OCIO.

OCIO did not have a process to measure efficiencies created from its bots and relied on initial labor hour savings estimates from program offices, which were often incorrect. As a result, OCIO's reported program results were inaccurate and overstated because OCIO did not monitor bot utilization or measure actual program results. In some cases, bots did not work as initially intended, or the planned functionality was scaled back during the development process. For example,

- A bot developed for OCFO was planned to save 2,100 hours annually by sending a survey form to grant recipients via email. The project scope was later reduced, and part of the planned functionality was eliminated. OCFO reported that the bot is now expected to save only 24 labor hours annually, or 1 percent of the amount OCIO reported.

- A bot developed for HUD's FHA was planned to save 9,100 hours annually by summarizing report information to assist in determining the status of open obligations for financial audit purposes. Bot development took approximately 3 years due to project delays. By the time it was completed, the transactions the bot was intended to automate had already been processed manually. Program office officials indicated that if the bot were needed in the future, it could potentially save roughly 952 labor hours, or 11 percent of the amount OCIO reported.

- Three bots developed to assist OCFO with internal billing were initially estimated to save 500 labor hours each annually. However, OCFO reported that this estimate was for all three bots combined and that each bot would, therefore, save on average approximately 167 hours, or 33 percent of the amount OCIO reported.

[4] A schedule of the operating status and estimated annual labor hour savings for 14 bots reported by HUD as in production is included in appendix A of this report. This appendix includes the annual labor hour savings reported by HUD and our estimated potential annual labor hour savings based on information provided by HUD program office bot users.

[5] One additional bot used in production reportedly had inaccurate results, and the user indicted that the program office might discontinue using the bot and revert to manual processing.

**HUD Lacked Adequate Program and Project Planning**

HUD's RPA program maturity was low, and results were limited, in part, because HUD had not implemented effective internal controls over RPA program and project planning. HUD officials understood the potential benefits of RPA, yet they did not maintain a clear vision for the RPA program with well-defined program goals, objectives, and performance metrics.

HUD did not identify and prioritize RPA projects effectively.

OCIO did not have planning procedures in place to strategically identify and prioritize potential bot projects.[6] As a result, HUD expended resources inefficiently on projects that did not align with program office business needs. HUD's RPA program policy stated that HUD program offices could identify potential processes for automation; however, OCIO officials confirmed that since assuming RPA program oversight responsibility, OCIO had not coordinated with the program offices to advertise RPA program availability and to identify the highest value automation opportunities. OCIO officials stated that project ideas were not actively solicited because OCIO had limited capacity to develop new bots. HUD maintained a list of approximately 40 potential bot projects that was developed before RPA program management transitioned from OCFO to OCIO. This listing did not include an assessment of current mission needs or priorities. OCIO officials agreed that a more effective process for identifying and prioritizing bot projects was needed.

HUD had not implemented effective controls to assess project costs and benefits during planning phases to ensure that bot projects selected for development would achieve an adequate return on investment. HUD's RPA governance policy required HUD to establish and review quantitative and qualitative estimates of business value. However, we found that many of HUD's bots were not well aligned with program office needs and ultimately provided minimal business value. For example,

- HUD reportedly spent at least $489,885[7] for contractor assistance to develop a bot that was expected to save only 100 labor hours annually by sending reminder emails to employees who were overdue for completing a required IT security awareness training course. The bot took more than 18 months to complete and had not been used in production. Because the bot performed a relatively basic task, sending emails based on spreadsheet data, the process could potentially have been efficiently and readily automated using HUD's available spreadsheet and email programs and without the need for protracted and costly RPA development.

[6] Before OCIO assumed RPA program oversight responsibility, HUD had developed an initial list of potential RPA projects. However, we found no evidence that the list had been updated.

[7] The actual development cost may have been more than the estimated amount stated because this figure did not include associated indirect costs that HUD did not track for items such as internal staffing, software licensing, and IT operations costs. It also did not include costs for work that might have been provided by other contractors. Program office officials reported that multiple contractors were involved in the development process, yet HUD was able to provide estimated cost information for only one of the involved contractors.

- HUD reportedly spent at least $408,238 for contractor assistance to develop a bot that was expected to save 316 labor hours annually by automating the process of reassigning employee roles within an IT system. Assuming that HUD were to continue using the bot for a 5-year period, use of this this bot would cost HUD approximately $250 per labor hour saved.

- HUD reportedly spent at least $104,811 for contractor assistance to develop a bot that was expected to save 80 labor hours annually by sending notification emails to HUD grant recipients. After more than a year in development, program office officials determined that the bot was impractical and did not provide any significant advantages over the existing process, which used a standard Microsoft mail merge function.

- Four additional bots that HUD developed were expected to save less than 30 labor hours annually. HUD was unable to provide information supporting development cost amounts for these bots.

**HUD Also Lacked Adequate Controls and Staffing Capacity To Oversee and Manage RPA Operations**

We identified several significant control weaknesses that limited HUD's RPA program progress and performance.

HUD lacked controls to effectively oversee bot development and operations.

HUD's RPA program policies were not always clearly defined or were missing key guidance for program operations. In January 2022, HUD revised and improved its RPA program governance policy. HUD's updated policy included more clearly defined process roles and responsibilities and added procedures for ensuring that privacy requirements were addressed during the bot development process. However, the updated policy did not include well-defined and specific criteria for identifying, evaluating, and prioritizing potential bot projects; procedures for managing bot change requests; specific procedures for monitoring ongoing bot operations; and procedures for periodically reviewing and adjusting RPA system access rights.

HUD did not always follow its program policies and procedures for bot development and project management. Based on our review of detailed project documentation for five of HUD's most recent bot projects, we observed that all five projects were missing required documentation or approvals. A schedule of exceptions noted during our review is included in appendix B of this report.

HUD did not track costs for individual bots or for the RPA program as a whole. Before March 2021, RPA services were provided under two broad financial services and business process reengineering contracts. The associated contract documents provided during our evaluation did not reference RPA. In addition, OCFO was unable to provide details to demonstrate the amount spent for RPA services under the contracts. HUD entered into a separate contract starting in March 2021, which specifically identified the amount associated with RPA services. However, HUD was able to provide only estimated amounts that were attributable to individual bot projects. Further, HUD did not track RPA program costs for non-contract-related items, such as

internal staffing and IT resources needed for hosting the RPA system virtual machines and bot administration software. Without tracking bot costs, HUD lacked the ability to assess the cost-benefit of the RPA program or determine the total amount that HUD invested in RPA activities.

HUD did not maintain project budgets or development schedules, which could have been used to track process efficiency and assess RPA contractor performance. This weakness is concerning, given that HUD's contracts used for RPA services did not identify RPA as an included service or provide related service-level requirements. Also, in the three examples above, we observed contract costs that far exceeded the savings achieved. Without an effective approach to consistently monitor RPA budgets and development activities, HUD missed opportunities to gain insight into excessive costs or delays in projects.

HUD did not implement procedures to assess utilization levels and whether bots were performing as expected. OCIO did not monitor bot execution logs or perform annual bot assessments and business intelligence reporting as prescribed in its RPA governance policy.[8] Our evaluation found that OCIO was unaware that program offices were no longer using two bots and that another bot had been running in an incorrect IT environment intended only for development and testing.

HUD's ability to effectively manage and mature its RPA program was significantly impacted by inadequate staffing capacity. OCIO officials cited staffing levels as their greatest program challenge and noted that only two Federal staff members were assigned to manage RPA activities. These staff members had multiple roles within OCIO, and RPA was reportedly not always a primary concern due to competing priorities. OCIO officials acknowledged that their internal staff had limited training and knowledge related to RPA technology. OCIO reported that plans were in place to conduct basic-level training for HUD staff, yet officials cautioned that this initial training would not immediately provide sufficient internal capacity for HUD to further develop and support the RPA program.

**IT Controls Related to Security, Auditability, and Performance Were Not Always Effective**

HUD did not consistently implement controls for managing and monitoring RPA system access, assessing compliance with privacy requirements, overseeing system operations, and managing virtual machine (VM) environments.

RPA IT controls were not consistently implemented.

Access to HUD's RPA system was not restricted to appropriate personnel who had a legitimate and ongoing need to use the system. HUD's RPA program developer guidelines included an appendix that referenced the principle of least privilege, stating that an individual should be given the minimum access needed to perform his or her job functions. The guidelines also described how "privilege creep" can result in users' having access to resources they no longer need, which would then violate the principle of least privilege. However, they did not include specific procedures for periodically reviewing system access and removing access for users who

[8] The RPA governance policy states, "…[a]n annual assessment is conducted and results in a decision to reengineer to retire the system. Continual improvements, mitigation, and risks or exceptions are considered, to include change and configuration management."

no longer had a need to use the system. Based on discussions with program office officials, at least two users had access to HUD's RPA VMs without a legitimate need.[9] In one instance, a user was granted system access for bot testing, yet the related project was abandoned, and the employee retained system access after more than 2 years. In a similar instance, a user continued to retain system access after almost a year without an ongoing need to use the system.

HUD did not maintain proper documentation to track RPA system access. HUD initially provided a host machine system access list that did not identify write access permissions held by five system users. Additionally, although our evaluation did not test system access for all users, we observed during a program office bot demonstration that one user was able to access an environment that was not specified for the user according to HUD's system access list. Weaknesses with HUD controls for managing RPA system access present a risk that HUD may not be fully aware of which users have access to its RPA system.

HUD did not fully comply with its requirement to complete a privacy impact assessment (PIA)[10] for at least one of its bots that was reported as in production. One of the five bots that we selected for detailed review had an incomplete PIA without approval signatures, which indicated the potential use of personally identifiable information (PII), including name and address information of HUD officials.

HUD's RPA system provided the capability for centralized logging to monitor bot use and operation, but HUD did not use this capability. HUD officials and HUD's contractor responsible for administering the RPA system were unaware that centralized logs were not being stored. Because logs were not maintained, auditability of bot activities was limited, and records – which could have been used to measure program performance and assess bot activities, such as utilization rates, error rates, and runtime successes or failures – were not available. Without effective monitoring and oversight of bot activities, HUD was unaware of significant problems with bot operations. For example, OCIO was unaware that at least two bots were not operational and one bot was running in a nonproduction environment even though it was being used in production.

In one instance, we observed that HUD did not follow best practices and its own policies for bot credentialing. HUD's RPA developer guidelines required that bots initiated by program office users use the security rights and credentials of the attending user. In one case, we observed that a bot was using a machine ID credential instead of the attending user credential to authenticate with a database system. Searches made in this manner would not be readily identifiable with the attending HUD user on the source system. The use of machine IDs for attended bots could potentially result in users' gaining access to information that they were not authorized to access. HUD indicated that the bot using the machine ID credential was developed before HUD's current RPA developer guidelines were issued and stated that this situation should be avoided. However, at the time of our evaluation, the bot had not been revised to use an attending user credential.

[9] HUD's RPA system used virtual machines to host and deploy bots. A separate server hosted HUD's "Orchestrator" software, which allowed for centralized management and control of automation resources.
[10] A PIA is a record of how HUD collects, stores. protects, shares, and manages PII. It lists who has access to PII and what controls are in place to protect it.

HUD did not adequately plan for VM limitations that could affect bot performance or ensure that VM configurations were consistent across its different environments used for development, testing, and production. In two instances, bot users reported significant VM-related problems. For example, a program office official reported that a completed bot was ultimately impractical to use because the attending user was unable to perform other tasks while the bot was running on the assigned VM. The official further stated that if the program office had been aware of this limitation upfront, it would have concluded that the process was not suitable for automation using RPA. Program office and OCIO officials also reported that inconsistency between development and production VM environments caused significant problems in some cases, when bots were released into production. In another instance, a program office bot user reported VM issues with lagging performance, lack of support for needed software, and nonresponsive applications. As a result of these issues, the bot was never completed and used in production.

### Conclusion

RPA technology holds great potential for organizations to improve work processes and generate efficiencies. However, after approximately 3 years, HUD's RPA program had achieved minimal results. HUD discontinued contract funding for new bot development in March 2022, and the RPA program was in a state of transition as HUD was considering new approaches for continuing the program. HUD's program failed to advance because HUD lacked adequate controls and capacity to effectively manage and oversee its program. HUD did not clearly define program objectives or maintain adequate oversight of bot development and operations to ensure that limited RPA program funds were used efficiently. HUD also lacked important IT controls related to the security and auditability of its RPA system. This report includes recommendations and opportunities for improvement, which if effectively implemented, could assist HUD with increasing its RPA program maturity, improving program outcomes, and reducing IT-related risks.

## Recommendations

We recommend that HUD's Chief Information Officer

1. **Identify short- and long-term plans for the RPA program that align its capabilities, staffing needs, funding projections, and mission needs.**

   If HUD intends to continue developing its RPA program, the initiative should have clear and realistic plans describing how the technology will deliver value and improve operations in a cost-effective manner.

2. **Implement procedures to capture and monitor centralized logs to maintain appropriate visibility into bot activities and provide for auditability of bot actions.**

3. **Implement procedures to periodically review RPA system access and remove access for users that are not authorized or no longer have a need to use the system.**

   HUD should ensure that user access is controlled in accordance with the principle of least

privilege and that access to the RPA system is revoked when no longer needed.

4. **Implement procedures to ensure that attended bots use the security rights and credentials of the attending user.**

# Agency Comments and OIG Response

## Summary of Agency Comments and OIG Responses

In response to our draft report, OCIO provided formal comments, which did not indicate disagreement with the report finding or recommendations and stated that OCIO would work with the Office of Inspector General (OIG) to close the report recommendations.

We appreciate the assistance that HUD staff provided throughout the evaluation and OCIO's commitment to address the report results. We look forward to working with OCIO to reach a management decision on the unresolved, open recommendations in this report.

## Office of Chief Information Officer Comments

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U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410-3000

CHIEF INFORMATION OFFICER

February 1, 2023

MEMORANDUM FOR: Brian T. Pattison, Assistant Inspector General, G

FROM: Beth Niblock, Chief Information Officer

SUBJECT: Proposed Response for the **HUD's Robotic** Process Automation (RPA) Program Was not Efficient or Effective, 2021-OE-0007 Draft Evaluation Report.

This memorandum is in response to the HUD**'s** Robotic Process Automation (RPA) Program Was not Efficient or Effective, 2021-OE-0007 Draft Evaluation Report issued on January 13, 2023.

The Office of the Chief Information Officer (OCIO) has carefully reviewed the results **and recommendations presented by the Office of the Inspector General regarding HUD's Robotic** Process Automation (RPA) Program. This program was initiated some time ago and since my arrival, my team and I have made changes and are reviewing the operations and future of this program. The OCIO will continue to evaluate the RPA program and take into considerations the results and recommendations contained in this report.

We look forward to working with you and your staff to close out the recommendations. If you have questions or require additional information, please contact Paul Scott, Business Change & Integration Officer at (202) 402-2354 (paul.a.scott@hud.gov) or Ebony Grey, Audit Liaison Officer, at 202-402-2164 (ebony.a.grey@hud.gov).

DocuSigned by:
Beth Niblock
[illegible]

Beth Niblock
Chief Information Officer
Department of Housing and Urban Development

2/2/2023
Date

cc:
Brian Pattison, Assistant Inspector General for Evaluation, G
Vinay V. Singh, OCIO, Chief Financial Officer, F
Paul Scott, OCIO, Business Change and Integration Officer
Helen McBride, Senior Adviser, Office of the Chief Information Officer, Q

# Appendixes

## Appendix A – Opportunities for Improvement

We note suggested opportunities for improvement below. These issues will not be tracked as formal recommendations but are noted here as general suggestions for OCIO to address to improve the effectiveness of HUD's RPA program implementation, especially if the program were to be expanded by HUD.

1. **Define procedures for establishing and routinely monitoring performance metrics for individual bots and for the RPA program as a whole that can be used to promote performance accountability.**

   HUD should have appropriate controls in place for establishing and monitoring performance measures. These controls could include measurements for efficiency improvements, such as labor hour savings or human resource hours redeployed to less tedious and higher value work. Metrics should also include qualitative measures when appropriate, such as a reduction in process errors, service capabilities created, or other operational improvements.

   HUD management should routinely use performance reporting as a tool to identify opportunities for continuous improvement. Ideally, this reporting should include a comprehensive performance dashboard to monitor all approved bot projects; progress to date; and program-level key performance indicators, such as bot utilization, error rates, and accurate measurement of benefits achieved.

2. **Perform a comprehensive assessment of current RPA program governance and software development policies and make appropriate revisions to ensure that the RPA process is aligned with the planned program structure and operating capacity.**

   If HUD intends to deploy a decentralized, or federated, model for bot development, the RPA governance policy should include comprehensive procedures for program office bot development and process coordination with OCIO. RPA policies should be updated to include clearly defined procedures for processing bot changes and ensuring that design documents are updated appropriately. HUD's policies should include procedures to assess whether RPA is the most appropriate automation solution for identified business challenges, balancing capabilities, cost, and feasibility.

3. **Develop a coordination process with program offices to design and implement procedures to identify and prioritize the highest value projects for development.**

   Process improvement initiatives should be driven by HUD's mission needs and objectives. Before proceeding with new bot projects, HUD should ensure that RPA resources will be used efficiently and to achieve the greatest available return on investment.

4. **Implement procedures to plan for and routinely evaluate costs for the program as a whole and for individual bot projects to ensure that costs are reasonable and appropriate given the expected benefits.**

   The selection of bots to deploy should be based on an understanding of the likely benefits and predicted development costs.

## Appendix B – Bot Status and Estimated Annual Labor Hour Savings

The table below includes the status of bots reported as in production by HUD and includes a comparison of HUD's and OIG's estimated bot labor hour savings.

*Figure 1. Bot status and estimated annual labor hour savings*

| | HUD internal bot ID number | Bot name | HUD estimated annual labor hour savings | OIG estimated potential annual labor hour savings[11] | Discontinued by program office | Not yet used in production |
|---|---|---|---|---|---|---|
| 1 | MFHVA | Multifamily Housing Virtual Assistant Bot | 24 | 24 | | |
| 2 | P16 | WCF Obligations Process | 500 | 167 | | |
| 3 | P31 | Enhanced Reporting and Tracking of Unliquidated Program Obligations | 9,100 | 952 | | X |
| 4 | P35 | Security Awareness Training | 250 | 0 | X | |
| 5 | P37 | APP Performance | 26 | 26 | | |
| 6 | P39 | APP Scorecard[12] | 26 | 26 | | |
| 7 | P40 | RCS Performance | 26 | 26 | | |
| 8 | P41 | PALTS Scorecard[13] | 96 | 96 | | |
| 9 | P44 | WCF Internal Billing | 500 | 167 | | |
| 10 | P45 | WCF Invoicing | 500 | 167 | | |
| 11 | P49 | CPD Formula Grant Announcement Letter | 80 | 0 | X | |
| 12 | P50 | CPD Grant Accrual Validation | 2,100 | 24 | | X |
| 13 | P52 | Property Assignment | 316 | 316 | | |
| 14 | P58 | Training Reminders | 100 | 100 | | X |
| | | **Total:** | **13,644** | **2,091**[14] | **2** | **3** |

[11] OIG's estimated potential annual labor hour savings were determined based on information provided by HUD program office bot users.
[12] The APP Scorecard bot ran as part of a single process along with the APP Performance bot. These were considered as a single bot by the program office user.
[13] The PALTS Scorecard bot ran as part of a single process along with the RCS Performance bot. These were considered as a single bot by the program office user.
[14] Excluding bots that had not been used in production, the total OIG estimated annual labor hour savings was 1,015 hours.

## Appendix C – Schedule of Bot Testing Exceptions

Results for our evaluation testing of HUD's development and project management procedures are documented in the figure below.

*Figure 2. Evaluation testing results for five bots reviewed*

| Exception | CPD Formula Grant Announcement Letter bot (P49) | CPD Grant Accrual Validation bot (P50) | Property Assignment bot (P52) | Email Case Assignment: Contractor bot (P55) | Training Reminders bot (P58) |
|---|---|---|---|---|---|
| Missing an RPA intake request used to collect initial information for prospective bot projects | | X | | | X |
| Incomplete project initiation form used to document initial project details | X | X | | X | X |
| Incomplete process definition document used to outline the business processes chosen for automation | | X | X | | X |
| Missing process traceability matrix used to ensure that all defined requirements are included in test protocols | X | X | | X | |
| Missing a digital services site used to upload and store project documentation | X | X | X | X | X |
| Missing Technical Review Committee business intelligence reporting data used for management oversight | X | X | X | X | X |
| Missing an upfront project schedule | X | X | X | X | X |

| Exception | CPD Formula Grant Announcement Letter bot (P49) | CPD Grant Accrual Validation bot (P50) | Property Assignment bot (P52) | Email Case Assignment: Contractor bot (P55) | Training Reminders bot (P58) |
|---|---|---|---|---|---|
| Missing a project budget showing planned costs | X | X | X | X | X |
| Missing a project planning and management gate review approval used to ensure that process policies were followed | | X | | | |
| Incomplete user acceptance testing documentation used to plan and conduct bot testing | | X | | | |
| Incomplete PIA used to identify and document PII data the bot may process | X | | | | |
| Incomplete implementation plan used to ensure that the process owner reviewed and approved the bot for release to production | X | X | | | |
| Missing an annual assessment used to identify needed improvements, risks, or exceptions[15] | N/A | X | N/A | N/A | N/A |

[15] Four of the five bots reviewed had not been in operation for more than a year and were, therefore, not due for an annual assessment.

## Appendix D – Abbreviations

| Abbreviation | Definition |
|---|---|
| **CPD** | Office of Community Planning and Development |
| **FHA** | Federal Housing Administration |
| **HUD** | U.S. Department of Housing and Urban Development |
| **IT** | information technology |
| **OCFO** | Office of the Chief Financial Officer |
| **OCIO** | Office of the Chief Information Officer |
| **OIG** | Office of Inspector General |
| **PIA** | privacy impact assessment |
| **PII** | personally identifiable information |
| **RPA** | robotic process automation |
| **RPA CoP** | Federal RPA Community of Practice |
| **RPA Playbook** | RPA Program Playbook |
| **VM** | virtual machine |

## Appendix E – Acknowledgements

This report was prepared under the direction of Brian T. Pattison, Assistant Inspector General for Evaluation (AIGE); Kathryn Saylor, Deputy AIGE; and John Garceau, Director of the Information Technology Evaluations Division. The Office of Evaluation staff members who contributed are recognized below.

**Major Contributors**

David J. Torre, IT Evaluator (team lead)
Brian Vu, IT Evaluator
Jason Smith, IT Evaluator
Craig Wood, IT Evaluator (referencer)

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