MEMORANDUM

June 30, 2021

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

To: Christopher S. Webber
Principal Deputy Chief Information Officer, Q

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

Subject: Final Report – HUD Information Technology Modernization Roadmap Evaluation, 2021-OE-0003

We have completed our evaluation of the U.S. Department of Housing and Urban Development's (HUD) information technology (IT) modernization roadmap. The attached report summarizes our findings and conclusions. It contains seven results, two recommendations, and five opportunities for improvement.

HUD's recent efforts to modernize key IT systems that support its programs has been well managed and resulted in positive outcomes. HUD made significant progress with implementing its multiyear modernization roadmap; formalizing its strategy for converting to modern technology; and delivering improved information systems. However, leadership changes with shifting priorities and insufficient funding pose potential risk to modernization. OIG was informed that there may be delays in FHA Catalyst development. The extent and cause of those delays are outside the scope of this report. A follow-on evaluation was started in June 2021 to address these potential challenges.

In response to our draft report, HUD provided technical comments, some of which we incorporated into the final report, but they did not provide formal comments.

We encourage HUD to develop a corrective action plan for each new recommendation and allocate the personnel and resources needed to make the recommended improvements to address and continue to modernize its information systems. We look forward to working with HUD to reach a management decision on the unresolved, open recommendations in this report.

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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.

Enclosures:

HUD IT Modernization Roadmap Evaluation Report (2021-OE-0003)

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U.S. Department of Housing and Urban Development

Office of Inspector General

Office of Evaluation

HUD Information Technology Modernization Roadmap Evaluation Report

Information Technology Evaluations Division

Washington, DC Report Number: 2021-OE-0003 June 30, 2021

Executive Summary

HUD IT Modernization Roadmap Evaluation Report

Report Number: 2021-OE-0003 June 30, 2021

Why We Did This Evaluation

We reviewed the U.S. Department of Housing and Urban Development's (HUD) information technology (IT) modernization roadmap. A significant number of HUD's mission-essential applications have not been modernized, which presents multiple sources of risk. These applications are hosted on legacy information systems and mainframe platforms, which are operationally inefficient, increasingly difficult to secure, and costly to maintain. Historically, HUD has failed to successfully implement multiple modernization plans and projects. Leadership changes with shifting priorities and insufficient funding pose potential risk to modernization. As a result, hundreds of millions of dollars in potential savings from modernization have not been realized, and security risks have remained.

Our objectives were to (1) determine the extent to which HUD has developed an IT modernization roadmap and to report on its current and future state, (2) gain an understanding of HUD's IT modernization strategy and priorities, and (3) assess the effectiveness of the roadmap and strategy.

Results of Evaluation

HUD's recent efforts to modernize key IT systems that support its programs has been well managed and resulted in positive outcomes. HUD made significant progress with implementing its multiyear modernization roadmap; formalizing its strategy for converting to modern technology; and delivering improved information systems. HUD reported that these modernization efforts result in long-term cost savings and industry efficiencies. Prior IT modernization efforts often failed, costing millions of dollars and lost resources. HUD's Office of the Chief Information Officer (OCIO) developed an enterprisewide IT modernization roadmap in April 2020. This roadmap includes initiatives within HUD program offices, enterprise capabilities, and improving technologies, such as migrating legacy mainframe platforms to modernized cloud technologies. The roadmap includes initiatives and timelines based on an agile approach, which allows HUD to deliver new functionality incrementally, maximize flexibility, and adjust to shifting program office modernization priorities. The Federal Housing Administration (FHA), Office of Public and Indian Housing (PIH), and mainframe modernization were identified as priority modernization initiatives.

With financial support from a congressional appropriation, OCIO and FHA developed a new system, FHA Catalyst, to transform housing program participants' interactions with FHA using a single technology platform. PIH is also embarking on an IT modernization effort to enhance public-facing systems to meet the office's growing insurance and subsidy program needs. OCIO recognized that mainframe platforms were operationally inefficient, increasingly difficult to secure, and costly to maintain. OCIO has a timeline to migrate 10 legacy systems to the cloud in FY 2021, with plans to migrate 9 more and retire its 2 mainframe platforms in future years. HUD has several other modernization initiatives underway, including efforts within other program offices and improving enterprise capabilities that support its cybersecurity program maturity, which will require appropriate development, modernization, and enhancement funding. OCIO is developing the enterprise analytics platform to deliver a centralized data visualization and analytics platform with dashboards, analytics, and program metrics for senior leadership. Additionally, OCIO is using robotics process automation to automate repetitive and rules-based business tasks. The Government National Mortgage Association has developed an IT modernization roadmap, separate from HUD and specific to its initiatives, including its securitization platform. HUD enterprise grants and financial management modernization are not part of the current modernization roadmap. Lastly, HUD's enterprise identity, credential, and access management solution is not part of the current modernization roadmap.

Recommendations and Opportunities for Improvement

This evaluation report contains two recommendations and five opportunities for improvement to assist in continued successes for future modernization efforts.

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Introduction

Objectives

The objectives of this evaluation were to (1) determine the extent to which the U.S. Department of Housing and Urban Development (HUD) has developed an information technology (IT) modernization roadmap and to report on its current and future state, (2) gain an understanding of HUD's IT modernization strategy and priorities, and (3) assess the effectiveness of the roadmap and strategy. This report also provides insights into HUD's ongoing and future modernization decisions and priorities.

Background

A significant number of HUD's mission-essential applications have not been modernized, which presents multiple sources of risk. These applications are hosted on legacy information systems and mainframe platforms, which are operationally inefficient, increasingly difficult to secure, and costly to maintain. HUD has significant challenges in protecting the confidentiality of at least one billion personally identifiable information (PII) records[1] and the integrity of financial data for hundreds of billions of dollars.

The U.S. Government Accountability Office (GAO) issued a report in June 2019 that underscored the need for agencies to develop modernization plans for critical legacy systems.[2] This report highlighted that the Federal Government planned to spend approximately $90 billion on IT in fiscal year (FY) 2019 and about 80 percent of that amount was used to operate and maintain existing IT investments, including aging legacy systems.

The Office of Evaluation (OE) has issued several reports that address HUD risks from its legacy technology. Our 2015 evaluation[3] found that HUD has historically failed to fully implement multiple modernization plans and projects.[4] As a result, hundreds of millions of dollars in potential savings from modernization were not realized,[5] and security risks have remained. Without a proper modernization roadmap and strategy, HUD was at risk of repeating past modernization failures, which included the inability to sustain modernization priorities during changes in HUD leadership.

HUD IT Modernization Roadmap and Priorities

HUD Office of the Chief Information Officer (OCIO) has made significant IT modernization progress over the last 2 fiscal years with the implementation of the multiyear modernization

[1] HUD OIG Evaluation Report 2018-OE-0001, HUD Privacy Program Evaluation Report, dated September 13, 2018
[2] GAO IT Report, GAO-19-471, Agencies Need to Develop Modernization Plans for Critical Legacy Systems, dated June 11, 2019
[3] HUD OIG Evaluation Report 2015-OE-0002, HUD IT Modernization Report, dated September 29, 2015
[4] HUD developed plans for modernization but never implemented them, while projects were partially implemented but never completed.
[5] HUD OIG Topic Brief 2017-OE-0010, Persistent IT Challenges and Issues Facing HUD, dated January 7, 2018

roadmap. This roadmap was developed in coordination between OCIO and the program offices in April 2020.[6] This roadmap contains three major initiatives, including modernizing systems within the Federal Housing Administration (FHA), modernizing systems within the Office of Public and Indian Housing (PIH), and mainframe modernization. Additionally, the roadmap includes modernizing systems within other program offices, such as the Office of Fair Housing and Equal Opportunity (FHEO), the Office of Administration (Admin), and the Office of Public Affairs (OPA). The roadmap also includes plans to improve enterprise capabilities such as the development of an enterprise analytics platform (EAP), maturing its cybersecurity program, and implementing robotics process automation (RPA).[7] The roadmap includes initatives and timelines based on an agile approach, which HUD stated allows it to deliver new functionality incrementally, maximize flexibility, and adjust to leadership's shifting priorities. Additionally, the Government National Mortgage Association (Ginnie Mae) has developed a specific IT modernization roadmap, which is separate from HUD. Ginnie Mae stated that its modernization efforts are aligned to its initiatives that focus on its securitization platform. See figure 1 below for an overview of HUD's IT modernization initiatives.

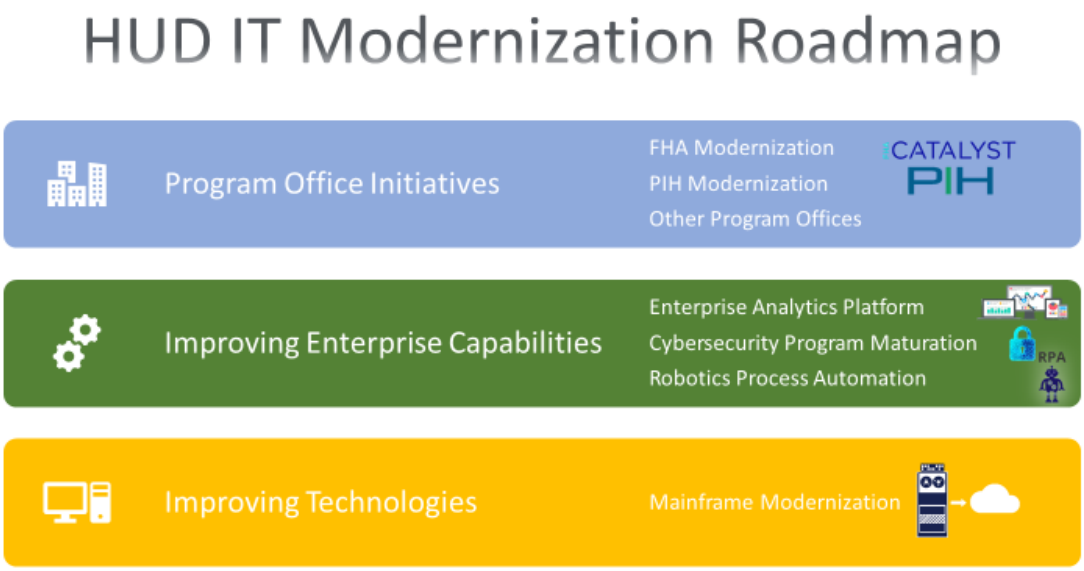


Figure 1. HUD IT Modernization Roadmap Initiatives

HUD IT Modernization Funding

HUD has received specific IT modernization earmarked funds from Congress over the last few fiscal years to modernize systems that support specific program office business processes. The Modernizing Government Technology Act of 2017 (MGT Act) provided financial resources and technology expertise to agencies to stimulate Federal modernization initiatives. The MGT Act

[6] Although the roadmap was not formally developed until April 2020, OCIO and program offices collaborated on modernization efforts prior to the roadmap.

[7] The Federal RPA Community of Practice, chaired by the General Services Administration CFO, defines RPA as a low- to no-code commercial off-the-shelf technology that can be used to automate repetitive, rules-based tasks. Like an Excel macro operating within a spreadsheet, RPA can record actions performed across a personal computer, access systems, and perform delineated tasks for human users.

allows agencies to invest in modern technology solutions to improve service delivery to the public, secure sensitive systems and data, and save taxpayer dollars. In 2018, HUD was granted $20 million from the Technology Modernization Fund (TMF), which was created to support initiatives under the MGT Act. HUD is using $20 million from the TMF to migrate four mainframe systems from its Unisys platform to the cloud. See appendix A, roadmap #3, for the four Unisys mainframe systems being migrated to the cloud using the TMF.

The Office of Housing (Housing) and PIH have also received earmarked funds from Congress to modernize their systems. Housing received $20 million per year in appropriations for 3 years (FY 2019-2021) for FHA single family housing modernization. PIH received a $20 million appropriation in FY 2021 to make critical investments in the modernization and development of specific PIH IT systems. These funds must be used for development, modernization, and enhancement (DME) work related to the Public Housing Information Center, voucher management systems, the Public Housing Operating Fund web portal, the National Standards for Physical Inspection of Real Estate (NSPIRE) demonstration, and the loan origination system for the Section 184 loan guarantee program. These earmarked funds are critical for OCIO and program offices to ensure that sufficient resources are available for modernization efforts. It should be noted that HUD explained additional funding will be needed to complete some of the projects in future years. Additionally, HUD is accountable to Congress through recurring performance updates on the status of the projects.

If appropriations are not earmarked specifically for IT modernization, OCIO has limited funding for DME initiatives. Historically, HUD's IT Fund primarily supports operations and maintenance (O&M) activities, such as sustaining current systems and applications. In FY 2021, HUD had an IT Fund of $257.6 million. The funds were allocated with $217.6 million to OCIO for O&M, $20 million earmarked to continue the modernization of FHA single-family systems, and $20 million for PIH modernization. See allocation of HUD's IT budget in figure 2 below.

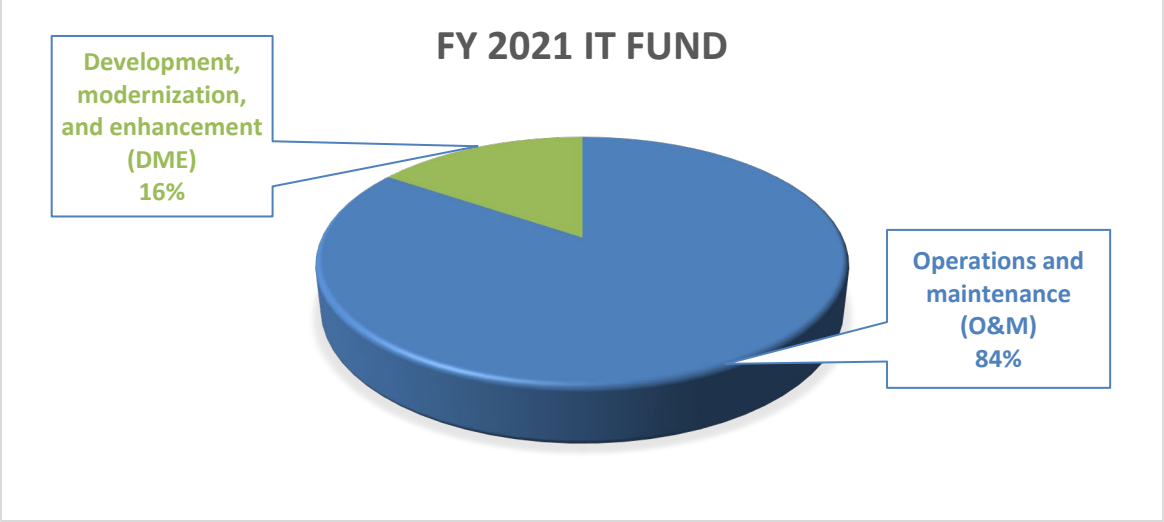


Figure 2. FY 2021 HUD IT Fund

The FY 2021 budget request built upon the critical modernization of IT systems that began in 2019 for FHA single family housing modernization. The FY 2021 IT Fund budget request

justification described development and modernization iniatitives that HUD states will lead to improved program performance and lower technology costs through integration and consolidation of IT systems.[8] Although OCIO received earmarked funds for modernization efforts, these funds represent only 16 percent of the overall IT Fund budget. The remaining budget is allocated for O&M of current services. The Top Management Challenges Facing HUD in 2021[9] details that historically, IT resources have been distributed across multiple program offices and not under the Chief Information Officer's (CIO) authority. These program offices continued to operate their applications and initiate development actions that were not in alignment with the enterprise-level modernization roadmap or Federal guidance. The FY 2021 budget request stated OCIO has since expanded its oversight and management of IT spending in accordance with the Federal Information Technology Acquisition Reform Act[10] (FITARA). These expanded efforts involve coordination with the program offices to modernize their technology needs, digitize manual processes, and improve end-user experiences.

HUD IT Capital Planning and Investment Control Process

HUD developed a process guide that outlines the capital planning and investment control (CPIC) process as a framework for IT investment management. The guide provides an overview of the elements needed to ensure compliance with laws, policies, and regulations governing the management of Federal information resources. HUD's policy and management of its IT investments incorporate FITARA requirements. The Capital Planning and Investment Control Process Guide defines DME as efforts that lead to new IT assets, systems, and services or enhancements to existing IT assets. DME efforts are intended to improve capability or performance, implement legislative or regulatory requirements, or meet an agency's priority request. HUD's CPIC process includes the following four phases:

- Preselect: Allows executive decision makers the ability to assess each proposed investment and how it supports HUD's strategic and mission needs.
- Select: Ensures that only financially sound and viable initiatives are included in HUD's IT portfolio.
- Control: Ensures that HUD's IT portfolio is properly managed and that IT investments, projects, systems, and services perform as expected.
- Evaluate: Examines whether an IT investment has met or is meeting its intended objectives and yielded its expected benefits.

The control phase provides oversight to monitor the progress and performance of IT investments against projected cost, schedule, performance, and delivered benefits. All major and standard

[8] https://www.hud.gov/sites/dfiles/CFO/documents/54_FY21CJ_IT_Fund.pdf
[9] HUD OIG Top Management Challenges Facing the U.S. Department of Housing and Urban Development in 2021, dated November 25, 2020
[10] FITARA, passed by Congress in December 2014, requires that agencies' respective CIOs have a significant role in IT decisions, including annual and multiyear planning, programming, budgeting, execution, reporting, management, governance, and oversight functions.

investments[11] are reviewed monthly and reported on the Federal IT Dashboard.[12] The IT Dashboard was launched to provide Federal agencies and the public with the ability to view details of Federal IT investments online and to track their progress over time. It enables Federal agencies, industry, the general public, and other stakeholders to view Federal IT investment details. HUD is required to report an "Investment Evaluation by Agency CIO," referred to as the CIO rating, to the Dashboard. We did not review reports of HUD's IT investments on the Dashboard, but the reports provide business cases for each individual investment. These business cases provide information about how the investment aligns to agency goals, the return on investment, and estimated life-cycle costs to key stakeholders.

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 objectives. We believe the evidence obtained provides a reasonable basis for our results and conclusions.

Scope

We reviewed HUD's most recent IT modernization roadmap and gained an understanding of its strategy and priorities starting with FHA modernization initiatives in 2019. We also obtained supporting documentation regarding modernization plans, progress, and milestones. Specifically, we identified the many ongoing modernization efforts within the roadmap and obtained sufficient evidence of each effort's plan, development, timeline, and effectiveness. Additionally, we reviewed Ginnie Mae's IT modernization plans and roadmap to gain an understanding of its strategy and priorities since it is maintained separately from HUD.

Methodology

Our approach included the following steps during the planning, fieldwork, and analysis phases of the evaluation. During the planning phase we obtained HUD IT modernization background information through previous Federal Information Security Modernization Act of 2014[13] (FISMA) evaluations, meetings with the CIO, and corrective action plans from prior OE reports and recommendations.

[11] A major investment refers to any IT investment that is critically important to the mission and function of HUD. OMB defines standard investments, and all Federal agencies use them to account for their IT infrastructure costs. Standard investments are OCIO-managed enterprisewide investments that provide IT services to HUD's mission delivery applications.

[12] https://itdashboard.gov/

[13] FISMA requires inspectors general to annually assess the effectiveness of a Federal agency's information security program.

During the fieldwork phase conducted from January through March 2021, the evaluation team made observations, conducted interviews, and requested and received supporting documentation. Fieldwork was conducted with stakeholders at HUD headquarters and within program offices. We obtained documentation, such as plans to support HUD's roadmap, which included HUD's strategies and priorities; charters; roles and responsibilities; project health assessments; project performance plans; business needs assessments; feedback from users of modernized systems; and evidence of successes and challenges during the modernization process. Challenges described in this report may predate the modernization activity to provide context for how the IT modernization process has evolved over time. We interviewed key stakeholders within OCIO and applicable program offices, including leads for individual modernization projects. We obtained information focused on the following areas of IT modernization: (1) roles and responsibilities, (2) IT modernization strategy and priorities, (3) current and future state of the IT modernization roadmap, (4) authorities to operate (ATO),[14] and (5) effectiveness of modernization.

We analyzed HUD's IT modernization roadmap and other supporting documentation to determine the status of its current and future state. We analyzed all supporting documentation and conducted interviews to arrive at an overall determination of the effectiveness of HUD's IT modernization roadmap. We analyzed the areas outlined in the fieldwork phase, including

- Roles and responsibilities: We identified the governing bodies and the roles and responsibilities of key IT modernization stakeholders at HUD who developed the roadmap and tracked its progress.
- IT modernization strategy and priorities: We determined the methods HUD used to develop its strategy for modernization, including prioritization of initiatives.
- Current and future state of the IT modernization roadmap: We analyzed the state of the current roadmap and identified HUD's milestones for future modernization efforts, including any assumptions and constraints HUD considered to achieve future milestones.
- ATO: We assessed the ATO process for systems that are in development, have completed IT modernization, or are expected to complete IT modernization efforts before FY 2022 to determine whether HUD appropriately issues ATOs for modernized systems and whether the program offices follow HUD policy.
- Effectiveness of modernization: We reviewed HUD's overall modernization progress. Historically, HUD had failed to fully implement multiple modernization projects. We reviewed how HUD was progressing on the milestones within the roadmap. Additionally, we reviewed feedback received by HUD from users of modernized systems to assess whether modernization efforts resulted in industry efficiencies or resulted in cost savings.

Limitations

We did not encounter any significant limitations associated with reliability, validity, or accuracy of the evidence collected during this evaluation. We relied on HUD's attestations and reports

[14] ATO information was analyzed to obtain an understanding of the level of coordination between the Office of IT Security, other offices within OCIO, and the program offices to ensure modernized systems had the proper authorization to operate on HUD's network.

regarding the capabilities, estimated cost savings, and expected industry efficiencies resulting from modernization efforts.

Results of Review

OCIO and IT Modernization Roadmap Overview

Roadmap Overview

HUD developed an enterprisewide IT modernization roadmap, which defined its strategy and priorities. HUD made significant progress within the past year implementing its multiyear modernization roadmap; formalizing its strategy for converting to modern technology; and delivering improved information systems. HUD reported that these modernization efforts result in long-term cost savings, and industry[15] efficiencies. This roadmap includes many initiatives to modernize systems within HUD program offices, improve enterprise capabilities, and improve technologies, such as migrating legacy mainframe platforms to modernized cloud technologies. OCIO updates the roadmap quarterly to adjust to shifting priorities and make adjustments following leadership changes. The roadmap includes initatives and timelines based on an agile approach, which HUD stated allows it to deliver new functionality incrementally and maximize flexibility.

HUD prioritized three modernization initiatives, including FHA, PIH, and mainframe modernization. Appendix A contains HUD's roadmap which identifies each of the three initiative's systems, statuses, and timelines. OCIO and FHA initiated a modernization effort starting in April 2019, called FHA Catalyst, to improve how Housing program participants do business with FHA. FHA Catalyst was developed to transform program participants' interactions with FHA across a single technology platform. PIH is also embarking on an IT modernization effort in coordination with OCIO to enhance public-facing systems to meet the office's growing insurance and subsidy program needs. Lastly, the April 2020 roadmap recognized that mainframe platforms were operationally inefficient, increasingly difficult to secure, and costly to maintain, which represents an increasing liability as they age. Therefore, OCIO is in the process of retiring its 2 mainframe platforms, IBM and Unisys, and migrating 19 legacy systems from those platforms to modernized cloud technologies, with a goal to migrate 10 systems in FY2021. The roadmap did not include when the migration will occur for the remaining 9 legacy systems on those platforms.

Modernization effort priorities in FHA and PIH focused on loan management modernization. Grant and financial management are other areas in need of modernization but were not included in the HUD modernization roadmap from October 2020. Through OCIO and Office of the Chief Financial Officer (OCFO) collaboration, it was determined the HUD's enterprise financial management systems modernization plan will initially focus on loans management and not grants management.

HUD has several other modernization initiatives underway, including efforts to improve enterprise capabilities. These efforts include standing up a centralized, cloud-based analytics and data visualization environment, referred to as the EAP. OCIO is also improving its network and

[15] This report uses the word industry to refer to the mortgage industry.

data system defenses and lowering the time from threat detection to threat elimination. Lastly, HUD's roadmap described the deployment of RPA "bots"[16] that would "automate repetitive and rules-based business tasks with more accuracy and virtually no human input required, which frees up staff for other work."

Additionally, Ginnie Mae has developed a specific IT modernization roadmap, which is separate from HUD. Ginnie Mae stated that its modernization efforts are aligned to its initiatives that focus on its securitization platform.

Roles and Responsibilities

HUD has identified the key stakeholders and their roles and responsibilities in the modernization process. There are dedicated leads and teams for each of the three key OCIO modernization initiatives: FHA, PIH, and mainframe modernization. These dedicated teams manage daily tasks of the modernization effort and engage with internal and external stakeholders to ensure that modernization efforts meet business needs. Within the program offices, the General Deputy Assistant Secretary (GDAS) often leads the effort, working with other HUD personnel and external parties (such as servicers and lenders) to identify the business needs and how to improve industry efficiencies. Interviews with OCIO and program offices revealed that much of the success of recent efforts can be attributed to ongoing communication among OCIO, the program offices, and stakeholders. Additionally, HUD stated that collaboration with external stakeholders led to the ability to develop systems that supported their business needs, which was verified through communication evidence. Historically, modernization efforts were ineffectively coordinated, resulting in siloed system design that was not in accordance with OCIO's strategy and security requirements or did not achieve program office business needs. Although HUD has identified several key stakeholders and their responsibilities, HUD did not document assigned responsibility for updating the roadmap and how to apply lessons learned from both successes and challenges observed from past modernization efforts.

> Collaboration among OCIO, program offices, and external stakeholders led to modernization successes.

Several IT governing bodies encompass the departmental level, the program office leadership, and several OCIO operational committees. Together these governing entities are tasked with ensuring oversight of HUD's enterprise IT portfolio and alignment with HUD's modernization strategy. The Executive Operations Council, chaired by the HUD Secretary, meets to approve investments; approve and monitor the IT portfolio; define and implement HUD's strategic direction, policies, and investments; and define investment and project oversight criteria. Then the Executive Steering Committee, chaired by the program offices' GDASs, meets weekly and decides on and prioritizes modernization projects, monitors project performance, and resolves any escalated issues. This committee also informs Congress and other stakeholders on the status of projects to ensure that resources are secured for future phases. During interviews, OCIO and program office stakeholders credited successes in recent modernization efforts to the collaboration that occurs in this committee. The Customer Care Committee, chaired by the CIO,

[16] An RPA bot is a form of intelligent software. Unattended bots perform without any human help. Attended bots work with people on processes that require human intervention.

monitors all IT projects and investments, including the alignment of the IT portfolio with HUD's strategic direction. The Technical Review Committee, chaired by the Chief Technology Officer, oversees technology that is procured with OCIO funds and makes technical recommendations. Lastly, the Investment Review Committee, chaired by the Investment Management Division director, ensures that IT investments align with HUD's strategic plan, makes recommendations for IT investments, and supports the IT budget formulation processes.

Federal Housing Administration Modernization

Initiatives

The FHA modernization effort has successfully transformed the FHA loan origination and claims process. HUD has successfully managed the project and gained efficiencies, security, and cost savings to industry partners. With support from congressional appropriations, OCIO and FHA initiated a modernization effort, called FHA Catalyst, to improve how Housing program participants do business with FHA throughout the life cycle of the loan, from origination and endorsement to disposition. FHA Catalyst was developed to transform program participants' interactions with FHA across a single technology platform. Housing's modernization roadmap was created with single-family business processes and functions in mind, although multifamily business processes were considered as well for future development. Previous versions of the modernization roadmap were focused on one-for-one system replacements, while the latest version of the roadmap focuses on an agile approach to address cost savings and industry efficiencies across all FHA systems. One FHA official indicated that much of the success of FHA Catalyst can be attributed to the "authentic" collaboration between OCIO and Housing.

FHA Catalyst Implemented and Planned Modules

OCIO and FHA used an agile modernization approach that resulted in quick releases of targeted areas for modules launched within FHA Catalyst. These modules included origination and endorsement, claims processing, electronic document delivery (EDD), servicing, and disposition.

HUD deployed electronic document delivery in 9 business days in response to the COVID-19 pandemic.

FHA Catalyst's agile approach allowed for a reprioritization of tasks to quickly respond to policy and operational changes due to the COVID-19 pandemic. HUD indicated that the EDD module in FHA Catalyst was deployed in 9 business days to allow for the submission of single-family case binders for endorsement because of the Homeownership Center (HOC) closures. Before the EDD implementation, this mission-essential function was suspended because of office closures associated with the pandemic due to lender requirements to physically mail the case binders to HUD offices. As a result of the initial EDD successes using FHA Catalyst, the module was adopted in other program offices. Additional modules of FHA Catalyst were deployed, including

- loss mitigation claims to provide relief for lenders and homeowners impacted by job loss or reduction of income,

- Office of Native American Programs Section 184-184A case binders for loan guaranty,
- multifamily applications for endorsement, and
- loan review binders.

OCIO planned additional capabilities for deployment in FHA Catalyst throughout FY 2021, including those listed in table 1 below. OCIO indicated that full implementation of FHA Catalyst is projected to be completed in FY 2023 contingent upon sufficient funding and leadership priorities. Appendix A, roadmap #1, provides more details on FHA's modernization systems, statuses, and timelines.

FHA Catalyst planned capabilities	Description
Migration of all claim types	Into the Claims module after initial deployment.
Loan application data	Via direct integration with lenders' loan origination systems.
Credit underwriting	With detailed eligibility feedback provided to the lender.
Loan closing	Allowing for the collection of industry standard Uniform Closing Dataset.
Loan endorsement	Allowing for the fully digital completion of the application and endorsement process.
Active servicing	Onboarding of endorsed loans to the FHA active portfolio and migrating legacy cases, which allows decommissioning of legacy insurance systems.
Origination full capability	Enabling loan application to endorsement capability.
Portfolio reporting	Default and performing loan data and allowing decommissioning of legacy default monitoring and reporting systems.
Claims processing	Digitizing claim policy and allowing decommissioning of legacy claim systems.

Table 1. FHA Catalyst future capabilities

Funding

HUD estimated the overall cost for the full FHA Office of Single-Family Housing (Single Family) IT modernization to be around $88 million over 4 years.[17] Thus far, HUD has contributed approximately $8 million in funds for planning the project and received three $20 million earmarked appropriations from Congress for housing modernization covering FY 2019-2021, leaving approximately $20 million needed to complete the effort. The specific appropriation in the IT Fund requires the submission of a performance plan before HUD may obligate funds for DME activities. The performance plan includes a description of each initiative; how each of the $20 million earmarks are distributed among all FHA Catalyst modules; the IT funds committed by Housing; the total planned costs, costs incurred to date, and actual costs; and planned start dates, actual start dates, planned completion dates, and actual

[17] HUD's project plan from November 2020 estimated the total cost to be around $91 million.

completion dates. The performance plan from November 2020 stated that every module was on track with the planned start and completion dates.

Cost Savings

According to HUD, once fully deployed, FHA Catalyst will enable the decommissioning of at least 11 legacy HUD IT systems, saving approximately $20 million annually in O&M costs of legacy systems.[18] After factoring in the costs of the new modernized environment, OCIO projects a savings of $5-10 million in annual operating costs once the project has been completed. Additionally, estimated operational cost savings through the elimination of paper-based processes for FHA and its program participants are depicted in figure 3 below. HUD estimated that FHA Catalyst will save lenders approximately $200 million annually by eliminating paper-based processes.

Estimate Operation Cost Savings Through Digitized Submission via FHA Catalyst	
Annual Paper Case Binders	300,000
Annual Paper Claims	100,000
Total Annual Paper Submissions	400,000
Per File Shipping, Handling, and Administrative Costs	$500
Total Annual Cost	**$200,000,000**

Figure 3. FHA Catalyst estimated cost savings for lenders[19]

Industry Efficiencies

FHA and the lenders have realized more benefits in addition to cost savings. Some of these benefits include improved processes and a reduction in paper-based tasks. For instance, to send a case binder to HUD at the HOCs, a lender with digital systems and processes would have to print the required HUD documentation and mail it to FHA for processing. Once received at the HOC, HUD employees would scan and digitally store the loan documents. FHA Catalyst, with its EDD module, reduces the manual processing and increases efficiencies for both HUD and the lender. See figure 4 below for actual realized benefits and improvements as of February 2021 that HUD provided, including the number of case binders submitted into FHA Catalyst that align with HUD's estimate.

[18] HUD OIG did not confirm these estimates and relied on HUD's statements and reports regarding cost savings.
[19] 300,000 annual paper case binders + 100,000 annual paper claims = 400,000 total annual paper submissions. The per file shipping, handling, and administrative costs are estimated at $500. Estimated 400,000 total annual paper submissions at $500 each = $200,000,000 total annual cost savings for lenders using FHA Catalyst digitized submission.

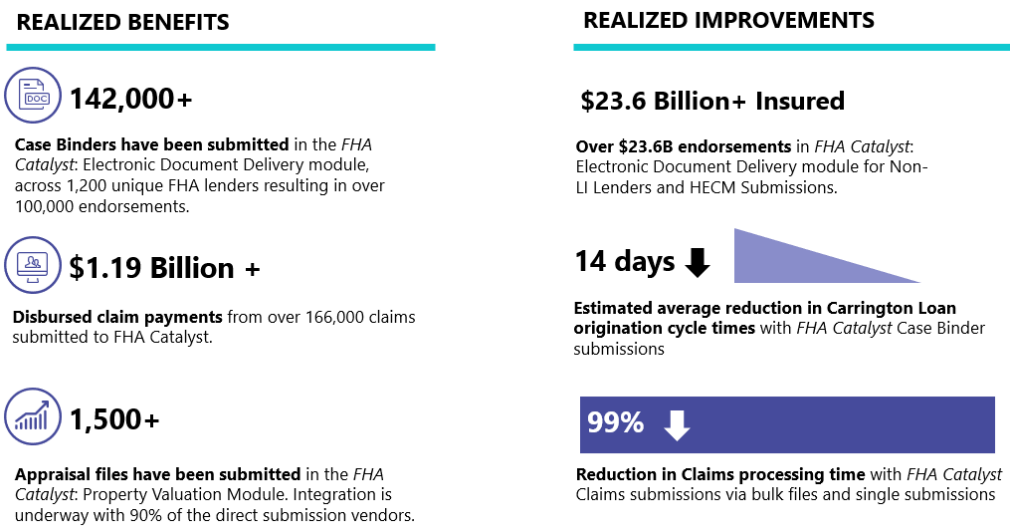


Figure 4. FHA Catalyst industry efficiencies, as of February 3, 2021[20]

Challenges

FHA faced many challenges that made modernization of its systems necessary, both historically and currently. FHA has more than 20 IT systems that manage the Single-Family program. The systems lack modern features and have high O&M costs, as discussed in the cost savings section above. These systems cannot properly evaluate whether lenders fully comply with FHA underwriting and servicing policies and do not provide lenders with feedback on loan application data. FHA relied on many operationally inefficient paper-based processes and quality control processes that increased HUD's and the lenders' PII risks.

Other challenges include HUD staff's resistance to change and adapting to new systems and processes. Additionally, the success of FHA Catalyst is dependent upon several factors that pose potential risk. The leadership transition has resulted in a shift in focus from continued FHA Catalyst module deployments and improvements to other program office priorities.[21] This change not only affects HUD but affects the industry as it has already committed, allocated resources, and begun integrating FHA Catalyst into its business processes. Lastly, the progress, continued development, and improvement of FHA Catalyst is dependent on annual appropriations through FY 2023.

[20] Carrington Mortgage Services, LLC is a fully integrated mortgage company with lending and mortgage servicing operations that conducts business with HUD.
[21] After fieldwork ended in March 2021, OIG was informed that there may be delays in FHA Catalyst development. The extent and cause of those delays are outside the scope of this report.

Feedback From Users

HUD gathered many lender insights to address their business needs related to FHA processes. HUD described how lenders were concerned about many aspects of legacy FHA systems and processes, including the security of FHA systems, business processes, user-friendly systems, and lack of industry efficiencies. Historically, lenders expressed that the system capabilities were not designed from a business or customer perspective. Further, FHA did not provide lenders with application programming interfaces (API) and did not adopt industry standard datasets that would align to operational processes with other mortgage portfolios. These lender insights provided useful information on how to improve FHA processes during the development of FHA Catalyst. HUD provided feedback received from lenders, showing that the largest lenders praised FHA Catalyst and the intuitive user interface. HUD continues to conduct lender feedback stakeholder sessions weekly to gather continual feedback on the modules deployed in FHA Catalyst. Lastly, HUD reported that the Office of Management and Budget (OMB) informed them that FHA Catalyst is the most successful IT project in HUD's history.

OMB informed HUD that FHA Catalyst is the most successful IT project in HUD's history.

Public and Indian Housing Modernization

Initiatives

PIH is also embarking on an IT modernization effort in coordination with OCIO to enhance public-facing systems to meet the office's growing insurance and subsidy program needs. PIH identified seven initiatives for modernization that should lead to cost savings and industry efficiencies for PIH and its external stakeholders. Six of the seven initiatives are ongoing, with the remaining one planned to start in the third quarter of FY 2021. PIH, like FHA, received a congressional appropriation in FY 2021 for the modernization and development of its IT systems. According to PIH's performance plan, this funding supports the following seven initiatives identified for PIH modernization and described in detail below:

- Inventory Management System-PIH Information Center (IMS-PIC)
- PIH Data Warehouse modernization
- Enterprise Voucher Management System (eVMS)
- Grants Enterprise Management System (GEMS)
- Operating Fund portal modernization
- Loan Origination System for Section 184 – Native Advantage
- National Standards for the Physical Inspection of Real Estate (NSPIRE)

IMS-PIC: IMS-PIC data are used to calculate more than $30 billion in annual HUD subsidies. The system has become cost prohibitive to maintain and enhance. This modernization initiative is expected to improve efficiencies, streamline data entry and processing, and improve reporting and analytics. The modernized application will be able to handle changing business needs and

provide improved service to both those receiving the subsidies and HUD's housing partners. The IMS-PIC modernization is scheduled for completion in the second quarter of FY 2022.

PIH Data Warehouse: The PIH Data Warehouse initiative will provide homogenized storage of PIH's information to support the enterprise analytics platform. This information can then be used for data analytics and reporting needs. The data and data sources that PIH currently maintains will be migrated to the data warehouse. The PIH data warehouse is scheduled for completion in the third quarter of FY 2022.

Voucher Management System: Currently, PIH uses its Voucher Management System (VMS) to provide $22.2 billion in payments to public housing agencies (PHA) for tenant-based rental assistance. eVMS will modernize the existing VMS to monitor and manage PHAs' use of vouchers. Additionally, eVMS will use PHA data that are 1-2 days old rather than the current 45- to 60- day data delay, resulting in the obligation and disbursement of funds in a much timelier manner. eVMS is scheduled for completion in the third quarter of FY 2022.

eVMS will collect data from PHAs to fund, obligate, and disburse funding in a timely manner.

Grants management: The Office of Native American Programs (ONAP) administers housing and community development grant programs to assist tribal communities in promoting home ownership and community development. As part of HUD's IT modernization program, OCIO will replace a legacy management system for grants with GEMS. GEMS is expected to allow ONAP to better manage grants and the program's risks as well as provide lower costs and increased efficiencies. The results of the GEMS project can then be leveraged across other HUD program offices, like the successes that have occurred under the FHA Catalyst program. The grants management modernization is scheduled for completion in the first quarter of FY 2023.

Operating Fund portal: HUD provides an annual subsidy totaling $4.5 billion to PHAs to help them meet operating and management expenses. This functionality is currently provided through a web-based platform. As part of this modernization project, the platform will be built on a cloud-based system and improve automation of data processes. HUD's goal is to have a quicker response to changes in business needs as well as inline calculations, validations, and business logic. The Operating Fund portal modernization is scheduled for completion in the second quarter of FY 2022.

Native Advantage: ONAP guarantees loans under Section 184 and Section 184A. These programs were heavily reliant on paper-based processing, and COVID-19 has forced changes to this processing method. According to PIH, the ONAP Office of Loan Guarantee Section 184's Loan Origination project discontinued in February 2021 due to the challenge in onboarding lenders and a delayed timeline. Native Advantage was launched in January 2021, leveraging functionality already developed for the cloud-based FHA Catalyst to modernize processing. Some functionality was released in June 2020. This initiative continues to support the development of new functionality in modules for claims, origination, and appraisals. An FY

2018 HUD OIG report[22] concluded that PIH spent $4 million on developing ONAP-LOS and it still did not satisfy all management and oversight objectives. OCIO estimated that $900,000 in annual O&M costs for ONAP-LOS will be reduced for this modernization because of functionality adopted from FHA Catalyst. The Native Advantage claims, loan origination, and appraisals modules are scheduled for release in the fourth quarter of FY 2021. Due to the shift in priorities following leadership changes, the Native Advantage module implementation scheduled for the fourth quarter may be at risk of not being implemented.

Physical inspections: Finally, HUD expects a modernized NSPIRE technology solution would enhance the current series of disjointed, manual, and error-prone steps into a streamlined, data-infused, holistic process that enables HUD's Real Estate Assessment Center (REAC) to carry out its core mission more effectively. The NSPIRE solution was scheduled to begin in April 2021 and scheduled for completion in the first quarter of FY 2023. We identified issues around the NSPIRE solution, which are further discussed in the challenges section below.

Timelines

PIH is in the early stages of its IT modernization timeline in relation to FHA's modernization efforts. PIH's modernization timeline indicates that its current initiatives are expected to finish in the first quarter of FY 2023. PIH used FHA Catalyst's agile approach, and all projects are planned to release capabilities into production throughout development. Appendix A, roadmap #2, provides more details on PIH's modernization, including its systems, statuses, and timelines.

Funding

PIH received $20 million in earmarked appropriations from Congress for IT modernization in FY 2021. The specific appropriation in the IT Fund requires the submission of a performance plan before HUD may obligate funds for DME activities, like the FHA funding requirement. HUD estimated $31.7 million to complete the seven PIH projects in December 2022. HUD funded these modernization efforts with $7 million from their IT funds, $20 million in earmarked appropriations in FY 2021, and estimated $4.7 million in future funding is needed.

Cost Savings

The PIH modernization efforts were in the initial stages of development at the time of this evaluation. Therefore, HUD was not able to provide estimated cost savings. However, HUD anticipated there will be O&M cost savings due to legacy system replacement with the same cloud environment platform used by FHA and other modernization efforts.

Industry Efficiencies

According to PIH's performance plan which details each project's functional and performance capabilities, PIH expects that these modernization initiatives will improve the efficiency of its operations for all stakeholders. The IMS-PIC project is designed to allow PHAs to submit forms

[22] HUD OIG Evaluation Report 2018-OE-0004, IT System Management and Oversight of the Section 184 Program, dated August 13, 2018

electronically, reducing the need for processing paper forms and reducing the chance of inadvertent errors. The PIH data warehouse should eliminate inefficiencies in the design of PIH's existing data analytics environments. eVMS is planned to both improve the timeliness of data used for housing assistance payments and perform daily reconciliation of reserve balances.

Three of the modernization projects (GEMS, Operating Fund portal, and Native Advantage) are expected to provide efficiencies that can be leveraged across other HUD program offices. Some future efficiencies will be leveraging functionalities that have already been developed for other program offices. GEMS is being designed to reduce manual data entries, which would then reduce data inconsistencies, the time spent on these manual processes, and costs. The reduced time spent on manual processes could allow employees to perform other work. Additionally, HUD's goal is for GEMS to enable more remote work and improve continuity of operations, resulting in improved employee efficiency. These improvements can potentially be leveraged in future modernization projects.

Modernization of the Operating Fund portal replaces a tedious process of sending 14,000 Microsoft Excel files from PHAs to HUD.

The Operating Fund portal modernization project will be connected to other modules, providing a "one stop" place for PHA users. The improved portal is planned to allow for the electronic submission of two HUD forms, 52722 and 52723. Previously, these forms were sent as Excel files directly to all 7,000 PHAs and returned to HUD, for a total of 14,000 Excel files. PHAs were unable to see HUD changes to the forms that they had submitted. The modernized portal should resolve both the need to transmit the large number of Excel files and the inability of PHAs to see updated versions of their submitted forms.

Native Advantage has also used functionality already developed as part of the FHA Catalyst platform to speed the delivery of some of its key services. Changing the configuration of the existing platform was determined to be more efficient, with improved timeliness and financial advantages, than building a new platform. According to PIH's performance plan, this modernization initiative continues to build upon the success of FHA Catalyst to provide additional functionality in the areas of loan origination, appraisals, and claims processing to further support the ONAP loan guarantee program.

The NSPIRE modernization initiative is expected to use automated analysis of "big data" to replace "human only" analysis, resulting in improved efficiency for physical inspections. This initiative replaces tedious and error-prone manual processes with an automated system that is more comprehensive. As a result, HUD should be able to analyze and report inspection results in a more timely and accurate manner. PIH REAC expects this project to improve the operational effectiveness of HUD's physical inspections to a greater scope, scale, and speed than has been previously achieved.

Challenges

HUD's modernization strategy has brought improvements to the process, which avoids challenges PIH modernizations have faced in the past. OCIO continues to look at the end state

and take action to discontinue efforts even when projects have expended significant financial resources, but the result will not contribute positively to HUD. One example of this strategy is the CIO's decision to terminate the PIH Information Center-Next Generation (PIC-NG) modernization effort in January 2021. This previous effort has now been replaced with the IMS-PIC initiative previously described. Since 2016, HUD has spent more than $8 million on the development of PIC-NG. PIC-NG was not built in alignment with OCIO's system architecture or strategy, and the system did not have an approved ATO due to security deficiencies, as OCIO had minimal involvement in its development. The cost to finish PIC-NG was estimated at $15-20 million, while the cost of the entire IMS-PIC initiative is projected to cost $4.6 million. OCIO and PIH will need to apply lessons learned from PIC-NG to ensure that future modernization efforts are successful.

In summary, the CIO's decision to terminate the PIC-NG modernization effort was based on an independent, third-party assessment which recommended to cancel PIC-NG based on the following:

- significant risks to mitigate security vulnerabilities and other business needs,
- data architecture and downstream negative impacts due to legacy data models,
- resource and knowledge gaps due to staff turnover (lack of knowledge transfer processes),
- continued delays due to project complexity, and
- costly maintenance and staffing shortfalls to support multiple overlapping systems.

Another challenge for PIH has been the transition of 36 REAC IT staff members to OCIO. REAC's staff was transitioned to OCIO in November 2019 but continued to support REAC-specific projects for an additional year. REAC managed its own IT operations and development before this decision, which was made to consolidate IT resources with OCIO in accordance with FITARA and to prevent siloed IT implementation approaches. Previously, REAC coordinated directly with internal REAC IT staff. Now, the interactions have transitioned into a service request relationship with OCIO. PIH officials expressed that this relationship could pose a challenge moving forward because PIH was accustomed to having dedicated IT staff.

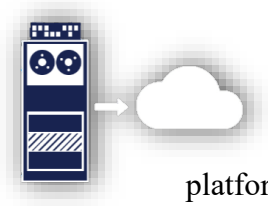
Additionally, in February 2020, REAC concluded that the NSPIRE application did not meet requirements to perform inspections, which led to the project being put on hold in March 2020. This hold occurred even though OCIO stakeholders believed the contractor had adequate capacity to complete the NSPIRE contract and meet REAC's requirements. REAC selected a contract under a General Services Administration blanket purchase agreement for a vendor to perform inspections under NSPIRE using the vendor's application, but OCIO did not approve the request, stopping the contract. According to PIH, OCIO and PIH have resolved concerns and have been working closely and collaboratively on the NSPIRE effort. Challenges such as this will need to be addressed through coordinated collaboration, communication, and senior leadership support; otherwise, there is a risk of failed projects.

Feedback From Users

PIH's modernization efforts were still in the initial stages of development during this evaluation. Therefore, PIH was not able to provide details of user feedback during the evaluation but noted that it was collecting data from external users to address their business needs.

Improving Technologies

Initiatives



OCIO recognized that mainframe platforms were operationally inefficient, increasingly difficult to secure, and costly to maintain, which represents an increasing liability as they age. Therefore, OCIO was in the process of retiring its 2 mainframe platforms, IBM and Unisys, and migrating 19 legacy systems from those platforms to modernized cloud technologies. OCIO included a multiyear effort within HUD's overall modernization roadmap to migrate the legacy mainframe applications to secure, scalable cloud platforms that provide HUD with greater maintainability, agility, and cost effectiveness. The migration included systems from FHA, OCFO, the Office of Community Planning and Development (CPD), and the Office of Policy Development and Research. OCIO is using the TMF to transition systems from one mainframe platform to the cloud. Additionally, the mainframe modernization efforts will help strengthen key asset management and debt collection systems within FHA's Single-Family Housing financial systems. Lastly, mainframe modernization will improve the centralized address data and geocoding service that HUD programs use.

> Cloud technology provides HUD with greater maintainability, agility, and cost effectiveness.

OCIO's goal is to migrate 10 of these systems into the cloud in FY 2021. The remaining systems are in the analysis and planning stage of the modernization process. Appendix A, roadmap #3, provides more details on OCIO's mainframe modernization systems, statuses, and timelines.

Improving Enterprise Capabilities

HUD has several other modernization initiatives underway, including efforts to improve enterprise capabilities. These efforts include standing up a centralized, cloud-based analytics and data visualization environment, referred to as the EAP. OCIO is also improving its network and data system defenses and lowering the time from threat detection to threat elimination. HUD's roadmap described the deployment of RPA bots to automate repetitive and rules-based business tasks with accuracy and virtually no human input required, which frees up staff for other work. Additionally, in September 2020, OCIO updated its 2017 enterprisewide identity, credential, and access management (eICAM) strategy. This strategy outlines the implementation of an enterprisewide access management solution supporting multifactor authentication for all users, although this initiative was not on the HUD roadmap.

Enterprise Analytics Platform

OCIO has two dashboards, one for FHA and another for CPD stakeholders. Additionally, OCIO developed a property search tool for the public. OCIO is working toward a centralized data visualization and analytics platform, referred to as EAP, which includes dashboards, analytics, and program metrics for senior leadership. The EAP goal is to provide senior leaders access to reliable, near-real-time data with insights to core programs, including mobile device accessibility through multiple dashboards. One dashboard is for CPD's Home Investment Partnerships Program (HOME),[23] which helps HUD stakeholders track more than $300 billion in grants across eight programs. A second dashboard consists of the FHA Single Family Default Monitoring Dashboard, which gives leadership insights into payment defaults, delinquency rates, and other key mortgage insurance metrics.

Additionally, HUD is working to provide relevant and timely information to the public. For instance, at the height of the COVID-19 pandemic in 2020, HUD deployed a new Multifamily Housing Property Search Tool,[24] which assisted tenants in determining whether their homes were in multifamily properties that have FHA-insured mortgages or receive rental assistance under multifamily housing rental assistance programs. Renters in these properties were protected from eviction under the Coronavirus Aid, Relief, and Economic Security Act moratorium. HUD's agile modernization approach led to the ability to successfully shift priorities to address this immediate need.

Cybersecurity Program Maturation

HUD's roadmap also focuses on the design and implementation of a cybersecurity framework tailored for HUD's increasingly cloud-focused architecture and geographically distributed workforce. HUD and OCIO realize these cybersecurity shortcomings and continue to address open recommendations from the OIG FISMA evaluations. HUD continues to mature its cybersecurity program areas, such as governance, risk management, and improving Security Operations Center (SOC) capabilities. With the SOC becoming operational in FY 2020, OCIO emphasized improvements in cyber threat intelligence, analytics, and incident management. Additionally, OCIO prioritized an IT governance structure to establish a strategic cybersecurity framework that incorporates metrics, recommendation remediation, policy oversight, and a robust operating model. Lastly, OCIO is standardizing processes that drive continuous monitoring, ongoing IT system authorization, and data loss prevention to reduce overall risk. OCIO is updating its ATO process and using a continuous monitoring approach as part of that maturation. HUD was piloting five systems in the initial phase of its updated ATO and continuous monitoring process, often called ongoing authorizations. Other cybersecurity initiatives include developing a continuous

[23] HOME is the largest Federal block grant to State and local governments designed exclusively to create affordable housing for low-income households.
[24] https://www.hud.gov/program_offices/housing/mfh/hsgrent/mfhpropertysearch

monitoring strategy and implementation, developing an ongoing authorization strategy and processes, and defining reporting requirements for ongoing authorization reporting.

Information security is an important aspect of all IT system modernization efforts. The Chief Information Security Officer should be involved in modernization efforts early in the process. Program offices are required to submit a request to the Office of IT Security (OITS) in advance of requiring an ATO to ensure that security control assessments are conducted and proper approvals of ATOs are obtained before systems operate on the HUD network. OITS conducts security assessments of new systems and before the release of new modules on current systems. OITS developed a plan to issue risk-based decision memorandums for systems that have upcoming expiring ATOs but are scheduled to be included in ongoing modernization efforts and eventually decommissioned. FHA Catalyst, the joint FHA and OCIO modernization effort, received an ATO for its platform, which is a Federal Risk and Authorization Management Program (FedRAMP)[25] certified solution, that completed the HUD security assessment process.

Documenting and remediating plans of action and milestones (POA&M) resulting from security assessments are key steps to ensuring information system security. Each modernized system requesting an ATO approval should remediate the POA&Ms resulting from the security control assessment before systems operate on the HUD network. OITS expressed concerns about program offices' not addressing POA&Ms and, instead, relying on risk-based decisions to continue operations of systems even when remediation steps were not taken. OITS will need the collaboration and cooperation of program offices to continue strengthening HUD's cybersecurity program.

Robotic Process Automation

HUD is deploying an RPA program by implementing "bots" to "automate repetitive, rules-based business tasks, which OCIO reported could lead to more accuracy with little to no human input required, freeing staff resources for other work." OCIO continues to develop its RPA Governance Framework with policies that define RPA bot tasks and how security and monitoring will be conducted. HUD OIG plans to conduct a more detailed evaluation of RPA soon.

Enterprise Identity, Credential, and Access Management (eICAM)

OCIO updated a 2017 strategy for implementing an enterprisewide access management solution supporting multifactor authentication for all users, although this initiative was not on the HUD roadmap. If included on the roadmap, this enterprisewide capability would give program offices and other stakeholders awareness of OCIO's initiatives. According to the updated strategy, a roadmap for migrating applications to a new solution was in development. OCIO recognized that a modernized solution would address HUD system access and security challenges, enabling HUD to retire multiple vulnerable access management solutions implemented within program

[25] FedRAMP was established in 2011 to provide a cost-effective, risk-based approach for the adoption and use of cloud services by the Federal Government. FedRAMP empowers agencies to use modern cloud technologies, with an emphasis on security and protection of Federal information.

offices. Like other modernization initiatives, this strategy is contingent upon sufficient DME funding and HUD leadership prioritizing funding to implement the strategy. This initiative will be evaluated in further detail during HUD OIG's annual FISMA evaluation.

Other Modernization Initiatives

HUD developed several other modernization initiatives, including efforts within other program offices. We did not review these efforts in detail but are noting them in this report to capture all aspects of HUD's IT modernization plans, priorities, and long-term strategy. The following are statements in HUD's modernization roadmap describing modernization initiatives.

Office of Fair Housing and Equal Opportunity

Modernization within FHEO includes rearchitecting the platform that enables Davis-Bacon Labor Standards to execute its HUD mission and comply with the current Davis-Bacon Act and amendments. The new FedRAMP-authorized platform is intended to provide better integration capability with HUD financial systems and interoperability using APIs.

Office of Administration

OCIO was in the process of implementing an ongoing artificial intelligence project to help solve HUD's unique procurement and human capital management business challenges. To identify issues in these process areas, OCIO deployed an automated tool to map complex business workflows. This tool should provide a better understanding of the current processes and opportunities to accelerate HUD's purchasing and hiring cycles.

Office of Public Affairs

OCIO is enhancing the customer experience of FHA.gov with a focus on meeting service needs more efficiently. The new site, which uses a mobile responsive design for a consistent experience on any device, will increase HUD's public outreach capabilities and integrate with FHA's social media. HUD stated the improved site also makes it easier for HUD staff to update the latest content and builds for enhanced search functionality.

Office of the Chief Financial Officer

HUD also developed initial financial management system modernization plans. OCFO and OCIO collaborated through the IT Fund capital planning process and developed HUD's initial financial management systems transformation plan, although an implementation date has not yet been established. HUD prioritized loans management modernization in FY 2019 and determined that although a HUD-wide grants management process, financial management, and technology modernization are required to further address HUD's needs, it was determined to not be a priority modernization effort. Therefore, OCFO and OCIO acknowledged that for the foreseeable future, there will be no plans for the grants management initiative, as the primary focus will be on loans management modernization.

Office of Field Policy and Management

Within the Office of Field Policy and Management, OCIO is reengineering the Section 3[26] Performance Evaluation and Registration System, which captures data on the number of Section 3 residents hired or receiving training positions and the number of contracts awarded to Section 3 businesses. This information will assist with financial grant recipients who must meet certain obligations for the creation, or utilization of employment and education opportunities.

Government National Mortgage Association Modernization

Ginnie Mae has developed a specific IT modernization roadmap, which is separate from that of HUD. Ginnie Mae stated that its modernization efforts are aligned to its initiatives that focus on its securitization platform. A 2012 agreement between HUD and Ginnie Mae stated that Ginnie Mae was authorized to manage its own IT systems and appoint its own CIO. The agreement expressed that Ginnie Mae has business needs that are specific and distinct from those of HUD. As a result, the 2012 agreement authorized Ginnie Mae to develop and operate IT systems for secondary mortgage market activities separately from HUD's systems. FITARA implementation requires the CIO to develop a CIO assignment plan when a CIO delegates aspects of FITARA to other department officials. This requirement is applicable to the Ginnie Mae CIO. In FY 2018, the HUD CIO provided a delegation of authority memorandum to the Ginnie Mae CIO addressing all delegations of FITARA common baseline elements. Future collaboration between Ginnie Mae and HUD OCIO may present opportunities to coordinate modernization efforts.

Modernization Strategy

Ginnie Mae is engaged in a multiyear effort initially undertaken to modernize the Integrated Pool Management System (IPMS) and corresponding business processes essential to supporting Ginnie Mae's securitization activities and administering its mortgage-backed securities (MBS) programs. At the time of our evaluation, Ginnie Mae was in year 8 of modernizing the IPMS, security processes, reference architecture, data architecture, and supporting hardware and software. Ginnie Mae established a charter for its securities platform modernization that defines roles and responsibilities. Ginnie Mae's principles for IT modernization are to continue to enable home ownership for U.S. citizens; become a market leader in the MBS industry; operate modernized, transformed, scalable, and efficient infrastructure that supports high-quality applications; provide a seamless user experience to program participants; and be an agile organization that responds to market changes quickly. Ginnie Mae's IT vision and strategy consist of four pillars as shown in figure 5 below.

[26] The Section 3 program requires that recipients of certain HUD financial assistance, to the greatest extent possible, provide training, employment, contracting, and other economic opportunities to low- and very low-income persons, especially recipients of government assistance for housing, and to businesses that provide economic opportunities to low- and very low-income persons.

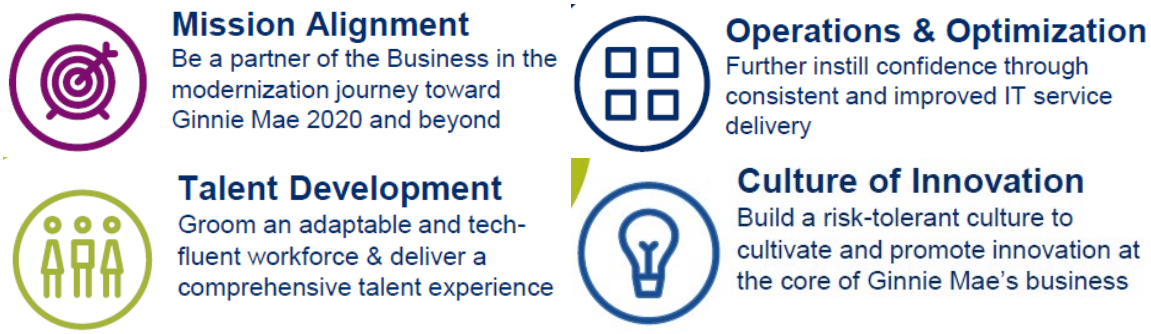


Figure 5. Ginnie Mae IT vision and strategy

Ginnie Mae uses these four pillars to guide its IT modernization strategy. Its goals include modernizing to an agile multi-cloud architecture IT environment that effectively delivers on the mission and strategic objectives and optimizes operations. Additionally, Ginnie Mae plans to continue to establish a culture of innovation to stay on top of market trends and develop talent in the workforce to support an evolving IT environment.

Initiatives

The Ginnie Mae IT modernization roadmap tracks each initiative's status, including start and end dates. It provides a snapshot of each major category and individual initiative within each category from calendar years 2018 through 2022. Some of the ongoing modernization initiatives identified during this evaluation include

- customer experience and onboarding activities,
- Ginnie Mae Enterprise portal (GMEP) 1.0 migration to MyGinnieMae,
- document custodian strategy and implementation,
- data center modernization,
- Single Family Pool Delivery Module,
- Multifamily Pool Delivery Module, and
- decommissioning of previous systems.

Cost Savings, Industry Efficiencies, Funding, and Successes

Ginnie Mae Platinum securities allow investors to combine Ginnie Mae MBS pools with uniform mortgage interest rates and original terms to maturity into a single security. Investors receive a single payment from the combined securities every month rather than separate payments from each individual security, which lowers administrative costs and improves liquidity. Ginnie Mae's goals for the Platinum modernization was to minimize personal interactions among parties, improve customer experience, and maximize use of new technology in support of greater processing volumes. Ginnie Mae re-platformed the Platinum application in July 2017 to the new MyGinnieMae portal to automate workflows and processing. Baseline processing before modernization was up to 60 Platinum securities, which resulted in $2.3 million in fee revenue and $7.8 billion in volume during FY 2017. Ginnie Mae reported the following successes in its Platinum processes from FY 2018 through 2020, as described in table 2 below.

Fiscal year	Fee revenue	Revenue compared to FY 2017	Volume	Volume compared to FY 2017
FY 2017	$2.3 million	N/A	$7.8 billion	N/A
FY 2018	$3.9 million	170%	$19.5 billion	250%
FY 2019	$3.8 million	165%	$31.8 billion	408%
FY 2020	$5.7 million	248%	$23.9 billion	306%

Table 2. Ginnie Mae Platinum process improvements

Ginnie Mae indicated that the success of the Platinum application modernization was important because it does not have a dedicated IT modernization budget. According to Ginnie Mae, approximately one-third of its contract funding is spent on mortgage-backed securities issuance and bond administration and mortgage backed securities operations and analytics, that support modernization. Ginnie Mae IT modernization officials stated that the success in the Platinum application has funded other modernization efforts.

Another example of modernization success is the MyGinnieMae portal. Ginnie Mae stated the MyGinnieMae portal replaced an aging enterprise portal, GMEP 1.0, with features such as enhanced security and improved user experiences when working with Ginnie Mae business applications. The portal provides a single, central access point for Ginnie Mae business processes and a single sign-on to Ginnie Mae applications and legacy systems. Additionally, this portal supports multifactor authentication for additional security of financial applications. As of the end of calendar year 2020, all Ginnie Mae issuers and stakeholders were onboarded and using MyGinnieMae to conduct business.

Challenges

Ginnie Mae stakeholders noted several challenges in modernization. Initially in the modernization process, Ginnie Mae used IBM as its cloud service provider (CSP) to provide the services of some core functions and applications of its business, although this effort did not involve consolidation of applications. Ginnie Mae experienced issues and inadequate performance as it related to the service delivery of the Ginnie Mae systems and the stability of the Ginnie Mae environments. In this initial modernization process, Ginnie Mae migrated only its simpler processes to IBM, while its core mission, the securitization platform, was not migrated. The processes behind the securitization platform were more complex than those already migrated to IBM. This issue led Ginnie Mae to explore other CSPs and to develop a proof of concept in 2020 to migrate to a new CSP with full implementation planned for 2022.

Conclusion

HUD developed an IT modernization roadmap that encompassed system modernization, migration of technologies from mainframe platforms to the cloud, and continued maturity of its overall cybersecurity posture. HUD is executing on this roadmap and making significant progress in modernization. For future modernization initiatives, it would be beneficial for HUD to officially document assigned responsibility for updating the roadmap and apply lessons learned from both successes and challenges observed from past modernization efforts. HUD's

strategy for continued collaboration among OCIO, program offices, and external stakeholders has been useful in identifying the business needs of all parties involved and to cost effectively build systems while meeting business requirements. HUD's agile approach improved flexibility and allowed for the delivery of new functions incrementally. To date, FHA Catalyst has been referenced as the most successful effort due to its increased efficiencies and cost savings results, while being able to quickly respond to policy and operational changes due to the COVID-19 pandemic.

Recommendations and Opportunities for Improvement

We have two recommendations and five opportunities for improvement to assist in continued successes for future modernization efforts. Recommendations require a management decision and will be formally tracked. Opportunities for improvement do not require a management decision or formal tracking but provide HUD opportunities to review how it approaches its efforts to make immediate positive IT impacts.

Recommendations:

1. HUD OCIO should develop an enterprisewide IT modernization strategy that establishes a framework to align with the IT modernization roadmap. The strategy should define the following:

    a. Roles and responsibilities of key stakeholders throughout the modernization process, including an assigned responsibility to a role within OCIO for maintaining and updating the IT modernization roadmap on a recurring basis.

    b. Identification and prioritization of modernization initiatives, including initiatives within program offices and enterprise capabilities.

    c. Coordination process between OCIO and the program offices.

    d. An overview of each phase of the modernization process, such as the identification of business needs, security considerations, and system or capability implementation.

    e. How to capture lessons learned, both successes and challenges, to support future modernization initiatives.

2. HUD OCIO should obtain the proper approval and communicate the IT modernization strategy to all appropriate stakeholders, including HUD program offices.

Opportunities for Improvement:

3. HUD OCIO and OCFO should coordinate to include HUD grants and financial management modernization as part of the current and future modernization roadmap.

4. HUD OCIO should include the eICAM initiative as part of the current and future modernization roadmap.

5. HUD OCIO and PIH should continue to collaborate and coordinate modernization efforts with senior leadership support to reduce the risk of unsuccessful modernization projects.

6. HUD OCIO and Ginnie Mae should coordinate to provide insights into their modernization strategies, authority, plans, initiatives, and priorities, including the review of a 2012 agreement between Ginnie Mae and OCIO.

7. HUD OCIO should continue to emphasize and communicate to stakeholders, including congressional appropriation committees, the need for future development, modernization, and enhancement funding that supports modernization initiatives.

Agency Comments and OIG Response

Summary of Agency Comments

We requested comments on our draft report from agency officials. They provided technical comments, some of which we incorporated into the report, but they did not provide formal comments.

OIG Response to Office of the Chief Information Officer Comments

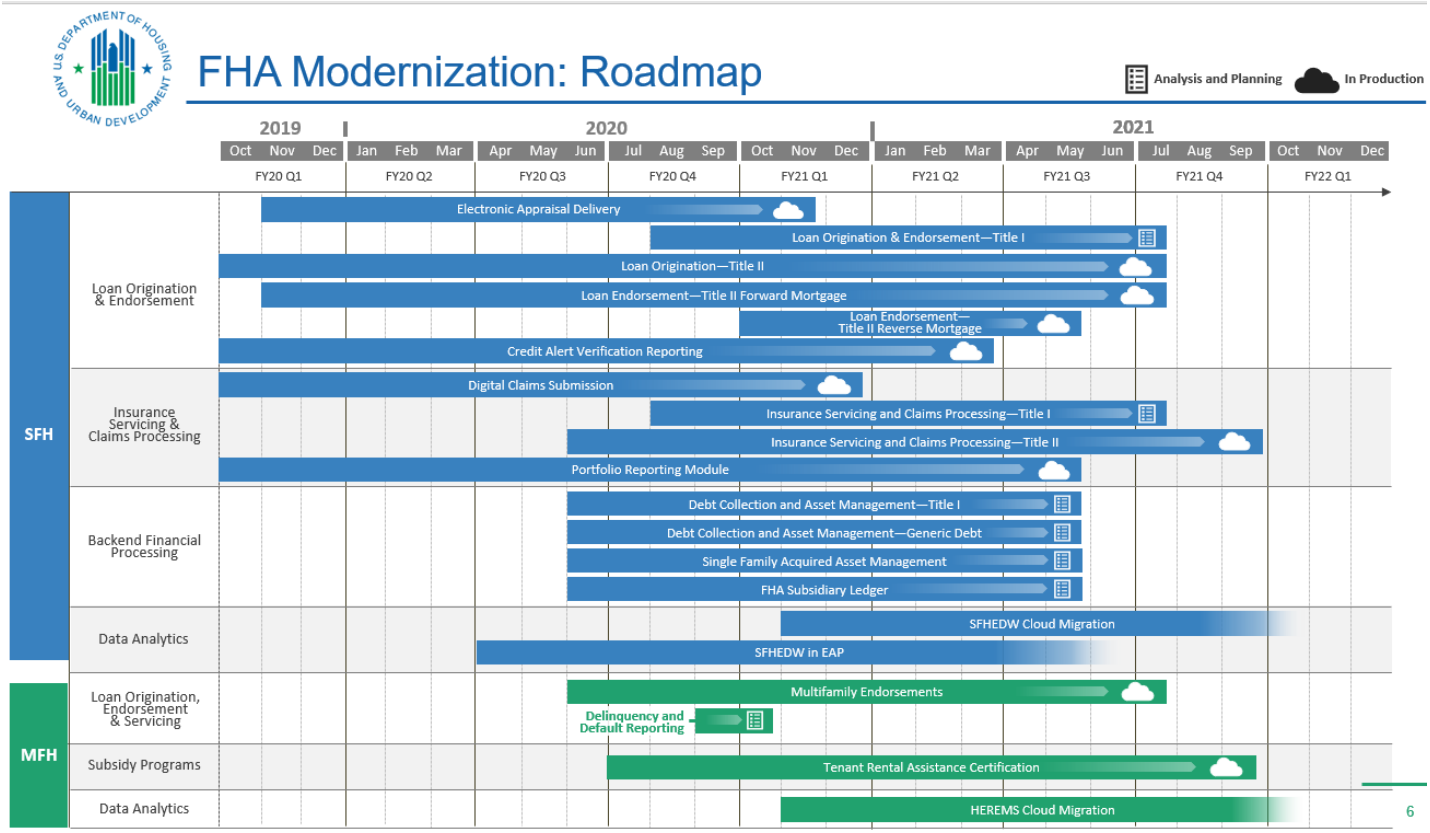
We encourage HUD to develop a corrective action plan for each new recommendation and allocate the personnel and resources needed to make the recommended improvements to address and continue to modernize its information systems. We look forward to working with HUD to reach a management decision on the unresolved, open recommendations in this report.

Appendixes

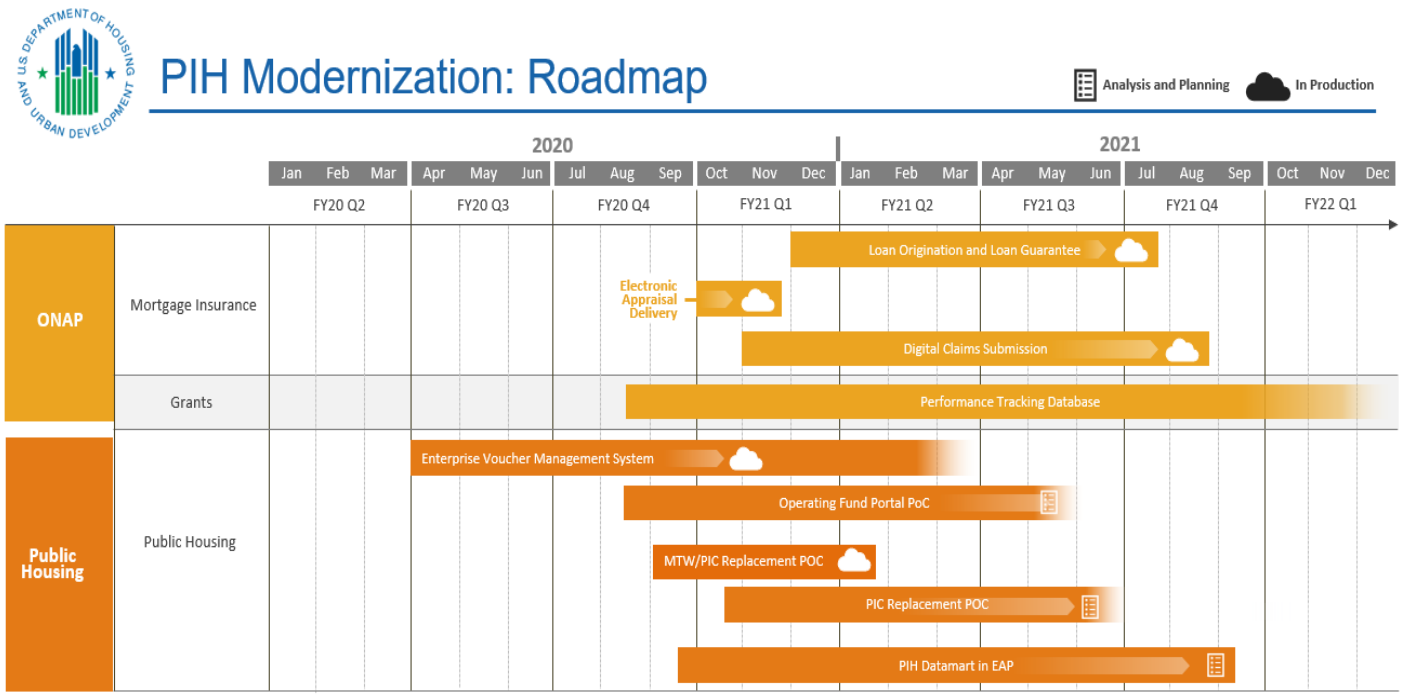
Appendix A – HUD IT Modernization Roadmap Timelines

HUD developed the following roadmaps with coordination from OCIO and the program offices. These roadmaps change frequently to adjust goals, priorities, and timelines. The version of the roadmap below is from October 2020, the most recent version that OCIO provided during the evaluation.

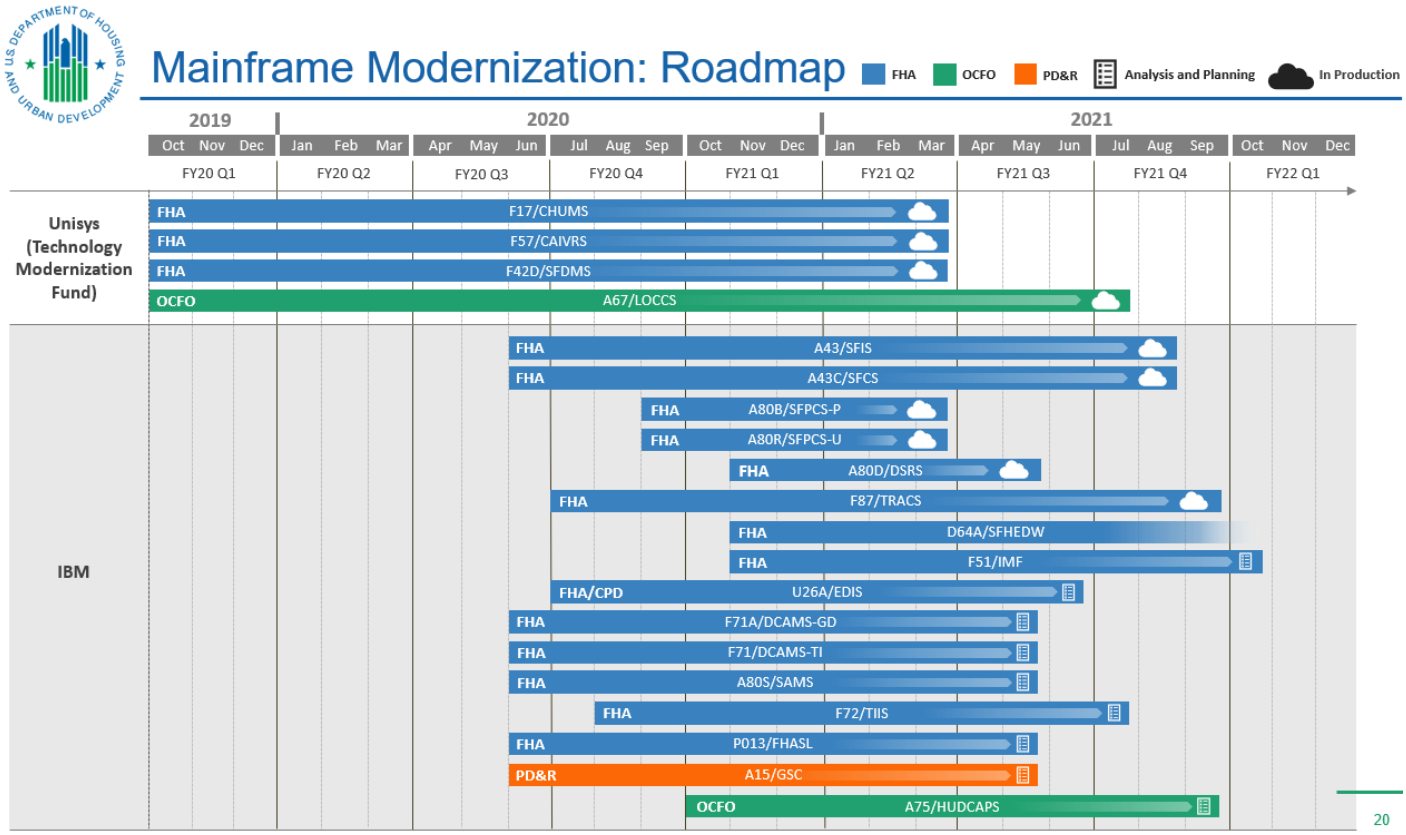
Roadmap #1: FHA Modernization



Roadmap #2: PIH Modernization



Roadmap #3: Mainframe Modernization



Appendix B – Acronyms

ACRONYM	DEFINITION
API	application programming interface
ATO	authority to operate
CPIC	capital planning and investment control
CSP	cloud service provider
DME	development, modernization, and enhancement
EAP	enterprise analytics platform
FedRAMP	Federal Risk and Authorization Management Program
FHA	Federal Housing Administration
FISMA	Federal Information Security Modernization Act of 2014
FITARA	Federal Information Technology Acquisition Reform Act
FY	fiscal year
GAO	U.S. Government Accountability Office
Ginnie Mae	Government National Mortgage Association
HOC	Homeownership Center
HUD	U.S. Department of Housing and Urban Development
IT	information technology
MGT	Modernizing Government Technology Act of 2017
NSPIRE	National Standard for the Physical Inspection of Real Estate
OCFO	Office of the Chief Financial Officer
OCIO	Office of the Chief Information Officer
OIG	Office of Inspector General
OMB	Office of Management and Budget
O&M	operations and maintenance
PIH	Office of Public and Indian Housing
PII	personally identifiable information
POA&M	plan of actions and milestones
REAC	Real Estate Assessment Center
RPA	robotic process automation
SOC	Security Operations Center
TMF	Technology Modernization Fund

Appendix C – Acknowledgements

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

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