USPTO Needs to Improve Its Cost Estimating, Scheduling, and Agile Practices to Timely Retire Patent Legacy Systems

UNITED STATES DEPARTMENT OF COMMERCE
Office of Inspector General
Washington, D.C. 20230

July 20, 2022

MEMORANDUM FOR: Kathi Vidal
Under Secretary of Commerce for Intellectual Property
  and Director of the United States Patent and Trademark Office

FROM: Frederick J. Meny, Jr.
Assistant Inspector General for Audit and Evaluation

SUBJECT: *USPTO Needs to Improve Its Cost Estimating, Scheduling, and Agile Practices to Timely Retire Patent Legacy Systems*
Final Report No. OIG-22-026-A

Attached for your review is our final report on the audit of the United States Patent and Trademark Office's (USPTO's) patent legacy systems. Our audit objective was to review USPTO's progress towards retiring its patent legacy systems. Specifically, we assessed USPTO's (1) cost, schedule, and capabilities of select patent legacy systems and (2) ongoing activities to transition from the legacy systems to next-generation systems.

We found that while USPTO continues to develop next-generation patent systems to replace and retire its patent legacy systems, USPTO's cost estimating and scheduling processes are not comprehensive for the patent product line investments. We also found that USPTO needs to improve Agile adoption practices when developing next-generation patent systems and continues to face challenges in replacing its unsupported servers.

On June 23, 2022, we received USPTO's response to the draft report's findings and recommendations. We also received technical comments. Based on those technical comments, we made changes to the final report where appropriate. In response to our draft report, USPTO generally concurred with all the recommendations and described actions it has taken, or will take, to address them. USPTO's formal response is included within the final report as appendix E.

Pursuant to Department Administrative Order 213-5, please submit to us an action plan that addresses the recommendations in this report within 60 calendar days. This final report will be posted on the Office of Inspector General's website pursuant to sections 4 and 8M of the Inspector General Act of 1978, as amended (5 U.S.C. App., §§ 4 & 8M).

We appreciate the cooperation and courtesies extended to us by your staff during this audit. If you have any questions or concerns about this report, please contact me at (202) 793-2938 or Amni Samson, Director for Audit and Evaluation, at (202) 510-5631.

Attachment

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Report in Brief

UNITED STATES PATENT AND TRADEMARK OFFICE

USPTO Needs to Improve Its Cost Estimating, Scheduling, and Agile Practices to Timely Retire Patent Legacy Systems

OIG-22-026-A

WHAT WE FOUND

We found the following:

I. USPTO's cost estimating and scheduling processes are not comprehensive.

II. USPTO needs to improve Agile adoption practices when developing next-generation patent systems.

WHAT WE RECOMMEND

We recommend that the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office direct the Chief Information Officer to do the following:

1. Establish a life cycle cost estimate (LCCE) and integrated master schedule (IMS) for current and planned PPL investments.

2. Establish a training plan to ensure PPL team members and other appropriate personnel receive specialized training to develop and maintain an LCCE and IMS.

3. Establish contingency plans consistent with the National Institute of Standards and Technology's *Risk Management Framework, Systems and Services Acquisition*, for system components when support for the components is no longer provided by the manufacturer.

4. Establish processes and procedures to ensure all end-user feedback is properly captured, tracked, and timely communicated to the appropriate product teams during the product life cycle.

5. Establish a detailed plan to ensure PPL team members and other appropriate personnel receive specialized training in developing key performance indicators (KPIs) and revise existing KPIs to ensure they are comprehensive.

6. Establish policy, guidance, and leadership roles and responsibilities for the Agile Delivery Office (or equivalent successor).

Contents

Cover: Herbert C. Hoover Building main entrance at 14th Street Northwest in Washington, DC. Completed in 1932, the building is named after the former Secretary of Commerce and 31st President of the United States.

Introduction

The United States Patent and Trademark Office (USPTO) relies on the performance of its information technology (IT) systems for managing its patent services. In fiscal year (FY) 2011, USPTO began its Patent End-to-End (PE2E) investment[1] to replace and retire critical patent legacy systems. The initial investment budget was approximately $130.2 million, with completion planned for FY 2013. This upgrade extended 7 years beyond that completion date, through September 2020. With additional work through 2020, the total expenditure was $734 million. However, USPTO did not fully complete its scope of work. Over that period, USPTO planned to develop nine next-generation[2] systems; however, three were developed and one was cancelled. USPTO deferred the remaining scope of work, which included developing the other five next-generation systems to retire eight legacy[3] systems. See appendix B for additional details regarding patent IT investment cost and schedule.

In August 2018, USPTO's PALM[4] system—a critical PE2E component—went offline for 9 days. In response to the outage, USPTO initiated a new IT management strategy known as the "New Ways of Working" (NWOW). With the NWOW, USPTO transitioned from a traditional project management approach focused on meeting milestones to a product[5] management approach focused on creating value for the customers. USPTO also refined its Agile[6] processes and implemented organizational changes to improve IT delivery. In FY 2021, USPTO incorporated the NWOW strategy into its Capital Planning and Investment Control (CPIC)[7] process for overseeing its IT investments.

On September 30, 2020, USPTO ended all active PE2E investments and transferred the five remaining systems that were deferred to product roadmaps[8] under the NWOW. USPTO divided the PE2E investment into several Patent Product Line (PPL)[9] investments with an overall

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[1] The Patent End to End Investment has been referred to as PE2E-SE (Software Engineering) and PE2E-SE (System Engineering).

[2] A next-generation system pertains to any method or technology intended to supersede an old or outdated technology.

[3] A legacy system is a technology or application that is based on outdated or obsolete technology or equipment.

[4] Patent Application Locating and Monitoring. This system is used to track every step of the patent process. The outage was caused in part due to USPTO's postponement of replacing or upgrading its legacy systems. For a discussion of the outage issue, *see* U.S. Department of Commerce Office of Inspector General, June 16, 2020. *Deficiencies in USPTO's Backup and Restoration Process Could Delay Recovery of Critical Applications in the Event of a System Failure and Adversely Affect Its Mission*, OIG-20-030-A. Washington, DC: DOC OIG.

[5] A product is defined as a collection of services or tangible features that delivers value to customers.

[6] *Agile* is an iterative and adaptive approach to product development in which requirements and solutions evolve through continuous engagement between self-organizing, cross-functional teams and the business units.

[7] USPTO's CPIC process describes the decision-making framework to select, control, and evaluate work done for its IT product line. *See* United States Patent and Trademark Office, Office of the Chief Information Officer, October 2021. *USPTO Capital Planning and Investment Control Guide*, Version 5.1. Alexandria, VA: USPTO OCIO.

[8] A roadmap is a high-level summary comprised of a set of strategic planning and execution artifacts that, together, map out the vision and direction of a product offering over time.

[9] PPLs include all IT products and product components to manage the patent application process through the entire patent life cycle.

budget estimate of $146 million and an estimated completion date in FY 2023. See appendix C for additional details regarding PPL investments.

Objective, Findings, and Recommendations

Our audit objective was to review USPTO's progress towards retiring its patent legacy systems. To address this objective, we assessed USPTO's (1) cost, schedule, and capabilities of select patent legacy systems and (2) ongoing activities to transition from the legacy systems to next-generation systems. See appendix A for a more detailed description of our scope and methodology.

We found that while USPTO continues to develop next-generation patent systems to replace and retire its patent legacy systems, USPTO's cost estimating and scheduling processes are not comprehensive for the PPL investments. We also found that USPTO needs to improve Agile adoption practices when developing next-generation patent systems and continues to face challenges in replacing its unsupported servers.[10]

If USPTO does not use best practices for cost estimating, scheduling, and Agile adoption in the NWOW, it continues to risk delays in replacing and retiring its legacy systems. Those delays could lead to additional system outages impacting patent applicants and other users, as well as cost overruns.

I. USPTO's Cost Estimating and Scheduling Processes Are Not Comprehensive

Office of Management and Budget (OMB) Circulars A-11[11] and A-130[12] require agencies to develop disciplined cost estimating practices to provide (1) greater information management support, (2) more accurate and timely cost estimates, and (3) improved risk assessments to help increase the credibility of program cost estimates. Generating reliable cost estimates is a critical program management function. A life cycle cost estimate (LCCE) is a type of cost estimate that provides a structured accounting of all costs throughout the life of the program, independent of the framework used (e.g., Waterfall, Agile, etc.).[13]

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[10] For a discussion of the server issue, *see* DOC OIG, October 14, 2021. *Top Management and Performance Challenges Facing the Department of Commerce*, OIG-22-001. Washington, DC: DOC OIG.

[11] Office of Management and Budget, August 2021. OMB Circular No. A-11, *Preparation, Submission, and Execution of the Budget*. Washington, DC: OMB. Available online at https://www.whitehouse.gov/wp-content/uploads/2018/06/a11.pdf (accessed March 24, 2022).

[12] OMB, July 2016. OMB Circular No. A-130, *Managing Information as a Strategic Resource*. Washington, DC: OMB. Available online at https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A130/a130revised.pdf (accessed March 24, 2022).

[13] *See* (1) U.S. Government Accountability Office, September 28, 2020. *Agile Assessment Guide: Best Practices for Agile Adoption and Implementation*, GAO-20-590G. Washington, DC: GAO. Available online at https://www.gao.gov/assets/720/710147.pdf (accessed March 22, 2022); (2) GAO, March 12, 2020. *Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Program Costs*, GAO-20-195G. Washington, DC: GAO. Available online at https://www.gao.gov/assets/710/706933.pdf (accessed March 22, 2022); (3) GAO, March 6, 2019. *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, GAO-19-157SP. Washington, DC: GAO. Available online at https://www.gao.gov/assets/700/697852.pdf (accessed March 25, 2022); and (4) GAO, December 22, 2015. *GAO Schedule Assessment Guide: Best Practices for Project Schedules*, GAO-16-89G. Washington, DC: GAO. Available online at https://www.gao.gov/assets/690/687052.pdf (accessed March 22, 2022).

In addition, an integrated master schedule (IMS) helps to provide a comprehensive, end-to-end view of all the work required to accomplish program goals. An IMS is critical for determining progress made against the plan and holds the program accountable to its performance goals over time. Tracking a program's performance using an LCCE and IMS allows management to identify cost and schedule variances from an overall baseline plan so that risks can be quickly discerned and managed.

We reviewed USPTO's cost estimating and schedule practices and found that USPTO did not develop processes and procedures to ensure that (1) cost estimates were based on the patent product's entire life cycle, (2) product roadmaps included an IMS, and (3) contingency plans exist for patent legacy systems that use unsupported servers.

A. *PPL cost estimates were not based on an entire life cycle*

USPTO did not prepare an LCCE for its patent product investments to determine all costs over its entire life cycle. Instead, USPTO product teams prepare a funding request based on an estimate of resources (e.g., size and scope of Agile teams) needed to develop each individual product. Each product's funding request is then used to create the budget estimate for the PPL investment. However, these funding requests and the budget estimate are designed to cover only the upcoming few years and do not account for all life cycle costs.

Since USPTO does not have LCCEs, we reviewed its budget estimate for three PE2E products. We found that the estimates were not comprehensive, well documented, accurate, or credible. As a result, USPTO could not justify and support its annual budget request for the PPL.

To illustrate:

- Budget estimates lacked sufficient justification. USPTO could not provide adequate documentation supporting its budget requests for PPL products. For example, product teams used previous FY funding request figures without sufficient justification. USPTO budgeted $30,000 for international travel for one product, despite travel limitations due to the COVID-19 pandemic. The Product Line Lead (PLL)[14] acknowledged that there was no available supporting documentation and stated the estimates were based on prior-year actual expenditures. Without documenting cost estimates that contain justification for using the prior year's actuals and supporting historical data, decision makers will not understand the level of certainty around the cost estimate and lack traceability.[15]

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[14] A PLL ensures that relevant IT systems align with business unit objectives and helps coordinate development across those systems.

[15] Traceability is the capability to repeat or update and follow the cost estimates to their original sources through auditing. *See* GAO-20-195G, p. 31.

- <u>PPL's budget estimate did not initially account for total product costs</u>. For the FY 2021 IT budget plan, USPTO's IT Planning Board[16] approved the PPL's total budget estimate of $117.2 million[17] to support 58 (out of 77) prioritized tasks. However, product teams later updated the budget estimate to $146 million—an increase of approximately $28.8 million. This increase accounted for both compensation and non-compensation changes. For example, USPTO did not include government employee compensation[18] totaling $27.9M in the initial funding request, and it was later added after the original request was approved. Without a comprehensive cost estimate, decision makers may not have a complete view of program costs. If USPTO used an LCCE, program managers would be better able to account for all costs used to support the program.[19] See appendix C for additional details regarding the initial and updated budget estimates.

According to the Program Manager (PgM),[20] the former PLL revised the budget estimate after the IT Planning Board approved the budget request because of changes made within the product line. USPTO could not provide supporting documentation to reflect the approval of the specific changes or impact to the budget estimate or prioritized tasks. USPTO confirmed that the updates to the budget estimate did not change the number or scope of tasks, which means the budget estimate increased but the size of the teams and the work remained the same.

USPTO's CPIC guide does not require product teams to use an LCCE to develop budget estimates. Specifically, USPTO did not implement a standardized LCCE process for developing product roadmap funding requests. The NWOW empowered lead product owners (LPOs)[21] to take on additional responsibilities and make decisions for developing product roadmaps. LPOs have discretion to use different methodologies and tools to identify team capacity needs and costs used to develop a cost estimate. During interviews, product team managers were aware of the importance of using an LCCE; however, they did not use one because it was not required. Without implementing LCCE requirements, USPTO increases its risk of cost overruns or budget shortfalls— which could lead to missed deadlines, schedule delays, and system performance issues.

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[16] The IT Planning Board—chaired by USPTO's Chief Information Officer—reviews and recommends approval of product roadmaps to USPTO Financial Advisory Board.

[17] USPTO changed the PPL catalog and moved the Patent Public Application Programming Interface to the Enterprise business product line, changing the budget estimate from $117.6 million to $117.2 million.

[18] Compensation of federal civilian employees consists of salaries and benefits, including any supplements (e.g., employer contributions).

[19] GAO-20-195G, p. 18.

[20] A PgM works with PLLs to perform various product line management activities such as, but not limited to, acquisition and financial planning/execution.

[21] An LPO is responsible for determining product objectives, allocating resources of Agile teams, and prioritizing work (epics) within the product to deliver business value to customers.

B. Patent products lack an IMS

Agile programs typically consist of fixed schedule iterations.[22] However, these programs should have an IMS to manage program risk and uncertainty and measure performance. Developing a reliable schedule involves planning for all activities and conducting a schedule risk analysis during the product's life cycle.[23] Therefore, programs should use an IMS to (1) identify and address risks most likely to cause delays and (2) identify risk contingencies or other mitigating measures.

We found that USPTO did not have an IMS or similar artifact, but instead used patent product roadmaps. While these roadmaps have some high-level milestones, they did not (1) ensure all planned activities to retire legacy systems were captured and (2) fully address risks that may impact the schedule to timely retire legacy systems.

To illustrate:

- <u>Documentation did not include all planned activities to retire legacy search systems</u>. The documentation for the Patent Search system did not contain specific details of planned activities related to the retirement of associated legacy search systems. The PgM explained that (1) product teams using an Agile method do not typically know the specifics of the work ahead of time and (2) this task is a placeholder for additional work to be discovered. If the schedule does not contain all planning details of the work ahead of time, the program will lack traceability and increase overall risk. By developing an IMS, product teams would have a comprehensive, end-to-end view of all the activities needed to retire and dispose of the legacy systems.

- <u>Product teams did not fully address schedule risks to mitigate impacts to timely retire legacy systems</u>. We found the product teams' efforts to identify schedule risks and develop a contingency plan were inadequate. For example, the deployment of two mission-critical next-generation systems experienced schedule slippages and did not have a contingency plan in place.[24] The slippages were due to conflicts with the examiners' union and pushback from external stakeholders on proposed fee rate increases.

To develop product roadmaps, LPOs received guidance and training from USPTO's Agile Delivery Office (ADO).[25] However, we found that the guidance and training material did not include processes and procedures based on IMS best practices. Additionally, some LPOs said that the training and materials they received were not

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[22] An iteration is a predefined, time-boxed, recurring period to develop software. *See* GAO-20-590G, p. 7.

[23] If time or resources are insufficient to conduct a schedule risk analysis for the full program or the level of detail is unclear because of rolling wave planning, programs should perform the analysis on a summary version of the schedule.

[24] The two next-generation systems are Patent Exam Center's Patent Search (used by examiners to conduct prior art searches) and Patent Center's Public Patent Application Information Retrieval (allowing public access to applications and patents).

[25] For more discussion on the ADO, see finding II.

sufficient. Based on interviews with and questionnaires completed by LPOs, we found that the ADO did not design the training to target different levels of Agile expertise. If the ADO does not tailor its training to the varying experience levels of LPOs, there is a risk that the training will continue to be ineffective.

C. *No contingency plans exist for patent legacy systems that use unsupported servers*

Product roadmaps also did not include plans to address security and sustainability risks for aging or obsolete servers. The National Institute of Standards and Technology's (NIST's) *Risk Management Framework, Systems and Services Acquisition (SA-22)*[26] states that agencies should replace system components when support for the components is no longer available from the developer, vendor, or manufacturer. Additionally, agencies should provide alternative support sources for unsupported components when replacing those components is not an option.

USPTO uses 49 different servers that are past their end of life (EOL)[27] across seven legacy systems. These servers range from 1 to 6 years beyond EOL. One LPO stated that the Patent Exam Center product team would "have no choice but to meet the deadline" to develop and deploy the new search tool by FY 2022. The LPO added that moving a legacy system would cost "a lot" of money, in terms of millions of dollars, but could not quantify the potential cost needed to complete the transfer. If product planning included LCCEs and IMSs, USPTO could have made contingency plans for risks associated with aging or obsolete servers and transferring a system to another server. Without a contingency plan, USPTO cannot prepare for unforeseen events that may lead to increased costs and operation interruptions.

Recommendations

We recommend that the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office direct the Chief Information Officer to do the following:

1. Establish an LCCE and IMS for current and planned PPL investments.

2. Establish a training plan to ensure PPL team members and other appropriate personnel receive specialized training to develop and maintain an LCCE and IMS.

3. Establish contingency plans consistent with NIST's *SA-22* for system components when support for the components is no longer provided by the manufacturer.

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[26] *See* (1) DOC National Institute of Standards and Technology Computer Security Resource Center, September 2020. *Security and Privacy Controls for Information Systems and Organizations*, Special Publication 800-53, Revision 5.1. Gaithersburg, MD: NIST. Available online at https://csrc.nist.gov/CSRC/media/Projects/risk-management/800-53%20Downloads/800-53r5/SP_800-53_v5_1-derived-OSCAL.pdf (accessed March 22, 2022); and (2) DOC NIST CSRC, September 2020. *Control Baselines for Information Systems and Organizations*, Special Publication 800-53B. Gaithersburg, MD: NIST. Available online at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53B.pdf (accessed March 22, 2022).

[27] Operating systems that reach EOL no longer receive support (e.g., security updates) from the manufacturer.

II. USPTO Needs to Improve Agile Adoption Practices When Developing Next-Generation Patent Systems

Agile adoption best practices state that management should implement a consistent process to track, measure, and monitor the value of work to ensure business value is delivered. This process should capture and apply user feedback early in the development process and be incorporated into future updates. Furthermore, an appropriate organizational entity should be in place to establish an Agile-supportive environment and ensure organizational goals align with Agile values and principles.

We reviewed USPTO's Agile guidance and adoption practices and found that USPTO did not develop processes and procedures to ensure that (1) all user feedback is being captured, and (2) comprehensive key performance indicators (KPIs) are being developed for patent products. In addition, we found that USPTO lacks a full commitment to Agile oversight.

A.   USPTO does not have clear processes or procedures to ensure all user feedback is captured

Agile programs require the ongoing collaboration and commitment of stakeholders such as business owners, developers, and users to deliver business value. Product teams depend on user feedback to define and reprioritize requirements[28] to deliver quality products. To do this, the program must have a process in place to field suggestions from users interacting with the system. If user feedback is not effectively captured for consideration, there will be no historical record of proposed requirements or modifications for reference. The lack of a documented process could hinder decision makers' insight into the true value of delivered product features.[29]

To determine how well USPTO captures and addresses user feedback, we held discussions with product owners and evaluated user feedback for the PE2E Search[30] tool. USPTO captures and manages user feedback for its patent products via the Patent Automation Support Manager (PASM)[31] system. Product owners stated they also capture user feedback via telephone, instant message, and email. However, USPTO personnel did not ensure a subsequent ticket from these sources was created in PASM. Therefore, USPTO's user feedback process did not ensure all suggestions and recommendations for Patent Search were maintained for analytical and recordkeeping purposes.

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[28] Requirements are high-level capabilities in a product roadmap, prioritized in the backlog and refined based on customer feedback.

[29] GAO-20-590G, p. 82.

[30] Patent Search is a component of Patent Exam Center, replacing the legacy systems Examiner's Automated Search Tool (EAST) and Web-based Examiner's Search Tool (WEST). These systems are used to manage patent applications, conduct searches for prior art, manage classifications, make patentability determinations, document official decisions, and create correspondence.

[31] PASM tickets were submitted by users who reported an issue or otherwise had feedback on Patent Search. From January 2021 to June 2021, 885 out of 898 tickets were closed (98.5 percent).

We reviewed a PASM report that contained 898 user tickets[32] submitted from January 2021 through June 2021. We evaluated each ticket to identify issues related to an expected search tool feature or a capability that examiners needed to perform day-to-day activities.[33] We found that 419 tickets (57 percent) were closed, on average, in 2 days, but not sufficiently resolved. We determined 370 of those tickets (88 percent) involved an expected feature of the new Patent Search tool. For example, USPTO's PASM representatives closed multiple tickets that related to issues with faulty foreign language translations and broken search strings without a workaround or an acknowledgment of the request.

We also interviewed 30 patent examiners[34] regarding Patent Search. They expressed general concerns related to (1) quality of search results, (2) system outages or system capacity, and (3) the need for more hands-on training. These issues were submitted in PASM as well as expressed to their supervisors and Patent Search training instructors. However, at the time of our review, some of those issues were unresolved. As the rollout of that tool reaches more than 8,100 patent examiners by the end of FY 2022, capturing and addressing concerns early in the development stage is critical.

By not effectively capturing user feedback, USPTO may be unable to deliver products that provide expected value. If USPTO does not improve its Agile adoption practices to capture all user feedback, USPTO risks further delays in replacing and retiring legacy systems.

B. *Products lack comprehensive KPIs to deliver business value*

Agile programs rely on KPIs, which are metrics that measure the value delivered for a product and the benefits realized by the business.[35] Agile guidance and adoption practices should be in place and communicated to product team members to ensure they have the required knowledge to measure business value.[36] USPTO's *CPIC Guide* requires LPOs to create KPIs to measure a product's contribution to the business need (user requirements).

To determine how well USPTO develops and manages KPIs, we reviewed product roadmap documentation. We found that product roadmaps did not have comprehensive KPIs. Specifically, roadmaps included some KPIs related to timeliness of outcomes, but did not address quality of outcomes. For example, the Patent Exam Center product roadmap contained a KPI for "Search Rollout" that only included the rollout date. In addition, the ADO's training and guidance related to developing KPIs was not sufficient

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[32] These tickets were submitted by 467 users. The maximum number of tickets submitted by a single user was 19, and the average was 1.92 tickets per user. On average, 148.6 tickets were submitted monthly.

[33] Our review excluded 161 tickets that were either duplicate tickets in the PASM report, tickets requesting access to PASM, or open tickets.

[34] We interviewed 30 patent examiners (15 Patent Search early adopters and 15 new examiners from the Patent Academy).

[35] USPTO OCIO *Capital Planning Guide*, p. 14.

[36] GAO-20-590G.

to address the business value needs for each product. Unless USPTO has an adequate quality metric, it will not be able to accurately determine whether the product delivers the desired benefits.

C. USPTO lacks clear guidance for Agile oversight

Organizational commitment describes the management actions that are necessary to ensure that a process is established and will endure. The organization should identify an Agile champion within senior management who has formal authority to advocate for the Agile approach and provide oversight.

The Office of the Chief Information Officer established the ADO to develop and execute USPTO's Agile program strategy and provide support to product teams. This support includes facilitating training on the product IT management and development process, which includes creating KPIs. However, LPOs did not receive specific guidance from the ADO related to developing KPIs. For example, one LPO stated that the KPI guidance and training were "too theoretical" and another LPO stated the guidance was "conflicting." Moreover, USPTO executive leadership did not provide clear top-down guidance to assist with the development of KPIs and did not prioritize or formally establish the ADO as a permanent organization. Specifically, USPTO executive leadership did not formalize permanent positions with clear roles and responsibilities (e.g., position descriptions) to provide the Agile foundations and guidance across the product lines and product teams.

Without clear guidance and leadership involvement on developing comprehensive KPIs, LPOs may make product decisions that are misaligned with USPTO's strategic goals and stakeholder expectations.

Recommendations

We recommend that the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office direct the Chief Information Officer to do the following:

4. Establish processes and procedures to ensure all end-user feedback is properly captured, tracked, and timely communicated to the appropriate product teams during the product life cycle.

5. Establish a detailed plan to ensure PPL team members and other appropriate personnel receive specialized training in developing KPIs and revise existing KPIs to ensure they are comprehensive.

6. Establish policy, guidance, and leadership roles and responsibilities for the ADO (or equivalent successor).

Summary of Agency Response and OIG Comments

In response to our draft report, USPTO generally concurred with all recommendations and described actions it has taken, or will take, to address them. We considered all USPTO's comments and made changes in the final report where appropriate. We have included USPTO's formal and technical comments in appendix E.

Agency Response Regarding Recommendation 1. USPTO noted that it generally concurs with recommendation 1 and plans to improve its current Agile-based project management artifacts to have high-quality, reliable cost estimates and schedules, instead of "using traditional planning tools such as LCCEs and IMSs."

OIG Comment. USPTO's approach not to incorporate LCCEs and IMSs within its planning process is not responsive to our recommendation. As we noted in our report, using an LCCE and IMS (or similar artifact) is compatible with an Agile framework to provide a structured accounting of all costs and to manage program risk. Without using LCCEs and IMSs, USPTO programs will continue to lack realistic budget and planning baselines and fundamental program management tools to identify cost and schedule variances and quickly discern and manage risk.

We are pleased that USPTO generally concurs with our recommendations and look forward to reviewing its proposed audit action plan.

Appendix A: Objective, Scope, and Methodology

Our audit objective was to review USPTO's progress towards retiring its patent legacy systems. To accomplish our objective, we judgmentally selected and reviewed certain patent systems to assess USPTO's (1) cost, schedule, and capabilities and (2) ongoing activities to transition from the legacy systems to next-generation systems. We focused our audit work on USPTO's PE2E investment efforts and transition activities under the NWOW from FY 2011 to FY 2021.

Specifically, to accomplish our objective, we performed the following actions:

- Interviewed USPTO personnel—specifically, those responsible for product line management, policy development, and quality assurance—to obtain an understanding of USPTO's CPIC and NWOW processes.

- Reviewed and analyzed CPIC documentation (e.g., meeting minutes, presentation documentation, and capital investment documents) to assess the cost, schedule, and capabilities of the PE2E investment.

- Reviewed and analyzed product roadmap artifacts (e.g., epic reports, capacity plans, budget reports, and KPI listings) to assess the cost, schedule, and capabilities of the PPL investment.

- Interviewed USPTO officials and patent examiners, and analyzed documentation (e.g., feedback from end users, metrics, and training reports) used by USPTO management in the development and deployment of the patent examiner search tool.

- Reviewed USPTO's policies and procedures and evaluated its efforts against the best practices outlined in GAO's *Cost Estimating*, *Schedule Assessment*, and *Agile Assessment* guides.

- Judgmentally selected the Patent Exam Center product to assess cost, schedule, and ongoing activities to replace and retire legacy systems. We based our selection on this product because it comprised a significant portion of USPTO's FY 2021 budget. Due to cost estimate issues identified during the audit, we further judgmentally selected the International Data Exchange and Patent Administrative Center products, as each product included a significant budget increase during USPTO's FY 2021 budget planning.

- Selected a statistical sample of 30 patent examiners to obtain user feedback on the next-generation Patent Search tool. Specifically, we (1) obtained feedback on the quality of the search tool training and strengths and weaknesses of the search tool, and (2) determined whether the search tool meets performance and functionality expectations. The issues identified from the judgmental sample of patent examiner interviews cannot be projected to the universe of patent examiners within USPTO. However, they provide generalized examples of issues that USPTO should address.

- Reviewed 898 Patent Search user ticket requests retrieved from the PASM system for the period of January 2021 through June 2021.

- Analyzed budget data for the PPL, including initial estimate, updated estimate, and final expenditures for FY 2021.

We also reviewed USPTO's adherence to the following applicable guidance:

- USPTO *CPIC Guide*, versions 4.4, 5.0, and 5.1, dated May 2019, October 2020, and October 2021, respectively

- OMB Circular A-11, *Preparation, Submission and Execution of the Budget*, dated August 2021

- OMB Circular A-130, *Managing Information as a Strategic Resource*, as revised by OMB Memorandum M-17-26, dated June 2017

- NIST Risk Management Framework Special Publications:

  - 800-53, Revision 5.1, *Security and Privacy Controls for Information Systems and Organizations*, dated September 2020

  - 800-53B, *Control Baselines for Information Systems and Organizations*, dated September 2020

We gained an understanding of internal controls significant within the context of the audit objective by interviewing USPTO officials and reviewing documentation for evidence of internal controls. Although we could not independently verify the reliability of all the information provided by USPTO, we compared it with other available supporting documents to determine data consistency and reasonableness. From these efforts, we believe the information we obtained is sufficiently reliable for this report. We did not find any instances of fraud, waste, or abuse.

We conducted our review from June 2020 through February 2022 under the authority of the Inspector General Act of 1978, as amended (5 U.S.C. App.), and Department Organization Order 10-13, as amended October 21, 2020. We performed our fieldwork at USPTO offices in Alexandria, Virginia.

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

Appendix B: PE2E Cost and Schedule

Table B-1 outlines the schedule and cost for the PE2E investments. USPTO exceeded its planned schedule and budget for PE2E-Software Engineering and PE2E-2 investments. While it appears that USPTO became more efficient at estimating its costs and spending for PE2E-3, USPTO continued to defer next-generation systems. The total actual expenditure for the PE2E for FYs 2011–2020 was approximately $734 million.

Table B-1. Schedule and Cost for Patent IT Investments

Investment	Schedule	Cost
PE2E-Software Engineering	• Estimated FYs 2011–2013 • Actual FYs 2011–2015	• Estimated $130,182,000 • Actual $159,802,000 • **Overspent $29,620,000**
PE2E-2	• Estimated FYs 2015–2017 • Actual FYs 2015-2019	• Estimated $337,541,000 • Actual $344,849,000 • **Overspent $7,308,000**
PE2E-3	• Estimated FYs 2017–2021 • Actual FYs 2017–2020	• Estimated $371,850,000 • Actual $229,350,000 • **Underspent $142,500,000**
PPL (under NWOW)	• Estimated FYs 2021–2023 • In progress	• Estimated $146,015,000 • In-progress

Source: Office of Inspector General (OIG) analysis of PE2E investments

Between FY 2011 and FY 2020, USPTO planned to develop a total of nine next-generation systems; however, three were developed and one was cancelled. The five deferred systems were transferred to the NWOW, with completion planned through FY 2023. Table B-2 outlines USPTO's schedule and its progress toward developing these next-generation systems.

**Table B-2. PE2E Investment Schedule and Progress Toward
Developing Next-Generation Systems**

Investment	Schedule	Planned	Developed	Cancelled	Deferred to Next Investment
PE2E-Software Engineering	FYs 2011–2015	6	0	I	5
PE2E-2	FYs 2015–2019	7 (5 deferred from PE2E-Software Engineering and 2 new planned systems)	2	0	5
PE2E-3	FYs 2017–2020	6 (5 deferred from PE2E-2 and 1 new planned system)	I	0	5
PPL (under NWOW)	FYs 2021–2023	5 (deferred from PE2E-3)	In progress	N/A	N/A

Source: OIG analysis of USPTO's PE2E investments

Table B-3 shows the status for the five deferred next-generation systems and USPTO's plan for the corresponding eight legacy systems that were transferred under the NWOW. For example, for Patent Exam Center, USPTO is developing PE2E Search to replace EAST and WEST.

Table B-3. Status of PPL Next-Generation and Legacy Systems

PPL Investment	Current Systems[a]	Replacement/Next-Generation Systems
Patent Exam Center	Legacy system: EAST Status: In use Planned retirement date: 3/31/2023	Next-generation system: PE2E Search Tool (Search) Status: Partially deployed (will replace EAST and WEST)
	Legacy system: WEST Status: In use Planned retirement date: 3/31/2023	
International Data Exchange	Legacy system: Classification Data System (CDS) Status: In use Planned retirement date: 9/30/2022	Next-generation system: Cooperative Patent Classification Status: Partially deployed (will replace CDS)
	Legacy system: Supplemental Complex Repository for Examiners (SCORE) Status: In use Planned retirement date: 9/30/2023	Next-generation system: Sequence Listing Information Control Status: Operating in parallel while preparing to retire SCORE
Patent Business Management Information	Legacy system: Quality Review System Status: Retired as of 5/25/2021	Next-generation system: Integrated Quality System Status: In use
Patent Center	Legacy system: Electronic Filing System-Web (EFS-Web) Status: In use Planned retirement date: 6/30/2023	Next-generation system: Patent Center Status: Operating in parallel while preparing to retire EFS-Web, Public PAIR, and Private PAIR
	Legacy system: Public – Patent Application Information Retrieval (Public PAIR) Status: In use Planned retirement date: 5/31/2022	
	Legacy system: Private – Patent Application Information Retrieval (Private PAIR) Status: In use Planned retirement date: 6/30/2023	

Source: OIG analysis of PPL next-generation and legacy systems

[a] Retirement date as of March 8, 2022.

Table B-4 provides a description of each legacy and next-generation system discussed in the previous tables.

Table-B-4. Patent System Names and Descriptions

System Name	Description
PE2E Search Tool	Web-based system for patent examiners to conduct prior art searches based on published U.S. and foreign applications, to include published nonpatent literature (i.e., books, articles, and published research).
EAST	Software interface that connects with USPTO patent database files.
WEST	Internal USPTO database used by U.S. patent examiners and patent researchers.
Cooperative Patent Classification	International patent classification system that is jointly managed and maintained by the European Patent Office and USPTO.
CDS	Software component that maintains current patent classification information, such as weekly new issues, master classification files, and foreign patent master classification files for USPTO.
Sequence Listing Information Control	Processing system for DNA, RNA, and protein sequence listings that provides a workflow for review and data transformation for downstream intake components, such as Patent Content Management and Patent Search repositories.
SCORE	Software component to provide patent examiners with access to unpublished mega-content associated with a patent application.
Integrated Quality System	Designed for use by the Office of Patent Quality Assurance and the Patents Technology Centers to conduct quality reviews of patent examiners' office actions.
Quality Review System	Software application that allows patent examiners to review, evaluate, and create reports for patent applications.
Patent Center	A web-based system used by patent applicants to review, manage, and submit electronic applications to USPTO. Allows applicants to view public applications.
EFS-Web	Software component that provides electronic filers a secure method to submit PDF files over the internet to USPTO.
Public PAIR	Software component that allows public access to published patent applications and published patents.
Private PAIR	Software component that provides restricted internet-based access to patent applicants and/or designated legal representatives on patent application status and history information.

Source: OIG analysis of USPTO's *Business Product Master List*

Appendix C: PPL Investments and Budget Estimates

Table C-1 provides a description of each product in the PPL.

Table C-1. PPL Business Product Descriptions

PPL Business Product	Description
Patent Center	Enables applicants to manage their patent applications and portfolio.
Patent Administrative Center	Enables USPTO personnel to receive and process patent applications.
Patent Exam Center	Enables users to manage patent applications, search prior art, make patentability determination, and create correspondence.
International Data Exchange	Enables internal and public stakeholders (e.g., foreign intellectual property owners) to view, monitor, and exchange application data on a global level.
Patent Trials and Appeals Center	Provides internal and external users with a unified case management and processing interface to file papers and conduct trial business.
Patent Business and Content Management Services	Enables users to access patent application documents and content stored in various formats.
Patent Data and Analytics	Provides users access to a collection of analytic and data tools used in production of business intelligence and advanced analytical solutions.

Source: OIG analysis of USPTO's *Business Product Master Listing*

Table C-2 outlines the PPL investments' initial and updated budget estimate for FY 2021. The PPL contains seven investments with a final estimated budget of approximately $146 million.

**Table C-2. PPL Initial and Updated Budget Estimates for FY 2021
(as of December 2020)**

Investment	Initial Budget Estimate (Jul 2020)	Updated Budget Estimate (Dec 2020)	Difference in dollars	Difference in percentage
Patent Center	$13,691,000.00	$13,691,000.00	$0	0%
Patent Administrative Center	$26,668,000.00	$39,884,454.40	$13,216,454.40	50%
Patent Exam Center	$49,384,950.00	$56,476,740.00	$7,091,790.00	14%
International Data Exchange	$8,275,000.00	$16,438,990.00	$8,163,990.00	98%
Patent Trials and Appeals Center	$7,978,000.00	$8,258,000.00	$280,000.00	4%
Patent Business and Content Management Services	$5,050,000.00	$5,050,000.00	$0	0%
Patent Data and Analytics	$6,216,200.00	$6,216,200.00	$0	0%
Total	**$117,263,150.00**	**$146,015,384.40**	**$28,752,234.40**	**25%**

Source: OIG analysis of PPL investments

Appendix D: Acronyms

Term	Definition
ADO	Agile Development Office
CDS	Classification Data System
CPIC	Capital Planning and Investment Control
EAST	Examiners Automated Search Tool
EFS-Web	Electronic Filing System-Web
EOL	End of Life
FAB	Financial Advisory Board
FY	Fiscal Year
GAO	U.S. Government Accountability Office
IMS	Integrated Master Schedule
IT	Information Technology
KPI	Key Performance Indicator
LCCE	Life Cycle Cost Estimate
LPO	Lead Product Owner
NIST	National Institute of Standards and Technology
NWOW	New Ways of Working
OIG	Office of the Inspector General
OMB	Office of Management and Budget
PALM	Patent Application Locating and Monitoring
PASM	Patent Automation Support Manager System
PE2E	Patent End-to-End
PLL	Patent Product Line Lead
PPL	Patent Product Line
Private PAIR	Private – Patent Application Information Retrieval
Public PAIR	Public – Patent Application Information Retrieval
SCORE	Supplemental Complex Repository for Examiners
USPTO	U.S. Patent and Trademark Office
WEST	Web-based Examiner's Search Tool

Appendix E: Agency Response

UNITED STATES PATENT AND TRADEMARK OFFICE

UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

June 23, 2022

MEMORANDUM FOR: Frederick J. Meny Jr.
                    Assistant Inspector General for Audit and Evaluation

FROM: Katherine K. Vidal
                    Users, Vidal, Katherine (Kathi)   Digitally signed by Users, Vidal, Katherine (Kathi) Date: 2022.06.22 17:27:31 -04'00'
                    Under Secretary of Commerce for Intellectual Property and
                    Director of the United States Patent and Trademark Office

SUBJECT: Response to Draft Report, "USPTO Needs to Improve Its Cost
                    Estimating, Scheduling, and Agile Practices to Timely Retire
                    Patent Legacy Systems"

Executive Summary

We appreciate the effort you and your staff made in reviewing the United States Patent and
Trademark Office's (USPTO) efforts to retire its patent legacy systems.

The USPTO continues to invest in modernizing its information technology (IT) and retiring its
legacy systems. The newest IT tools, including those that fall under the Patent Product Line
(PPL), are built on a modern, flexible, and more stable web-based infrastructure, leveraging
cloud-based technologies when possible. This allows us to benefit from the latest technological
advances and support a distributed national teleworking workforce.

At the same time, the USPTO is transforming its processes to provide better business outcomes
through a renewed commitment to Agile principles and practices under the banner of "New
Ways of Working (NWOW)." Our new approach to IT delivery and oversight relies on
stakeholder input to prioritize work and is designed to ensure iterative and consistent delivery of
business value. Key to the USPTO's product-focused approach is a strong commitment to
continuous learning and improvement. The USPTO continues to identify and implement
improvements to our product monitoring and control processes and tools. Your report provides
valuable input to the USPTO's growth and the maturation of our NWOW.

After careful consideration, we generally concur with the report's recommendations, which align
with improvements either already implemented or in the process of being implemented at the
USPTO.

P.O. Box 1450, Alexandria, Virginia 22313-1450 – www.uspto.gov

<u>**Response to Recommendations**</u>
IG recommendation that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office take the following action (1): Direct the Chief Information Officer to establish a Life Cycle Cost Estimate (LCCE) and Integrated Master Schedule (IMS) for current and planned PPL investments.

USPTO response:
As part of the NWOW initiative, the USPTO has intentionally moved away from using traditional planning tools, such as LCCEs and IMSs, in favor of Agile project management artifacts. However, the USPTO generally concurs with this recommendation to ensure that all PPL investments have high-quality, reliable cost estimates and schedules, and will take steps to improve those functions of the Agile planning process.

Under NWOW, the USPTO has shifted its IT planning and delivery from a project-based model to a product-based one. In support of that initiative, the USPTO adapted its program monitoring practices and codified these changes in its revised Capital Planning and Investment Control (CPIC) Guide. The USPTO intentionally replaced our traditional planning tools with Agile-based artifacts such as Product Roadmaps, Product Backlogs, Capacity Plans, Key Objectives, and Key Performance Indicators. These artifacts are consistent with the guidelines for cost estimates and schedules in the Government Accountability Office's (GAO) Agile Assessment Guide (published in September 2020) and also offer the necessary insight into product health for internal and external stakeholders.

For example, because accurately estimating the cost of building a specific IT product or feature cannot be done consistently early in the project lifecycle, the CPIC Guide instead utilizes estimates of the cost of team capacity to address the Agency's Key Objectives, which provides the USPTO's four product lines with critical high-level direction to ensure IT capacity is appropriately funded and delivers value to the Agency's business and technical priorities. The tenets of the CPIC Guide are consistent with GAO's four characteristics of a high-quality, reliable cost estimate:

1. **Well Documented:** The basis of each team capacity estimate is documented by the team members and captured in the USPTO's Enterprise Budget Tool. An improvement opportunity exists where the USPTO IT Planning Community is required to use this capability to document the basis of estimates at the budget line level.

2. **Comprehensive:** Team capacity estimates reflect all known effort documented in the Product Roadmap via prioritized epics, features, product objectives, and user stories. The size, complexity, and volume of epics are drivers for the number of teams needed.

3. **Accurate:** The USPTO's cost estimates for team capacity are based on historical cost data and cross-checked with negotiated labor rates contained in existing contracts. These estimates are updated annually as part of the USPTO's IT Planning Process and are validated via an independent cost estimate prior to contract award.

4. **Credible:** Credibility is driven primarily by customer feedback (via regular retrospective meetings and backlog grooming sessions) to ensure work is focused on the highest priorities. When specific business priorities are met, the product teams move to the next priority while continually reviewing the team's progress for business value delivered. The

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Quarterly Review Board provides control mechanisms by monitoring product team performance and adjusting priorities as necessary.

From a schedule perspective, GAO focuses on the following five areas to demonstrate high-quality, reliable schedules to help manage program risk: (1) planning for all activities, (2) minimizing the use of schedule constraints, (3) assigning resources, (4) conducting a schedule risk analysis, and (5) developing and using a schedule baseline. The USPTO meets the tenets of this guidance through the use of Product Roadmaps. Rather than constituting a single document, a Product Roadmap is a set of strategic planning and communication artifacts that provide the relevant information to stakeholders. Product Roadmaps are updated quarterly at the product line level and continuously at the product level. Product Roadmaps enable a consistent approach to IT decision-making by communicating specific resource capacity, highlighting risks and interdependencies to enable cross-product planning, documenting the technical boundaries of the product for clear accountability, and providing stakeholders insight into when IT capability will be implemented.

The USPTO also uses an Enterprise Agile Lifecycle Management tool that allows teams to collaboratively plan, prioritize, and track work on a synchronized cadence, as well as have insight into how their day-to-day work aligns with the greater goals of the USPTO.

The USPTO continues to improve its definition, implementation, and use of Product Roadmaps. The Agency recognizes the need to focus and improve in the areas of risk management and dependency identification across products and product lines, and to strengthen the overall master schedule aspects of Product Roadmaps, consistent with OIG's findings.

IG recommendation that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office take the following action (2): *Direct the Chief Information Officer to establish a training plan to ensure PPL team members and other appropriate personnel receive specialized training to develop and maintain an LCCE and IMS.*

USPTO response:
The USPTO concurs with this recommendation to provide training on developing high-quality, reliable cost estimates and schedules. As the USPTO makes improvements to its cost estimating practices as well as to Product Roadmaps in the areas of risk management, dependency identification across products and product lines, and overall master schedule aspects, as discussed in response to the recommendation above, training will be provided to the USPTO IT Planning Community. The USPTO's Transformation Delivery Division (TDD, formerly the Agile Delivery Office (ADO)) will also continue to provide quarterly training in product and Agile fundamentals and industry best practices in addition to on-demand classes and immersive learning offerings.

IG recommendation that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office take the following action (3): *Direct the Chief Information Officer to establish contingency plans consistent with the National Institute of Standards and Technology's (NIST) SA-22 for system components when support for the components is no longer provided by the manufacturer*

USPTO response:

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The USPTO generally concurs with this recommendation and can confirm that the USPTO has established contingency plans for all system components, not just those subject to NIST's SA-22, when support is no longer available from the developer, vendor, or manufacturer. Consistent with NIST's 800-34 Contingency Planning Guide for Federal Information Systems, and as mandated by the Department of Commerce for all mission-critical systems, the USPTO has developed Information System Contingency Plans (ISCPs) to ensure systems, with their respective components, can be restored to normal operations in the event of unexpected application or system software, hardware, network, or data maintenance failures.

The USPTO's ISCPs utilize multiple scenarios for minor, medium-sized, and major incidents. The ISCPs maximize the effectiveness of contingency operations through a defined plan with a notification/activation phase to detect and assess damage, a recovery phase to restore temporary IT operations and recover damage to the original system, and a reconstitution phase to restore IT system-processing capabilities to normal operations. The ISCPs identify the activities, resources, and procedures needed during prolonged interruptions, assign responsibilities to designated USPTO personnel, and ensure coordination with other USPTO staff and external points of contact and vendors.

With respect to system components that are no longer supported, the USPTO has created plans of action and milestones (POAMs) to track the remediation of End of Life/End of Service/Support (EOL/EOS) controls for the PPL and its components since 2020. In fiscal year (FY) 2021, the PPL retired and decommissioned 75 EOL/EOS Windows assets. The PPL continues to improve its security posture and resiliency with a plan to upgrade, by March 2023, over 800 assets to mitigate concerns with EOL/EOS Windows and Red Hat infrastructure.

IG recommendation that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office take the following action (4): *Direct the Chief Information Officer to establish processes and procedures to ensure all end-user feedback is properly captured, tracked, and timely communicated to the appropriate product teams during the product life cycle.*

USPTO response:
The USPTO concurs with this recommendation and can confirm that the PPL has already implemented many processes and procedures to ensure all end-user feedback, including informal feedback submitted via telephone, instant messages (IM), or email outside of the formal user feedback process, is properly captured, tracked, and timely communicated to the appropriate product teams during the product life cycle. The PPL is presently and actively engaging with users to collect their feedback across multiple channels:

1. **User Centered Design Council (UCDC):** The PPL actively recruits and engages a large cadre of volunteers from across the Patents business unit (1,063 members as of May 31, 2022) via the UCDC to conduct focus sessions, both when a team is beginning to chart its development course and whenever it must validate alternative approaches to implementing a particular piece of new functionality. The UCDC membership rotates on an annual basis to maintain new perspectives. UCDC volunteers regularly participate in a variety of activities to obtain user input, including:

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- Focus sessions to provide feedback
- Surveys
- Pilots
- Usability sessions
- User acceptance testing
- Creation of training content
- IT implementation assistance

2. **Detailees:** The PPL teams embed patent examiners as detailees within the development teams for periods from one quarter up to a full year. The detailees are users who are concurrently performing their regular examination work using the existing patent examination tools, providing direct input to the development teams regarding enhancements to improve tool usage, and identifying defects and new capabilities that would add value to business processes and tools under development.

3. **Patent Automation Support Manager (PASM):** The PPL actively utilizes the PASM tool to provide direct support and also to capture suggestions for further improving patent tools. The PE2E Search team relies on PASM as the primary source of input to capture user feedback. Through live training sessions, training correspondence, phone conversations, website notices, and direct IMs, all users are explicitly reminded to submit any issues or recommendations for improvement regarding the Search tool via PASM. The staff responsible for collecting and managing the feedback from PASM are part of the Search product team itself, which comprises a group of Product Owners, patent examiner detailees, and union representative examiner detailees. This staff should not be confused for the USPTO Office of the Chief Information Officer (OCIO) Service Desk, which is the USPTO entity that services IT incidents and problem management. The PE2E Search team maintains a detailed process on its internal team collaboration site for managing PASM ticket submissions. The process documentation describes how to use PASM and explains the internal tracking spreadsheet and how to interact with the user and close tickets, and includes template language and customer service tips.

The USPTO recognizes that even with processes such as those described above, there are always opportunities to further improve communications with users. The PPL is committed to developing a formal communications plan to share with users that fully describes how end-user feedback is properly captured, tracked, and timely communicated to the appropriate product teams during the product life cycle.

IG recommendation that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office take the following action (5): Direct the Chief Information Officer to establish a detailed plan to ensure PPL team members and other appropriate personnel receive specialized training in developing Key Performance Indicators (KPIs) and revise existing KPIs to ensure they are comprehensive.

USPTO response:
The USPTO concurs with this recommendation. The TDD, under the direction of the Deputy Chief Information Officer (CIO), developed an immersive learning solution (the "USPTO Dojo")

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to improve training delivery, problem solving, value delivery, and outcomes. Additionally, the TDD has worked collaboratively with the Patent Product Line Leads to develop strategic Organizational Key Objectives and Results (OKR) at the product line level and reviewed these with the 13 USPTO executives who constitute the Quarterly Review Board for suggested edits and improvements. These OKRs depend on KPIs to measure attainment of the goals outlined in the OKR. The TDD will develop a detailed plan to deliver specialized training in the development of key measures that help drive decision-making. Finally, the USPTO is in the process of procuring a vendor to assist in the maturity of performance and results measurement, including KPIs, across the Agency.

IG recommendation that the Under Secretary of Commerce for Intellectual Property and Director of the U.S. Patent and Trademark Office take the following action (6): *Direct the Chief Information Officer to establish policy, guidance, and leadership roles and responsibilities for the ADO (or equivalent successor).*

USPTO response:
The USPTO concurs with this recommendation. The CIO established the TDD within the Chief Technology Officer's (CTO) organization. The responsibility of the TDD is to provide product model best practices, Agile foundations, technical guidance, and coaching at an individual, team, and agency level across the entire USPTO. The TDD is responsible for coaching and training stakeholders in processes and activities that support mission attainment in a product environment that leverages Agile frameworks. Position descriptions for the TDD Director, Coaching Leads, and Coaches have been developed in coordination with the USPTO's Office of Human Resources, and a permanent Division Director was hired and was onboarded on May 22, 2022. Additional positions have been announced, and the USPTO anticipates that they will be filled by the end of FY 2022.

Conclusion

In closing, we appreciate your work and thank the Assistant Inspector General for Audit and Evaluation for providing us with this report.

As stated in the introduction to our response, the USPTO is always looking to improve its processes and drive the best outcomes on behalf of its stakeholders. This information will help us achieve those goals. The USPTO's OCIO and Patents have made improvements to implement the report's recommendations, and we are confident in our abilities to satisfy them in timely manner. We look forward to working with your office in the future as we continue our efforts to improve our cost estimating and scheduling processes, and adoption of Agile practices.

If you need additional information, please contact Jamie Holcombe, CIO, USPTO, at 571-272-9400 or Jamie.Holcombe@uspto.gov.

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USPTO Technical Comments to OIG Draft Report:
"USPTO Needs to Improve Its Cost Estimating, Scheduling, and Agile Practices to Timely Retire Patent Legacy Systems"

Page 1, Paragraph 3, Sentence 2: *"USPTO divided the PE2E investment into several Patent Product Line (PPL) investments with an overall budget estimate of $146 million and an estimated completion date in FY 2023."* Suggest striking the word "investments" and replacing it with "products." Also suggest striking the word "overall" and replacing with "FY 2022 annual." The new sentence should now read, *"USPTO divided the PE2E investment into several Patent Product Line (PPL) products with an FY 2022 annual budget estimate of $146 million."*

Page 4, Paragraph 4, Last sentence: *"As a result, USPTO could not justify and support its annual budget request for the PPL."* Suggest adding *"using best practices established in the GAO Agile Assessment Guide."* The USPTO did justify and support its annual budget request for the PPL, but OIG's assertion is that it was not done so per established best practices.

Page 5, Paragraph 3, Sentence 5: *"During interviews, product team managers were aware of the importance of using an LCCE; however, they did not use one because it was not required."* Suggest adding the following to the end of this sentence for clarification: *"...given that the CPIC Guide provided for alternate artifacts to capture this information (i.e., Product Roadmaps, capacity estimates)."*

Page 8, Last paragraph, Paragraph 1, Sentence 4 (and footnote 31): *"However, USPTO personnel did not ensure a subsequent help ticket from these sources was created in PASM."* Suggest striking the reference to "help ticket," as PASM does not serve as the USPTO OCIO Service Desk (a.k.a. Help Desk). The staff responsible for collecting and managing the feedback from PASM are part of the Search product team itself, which comprises a group of Product Owners, examiner detailees, and union representative examiner detailees. This staff should not to be confused for the USPTO OCIO Service Desk, which provides support for IT incidents and problem management.

Page 9, First paragraph, Last sentence: *"For example, USPTO's PASM Help Desk representatives closed multiple tickets that related to issues with faulty foreign language translations and broken search strings without a workaround or an acknowledgment of the request."* The USPTO does not agree with the last part of this statement, *"without a workaround or an acknowledgment of the request,"* and we recommend deleting that part based on the following clarifying information: We acknowledge a significant influx of PASM tickets due to an aggressive rollout schedule to transition over 8,000 users to the Nextgen PE2E Search tool over the past year. Each ticket is given thorough consideration and attention to detail in order to provide an optimal customer experience. A ticket is never closed without acknowledgement or an attempt to improve the user experience until a long-term fix is in place. New features must be weighed against the priorities of other items in the backlog, so they may take longer to implement. Fixes to foreign language translations do take time and collaboration with the data provider to fix, but the requirement of an acknowledgement remains. Broken search strings are addressed by fixing a defect in the backlog, finding a workaround, or providing an explanation of and training on a more appropriate query.

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USPTO Technical Comments to OIG Draft Report:
"USPTO Needs to Improve Its Cost Estimating, Scheduling, and Agile Practices to Timely Retire Patent Legacy Systems"

Page 9, Second paragraph, First four sentences: *"We also interviewed 30 patent examiners regarding Patent Search. They expressed general concerns related to (1) quality of search results, (2) system outages or system capacity, and (3) the need for more hands-on training. These issues were submitted in PASM as well as expressed to their supervisors and Patent Search training instructors. However, some of these issues remain unresolved."* The USPTO recommends deleting the last sentence, *"However, some of these issues remain unresolved,"* due to the following clarifying information:

1. Quality of search results: Queries submitted with search result issues are analyzed, and it is determined whether results should be expected. Oftentimes, users are expecting the same results the legacy system would provide. The PE2E Search product has thorough training materials that explain why results might differ from those from the prior system. The differences can occur because PE2E Search has some fundamental, asked-for, and sensible improvements in search execution. If a query does not get an intended result, the product team makes a significant effort to address it.

2. System outages: The product team gives outages and performance the highest priority. Significant efforts have been made to stabilize the tool, and in the past three months, there have been no unplanned outages.

3. Hands-on training: There are a variety of specialized training opportunities available to patent examiners that focus on key features of the Search product. Training Information Technology Resource Providers (ITRPs) are always available for 1-on-1 sessions. The product team is also available and willing to work with a user having an issue. Furthermore, we have a PE2E University help page that lists a number of computer-based trainings that a user can take.

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