



Statement for the Record to the  
Subcommittee on Courts, Intellectual  
Property and the Internet, Committee on  
the Judiciary, House of Representatives

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September 16, 2016

# INTELLECTUAL PROPERTY

## Patent Office Has Opportunities to Further Improve Application Review and Patent Quality

Statement for the Record by John Neumann, Director,  
Natural Resources and Environment

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number, GAO-16-883T, on the cover and other pages

# GAO Highlights

Highlights of [GAO-16-883T](#), a statement for the record to the Subcommittee on Courts, Intellectual Property and the Internet, Committee on the Judiciary, House of Representatives

## Why GAO Did This Study

USPTO examines patent applications to ensure that inventions meet the legal requirements for patentability as set forth in patent laws and federal case law. Resolving disputes over patent infringement and validity can be costly. Legal scholars and economists have raised concerns that an increase in low quality patents—such as those that are unclear and overly broad—may lead to an increase in patent infringement suits and hinder innovation. GAO was asked to provide information from its recent reports to inform a USPTO oversight hearing.

This statement addresses (1) the challenges examiners face in reviewing applications and issuing high quality patents, and (2) the steps USPTO can take to improve patent examination and the quality of granted patents, drawing from GAO reports issued in June 2016. For these reports, GAO's work included surveying a generalizable, stratified random sample of USPTO examiners with an 80 percent response rate; reviewing USPTO documents and relevant laws; and interviewing USPTO officials and knowledgeable stakeholders.

## What GAO Recommends

In its prior work GAO recommended, among other things, that (1) USPTO consistently and clearly define patent quality and a thorough prior art search for different technologies, and establish goals and indicators to monitor examiners' work; and (2) assess the time allotted for examination and analyze the effects of other USPTO incentives on patent quality. USPTO concurred with GAO's recommendations.

View [GAO-16-883T](#). For more information, contact John Neumann at (202) 512-3841 or [neumannj@gao.gov](mailto:neumannj@gao.gov).

September 2016

## INTELLECTUAL PROPERTY

# Patent Office Has Opportunities to Further Improve Application Review and Patent Quality

## What GAO Found

U.S. Patent and Trademark Office (USPTO) examiners face a variety of challenges in reviewing patent applications and issuing high quality patents. Some challenges affect examiners' ability to complete a thorough review of information relevant to a claimed invention—or a “prior art” search—which is the most time consuming aspect of examining a patent application. For example, the amount and availability of prior art as well as the extent to which examiners are able to search prior art quickly using the search tools USPTO provides may present a challenge to examiners in reviewing patent applications. Additionally, the clarity of patent applications and the amount of time USPTO allots examiners to complete their work, among other challenges, may affect examiners' ability to ensure that patents USPTO issues are high quality.

USPTO is taking steps to address the challenges examiners face in reviewing applications and issuing high quality patents—most notably through the agency's Enhanced Patent Quality Initiative—but some steps have limitations and opportunities exist for further improvement. For example,

- USPTO is taking steps to strengthen monitoring of examiners' work. However, USPTO still faces limitations in assessing patent quality overall, including the thoroughness of examiners' prior art searches, because, for example, USPTO has not established a consistent definition of patent quality or guidance on what constitutes a thorough prior art search for different technologies. Additionally, while USPTO has an overall strategic goal that includes optimizing patent quality, the agency has not developed specific goals and performance indicators related to patent quality and prior art search improvement. Without consistently and clearly defining patent quality and a thorough prior art search, and establishing goals and performance indicators to monitor examiners' work, USPTO will be unable to fully measure progress toward meeting its patent quality strategic goal consistent with internal control standards and leading practices for federal agencies.
- USPTO has not comprehensively assessed the time examiners need to perform high quality patent examinations, including thorough prior art searches, and has not fully assessed the effects of other agency incentive policies on patent quality. For instance, USPTO recently adjusted the time allotted to examiners for reviewing applications in some technologies, but has not recently assessed the time needed for a thorough examination in all technology areas. GAO estimates, based on its survey, that 70 percent of patent examiners say they do not have enough time to complete a thorough examination given a typical workload. Additionally, most stakeholders GAO interviewed said that the time pressures examiners face is one of the central challenges to ensuring patent quality; however, USPTO has not analyzed the effects of its production-based incentive policies on patent quality. According to federal standards for internal control, operational success requires providing personnel with the right incentives for the job. Without comprehensively assessing the time needed to conduct a thorough examination or USPTO's current incentives, USPTO cannot be assured that its time allotments and incentives support the agency's patent quality goal.

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Chairman Issa, Ranking Member Nadler, and Members of the Subcommittee,

At the request of the subcommittee, I am pleased to submit this statement for the record regarding GAO's recent work on patent quality issues and ways to improve patent quality through the use of the best available information related to an invention. As you know, scientific and technological innovation provide a foundation for U.S. economic growth and competitiveness. The Constitution grants Congress the power to give inventors a patent providing exclusive rights for a limited time to their inventions.<sup>1</sup> The U.S. Patent and Trademark Office (USPTO) administers the patent system and receives over half a million applications each year from inventors seeking patents to protect the intellectual property stemming from their work. When reviewing (or examining) a patent application, a USPTO examiner determines whether the claimed invention meets the legal requirements for patentability as set forth in patent laws and federal case law. USPTO examiners make such determinations by comparing information in the application to other information relevant to the claimed invention—generally known as prior art—which may include prior patents, patent applications, or nonpatent publications describing a technology, among other things. Finding prior art is the most time consuming part of examining an application, and identifying the most relevant prior art during the examination reduces the chance that USPTO will grant a patent for something previously invented or for an obvious combination of prior inventions.

While most patents are never the subject of a lawsuit, resolving patent infringement and validity disputes can be costly. Legal scholars and economists have raised concerns that an increase in the number of low quality patents—such as those in which the description of the invention is unclear or overly broad—may lead to an increase in patent infringement lawsuits and hinder innovation. In 2013, we reported that low quality patents, among other factors, were likely a key factor in many patent infringement lawsuits from 2007 through 2011, because their unclear boundaries make it easy to unintentionally infringe these patents.<sup>2</sup> We

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<sup>1</sup>U.S. Const., Art. I, § 8, cl. 8.

<sup>2</sup>GAO, *Intellectual Property: Assessing Factors That Affect Patent Infringement Litigation Could Help Improve Patent Quality*, [GAO-13-465](#) (Washington, D.C.: Aug. 22, 2013).

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also reported that some stakeholders we interviewed told us that USPTO should not have issued some patents because they believe they do not meet all of the legal standards required. USPTO has acknowledged the need to focus additional attention on patent quality and, in 2015, began its Enhanced Patent Quality Initiative aimed at helping to ensure that the thousands of patents the agency issues each year are of higher quality. We were asked to provide information from our recent reports on the steps USPTO can take to improve patent quality to inform this hearing on oversight of USPTO operations.

My statement today is based on two reports we issued in June 2016 and will address (1) the challenges USPTO examiners face in reviewing patent applications and issuing high quality patents, and (2) the steps USPTO can take to improve patent examination and the quality of granted patents.<sup>3</sup> We used multiple methodologies in conducting the work for these reports. We reviewed relevant laws and USPTO documents, and interviewed USPTO officials and examiners. We conducted semistructured interviews with patent stakeholders and subject matter experts knowledgeable about patent quality and prior art. Further, we conducted a web-based survey of a stratified random sample of 3,336 USPTO examiners from 8 of the 11 technology-based subject matter groups (referred to as technology centers) into which USPTO examiners are divided. The survey collected information on examiners' opinions on challenges and options for improving USPTO's prior art searches, and on how USPTO might improve its approach to ensuring patent quality. Overall, we received responses from 80 percent of the examiners in our survey, which we designed to produce estimates that are generalizable to the population of patent examiners in our study, and within each technology center.<sup>4</sup> The survey questions and detailed data on the results

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<sup>3</sup>GAO, *Intellectual Property: Patent Office Should Strengthen Search Capabilities and Better Monitor Examiners' Work*, [GAO-16-479](#) (Washington, D.C.: June 30, 2016); and *Intellectual Property: Patent Office Should Define Quality, Reassess Incentives, and Improve Clarity*, [GAO-16-490](#) (Washington, D.C.: June 30, 2016).

<sup>4</sup>Because we followed a probability procedure based on random selections, our sample is only one of a large number of samples that we might have drawn. Since each sample could have provided different estimates, we express our confidence in the precision of our particular sample's results as a 95 percent confidence interval. This is the interval that would contain the actual population value for 95 percent of the samples we could have drawn. All percentage estimates from our survey have margins of error at the 95 percent confidence level of plus or minus 6 or fewer percentage points.

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can be viewed on our website.<sup>5</sup> In assessing USPTO's effort to address patent quality issues, we identified criteria in the federal standards for internal control;<sup>6</sup> and the Government Performance and Results Act (GPRA) of 1993, as amended;<sup>7</sup> among other sources. (More information on the scope and methodology of our work is contained within our published reports.)

We conducted the work on which this statement is based 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 objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## USPTO Faces Challenges in Reviewing Applications and Issuing High Quality Patents

USPTO examiners face a variety of challenges in reviewing patent applications and ensuring that USPTO issues high quality patents. Examples of the challenges examiners face are as follows:

- **Amount and relevance of prior art cited by applicants.** Examiners we surveyed reported difficulties with the amount and relevance of prior art references applicants provide. At the time of our June prior art report,<sup>8</sup> we estimate, based on our survey, that 82 percent of examiners sometimes, often, or always encountered applications with what they considered an excessive number of submitted art references in the past quarter.<sup>9</sup> Considering all of the prior art

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<sup>5</sup>GAO, *Intellectual Property: Survey of U.S. Patent Examiners, an E-supplement to GAO-16-479 and GAO-16-490, GAO-16-478SP* (Washington, D.C.: June 30, 2016).

<sup>6</sup>GAO, *Standards for Internal Control in the Federal Government, GAO/AIMD-00-21.3.1* (Washington, D.C.: November 1999). Revised standards became effective beginning with fiscal year 2016 after our work began. See *Standards for Internal Control in the Federal Government, GAO-14-704G* (Washington, D.C.: September 2014).

<sup>7</sup>Pub. L. No. 103-62 (1993), amended by the GPRA Modernization Act of 2010, Pub. L. No. 111-352 (2011).

<sup>8</sup>GAO-16-479.

<sup>9</sup>We estimate all examiners' responses as follows: always, 3 percent of examiners; often, 29 percent; sometimes, 50 percent; rarely, 17 percent; never, 1 percent; don't know, less than 1 percent; and no response, less than 1 percent.

references applicants submit can be a challenge for examiners because applicants are generally not required to explain the relevance of references or to point examiners to the particular portions of a reference that the applicant considers relevant.

- **Availability of prior art.** Prior art availability and difficulties obtaining certain types of prior art are challenges, according to most experts we interviewed and examiners we surveyed. For example, some prior art may require a fee to access, may not be in a text-searchable format, may not be in a database, or may otherwise be difficult to access. Difficulty obtaining certain types of prior art may influence how often patent examiners search for them. Table 1 provides information on examiners' estimated difficulty and frequency of searching for various types of prior art. In analyzing our survey results, we found that the difficulty examiners ascribed to finding foreign patent literature and foreign-language nonpatent literature was statistically associated with how often they reported searching for these types of prior art.<sup>10</sup>

**Table 1: U.S. Patent and Trademark Office Examiners' Estimated Difficulty and Frequency of Searching for Various Types of Prior Art**

Type of prior art		Estimated percentage of examiners						
		Difficulty of obtaining relevant prior art		Frequency of searching				
		Very difficult	Some-what difficult	Always	Often	Some-times	Rarely	Never or don't use
Nonpatent literature	Foreign-language nonpatent literature	24	28	8	13	27	31	21
	Textbooks	14	28	4	9	29	40	17
	Industry-related nonpatent literature (e.g., manuals or company websites)	10	27	9	20	37	26	7

<sup>10</sup>We performed a test of association at the 5 percent level of significance on examiners' responses to questions on how often they search for certain types of prior art and how difficult it is to obtain relevant art from these searches. Following best statistical practices, we only carried out statistical tests of association with the factors that were of most substantive interest. Specifically, for this survey topic, we tested the association between frequency of searches and two survey items: foreign-language nonpatent literature and foreign patents. Therefore, we do not know the statistical association of the other factors presented in table 1.

	Scientific articles or presentations	9	26	19	22	28	24	8
	Software-related nonpatent literature	7	19	13	17	23	19	27
	Foreign patents	7	25	35	32	24	8	1
Patent literature	Prior U.S. patents and applications	1	4	95	4	1	<1	<1

Source: GAO survey of U.S. Patent and Trademark Office patent examiners. | GAO-16-883T

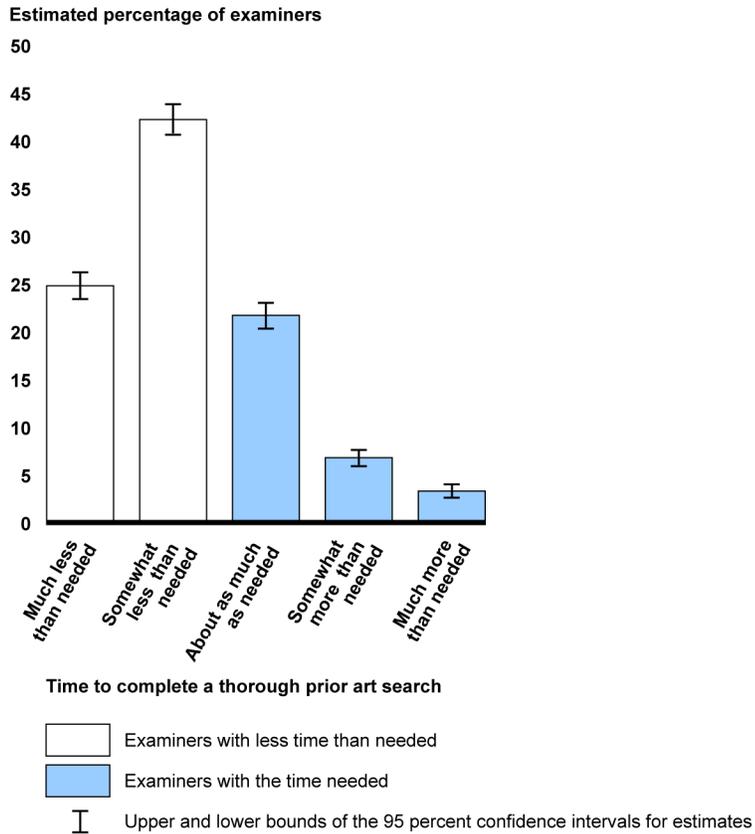
Note: Rows do not total 100 percent because the table does not include all response categories for each question related to the estimated difficulty or frequency of searching for prior art. Survey results reported here may not sum to the results provided in the text above because of rounding. All estimates have 95 percent confidence intervals of within +/- 5 or fewer percentage points.

- Time pressures for patent examination.** According to most examiners we surveyed and experts we interviewed, time pressures may reduce examiners' ability to conduct thorough examinations of a patent application, including searching for prior art. These pressures relate to USPTO's system for allotting an expected amount of time for examiners to complete an examination. For example, as figure 1 shows, we estimate on the basis of our survey that 67 percent of examiners find they have somewhat or much less time than needed to complete a thorough prior art search given a typical workload. Similarly, on the basis of our survey, we estimate that, given a typical workload, about 70 percent of examiners have less time than needed to complete a thorough examination.<sup>11</sup> In analyzing our survey results, we found that how often examiners searched for foreign patent literature, scientific articles or presentations, and foreign-language nonpatent literature was statistically associated with their description of the sufficiency of time they had to complete a thorough prior art search.<sup>12</sup>

<sup>11</sup>We estimate all examiners' responses would be as follows: much more time than needed, 4 percent; somewhat more time than needed, 7 percent; about as much time as needed, 19 percent; somewhat less time than needed, 43 percent; much less time than needed, 27 percent; don't know, less than 1 percent; no response, 1 percent.

<sup>12</sup>We performed a test of association at the 5 percent level of significance on examiners' responses to questions on how often they search for each of these types of prior art and whether they have sufficient time to complete a thorough prior art search.

**Figure 1: Estimated Sufficiency of Patent Examiners' Time for Completing Thorough Prior Art Searches**



Source: GAO survey of U.S. Patent and Trademark Office patent examiners. | GAO-16-883T

- Search tools and capabilities.** USPTO examiners we surveyed and experts we interviewed had mixed opinions on USPTO's search tools and capabilities. Based on our survey, examiners generally find that the search tools available to them from USPTO and from third parties make it easier to complete prior art searches, but that other tools would help. Also, a group of four supervisory patent examiners we interviewed said that it would be more efficient to search for prior art in one tool, with a single search method that covered multiple sources of prior art, including nonpatent literature. Currently, nonpatent literature may appear in different journals or databases that cannot be searched with a single search function.
- Ensuring examiners' technical competence.** According to most experts we interviewed, USPTO faces a challenge in ensuring that

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examiners have sufficient and appropriate technical backgrounds, knowledge, and skills for examining patent applications. As of May 2015, approximately 39 percent of all examiners in the technology centers we reviewed had been at USPTO for less than 5 years. USPTO officials we interviewed told us that the agency has aimed to match new hires' previous work experiences and educational backgrounds to technology centers. However, at the time of our June prior art report,<sup>13</sup> our survey found that in the past quarter, less than half of examiners—an estimated 42 percent—always or often encountered applications with a subject matter in which they had knowledge of existing prior art based on their education or previous work experience.<sup>14</sup>

- **Clarity of applications.** According to most of the experts we interviewed and examiners we surveyed, the lack of clarity in applications can pose a challenge to finding relevant prior art. For example, one expert we interviewed stated that there often are no standard terms to describe technologies, and different applications may use different terms to describe the same thing. Inconsistent terminology can make it more difficult for examiners to find relevant prior art because conducting keyword searches with certain terms—a common method of searching for prior art described by USPTO officials—will not identify documents that use a different term. Moreover, USPTO has encountered challenges with patent application clarity that can affect patent quality, such as the use of unclear terms or broadly worded claims, including the use of functional claim language.<sup>15</sup> On the basis of our survey, we estimate that 45 percent of examiners always or often encounter terms that are not well defined in the patent applications.<sup>16</sup> In addition, based on our

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<sup>13</sup>[GAO-16-479](#).

<sup>14</sup>We estimate all examiners' responses as follows: always, 7 percent; often, 35 percent; sometimes, 40 percent; rarely, 13 percent; never, 3 percent; don't know, 1 percent; and no response, 1 percent.

<sup>15</sup>In some cases, patent claims define the scope of the invention by encompassing an entire function rather than the specific means of performing that function. While "functional claiming" is permitted by statute, we reported in 2013 (see [GAO-13-465](#)) that patents that include functional claiming language were more likely to be unclear and to be disputed in court.

<sup>16</sup>We estimate all examiners' responses as follows: always, 8 percent; often, 37 percent; sometimes, 42 percent; rarely, 13 percent; never, less than 1 percent; don't know, less than 1 percent; and no response, less than 1 percent.

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survey, we estimate that nearly 90 percent of examiners always or often encountered broadly worded claims in applications they reviewed,<sup>17</sup> and for nearly two-thirds of examiners, applications with broadly worded claims make completing a thorough examination more difficult.<sup>18</sup>

- **USPTO policies and procedures.** Through interviews with USPTO officials and stakeholders and our examiner survey, we identified several USPTO policies and procedures that could affect patent quality. For example, applicants are allowed to include any number of claims in a patent application. According to USPTO officials, applicants' ability to file unlimited claims can have a negative effect on patent quality, because it is difficult for examiners to fully review an application with numerous claims in the time allotted. Additionally, applicants are currently allowed to file an unlimited number of requests for continued examination, which is a request by an applicant to reopen examination of a patent application after the examination has been closed.<sup>19</sup> Applicants most often request continued examination after the final rejection of an application, according to USPTO officials. Such requests provide applicants with virtually unlimited attempts to secure a patent, which is problematic for patent quality, according to some stakeholders. Some stakeholders also told us that requests for continued examination can wear down examiners, making them more likely to eventually grant the patent.

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<sup>17</sup>We estimate all examiners' responses as follows: always, 40 percent; often, 47 percent; sometimes, 11 percent; rarely, 1 percent; never, 0 percent; don't know, less than 1 percent; and no response, less than 1 percent.

<sup>18</sup>We estimate all examiners' responses as follows: much easier, 2 percent; somewhat easier, 14 percent; neither easier nor more difficult, 20 percent; somewhat more difficult, 33 percent; much more difficult, 30 percent; don't know, less than 1 percent; and no response, less than 1 percent.

<sup>19</sup>Applicants must submit a revised application and pay a fee to USPTO for filing a request for continued examination. 37 C.F.R. § 1.114.

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## USPTO Is Taking Steps to Improve Patent Quality and Address Prior Art Search Challenges, but Some Steps Have Limitations and Opportunities for Improvement Exist

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### USPTO Faces Limitations in Its Ability to Assess Patent Quality and the Thoroughness of Examiners' Prior Art Searches

USPTO is taking steps to strengthen its monitoring of examiners' work; however, these efforts may not provide USPTO with adequate data to identify and address issues with patent quality, or shortcomings with examiners' prior art searches specific to individual technology centers. USPTO uses two methods to review patent examinations that may help the agency monitor patent quality as well as the thoroughness of prior art searches. First, USPTO's Office of Patent Quality Assurance (OPQA) conducts audits of a random sample of examiners' work (referred to here as office actions), and some of these audits include a review of examiners' prior art searches. Second, supervisory patent examiners review examiners' work as part of each examiner's annual performance appraisal. USPTO supervisory patent examiners are required to review at least four office actions of each of their primary examiners per year—with additional reviews for junior examiners—and to evaluate the thoroughness of examiners' prior art searches during these reviews.<sup>20</sup> However, in recent years, the number and consistency of OPQA staff and supervisory patent examiners' reviews have not been sufficient to identify trends in the thoroughness of prior art searches within individual technology centers or art units (subunits of a technology center). Further, because the supervisory patent examiners' reviews have not been

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<sup>20</sup>Primary examiners may accept or reject a patent application without additional review. This level of authority is in contrast to junior examiners—whose work must first be reviewed by a supervisory or primary patent examiner before it can be sent to the applicant.

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conducted or documented in a consistent manner, USPTO could not examine trends at the technology center or art unit level by combining supervisory reviews with OPQA's reviews.

As part of the Enhanced Patent Quality Initiative, USPTO drafted a master review form that could standardize OPQA and supervisory examiner reviews with a single, consistent approach and documentation. This effort is expected to replace USPTO's current quality assurance and supervisory approaches to reviewing examiners' work and will allow the agency, for the first time, to collect consistent data across all the reviews. OPQA began using a draft version of the review form in November 2015, and USPTO began to pilot the form with some supervisory patent examiners in 2016. According to OPQA officials, the new master review form, along with an increase in OPQA staff, should allow the office to perform about 12,000 reviews in 2016 compared with about 8,000 reviews per year in the past.<sup>21</sup> As of March 2016, USPTO had not made decisions about the final content of the review form, when supervisory patent examiners might begin to use the new form, or how the data from OPQA and supervisory examiner reviews would be used to assess examiners' prior art searches.

Despite potential improvements in how OPQA and supervisory patent examiners monitor examiners' work, USPTO's ability to use these data to assess patent quality and the thoroughness of examiners' prior art searches may be limited because USPTO (1) does not have a consistent definition of patent quality or clear definition of what constitutes a thorough prior art search, (2) may not collect sufficient information to assess examiners' search strategies or the sources of prior art they consider, and (3) has not established specific goals and performance indicators for patent quality or improving prior art searches. Specifically,

- USPTO does not currently have a consistent definition of patent quality, which may limit its ability to assess the effects of its examination policies and review processes—as well as its Enhanced Patent Quality Initiative—on patent quality. Several high level USPTO officials and the four supervisory patent examiners that we interviewed told us there is no consistent definition of patent quality at

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<sup>21</sup>Prior to adopting the master review form, reviewers in OPQA performed about 400 audits per year that focused on assessments of examiners' prior art searches.

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USPTO, and several USPTO officials offered a variety of definitions of patent quality that focused on validity, patentability (i.e., meeting statutory requirements), or clarity. Some USPTO officials also included aspects of patent examination in defining patent quality, such as an examination that is completed quickly. According to USPTO officials, one challenge in developing a consistent definition is that the patent community holds varying definitions of patent quality. However, most of the stakeholders that we interviewed—including former high ranking USPTO officials, academics, and representatives from nongovernmental organizations—said that it is important for USPTO to develop a consistent definition of patent quality. Additionally, USPTO requires examiners to perform a thorough prior art search and record their search results or search history, but has not clearly defined what constitutes a thorough prior art search. USPTO’s manual for patent examiners requires examiners to conduct a thorough prior art search by identifying related technologies, the appropriate search tools, and a search strategy.<sup>22</sup> It also requires examiners to consider U.S. patents, foreign patents, and nonpatent literature, unless they can justify with reasonable certainty that no more pertinent references can be found. Examiners have access to guidance and training on conducting searches, but USPTO has not documented technology-specific guidance—such as by technology center or art unit—on what constitutes a thorough prior art search.

- At the time of our June prior art report, USPTO’s draft of the new master review form did not require OPQA or supervisory examiners to evaluate the thoroughness of an examiner’s search.<sup>23</sup> Instead, the form asks if the examiner (1) searched for prior art associated with the inventor’s name, (2) searched for prior art using classification results for the application, and (3) recorded his or her search strategy. If a reviewer finds that the examiner should have made a rejection but did not, the form asks the reviewer to identify the source of prior art needed for the missed rejection. The March 2016 draft of the form did not include, as an October 2015 draft we reviewed did, questions assessing if search queries were likely to result in identification of relevant prior art. The March 2016 draft of the form also did not

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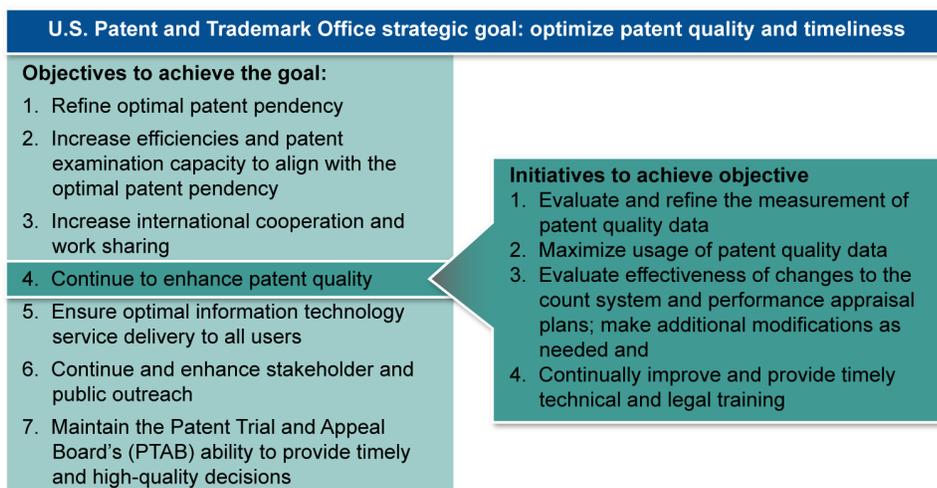
<sup>22</sup>U.S. Patent and Trademark Office, *Manual of Patent Examining Procedure* (November 2015). The manual is available electronically at [www.uspto.gov/web/offices/pac/mpep/](http://www.uspto.gov/web/offices/pac/mpep/).

<sup>23</sup>[GAO-16-479](#).

include questions that address whether the examiner searched foreign patent literature or nonpatent literature, as is required by the agency's manual for patent examiners.

- Although USPTO is taking steps to improve patent quality metrics as part of the Enhanced Patent Quality Initiative, it has not established specific goals or performance measures related to its strategic goal to optimize patent quality and timeliness. Specifically, USPTO's 2014-2018 strategic plan includes the goal to "optimize patent quality and timeliness," but the patent quality objective does not include specific performance measures that fully assess progress towards the goal.<sup>24</sup> For example, USPTO names seven objectives to achieve this goal, but six of the seven objectives focus on timeliness, customer service, and process or production goals rather than patent quality. For the one patent quality objective, USPTO cites improving patent quality data and maximizing the use of such data as two of its four performance measures (see fig. 2). Similarly, the goals for patent quality in USPTO's strategic plan do not currently include goals or indicators for assessing the thoroughness of prior art searches.

**Figure 2: U.S. Patent and Trademark Office (USPTO) Strategic Goal Related to Patent Quality and Timeliness**



Source: USPTO. | GAO-16-883T

<sup>24</sup>USPTO 2014-2018 Strategic Plan, U.S. Patent and Trademark Office.

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Federal standards for internal control state that agencies' monitoring of their internal controls should assess the quality of performance over time, and that internal controls should generally be designed to assure that ongoing monitoring occurs in the course of normal operations.<sup>25</sup> Also, GPRA, as amended, requires, among other things, that agencies establish objective, quantifiable, and measurable performance goals, and establish performance indicators to measure progress toward each performance goal. Although USPTO is not required to establish specific goals or performance indicators specifically for patent quality or for improving prior art searches, we have previously reported that establishing program goals and associated indicators constitutes a leading practice for planning within federal agencies.<sup>26</sup>

In our June patent quality report,<sup>27</sup> we concluded that without a consistent definition of patent quality, USPTO is at risk of having staff work at cross purposes to improve patent quality based on their individual definitions of patent quality. Similarly, without greater clarity on what constitutes a thorough prior art search in different technology areas, the thoroughness of examiners' searches may vary and it will be difficult for USPTO to assess the adequacy of their searches. Without measurable goals and performance indicators to assess patent quality and the thoroughness of examiners' prior art searches, USPTO is at risk of not being able to fully measure and capture key performance data on whether the agency is meeting its strategic goal to optimize patent quality and cannot reliably assess the thoroughness of its searches or improvement in searches over time. Additionally, without consistently collecting the information needed to assess the thoroughness of prior art searches and monitoring at a

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<sup>25</sup>[GAO/AIMD-00-21.3.1](#).

<sup>26</sup>GPRA, as amended, sought to improve the effectiveness and accountability of federal programs by requiring federal agencies to set goals for program performance, measure results, and report on annual performance compared with the goals. Although the Act's requirements apply at the agency level, we have previously reported that these practices can serve as leading practices within an organization, such as with individual programs or initiatives. See GAO, *Environmental Justice: EPA Needs to Take Additional Actions to Help Ensure Effective Implementation*, [GAO-12-77](#) (Washington, D.C.: Oct. 6, 2011), and *Great Lakes Restoration Initiative: Further Actions Would Result in More Useful Assessments and Help Address Factors That Limit Progress*, [GAO-13-797](#) (Washington, D.C.: Sept. 27, 2013).

<sup>27</sup>[GAO-16-490](#).

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technology center or art unit level, the USPTO cannot identify and address issues that are more prevalent in certain technology centers or art areas, such as variations in the extent to which examiners in certain areas search for foreign patents or nonpatent literature. Thus, we recommended that USPTO

- develop (1) a consistent definition of patent quality, and clearly articulate this definition in agency documents and other guidance, and (2) written guidance on what constitutes a thorough prior art search within each technology field (i.e., mechanical, chemical, electrical), technology center, art area, or art unit, as appropriate;
- ensure that sufficient information is collected in reviews of prior art searches to assess the quality of searches at the technology center level, including how often examiners search for U.S. patents, foreign patents, and nonpatent literature, and use the audits and supervisory reviews to monitor the thoroughness of examiners' prior art searches and improvements over time; and
- further develop measurable, quantifiable goals and performance indicators related to patent quality as part of the agency's strategic plan, and establish goals and indicators for improving prior art searches.

USPTO concurred with our recommendations to develop a consistent definition of patent quality and establish guidance on what constitutes a thorough prior art search. In response to our June patent quality report, USPTO stated that it already has a consistent definition for patent quality; specifically, that a quality patent is one that is correctly issued in compliance with all of the requirements of applicable patent statutes as well as relevant case law at the time of issuance. However, in our audit work, we did not find evidence that this definition was clearly articulated in agency documents and guidance or used in agency performance indicators and goals. We revised our recommendation to clarify that USPTO should not only define patent quality, but also clearly state the definition in relevant agency documents. In response to our June prior art report, USPTO stated it would develop technology-based search training guidance. USPTO also concurred with our recommendations to ensure that reviews of examiners' prior art searches collect sufficient information to assess search quality at the technology center level and to use these reviews to monitor examiners' prior art searches over time. USPTO stated that the agency would ensure adequate data are collected to assess the quality of searches at the technology center level, and would investigate using audits and reviews to monitor the thoroughness of examiners' prior art searches over time. USPTO noted that a great deal of information on

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examiners' prior art searches is potentially available from examiners' records and reviews by primary examiners, supervisors, OPQA, and others. However, as we describe in our June prior art report,<sup>28</sup> in the past, these reviews have not been conducted or recorded in a consistent manner. USPTO's recent effort to improve the consistency of these reviews is an important step to address this issue, but additional steps are needed to ensure that the reviews provide USPTO with reliable information to assess trends in prior art search quality at the technology center level. USPTO concurred with our recommendations to develop measurable goals and indicators for patent quality and improving prior art searches. Specifically, in response to our recommendation regarding goals and indicators related to patent quality USPTO said that it has taken some steps to update and improve its goals and indicators. We modified our recommendation to reflect that USPTO has made progress in this regard. As USPTO further develops its goals and performance indicators, we encourage the agency to more clearly link these goals and indicators to its definition of patent quality.

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### USPTO Is Making Improvements to Prior Art Search Tools but Has Not Developed a Strategy to Assess New Sources of Art

As we reported in our June prior art report, USPTO is making improvements to its prior art search tools that may help address some of the challenges examiners face in identifying relevant prior art, but USPTO has not developed a strategy to assess incorporating new sources of art into these tools over time.<sup>29</sup> As part of its Enhanced Patent Quality Initiative, USPTO is procuring an automated prior art search capability that could enhance examiners' ability to identify relevant prior art. In June 2015, USPTO requested information on a search system that uses the information contained in a patent application to search for patent and nonpatent literature automatically, without human involvement. In its request for information, USPTO described the intent of the system as providing a useful prior art baseline for patent examiners to begin their own searches. Such a system could improve the search tools available to examiners and help address the challenge of managing the quantity of potentially relevant prior art. At the time of our June prior art report, USPTO officials anticipated awarding a contract for a pilot system in late

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<sup>28</sup> [GAO-16-479](#).

<sup>29</sup> [GAO-16-479](#).

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Summer 2016 that will be available to a limited number of examiners to improve prior art searches.

Moreover, USPTO's 2014-2018 Strategic Plan includes an objective to ensure optimal information technology services, including upgrading search systems and prior art access. Toward this objective, USPTO is in the process of a major, multiyear \$405 million effort to upgrade its information technology tools to provide examiners with a new system to manage all aspects of patent examination, including certain aspects of their prior art searches. According to USPTO's Strategic Information Technology Plan for fiscal years 2015 through 2018, the new system, called Patents End-to-End, will replace nearly 20 systems currently used to search patent applications. The new system will initially replicate the prior art search capabilities of USPTO's current systems, which focus on U.S. patent literature and include only one source of nonpatent literature. Although searching for nonpatent literature is directed by the agency's manual for patent examiners, under the current and planned systems, examiners need to individually access and search a variety of external sources to look for nonpatent literature during their examinations. Consequently, neither the current nor planned systems provide USPTO examiners with the capability to efficiently search for prior art using a single, integrated search that includes both patent literature and multiple sources of nonpatent literature.

The time it takes examiners to search the large and increasing volume of nonpatent literature and the inefficiency of having to search many different sources individually may lead examiners to conduct less thorough searches of nonpatent literature, potentially missing relevant prior art. Our analysis of examiners' survey responses and experts' statements suggests that examiners are less likely to search for certain types of prior art, particularly foreign-language patents and nonpatent literature, from which it is more difficult to find relevant prior art. Integrating additional sources of prior art into USPTO's search tools is one way USPTO could increase the types and sources of prior art that examiners consider. According to USPTO officials, the capabilities of the new Patents End-to-End system can be expanded in the future to include additional nonpatent literature sources. However, USPTO officials told us that, as of March 2016, the agency does not currently have specific plans to add additional nonpatent literature sources to its new system because of its initial focus on developing parity with the existing system. In addition, as of March 2016, USPTO had not established a documented strategy to identify and assess new sources in the future or the most optimal means of providing access to them.

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According to federal standards for internal control, control activities are the policies, procedures, techniques, and mechanisms to help ensure that agencies take action to address risks. Such actions are an integral part of an agency's planning to achieve desired results and efficiently manage government resources, including the development and maintenance of information systems. Because information technology changes rapidly, standards for internal control note that controls must evolve to remain effective. These standards also highlight the importance of clearly documenting internal controls.<sup>30</sup>

In our June prior art report, we concluded that developing and periodically updating a strategy to identify and assess the optimal means of incorporating new sources of prior art into the Patents End-to-End system, consistent with federal standards for internal control, could help USPTO take full advantage of its major investment in its new information technology tools to address some of the challenges examiners face in identifying relevant prior art.<sup>31</sup> We recommended that USPTO develop and periodically update a documented strategy to identify key sources of nonpatent literature for individual technology centers and to assess the optimal means of providing access to these sources, such as including them in USPTO's search system. USPTO concurred with our recommendation and stated that USPTO analyzes nonpatent literature sources used by examiners and assesses them for incorporation into the agency's search system. While we did not receive evidence of such assessments during our review, they may be a useful step toward a strategy to periodically assess the optimal means of providing examiners access to key nonpatent literature sources and to ensure the effectiveness of USPTO's planned Patents End-to-End search system.

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<sup>30</sup> [GAO/AIMD-00-21.3.1](#).

<sup>31</sup> [GAO-16-479](#).

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## USPTO Has Not Comprehensively Assessed the Time Examiners Need to Perform High Quality Patent Examinations, Including Thorough Prior Art Searches

USPTO plans to evaluate changes to the agency's system for determining the number of applications a patent examiner is expected to review within a specified period of time; however, USPTO has not fully assessed the amount of time examiners in different technologies need to perform thorough prior art searches or the effects of time allotment for examinations and other incentives on patent quality. According to USPTO officials we interviewed and a document we reviewed, the time allotted for examining patent applications in individual technology areas was determined when the examiner performance and production system was first created in the 1970s or when subsequent art units were added. USPTO adjusted the time allotted to examiners between fiscal years 2010 and 2012, and gave all patent examiners a total of 2.5 additional hours per application. However, according to USPTO officials, the agency did not evaluate art unit or technology-specific factors prior to making this change. USPTO also adjusted the time allotted in April 2016, when approximately 1,000 examiners received an additional 2.7 hours for examinations of certain technologies to address concerns based on an initial investigation of time needed to perform a thorough prior art search in these technologies. Additionally, patent examiners are rated annually on their production and docket management, among other elements. USPTO provides examiners with monetary incentives, or bonuses, for timeliness and production, but does not offer a bonus for producing high-quality work.

Time allotments and production-based incentives can lead to pressure for examiners to complete their work quickly. Most of the stakeholders we interviewed told us that examiners' time pressures are one of the central challenges for patent quality. Three USPTO officials told us that there are trade-offs between timeliness and patent quality, explaining that examiners cannot examine patents quickly and, at the same time, ensure that patents are of the highest quality. One of these officials told us that the agency's focus on timeliness currently trumps high quality work, potentially increasing the tension between the goals of timeliness and quality. As discussed above, our survey results indicate that most examiners say they are experiencing time pressures in their work. In addition, a few examiners we interviewed said that the system as currently designed incentivizes examiners to issue a patent instead of issuing a final rejection, suggesting that when pressed for time examiners tend toward granting patents.

Federal standards for internal control specify that agencies should assess the risks the agency faces, including identifying relevant risks associated with achieving the agency's objectives, assessing a risk's significance

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and likelihood of its occurrence, and deciding what actions should be taken to manage the risk.<sup>32</sup> In addition, these standards note that an agency's operational success requires providing personnel with the right incentives for the job. In USPTO's 2014-2018 Strategic Plan, the agency indicated its intent to evaluate changes to its system for evaluating if examiners are completing office actions in the time allotted and to make additional modifications as needed. In November 2015, USPTO's Commissioner for Patents affirmed the agency's intent to examine this system and told us that he had committed to the examiners' union to do so. As of May 2016, USPTO had not clarified the extent to which this evaluation will specifically consider the time needed for a thorough prior art search for different technologies, and had not analyzed the effect of its time allotment and production-based incentive policies on patent quality.

In our June reports, we concluded that USPTO's policies regarding the time allotted to complete patent application reviews, including prior art search, and incentives that are based on the quantity of the work examiners complete—not the quality of their work—may negatively affect the quality of issued patents.<sup>33</sup> Without analyzing whether time allotments to complete examination of a patent application, including a thorough prior art search are sufficient, USPTO is at risk of issuing lower quality patents due to examiners not having enough time to complete their work. Without analyzing the current incentive structure, USPTO cannot ensure that its incentives are aligned with high-quality work. Thus, we recommended that USPTO analyze the time examiners need to perform a thorough patent examination and, in particular, the time examiners need to conduct a thorough prior art search for different technologies. We also recommended that USPTO analyze how current performance incentives affect the extent to which examiners perform thorough examinations of patent applications.

USPTO concurred with our recommendations to analyze the time examiners need to perform a thorough patent examination, including a thorough prior art search for different technologies, and the effect of USPTO's performance incentives on patent examination. In its response to our reports, USPTO noted that it has begun analyzing the time

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<sup>32</sup>[GAO/AIMD-00-21.3.1](#).

<sup>33</sup>[GAO-16-479](#) and [GAO-16-490](#).

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examiners need to perform a thorough patent examination, including searching for prior art and had provided additional time to some examiners based on this analysis. We did not receive details of this evaluation during our review, but recognize that this action may have provided the agency with important information about the time needed for patent examination and prior art searches in some technologies. We continue to believe that the agency should review the time allotted to examine patent applications for all technologies. Regarding USPTO's performance incentives, USPTO stated that it will analyze how current performance incentives affect the extent to which examiners perform thorough examinations of patent applications and, in particular, whether these incentives support USPTO's goal to optimize patent quality.

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### USPTO Has Not Fully Evaluated the Effects of Certain Policies on Patent Quality

As discussed above, through interviews with USPTO officials and stakeholders and our examiner survey, we identified several policies and procedures that could affect patent quality, such as allowing applicants to file unlimited requests for continued examination. USPTO officials acknowledged that some of the agency's policies could affect patent quality. However, USPTO has not fully evaluated the effects of its policies and procedures on patent quality, which may also affect the agency's ability to issue high quality patents. Federal standards for internal control direct agencies to comprehensively identify risks and consider all significant interactions between the entity and other parties. Once these risks have been identified, they should be evaluated for their potential effects, including the significance of the risks and the likelihood of their occurrence.<sup>34</sup> In our June patent quality report, we concluded that without evaluating the effects of these policies USPTO is at risk of continuing practices that may adversely affect patent quality.<sup>35</sup> Thus, we recommended that USPTO evaluate the effects of agency application and examination policies on patent quality and, in doing so, determine if any changes are needed to ensure that the policies are not adversely affecting patent quality. USPTO concurred with this recommendation.

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<sup>34</sup>GAO/AIMD-00-21.3.1.

<sup>35</sup>GAO-16-490.

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## Additional Actions Are Needed to Further Improve the Clarity of Issued Patents

USPTO policies and procedures generally require clarity in issued patents; however, we found that there are additional steps USPTO could take to help ensure the clarity of issued patents. On the basis of our survey, we estimate that additional claim clarity requirements for applicants would help more than 80 percent of examiners do their jobs more effectively.<sup>36</sup> For example, most of the stakeholders we interviewed—including legal scholars and former high-ranking USPTO officials—as well as four supervisory patent examiners and the majority of examiners responding to our survey—indicated that requiring applicants to provide a glossary and define their terms would help to improve patent quality.<sup>37</sup> Further, USPTO officials said that examiners and applicants that participated in a USPTO Glossary Pilot Program generally indicated benefits to including a glossary and that the glossary improved claim clarity.<sup>38</sup> According to some stakeholders, other measures, such as having applicants include a functional claim check box to indicate whether they were using functional claim language could help to improve patent quality.<sup>39</sup>

By statute, an application for a patent must particularly point out and distinctly claim the subject matter of the invention.<sup>40</sup> USPTO regulations

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<sup>36</sup>We estimate all examiners' responses as follows: much more effectively, 41 percent; somewhat more effectively, 41 percent; neither more nor less effectively, 12 percent; somewhat less effectively, 1 percent; much less effectively, less than 1 percent; don't know, 4 percent; and no response, 1 percent.

<sup>37</sup>We estimate all examiners' responses as follows: much more effectively, 21 percent; somewhat more effectively, 38 percent; neither more nor less effectively, 29 percent; somewhat less effectively, 3 percent; much less effectively, 2 percent; don't know, 6 percent; and no response, 1 percent.

<sup>38</sup>In response to a series of executive actions to improve claim clarity, USPTO launched a Glossary Pilot Program, which was held from June 2014 to November 2015. As part of the voluntary program, USPTO provided guidance that applicants should include definitions that assist in clarifying the claimed invention, and allowed participants to select which terms to define and how best to define the selected terms. In March 2016, USPTO officials said that their analysis thus far of the pilot program did not find significant differences in pilot and non-pilot applications' initial quality review scores, but that this analysis would continue as the glossary pilot applications progress through the USPTO examination process.

<sup>39</sup>See Menell, Peter S. *Promoting Patent Claim Clarity*. UC Berkeley Public Law Research Paper No. 2171287. Nov. 2012.

<sup>40</sup>35 U.S.C. § 112(b).

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require that the application include a description of the process of making and using the invention in such full, clear, concise, and exact terms as to enable a person skilled in the art to use and make the invention.<sup>41</sup> However, examiners continue to encounter problems with patent application clarity because USPTO does not specifically require patent applicants to clearly define the terms used in their applications, provide additional means to clearly describe the scope of claims, or clearly identify when they are using functional claiming language.

In our June patent quality report, we concluded that, without making use of tools to improve the clarity of patent applications, such as by having applicants include a glossary to define the terms used in the application or indicate the use of functional claims through a checkbox, the agency is at risk of issuing unclear patents that are overly broad and not clearly worded.<sup>42</sup> Such patents may not comply with statutory requirements, thereby increasing the likelihood that the patent becomes the subject of litigation. Thus, we recommended that USPTO consider whether to require patent applicants to use claim clarity tools—such as a glossary of terms or a check box to signal functional claim language—in each patent application. USPTO concurred with this recommendation and said it will continue to consider whether to require patent applications to use such claim clarity tools. In its response to our report, USPTO stated that, contrary to our findings, USPTO’s initial conclusion was that a glossary did not make a meaningful difference in quality during the prosecution of an application, although USPTO is still analyzing whether the use of a glossary has a long-term impact on a patent. We revised the statement in the report to more closely align with the information that USPTO provided on the issue.

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<sup>41</sup>37 C.F.R. § 1.71.

<sup>42</sup>[GAO-16-490](#).

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## USPTO Does Not Have a Process to Periodically Evaluate Gaps in Examiners' Technical Competence in Each Technology Center

We found that USPTO has taken several actions related to the challenge of ensuring that the agency's examiner workforce has the technical competence—backgrounds, knowledge, or skills—needed to identify relevant prior art; however, USPTO does not have a process to assess and measure progress toward closing any gaps in examiners' technical knowledge and skills within each technology center.<sup>43</sup> Effective management of an organization's workforce—its human capital—is essential; in particular, identifying critical occupations, skills, and competencies and analyzing workforce gaps are leading principles in workforce planning, as we and the Office of Personnel Management have previously identified.<sup>44</sup> Further, as described in federal standards for internal control, all personnel need to possess and maintain a level of competence that allows them to accomplish their assigned duties.<sup>45</sup> Management must ensure that skill needs are continually assessed and that the organization is able to obtain a workforce with the skills required to achieve organizational goals.

Since 2007, USPTO strategic and human capital plans have called for measuring the agency's performance in closing competency/skill gaps for mission-critical occupations. USPTO has identified the patent examiner role as a mission-critical occupation and identified the competencies needed for this occupation. These competencies include technical work experience/education and technical competence, which we refer to collectively as technical competence. USPTO defines technical competence as the ability to analyze and interpret written technical materials, rules, regulations, instructions, and reports. According to USPTO officials, specific technical competencies vary depending on the technology examined by each technology center and art unit. To further develop and maintain examiners' technical competence, USPTO offers several voluntary training programs for examiners and USPTO officials

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<sup>43</sup>USPTO examiners are divided among 11 technology-based subject matter groups, such as Biotechnology and Organic Chemistry; Communications; and Mechanical Engineering, Manufacturing, and Products. Each technology center is further divided into art units—subunits of the technology center.

<sup>44</sup>GAO, *Workforce Planning: Interior, EPA, and the Forest Service Should Strengthen Linkages to Their Strategic Plans and Improve Evaluation*, [GAO-10-413](#) (Washington, D.C.: Mar. 31, 2010).

<sup>45</sup>[GAO/AIMD-00-21.3.1](#).

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said that technology centers provide technology-specific training opportunities.

While these are important steps that can help develop and maintain examiners' technical competence, USPTO officials we interviewed told us that the agency has not conducted an analysis to identify any gaps in examiners' competence, either for the agency as a whole or within individual technology centers. USPTO officials told us that the technology centers use performance appraisal plans to individually assess examiners' skills and competency gaps. However, such an approach does not address the question of whether broader competency gaps exist at the technology center level or how any gaps can be addressed. As technologies change, the knowledge and skills required of examiners may evolve accordingly, and examiners may move from one technology center or art unit to another during their careers. According to USPTO officials, there are also times when, upon completion of their initial training, patent examiners are assigned to a different technology center than the one to which they were assigned when they were hired. Because of these factors, the technical knowledge and skills needed in a technology center may differ from the knowledge and skills of the individual examiners assigned to that center.

In our June prior art report, we concluded that periodically analyzing the technical competence of USPTO examiners and seeking to identify potential competency gaps for each technology center, as called for by federal standards for internal control, would give USPTO greater assurance that examiners in each technology center have the technical skills and knowledge to identify the most relevant prior art during patent examination.<sup>46</sup> Furthermore, analyzing the results of such analyses would help the agency define and prioritize its strategies for closing any competency gaps, such as through training or other efforts. Lastly, these steps, in conjunction with developing measures to monitor progress toward closing any gaps, would help USPTO address the effects of evolving technologies and workforce changes over time. Thus, we recommended that USPTO assess whether the technical competencies of examiners in each technology center match those necessary; develop strategies to address any gaps identified, such as a technical training

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<sup>46</sup> [GAO-16-479](#).

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strategy; and establish measures to monitor progress toward closing any gaps. USPTO concurred with our recommendation and indicated that the agency would assess whether the technical competence of examiners in each technology center matches those necessary and develop strategies to address any identified gaps.

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Chairman Issa, Ranking Member Nadler, and Members of the Subcommittee, this concludes my statement for the record.

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## GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this statement, please contact John Neumann, Director, Natural Resources and Environment, at 202-512-3841 or [neumannj@gao.gov](mailto:neumannj@gao.gov). You may also contact Frank Rusco, Director, Natural Resources and Environment, at 202-512-3841 or [ruscof@gao.gov](mailto:ruscof@gao.gov). Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this statement include Krista Breen Anderson, Hilary Benedict, Richard Burkard, John Delicath, Alice Feldesman, Cindy Gilbert, Shilpa Grover, Rob Letzler, Armetha Liles, Rebecca Makar, Rob Marek, Chris Murray, Eleni Orphanides, Kelly Rubin, Tind Shepper Ryen, Monica Savoy, Ardith Spence, Sara Sullivan, and Sonya Vartivarian.

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