



June 2016

INTELLECTUAL PROPERTY

Patent Office Should Define Quality, Reassess Incentives, and Improve Clarity

Accessible Version

GAO Highlights

Highlights of [GAO-16-490](#), a report to the Chairman, Committee on the Judiciary, House of Representatives

Why GAO Did This Study

Resolving disputes over patent infringement and validity in court often costs millions of dollars. Legal scholars and economists have raised concerns about an increase in the numbers of low quality patents—such as those that are unclear and overly broad—which may lead to an increase in patent infringement suits and can hinder innovation by blocking new ideas from entering the marketplace.

GAO was asked to review issues related to patent quality. GAO examined (1) recent trends in patent infringement litigation and (2) what additional opportunities exist, if any, to improve patent quality. GAO reviewed relevant laws and agency documents; analyzed patent infringement litigation data from 2007 through 2015; conducted a survey of a generalizable sample of USPTO examiners; and interviewed officials from USPTO and knowledgeable stakeholders, including legal scholars, technology companies, and patent attorneys, among others.

What GAO Recommends

GAO makes seven recommendations, including that USPTO more consistently define patent quality and articulate that definition in agency documents and guidance, reassess the time allotted for examination, analyze the effects of incentives on patent quality, and consider requiring applicants to use additional clarity tools. USPTO generally agreed with GAO's findings, concurred with the recommendations, and provided information on steps officials plan to take to implement the recommendations.

View [GAO-16-490](#). For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

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What GAO Found

GAO found that district court filings of new patent infringement lawsuits increased from about 2,000 in 2007 to more than 5,000 in 2015, while the number of defendants named in these lawsuits increased from 5,000 to 8,000 over the same period. In 2007, about 20 percent of all defendants named in new patent infringement lawsuits were sued in the Eastern District of Texas, and by 2015 this had risen to almost 50 percent. According to stakeholders, patent infringement suits are increasingly being tried in the predominantly rural Eastern District of Texas, likely due to recent practices in that district that are favorable to the patent owners who bring these infringement suits. GAO also found that most patent suits involve software-related patents and computer and communications technologies. Several stakeholders told GAO that it is easy to unintentionally infringe on patents associated with these technologies because the patents can be unclear and overly broad, which several stakeholders believe is a characteristic of low patent quality.

The U.S. Patent and Trademark Office (USPTO) has taken actions to address patent quality, most notably through its Enhanced Patent Quality Initiative, but there are additional opportunities for the agency to improve patent quality. For example, USPTO does not currently have a consistent definition for patent quality articulated in agency documents and guidance, which would be in line with federal internal-control standards and best practices for organizational performance. Most stakeholders GAO interviewed said they would define a quality patent as one that would meet the statutory requirements for novelty and clarity, among others, and would be upheld if challenged in a lawsuit or other proceeding. Without a consistent definition, USPTO is unable to fully measure progress toward meeting its patent quality goals. Additionally, USPTO has not fully assessed the effects of the time allotted for application examinations or monetary incentives for examiners on patent quality. Specifically, most stakeholders GAO interviewed said that time pressures on examiners are a central challenge for patent quality. Based on GAO's survey of patent examiners, GAO estimates that 70 percent of the population of examiners say they do not have enough time to complete a thorough examination given a typical workload. According to federal standards for internal control, agencies should provide staff with the right structure, incentives, and responsibilities to make operational success possible. Without assessing the effects of current incentives for examiners or the time allotted for examination, USPTO cannot be assured that its time allotments and incentives support the agency's patent quality goals. Finally, USPTO does not currently require applicants to define key terms or make use of additional tools to ensure patent clarity. Federal statutes require that patent applications use clear, concise, and exact terms. Based on a survey of patent examiners, GAO estimates that nearly 90 percent of examiners always or often encountered broadly worded patent applications, and nearly two-thirds of examiners said that this made it difficult to complete a thorough examination. Without making use of additional tools, such as a glossary of key terms, to improve the clarity of patent applications, USPTO is at risk of issuing patents that do not meet statutory requirements.

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Abbreviations

GS	General Schedule
GPRAMA	Government Performance and Results Modernization Act of 2010
PTAB	Patent Trial and Appeal Board
USPTO	U.S. Patent and Trademark Office

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June 30, 2016

The Honorable Bob Goodlatte
Chairman
Committee on the Judiciary
House of Representatives

Dear Mr. Chairman:

Intellectual property-intensive industries such as electronics and pharmaceuticals support at least 40-million jobs in the U.S. and contribute more than \$5 trillion annually—or nearly 35 percent—to the nation’s gross domestic product. While most patents are never the subject of a lawsuit, resolving a dispute over patent infringement and validity in courts can cost millions of dollars. Legal scholars and economists have raised concerns about an increase in the number of low quality patents—such as those that are unclear and overly broad—which may lead to an increase in patent infringement suits and hinder innovation by blocking new ideas from entering the marketplace.¹ Further, in our 2013 report, we found that low quality patents were likely a key factor in many patent infringement lawsuits between 2007 and 2011, because their unclear boundaries make it easy to unintentionally infringe these patents, among other factors.²

The U.S. patent system—authorized by the U.S. Constitution—aims, in part, to make innovation more profitable.³ For example, a patent owner

¹Anyone who makes, sells, offers to sell, uses, or imports the patented invention during the term of the patent without the patent owner’s permission infringes the patent.

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

³The Constitution grants to Congress the power “[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.” U.S. Const., art. I, § 8, cl. 8. Because a patent expires after a fixed period, patent law also “ultimately provid[es] the public with the benefit of lower price through unfettered competition.” *Biotechnology Indus. Org. v. District of Columbia*, 496 F.3d 1362, 1373 (Fed. Cir. 2007) (stating that “these two objectives—to reward innovators with higher profits and to keep prices reasonable for consumers—are in dialectic tension”).

can generally exclude others from making, using, selling, or importing the patented technology for up to 20 years from the date on which the application for the patent was filed. By restricting competition, patents can allow their owners to earn greater profits on their patented technologies than they could earn if these technologies could be freely imitated. Patent owners sometimes need to assert their patent rights by filing a lawsuit if competitors infringe their patent. The exclusive rights provided by patents can help their owners recoup the costs of the research and development of new technologies. On the other hand, any reduction in competition caused by the exclusive nature of patents may result in higher prices for products having patented technologies. The patent system, therefore, gives rise to complex trade-offs involving innovation and competition. Some researchers have suggested that the balance between these trade-offs has tipped and that some patents now are limiting innovation, especially in areas such as software and computer technologies.

We found in 2013 that some stakeholders, including technology companies, judges, and legal scholars, said that the U.S. Patent and Trademark Office (USPTO) should never have issued some patents because they believe they do not meet all of the legal standards required. Patents must meet standards set forth in law and interpreted by the courts. For example, they must cover eligible subject matter, be novel, not obvious, and they must clearly describe the invention.⁴ In this report, we consider patents that fully meet federal patentability standards to be high quality.⁵ 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. In a Department of Commerce Inspector General's report, USPTO's deputy director said an increased focus on patent quality would play a significant role in curtailing patent litigation.⁶

⁴See 35 U.S.C. §§ 101, 102, 103 and 112. A patent that is unclear or overly broad, for example, could be found to be invalid under section 112 of title 35.

⁵These legal standards and the judicial interpretation of them could change after a patent has been granted.

⁶U.S. Department of Commerce, Office of Inspector General. *USPTO Needs to Strengthen Patent Quality Assurance Practices*, Final Report Number OIG-15-026-A (Apr. 10, 2015)

You asked us to review issues related to patent quality. This report examines: (1) recent trends in patent infringement litigation, and (2) what additional opportunities exist, if any, to improve patent quality. Our work for this report was coordinated with our report on a part of the patent examination process known as “prior art” searches.⁷

To examine recent trends in patent infringement litigation, we obtained patent infringement litigation data from two companies—RPX Inc. and Lex Machina—that included all of the patent infringement lawsuits filed in all 94 federal district courts between 2007 and 2015. These data included information on the patents asserted in each suit, the defendants involved, and the federal district court where the suit was filed. We conducted data quality testing on the data from RPX and Lex Machina, interviewed relevant officials, and reviewed relevant documentation for the data and found the data to be sufficiently reliable to determine recent trends in patent infringement lawsuits. We also conducted 11 semi-structured interviews with stakeholders from technology companies, venture capital investors, and others knowledgeable about recent patent infringement litigation. In addition, we reviewed published literature on the patent system, including reports from patent researchers, the Federal Trade Commission, and the Congressional Budget Office.

To examine what additional opportunities exist, if any, to improve patent quality, we reviewed relevant laws and USPTO documents and interviewed USPTO officials and representatives of the examiners’ union—the Patent Office Professional Association. We interviewed four supervisory patent examiners and six patent examiners from a variety of technology areas. We also conducted 11 semi-structured interviews with patent stakeholders who were knowledgeable about patent quality and USPTO, including legal scholars, former high-ranking USPTO officials, and representatives from public interest non-governmental organizations. In addition, we conducted a web-based survey of a stratified random sample of 3,336 USPTO patent examiners from across eight of the technology-based subject matter groups (referred to as technology centers) into which USPTO examiners are assigned. We excluded examiners employed at USPTO for less than one year, as of May 2015.

⁷GAO, *Intellectual Property: Patent Office Should Strengthen Search Capabilities and Better Monitor Examiners’ Work*, [GAO-16-479](#) (Washington, D.C.: June 30, 2016).

The survey collected information on examiners' views on USPTO's approach to patent quality and how the agency might improve its patent quality efforts. The survey was designed and administered in conjunction with a concurrent report on patent prior art.⁸ Overall, we received responses from 80 percent of the examiners in our sample. Our methodology was designed to produce estimates that are generalizable to the population of patent examiners in our study overall, as well as within each technology center.⁹ The survey questions and detailed data on the results can be viewed on our website.¹⁰ Appendix I provides more detail on our scope and methodology.

We conducted this performance audit from November 2014 to June 2016 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.

Background

This section provides an overview of USPTO's patent examination process, patent infringement litigation and challenges, and USPTO's Enhanced Patent Quality Initiative. A list of our prior work related to patents and intellectual property is included at the end of this report.

⁸Survey questions also addressed concerns regarding prior art searches. See: GAO, *Intellectual Property: Patent Office Should Strengthen Search Capabilities and Better Monitor Examiners' Work*, [GAO-16-479](#) (Washington, D.C.: June 30, 2016).

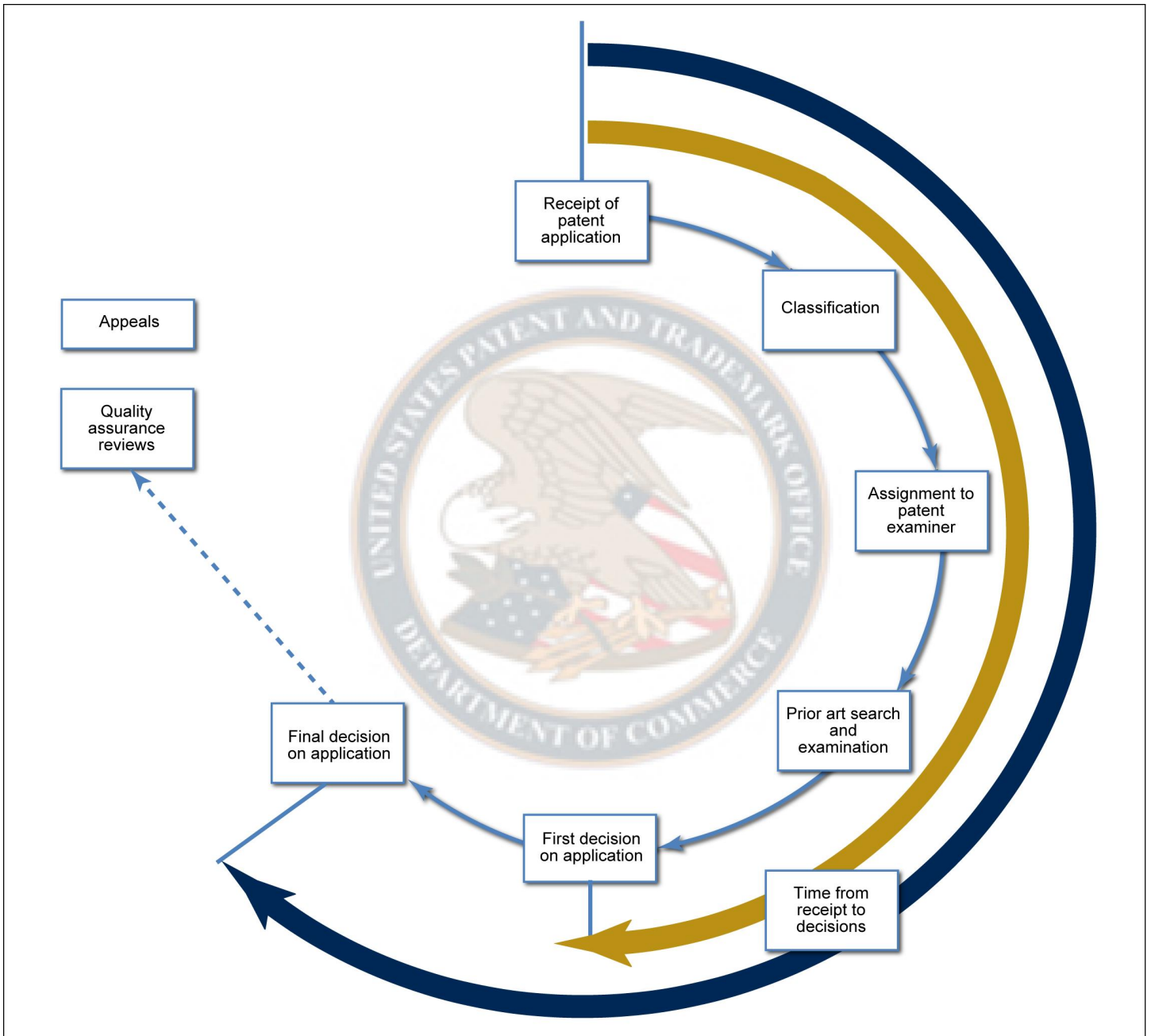
⁹Because we followed a probability procedure based on random selections, our sample is only one of a large number of samples that we might have drawn. Since each sample could have provided different estimates, we express our confidence in the precision of our particular sample's results as a 95 percent 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 percentage points or less, unless otherwise noted.

¹⁰GAO, *Survey of USPTO Patent Examiners*, [GAO-16-478SP](#) (Washington, D.C.: June 30, 2016).

Patent Examination Process

When USPTO receives a patent application, the agency assigns it to a division of patent examiners with relevant technology expertise called a technology center. There are 11 technology centers focusing on everything from biotechnology to mechanical inventions. After the application is assigned to a technology center, it is then assigned to an individual examiner who is responsible for the examination, or prosecution, of the application. Figure 1 shows the key steps in the patent prosecution process.

Figure 1: Selected Steps in the Patent Examination Process at the U.S. Patent and Trademark Office Interactive Graphic (USPTO)



Sources: GAO analysis of information from U.S. Patent and Trademark Office documents and officials. | GAO-16-490

The focus of patent examination is determining whether the invention in a patent application satisfies the statutory requirements for a patent, including that the invention be novel, useful, not obvious, and clearly described. Generally, prior patents, patent applications, or publications describing an invention, among other things, are known as prior art. During patent examination, the examiner, among other things, compares an application to the prior art to determine whether the invention is novel and not obvious.¹¹ Finding prior art is the most time consuming part of patent examination, according to our report on prior art.¹² Applicants are not required to search for prior art before submitting their application, although they are required to notify examiners of material prior art they know about.

A patent application includes the “specification” and at least one “claim.” By statute, the specification is to contain “a written description of the invention, and of the manner and process of making it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains to make and use the invention.”¹³ The law requires further that the specification “shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor regards as the invention.”¹⁴ A patent application’s claims define the legal boundaries of the invention for which patent protection is sought.

USPTO’s data show that, as of April 2016, the average time between filing an application and an examiner’s initial decision on the application was about 16 months, and it takes an average of 26 months after an application is submitted for USPTO to complete the examination of an

¹¹During the patent examination, the applicant and the examiner communicate about the application, including aspects that might be deficient. For example, the examiner may inform the applicant that the patent is not novel because of prior art, and the applicant might revise it to distinguish it from the prior art the examiner found. For more information on prior art and searching for prior art, see [GAO-16-479](#).

¹²[GAO-16-479](#).

¹³35 U.S.C. § 112(a).

¹⁴35 U.S.C. § 112(b).

application.¹⁵ Due to the current inventory of applications awaiting examination, USPTO is not able to begin examining patent applications upon receiving them—as of April 2016, USPTO had a backlog of about 550,000 unexamined applications.

Through the initial decision, or first action on the merits, examiners initially notify applicants about the patentability of their inventions. To avoid lengthy back and forth exchanges, the examiner is encouraged to identify all of the problems with the application under the patent statutes and rules during the first “office action”—a USPTO policy called “compact prosecution.”¹⁶ The applicant is able to respond to the examiner after the first office action, and interviews are often used so that the examiner and applicant can clarify their respective positions, as well as the scope of the claimed invention. Ultimately, and sometimes after many months, the examiner then issues a final rejection or allows the claims in the application. If applicants receive a final rejection, they may file a request for continued examination, which requires a new submission and the payment of additional fees, and the examiner will continue examining the application. There is no limit to the number of times an applicant may request continued examination for an application, but USPTO officials say it is rare to have three or more requests for continuing examination filed for a single application. Examination ends with an issued patent, or when the applicant abandons the application—there are no terminal rejections.

There are often a dozen or more claims per patent, and they can often be difficult for a layperson to understand, according to legal researchers. For example, one claim for a cardboard coffee cup insulator begins by referring to “a recyclable, insulating beverage container holder, comprising a corrugated tubular member comprising cellulosic material and at least a first opening therein for receiving and retaining a beverage

¹⁵Between fiscal years 2011 and 2015, USPTO reduced the average pendency from 28 months to 17 months, and for total pendency from 34 months to 27 months, according to the agency’s fiscal year 2015 performance and accountability report.

¹⁶According to USPTO’s *Manual of Patent Examining Procedure* 2173.06, “Under the principles of compact prosecution, the examiner should review each claim for compliance with every statutory requirement for patentability in the initial review of the application and identify all of the applicable grounds of rejection in the first office action to avoid unnecessary delays in the prosecution of the application.”

container.”¹⁷ A patent application’s claims can be written broadly or be more narrowly defined, according to legal researchers, and applicants can change the wording of claims—which can affect their scope—based on examiner feedback during examination. Examiners can suggest that applicants amend their claims by adding words to their claims to address statutory impediments to issuance. For example, adding the word “corrugated” to modify “tubular member” in the example claim above narrows the scope of the claimed invention. Companies often prefer broader patent claims that make it less likely a competitor would be able to make a small change to its invention to avoid infringement. Patents are a property right and their claims define their boundaries.

In some cases, patent claims define the scope of the invention by encompassing an entire function—like sending an e-mail—rather than the specific means of performing that function. While “functional claiming” is permitted by statute, we reported in 2013 that patents that include functional claiming language were more likely to be unclear and to be disputed in court.¹⁸ For example, if the pencil was patented as a “mechanism for writing,” the owner of the patent could theoretically sue manufacturers of different technologies for infringement, including pens and markers.

As of May 2015, USPTO had nearly 8,300 patent examiners across the eight technology centers that we reviewed. The agency uses the General Schedule (GS) classification system for patent examiners, whose levels range from GS-5 to GS-15.¹⁹ Examiners at the GS-14 level or above (44 percent of the examiners in the technology centers we reviewed) are referred to as “primary examiners” who may accept or reject a patent

¹⁷See US patent 5205473.

¹⁸An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification or equivalents thereof. 35 U.S.C. § 112(f).

¹⁹The GS system is the federal government’s classification system for defining and organizing federal positions, primarily to assign rates of pay, based on a position’s duties, responsibilities, and qualification requirements, among other things. The GS system includes 15 statutorily-defined grade levels, which are numerical designations based on the complexity of the work and knowledge required to do the job, and are on a scale of GS-1 to GS-15.

application without additional review. This level of authority is in contrast to junior examiners—most examiners below the GS-14 level— whose work must first be reviewed by a supervisory or primary patent examiner before it can be sent to the applicant.

Examiners are rated based on their production, or the number of examination tasks they perform, among other factors. The number of examination tasks that an examiner is expected to perform is set based on the examiner's technology area and experience level. USPTO allots more time to review applications to examiners that deal with more complex technologies. For example examiners working on artificial intelligence patent applications are given an average of about 31 hours to complete an examination, while those working on patent applications for exercise devices are given an average of about 17 hours. As examiners are promoted on the GS-scale, the average number of hours they are allotted to work on each application and the level of review from their supervisors declines. Primary examiners have the least amount of time to examine patent applications and the applications they review undergo the least amount of supervisory review, in part because their experience allows them to work more efficiently and effectively, according to USPTO officials. As examiners rise from junior to primary status, their examination time is roughly cut in half. According to USPTO officials, on average, examiners spend about 22 hours total on average on each application from start to final determination, with a low of about 11 hours on average for some primary examiners in the least complex technologies and a high of about 60 hours on average for an entry-level junior examiner in more complex technologies.

A few studies have shown that there are differences in issued patents depending on how much time examiners are given to complete their examination. For example, an academic paper from 2012 found that more experienced examiners cite less prior art, are more likely to grant patents rather than reject them, and are more likely to grant patents without any preliminary rejections.²⁰ Similarly, other researchers have found that examiners put less effort into searching for prior art when they are given less time to review an application. For example, the National Bureau of

²⁰Lemley, M. and Sampat, B. *Examiner Characteristics and Patent Office Outcomes*. Review of Economics and Statistics 2012. 94(3): 817–827.

Economic Research published a paper in 2014 that found when examiners were allotted less time to conduct a patent examination, they were less likely to make time-intensive prior art rejections and more likely to grant a patent.²¹

Patent Infringement Litigation and Challenges

When a patent right is not clearly defined, it can lead to boundary disputes, often in the form of infringement lawsuits. Although litigated patents are a small percentage of issued patents, low quality patents are more likely to be asserted in patent infringement lawsuits because, according to some economists, the less clear the claim boundaries are, the more likely that others will infringe the patent or will continue to infringe when confronted by the patent owner.²² Patent owners can bring infringement lawsuits against anyone who uses, makes, sells, offers to sell, or imports the patented invention without authorization. If the court finds that infringement has occurred, it must award the patent owner damages adequate to compensate for the infringement. During an infringement case, the accused infringer may seek to have the infringement lawsuit dismissed by showing, by clear and convincing evidence, that the patent at issue is invalid. However, because most of the roughly 4,000 patent infringement lawsuits filed each year settle before the court ever makes a determination of patent validity some patent owners asserting low quality patents may not be concerned with the risk the courts will invalidate their patents.²³ When the courts do rule on validity, they generally invalidate almost half of the patents that are challenged, according to academic research.²⁴

²¹Frakes, M. and Wasserman, M. *Is Time Allocated to Review Patent Applications Inducing Examiners to Grant Invalid Patents: Evidence from Micro-Level Application Data*, National Bureau of Economic Research, 2014. Obviousness rejections often require an examiner to combine multiple disparate prior art documents.

²²According to some scholars, the most litigated patents are among the most valuable patents and contain more claims, cite more prior art, and are more often cited by other patents as prior art. See John R. Allison et al., *Valuable Patents*, 92 Geo. L.J. 435 (2004).

²³We reported in 2013 that patent infringement lawsuits often settle before trial because parties want to avoid the high cost of litigation. See GAO-13-465.

²⁴For example, see Allison, J., Lemley, M., and Schwartz, D. *Understanding the Realities of Modern Patent Litigation*. Hoover Institution Working Group Paper, 2014.

Accused infringers can also challenge a patent's validity outside of an infringement lawsuit in administrative proceedings at USPTO's Patent Trial and Appeal Board (PTAB).²⁵ Patent challenges at PTAB are often initiated by individuals or firms that have been sued for infringing a particular patent, so the patents that appear in these proceedings are often the same ones that appear in patent infringement suits. The challengers in these proceedings seek to present evidence that shows that the patent claims should not have been granted because they failed to meet a statutory patentability requirement. The PTAB proceedings are a lower cost alternative to the federal courts where infringement suits are often very expensive.²⁶ As of March 2016, there have been around 4,700 patent challenges filed with the PTAB since its inception in 2012 and about 60 percent of these challenged patents are related to computers and software. About 30 percent of the PTAB proceedings have reached a final decision, and nearly 75 percent of those final decisions have resulted in all of the challenged claims being held unpatentable.²⁷

USPTO's Enhanced Patent Quality Initiative

In February 2015, USPTO launched an Enhanced Patent Quality Initiative designed to improve the quality of patents. According to USPTO, it started its quality initiative because the agency had successfully reduced its backlog of patent applications, and had the financial resources to consider longer-term improvements to patent quality due to fee setting authority provided by the America Invents Act.

As part of its initiative, the agency has taken a number of actions, including:

- *Creating a new leadership role and Patent Quality Office:* The agency created a new senior position for overseeing patent quality—the

²⁵The Leahy-Smith America Invents Act created the PTAB within the USPTO and established three new proceedings for challenging issued patents. Pub. L. No. 112-29, §§ 6, 7, and 18 (2011).

²⁶In 2013, industry stakeholders told us that challenges at PTAB cost upwards of \$400,000 including filing and legal fees, while federal court proceedings can cost between \$650,000 and \$5 million. See [GAO-13-465](#).

²⁷Data from PTAB. The PTAB's *Inter Partes* review, which is limited to challenges alleging that the patent does not meet the legal standards for novelty or non-obviousness, comprise nearly 90 percent of all PTAB post-grant decisions.

Deputy Commissioner for Patent Quality—in January 2015 to provide a dedicated focus on the agency’s patent quality efforts.

- *Patent Quality Summit*: USPTO held its first ever Patent Quality Summit in March 2015. The Summit was designed for the public, including internal and external stakeholders, to provide input to USPTO about patent quality, specifically how the agency could guarantee the most efficient process to review applications and to ensure the issuance of the highest quality patents, according to the USPTO Summit website. According to USPTO, the agency received 1,206 ideas for improvement for patent quality from all sources, including the Patent Quality Summit and examiner forums.
- *Evolving programs of the Enhanced Patent Quality Initiative*: USPTO established 11 initiatives based on feedback from internal and external stakeholders to help achieve its goals to enhance patent quality, according to its Enhanced Patent Quality Initiative website. These initiatives are in various stages, ranging from early development to having been completed, according to a senior USPTO official. Some of the evolving programs include:
 - *Clarity of the Record Pilot Program*: USPTO began this pilot in February 2016 with about 130 examiners, and the pilot is expected to end in August 2016. This pilot seeks to develop best practices for examiners to enhance the clarity of all aspects of the prosecution record, and to study the effect of implementing these best practices during examination.
 - *Clarity and Correctness Data Capture (Master Review Form)*: 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. Quality assurance officials also told us that using the form would allow their office to have data on 50 percent more reviews this year than in the past, resulting in a total of about 12,000 reviews of examiners’ work this year compared with about 8,000 reviews per year in the past. USPTO expects to implement the form agency-wide in fiscal year 2017.²⁸

²⁸In our report on prior art searching, we provide additional information on how the master review form could affect prior art searching and the deficiencies of the form to review prior art searches, and make a recommendation to address the deficiencies. See [GAO-16-479](#).

In addition to the actions taken under its Enhanced Patent Quality Initiative, the USPTO's Office of Patent Training develops and implements training for examiners on a variety of topics, with a focus on legal and policy matters.²⁹ For example, the USPTO recently provided examiners with training on functional claiming.

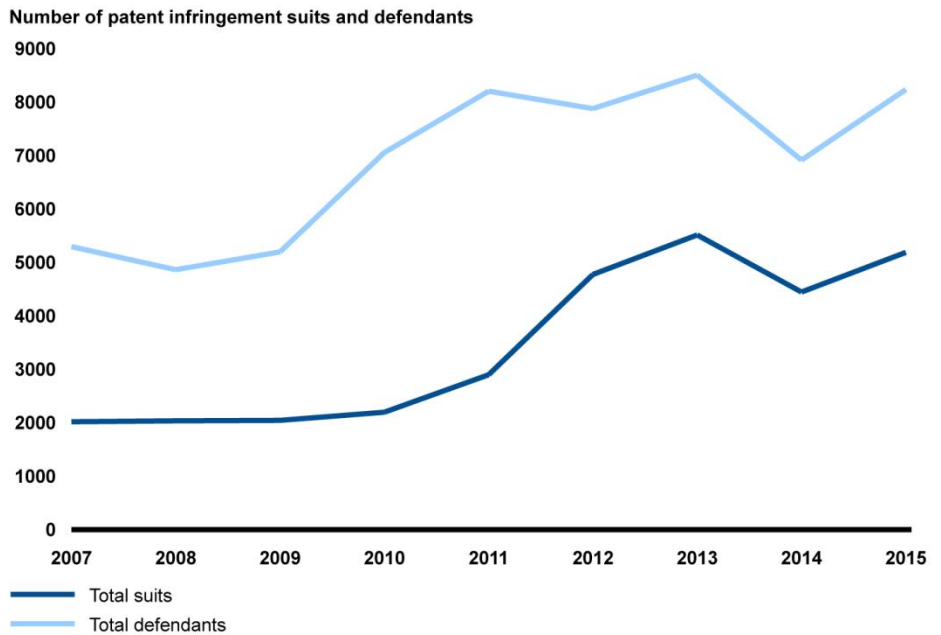
Patent Infringement Litigation Has Increased in Recent Years, and the Majority of Lawsuits Involved Patents Related to Computers and Computer Software

The number of federal district court filings of new patent infringement lawsuits has generally increased between 2007 and 2015, from more than 2,000 suits in 2007 to more than 5,000 suits in 2015 (see fig. 2). Because lawsuits can include multiple defendants, we also analyzed data on federal district court filings at the defendant level to account for lawsuits in which a patent was asserted against multiple defendants.³⁰ Looking at the data in this way, we found that the number of defendants in new patent infringement suits filed in federal district courts increased from about 5,000 defendants in 2007 to more than 8,000 defendants in 2015, as shown in figure 2.

²⁹USPTO officials told us that in fiscal year 2015, USPTO provided 340 examiners with new examiner training and more than 8,500 examiners with refresher and advanced examiner training. In [GAO-16-479](#), we also discuss issues related to technical training provided to examiners.

³⁰As we found in our 2013 report ([GAO-13-465](#)), some of the increase in the number of patent infringement lawsuits filed starting in 2011 was likely due to anticipated changes in the Leahy-Smith America Invents Act. The Act made it more difficult for plaintiffs to sue multiple defendants in a lawsuit, causing some plaintiffs that would have previously filed a single lawsuit with multiple defendants to break the lawsuit into multiple lawsuits.

Figure 2: Number of Patent Infringement Suits and Defendants, 2007 through 2015



Source: GAO analysis of RPX data. | GAO-16-490

According to some stakeholders with whom we spoke, the decreases in litigation that occurred in 2014, both in the number of suits and defendants, were likely due to a key Supreme Court decision in that year, *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*.³¹ The Court in the *Alice* decision held that where a patent claim is based on an abstract idea, which is not patentable, merely using generic computer implementation does not transform that idea into a patent-eligible invention. This decision has limited the validity of what some stakeholders considered to be overly broad and low quality patents thus preventing them from being used to file infringement lawsuits. In addition, the ability of potential defendants in patent infringement suits to file inter partes challenges to the validity of a patent at the PTAB beginning in 2012 may have made some patent owners reluctant to bring infringement suits, which could have contributed

³¹ 134 S. Ct. 2347, 189 L.Ed. 2d 296 (2014).

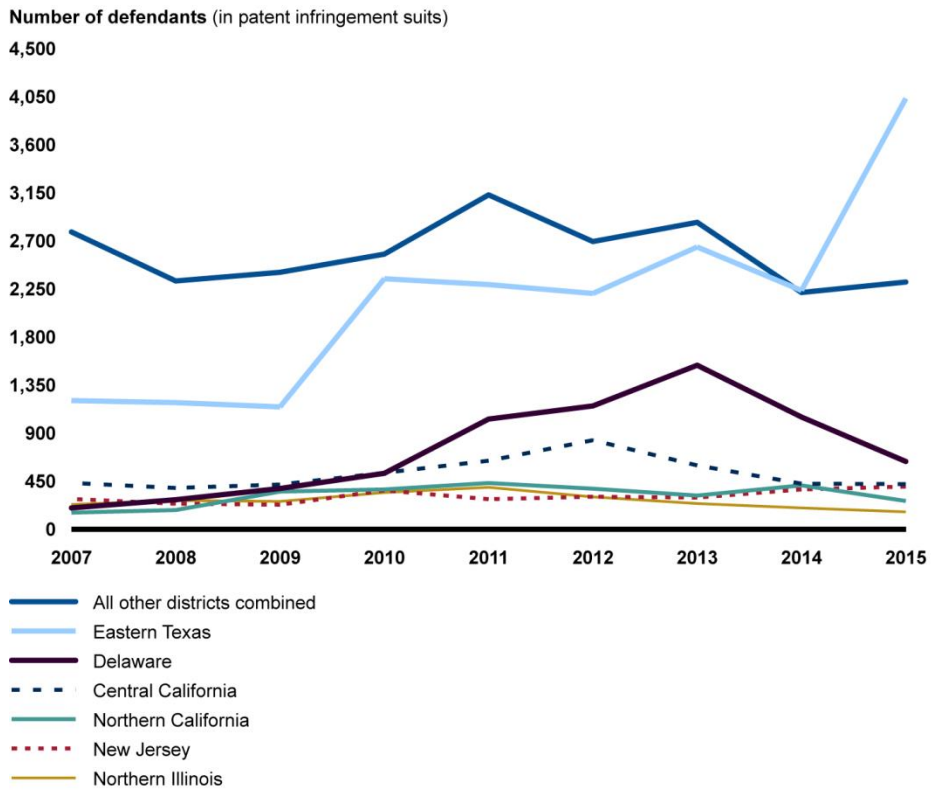
to the decline in the number of suits according to some stakeholders we spoke with.³²

Most patent infringement suits are filed in just a few of the 94 federal district courts, and these suits may generally be brought in any district in the country where the allegedly infringing products are sold.³³ Patent infringement suits are increasingly being filed in the predominantly rural Eastern District of Texas (see fig. 3). In 2007, about 20 percent of all patent infringement defendants were named in cases filed in the Eastern District of Texas, and this percentage increased to almost 50 percent in 2015.

³²The Leahy-Smith America Invents Act, Pub. L. No. 112-29, (2011), created, among other things, fast track proceedings for challenging issued patents, called *Inter Partes* Review. Under these proceedings, petitioners may challenge the patentability of claims under sections 102 and 103 of Title 35, which require novelty and non-obviousness. 35 U.S.C. § 311(b). These proceedings became available on September 16, 2012. Pub. L. No. 112-29, § 7(e).

³³See *Beverly Hills Fan Co. v. Royal Sovereign Corp.*, 21 F.3d 1558, (Fed. Cir. 1994), and *VE Holding v. Johnson Gas Appliance*, 917 F.2d 1574 (Fed. Cir. 1990).

Figure 3: Number of Defendants in Patent Infringement Suits by District Courts for Patent Suits, 2007 through 2015



Source: GAO analysis of RPX data. | GAO-16-490

Historically, the Eastern District of Texas has been attractive to patent owners filing infringement lawsuits because of the speed at which suits moved to trial, and the perception of plaintiff-friendly juries, as we found in 2013.³⁴ In addition, according to one published paper we reviewed, judges in the Eastern District of Texas have implemented a number of court rules and practices to attract patent infringement suits to their district.³⁵ For example, according to the paper and to some stakeholders

³⁴GAO-13-465.

³⁵Klerman D. and Reilly G. *Forum Selling*, 89 S. Cal L. Rev. 241 (Jan. 2016).

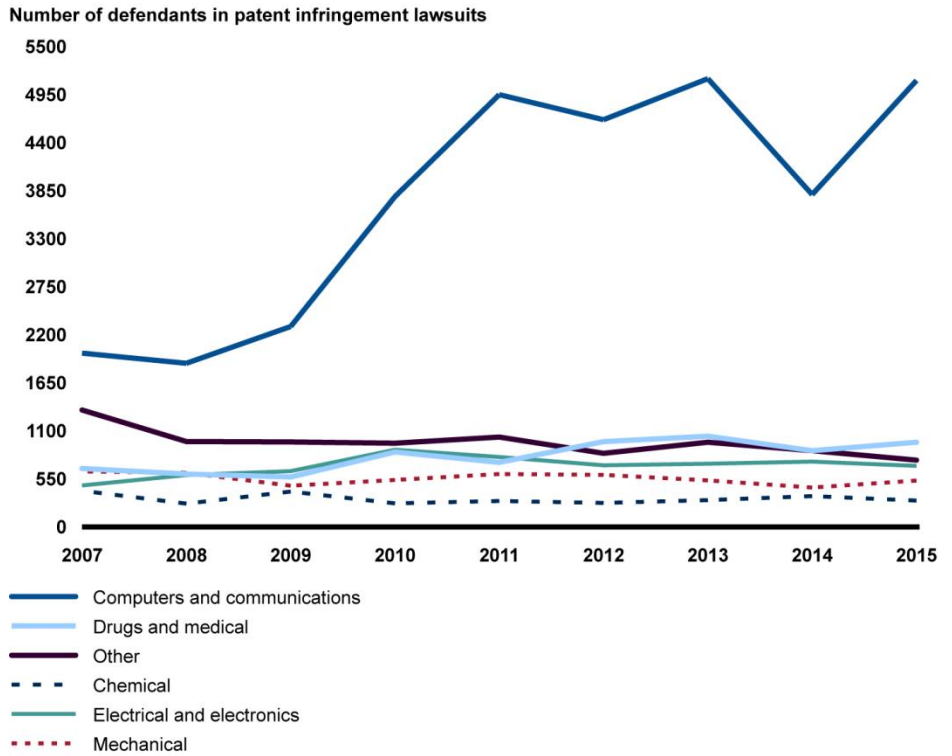
we interviewed, judges in the Eastern District of Texas have not been suspending infringement lawsuits pending patent validity challenges at the PTAB, as some had anticipated.³⁶ In addition, most recently, according to some stakeholders, some judges in Eastern Texas have been reluctant to dismiss infringement allegations at early stages of the litigation based on the *Alice* decision that calls into question the validity of certain types of software-related patents. Our analysis shows a sharp increase from 2014 to 2015 in the number of defendants that were accused of infringing software-related patents in suits filed in Eastern Texas, which have averaged about 85 percent of the defendants in that district each year between 2007 and 2015. None of the other top six district courts saw any large increases in patent infringement suits in 2015, including suits involving patents related to software or otherwise. This indicates that the increase in suits in Eastern Texas drove the overall increase in suits filed nationwide in 2015.

The number of defendants in patent infringement litigation was relatively stable between 2007 and 2015, with the exception of lawsuits involving patents for computers and communications technologies (see fig. 4).³⁷ This area includes technologies related to computer hardware and software. The percentage of defendants in lawsuits involving patents in this technology area increased from 38 percent in 2007 to 62 percent in 2015.

³⁶Courts may stay infringement litigation brought by a patent owner pending the outcome of a PTAB proceeding. One stakeholder mentioned Delaware as another district where it was less likely for judges to grant a stay for a PTAB proceeding.

³⁷These technology categories are used by USPTO and are described in Hall, Jaffe, Trajtenberg, *The NBER Patent Citations Data File: Lessons, Insights and Methodological Tools*. National Bureau of Economic Research 2001.

Figure 4: Number of Defendants in Patent Infringement Lawsuits by Technology Area, 2007 through 2015



Source: GAO analysis of RPX data. | GAO-16-490

Note: This represents the number of defendants in suits where there was at least one patent in the given technology area; therefore, suits involving patents from multiple technology areas would be represented in each of these technology areas.

Patents related to computer and communications technologies are easier to unintentionally infringe because they are more likely to be unclear and overly broad, according to some stakeholders we interviewed and some of the published research we reviewed. In addition, according to a 2003 Federal Trade Commission study, in industries such as computers and communications, firms need to avoid infringing dozens, hundreds, or even thousands of patents to produce just one commercial product.³⁸

³⁸Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* (2003).

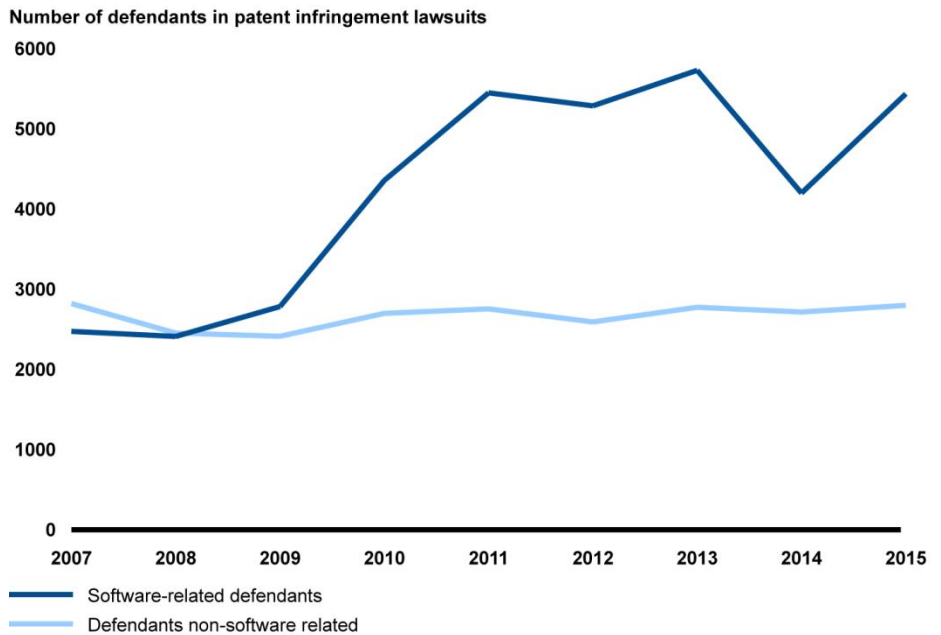
Therefore, it is particularly challenging to develop innovative new products where there are thousands of interrelated patents covering similar technologies making it nearly impossible to avoid infringement, according to some stakeholders we interviewed. These stakeholders also noted that unclear and overly broad patents—an indicator of lower quality—can harm innovation regardless of whether the patent owner files an infringement lawsuit because just the threat of an infringement suit can deter the development of new products.³⁹

Further, the majority of defendants in patent infringement suits were involved in suits with software-related patents each year from 2009 through 2015 (see fig. 5).⁴⁰ The number of defendants involved in infringement lawsuits where software-related patents were asserted generally increased through 2013, then dropped in 2014. As with computer and communications technologies, some stakeholders told us that software-related patents are easier to infringe because they also often have overly broad claims, an indicator of low quality patents.

³⁹The author of one paper argues that mere possession of a patent that would likely not survive a legal challenge can help maintain an illegitimate monopoly even if the patent-holder does not use the patent to file an infringement suit. See Leslie, Christopher. *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 Minn. L. Rev. 101 (Nov. 2006)

⁴⁰Software-related patents occur in a variety of technologies containing at least some element of software, and cover things like sending messages or conducting business over the Internet (e.g., e-commerce). According to USPTO officials, USPTO does not have a definition of or collect information on “software-related patents.” Our definition of “software-related” is based on the patent classes listed in S. Graham, and S. Vishnubhakat, *Of Smart Phone Wars and Software Patents*, *Journal of Economic Perspectives*, v. 27 no.1 (2013), pp. 67-86.

Figure 5: Number of Defendants in Patent Infringement Lawsuits for Software-Related and Non-Software-Related Patents, 2007 through 2015



Source: GAO analysis of RPX data. | GAO-16-490

Additional Opportunities Exist to Improve Patent Quality at USPTO

USPTO has taken actions to address patent quality—most notably through its Enhanced Patent Quality Initiative—but there are additional opportunities for USPTO to improve patent quality. Specifically, USPTO does not have a consistent definition of patent quality and has not fully developed specific performance measures to assess whether its efforts are affecting patent quality. Further, USPTO has not fully assessed whether the time it allots for examination and the monetary incentives it gives examiners for completing patent examinations faster affect patent quality. In addition, USPTO has limited data available on PTAB decisions. Finally, USPTO has not fully evaluated the effects of other policies and procedures on patent quality.

USPTO Has Not Consistently Defined Patent Quality or Established Specific Performance Measures

USPTO does not currently have a consistent definition for 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 USPTO to guide the agency in its overall operations. One examiner wrote in our open-ended survey

response that the USPTO appears to have no definition of patent quality and that without a working definition, management's focus on patent quality is meaningless.⁴¹ Most of the stakeholders that we spoke with—including former high ranking USPTO officials, academics, and non-governmental organizations—said that it is important for USPTO to develop a consistent definition of patent quality.

According to USPTO officials, one challenge in developing a consistent definition is that the patent community holds varying definitions of patent quality. For example, patent attorneys who defend companies against patent infringement generally tend to favor clearly defined patents that are easily understood in patent disputes, while patent owners tend to prefer less well defined patents that may offer broader coverage for their invention. USPTO officials offered a variety of definitions of patent quality. Several officials focused on validity, or patentability (i.e., meeting statutory requirements) and clarity, although we could not find this in agency guidance or documents as USPTO's definition. Some officials also included aspects of patent examination, such as an application that requires a limited amount of time for review by examiners in their definition. While USPTO has found it difficult to clearly define patent quality, most of the stakeholders we spoke with told us that they would define patent quality as patent validity—that is, a quality patent would meet all the statutory requirements for patentability and would be upheld if challenged in a lawsuit or PTAB proceeding.

According to federal standards for internal control, one important internal control activity is that management has established clear, consistent agency objectives that allow the agency to assess the risks the agency faces from external and internal sources.⁴² However, USPTO's objectives

⁴¹Our survey did not ask examiners about how well USPTO had defined patent quality. However, examiners were free to bring up any issue in open-ended responses and a few raised concerns about the USPTO's not having a definition for patent quality, saying it makes it difficult for examiners to understand what is meant by patent quality or to understand how to change their work behavior to improve patent quality. Because we did not conduct a systematic review of all open-ended responses to our survey, we are not reporting the exact number of examiners who provided a response on this topic. Responses to open-ended questions are not generalizable to other examiners.

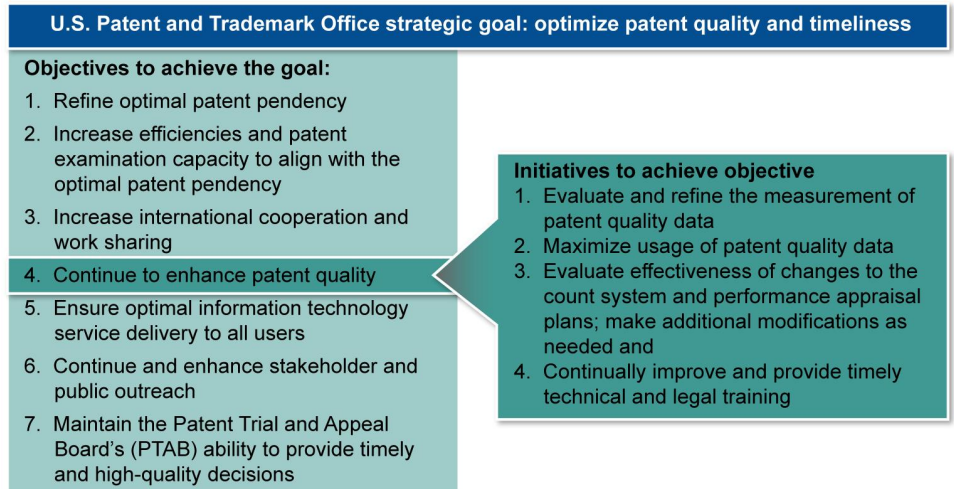
⁴²GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: November 1999). GAO has revised and reissued Standards for Internal Control in the Federal Government, with the new revision effective as of October 1, 2015. [GAO-14-704G](#) (Washington, D.C.: September 2014).

may not be clear because it does not have a consistent definition of patent quality. Four supervisory patent examiners we interviewed told us that without a consistent definition of patent quality, USPTO is unable to standardize practices to improve patent quality. As a result, it is hard for USPTO to define, measure, and work toward quality goals, according to these supervisors. Moreover, without a definition for patent quality, USPTO is at risk of having agency officials work inconsistently or at cross-purposes in their attempts to fulfill the call to improve patent quality, based on individual understandings of what patent quality means to each staff person.

Further, 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, which may limit its ability to assess potential effects of its efforts on patent quality. 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.⁴³ 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. 6).

⁴³USPTO 2014-2018 Strategic Plan, US Patent and Trademark Office.

Figure 6: U.S. Patent and Trademark Office (USPTO) Strategic Goal Related to Patent Quality and Timeliness



Source: USPTO. | GAO-16-490

The Government Performance and Results Modernization Act of 2010 (GPRAMA) requires, among other things, that agencies establish objective, quantifiable, and measurable performance goals, and establish performance indicators to measure progress toward each performance goal.⁴⁴ Although USPTO is not required to comply with GPRAMA, we have previously reported the practices established by the law, such as establishing goals and performance indicators, can serve as a leading practice for organizational performance management at lower levels within federal agencies, such as individual programs or initiatives.⁴⁵ However, USPTO has not established such goals and indicators because the office uses general terms to describe these two performance

⁴⁴Pub. L. No. 103-62 (1993), amended by GPRAMA Modernization Act of 2010, Pub. L. No. 111-352 (2011). These laws require federal agencies to set goals for program performance, measure results, and report on annual performance compared with the goals.

⁴⁵See, for example, GAO, *Environmental Justice: EPA Needs to Take Additional Actions to Help Ensure Effective Implementation*, [GAO-12-77](#) (Washington, D.C.: Oct. 6, 2011) and GAO, *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.: Sep 27, 2013).

measures and does not include measurable, quantifiable goals or performance indicators on how the agency plans to define or collect patent quality data or how, specifically, it will maximize use of such data. Without such goals and indicators, USPTO cannot determine whether it is meeting its goal of enhancing patent quality.

USPTO Has Not Fully Assessed the Time Allotted for Examinations or Monetary Incentives

USPTO has not fully assessed the time allotted for patent examinations or its monetary incentive system, which may be at odds with patent quality. Patent examiners are rated annually on their production and docket management, among other elements.⁴⁶ USPTO provides examiners with monetary incentives, or bonuses, for timeliness and production, but does not offer a bonus for producing high-quality work.⁴⁷ 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, grant patents that are of the highest quality. One of these officials told us that the office's focus on timeliness currently trumps high quality work at the agency, potentially increasing the tension between the goals of timeliness and quality.

Time allotments and incentives can lead to pressure for examiners to complete their work quickly. Most of the stakeholders we spoke with told us that examiners' time pressures are one of the central challenges for patent quality.⁴⁸ The results of our survey of patent examiners confirm that examiners are experiencing time pressures. Specifically, 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

⁴⁶Factors related to quality constitute 35 percent of an examiner's overall rating.

⁴⁷Between fiscal years 2009 and 2013, examiners received, on average, more than \$6,000 per year in monetary awards for meeting production and timeliness goals, according to a 2015 Inspector General report. Office of the Inspector General, U.S. Department of Commerce: *U.S. Patent and Trademark Office: USPTO Needs to Strengthen Patent Quality Assurance Practices*, OIG-15-026-A. (Washington, D.C.: April 2015).

⁴⁸In our prior art report, we provide additional information on how the time pressures that examiners face are a challenge for conducting thorough prior art searches. See [GAO-16-479](#).

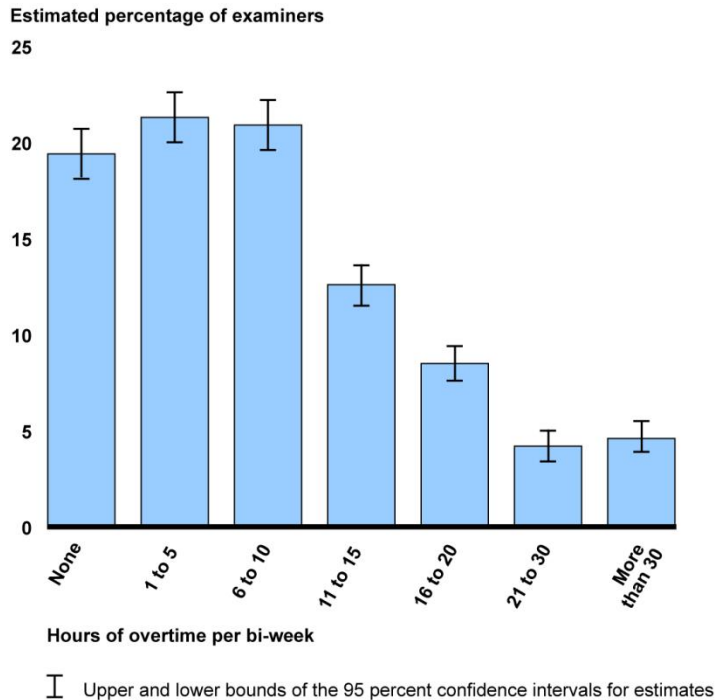
examination.⁴⁹ In addition, we estimate that more than 70 percent of examiners worked voluntary or uncompensated overtime in the past 6 months to meet their minimum production goals (see fig. 7).⁵⁰ Further, incentives appear to motivate examiners to complete their work quickly. For example, on the basis of our survey, we estimate that for 93 percent of examiners, receiving bonuses for achieving production goals motivates them to go above and beyond their base level of performance.⁵¹

⁴⁹Based on our survey, 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.

⁵⁰Examiners may have worked further overtime not included in their responses.

⁵¹We asked examiners how motivated they are by receiving bonuses for achieving production goals—specifically, their motivation to go above and beyond a “fully successful” rating on their Performance Appraisal Plans. Based on our survey, we estimate all examiners' responses would be as follows: very motivated, 53 percent; moderately motivated, 19 percent; somewhat motivated, 13 percent; slightly motivated, 8 percent; not at all motivated, 5 percent; don't know, less than 1 percent; no response, 1 percent.

Figure 7: Estimated Bi-weekly Overtime Worked by Patent Examiners in the Past 6 Months



Source: GAO survey of patent examiners. | GAO-16-490

Notes: We asked examiners about voluntary/uncompensated overtime worked to meet their minimum production goals. Examiners may have worked further overtime not included in their responses.

Because we surveyed a generalizable stratified random sample of examiners, our results provide estimates for the entire population of examiners included in our study. See the related e-supplement, [GAO-16-478SP](#), for the original survey language and more detailed results.

Additionally, on the basis of our survey, we estimate that nearly 70 percent of examiners experience pressure to avoid time-consuming office actions.⁵² In addition, a few examiners we interviewed said that the system as currently designed incentivizes an examiner to issue a patent instead of issuing a final rejection, suggesting that when pressed for time examiners tend toward granting patents. For example, USPTO rules and

⁵²Based on our survey, we estimate all examiners' responses would be as follows: a lot of pressure, 17 percent; moderate pressure, 18 percent; some pressure, 20 percent; a little pressure, 13 percent; no pressure, 26 percent; don't know, 4 percent; and no response, 2 percent.

procedures do not restrict the number of requests for continued examination an applicant may file, so issuing the patent is the only means USPTO has to end the examination process. This creates an environment where patents may be granted that do not fully meet patentability standards. In a 2015 study, USPTO economists found that patents examined by primary examiners had 26 percent better odds of appearing in a patent infringement lawsuit compared to similar patents examined by junior examiners, which suggests that primary examiners, despite their experience, may not have adequate time to ensure that the patents they issue are always high quality.⁵³ USPTO officials acknowledged that this difference was likely due to the additional time and supervisory review that junior examiners receive.

The precise effects of the time allotted for examinations and incentives on quality are unclear because USPTO has not fully analyzed the effects of current time allotments or incentives on an examiner's ability to perform a thorough examination. Since creating the time allotments in the 1970s, 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.⁵⁴ According to federal standards for internal control, agencies should provide staff with the right structure, incentives, and responsibilities to make operational success possible.⁵⁵ The right incentives and structure allow staff to be aligned with the agency's objectives. Without analyzing the time and incentives needed for examiners to complete thorough examinations, USPTO cannot be assured that its current time allotments and incentives support the agency's goal to optimize patent quality.

⁵³These were patents that were assigned to primary examiners at the time of allowance. See: USPTO Office of the Chief Economist, *Patent Litigation and USPTO Trials: Implications for Patent Examination Quality* (January 2015). USPTO officials told us that applications of varying levels of difficulty or complexity are assigned without regard to the examiner's experience, and that there should not be any correlation between patent examination factors and the incidence of litigation.

⁵⁴In addition, in April 2016, USPTO also adjusted the time allotted for approximately 1,000 examiners, who received an additional 2.7 hours for examinations of certain technologies to address concerns related to a transition to a new classification system.

⁵⁵[GAO/AIMD-00-21.3.1](#).

USPTO Has Limited Data on PTAB Decisions

The PTAB has been in operation since 2012 with hundreds of decisions made to date on challenges to existing patents; however, statistics kept by PTAB staff about the results of PTAB decisions are limited.⁵⁶ For example, the data available as of March 2016, did not specify which precise claims in a patent were found to be unpatentable and why, or which sources of prior art were used in the proceeding, both of which are key data fields for potential analysis.⁵⁷ Moreover, the data have not been widely shared within USPTO. According to a PTAB official familiar with the data, only a few USPTO staff in the Office of Patent Legal Administration have asked for and received the data that PTAB staff have compiled to date. Information on the results of the PTAB proceedings is not regularly provided to USPTO managers and supervisory patent examiners in the Technology Centers, according to PTAB staff.

According to federal standards for internal control, information from internal and external sources should be obtained and provided to management as a part of the agency's reporting on operational performance relative to established objectives. In addition, pertinent information should be identified, captured, and distributed in a form and time frame that permits people to perform their duties efficiently.⁵⁸ However, USPTO managers and staff in the technology centers do not have data on trends in the outcomes of PTAB's post-grant proceedings because USPTO has not systematically pulled information from PTAB decisions, has not widely shared PTAB information within the agency, and has not analyzed the data for trends in patent invalidations to identify whether additional training, guidance, or other actions are needed to address issues related to quality. Without a process for USPTO managers and staff to readily access the reasoning underlying PTAB's invalidation of patents or information on possible trends that may exist with those problem patents, USPTO may be overlooking critical information on problems the PTAB has found with patents issued by the agency. As a result, USPTO may be missing opportunities for using this

⁵⁶PTAB data and some statistics summarizing the decisions (holdings) on these cases are available on the USPTO website. See: <http://www.uspto.gov/patents-application-process/appealing-patent-decisions/statistics/aia-trial-statistics>

⁵⁷Outcome information is available on the PTAB website, but it requires reading individual decisions one at a time to determine which claims were found to be unpatentable.

⁵⁸[GAO/AIMD-00-21.3.1](#).

information to make decisions that could help to improve patent quality, such as improving guidance or providing additional training on potential patent quality issues, and USPTO's examiners are unable to learn lessons from the PTAB decisions.

USPTO Has Not Fully Evaluated the Effects of Other Policies and Procedures on Patent Quality

USPTO has not fully evaluated the effects of other policies and procedures on patent quality, which may also affect their ability to issue high quality patents. Through interviews with USPTO officials and stakeholders and our examiner survey, we identified several policies and procedures that could affect patent quality:

- *Compact prosecution*: This USPTO policy encourages examiners to complete an examination within two office actions and to address all statutory issues of an application in the first office action. One examiner commented in our survey that compact prosecution compels examiners to guess what unclear claims mean in order to search for prior art.⁵⁹ Further, based on our survey, we estimate that a change in policy that would not require examiners to address every issue in the first office action would help about half of USPTO examiners perform examinations more effectively.⁶⁰ In addition, some stakeholders raised concerns about the effect of compact prosecution on patent quality, with one stakeholder emphasizing that the policy does not work well in an environment where patent applications are increasingly complex.
- *Unlimited number of patent claims*: Applicants are allowed to include any number of claims in a patent application.⁶¹ According to USPTO

⁵⁹Examiners were free to bring up any issue in their open-ended responses and a few raised concerns about compact prosecution and the effects on patent quality. Because we did not conduct a systematic review of all open-ended responses to our survey, we are not reporting the exact number of examiners who provided a response on this topic. Responses to open-ended questions are not generalizable to other examiners.

⁶⁰Based on our survey, we estimate all examiners' responses would be as follows: much more effectively, 24 percent; somewhat more effectively, 24 percent; neither more or less effectively, 22 percent; somewhat less effectively, 14 percent; much less effectively, 8 percent; don't know, 6 percent; and no response, 2 percent.

⁶¹Applicants are charged additional fees for more claims, but examiners are given the same amount of time for each examination, regardless of the number of claims. Supervisory patent examiners have the authority to grant other time to examiners for reviewing applications that have a certain level of complexity, including applications with a large number of claims.

officials, applicants' ability to file unlimited claims can have a negative effect on quality, because it is more difficult for examiners to fully review an application with numerous claims in the time allotted; this was also supported by our survey results.⁶² The 2015 study by USPTO economists also supported this finding; it found that patents that had more claims had better odds of showing up in patent infringement lawsuits.⁶³

- *Requests for continued examination:* 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 the patent application after the prosecution of the application has been closed.⁶⁴ Applicants request continued examination most often after 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

⁶²Based on our survey, we estimate all examiners' responses to the question: "[h]ow much easier or more difficult do [a] larger number of dependent claims than needed to describe the invention make it to complete a thorough examination?" would be as follows: much easier, less than 1 percent; somewhat easier, 1 percent; neither easier nor more difficult, 5 percent; somewhat more difficult, 34 percent; much more difficult, 60 percent; don't know, less than 1 percent; and no response, less than 1 percent. Additionally, based on our survey, we estimate all examiners' responses to the question "Would a change to limit the number of dependent claims in an application result in you performing examinations more or less effectively?" would be as follows: much more effectively, 59 percent; somewhat more effectively, 33 percent; neither more nor less effectively, 5 percent; somewhat less effectively, 1 percent; much less effectively, less than 1 percent; don't know, 1 percent; and no response, less than 1 percent.

⁶³There was a 6 percent increase in the odds of a patent appearing in an infringement suit for each additional independent claim. USPTO, Office of the Chief Economist, *Patent Litigation and USPTO Trials: Implications for Patent Examination Quality* (January 2015).

⁶⁴Applicants must make a new submission and pay a fee to USPTO for filing a request for continued examination. 37 C.F.R. § 1.114. USPTO received about 111,000 requests for continued examination in fiscal year 2015; about 11,000 of those applications were the third such request for continued examination, according to data provided by USPTO officials.

stakeholders.⁶⁵ Some stakeholders also told us that such unlimited requests can wear down examiners, making them more likely to eventually grant the patent.⁶⁶ While USPTO has reached out to patent applicants to learn why they were using such continued examinations, the number of requests for continued examination continues to pose a burden for the agency's examiners.⁶⁷

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.⁶⁸ USPTO officials acknowledged that some of the agency policies discussed above could affect patent quality; however, officials did not know the extent of the effects because USPTO has not done an evaluation to determine the potential effects. Without evaluating the effects of these policies on patent quality, USPTO is at risk of continuing practices that may adversely affect patent quality.

Additionally, USPTO policies and procedures generally require clarity in issued patents. On the basis of our survey, we estimate that additional claim clarity requirements to applicants would help more than 80 percent

⁶⁵In 2007, USPTO amended the regulations to revise the rules of practice in patent cases relating to continuing applications and requests for continued examination practices and for examination of claims for applications containing more than 25 claims, among other things. *Changes to Practice for Continued Examination Filings, Patent Applications Containing Patently Indistinct Claims, and Examinations of Claims in Patent Applications*, 72 Fed. Reg. 46,716 (Aug. 21, 2007). A number of large patent holders challenged the new regulations in court. A panel of the U.S. Court of Appeals upheld portions of the regulation, and struck down the portion of the regulation relating to continuing applications and requests for continued examination. See *Tafas v. Doll*, 559 F.3d 1345 (Fed.Cir.2009). Following the granting of an en banc rehearing, the opinion was vacated and PTO withdrew the regulation.

⁶⁶In addition, some stakeholders told us that applicants can broaden the scope of their patent by using continuing examination to encompass new technologies that they did not actually invent.

⁶⁷*Request for Comments on Request for Continued Examination (RCE) Practice*, 77 Fed. Reg. 72830 (Dec. 6, 2012).

⁶⁸[GAO/AIMD-00-21.3.1](#).

of examiners do their jobs more effectively.⁶⁹ We identified two areas where USPTO has encountered challenges with claim clarity in patent applications that can affect patent quality: (1) unclear terms, and (2) unclear or broadly worded claims including the use of functional claim language.

First, patent applications that include unclear terms contribute to challenges with patent quality. 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' specifications.⁷⁰ 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.⁷¹ Further, USPTO officials said that examiners and applicants that participated in USPTO's Glossary Pilot

⁶⁹Based on our survey, we estimate all examiners' responses would be 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.

⁷⁰Based on our survey, we estimate all examiners' responses would be 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. These percentages were even higher for the portion of the technology center that focuses on business methods, an area which includes software-related patents. In that technology center, 67 percent of examiners always or often encounter terms that are not well-defined in the specification. Based on our survey, we estimate all examiners' responses would be as follows: always, 18 percent; often, 49 percent; sometimes, 30 percent; rarely, 3 percent; never, 0 percent; don't know, 1 percent; and no response, 0 percent.

⁷¹Based on our survey, we estimate all examiners' responses would be 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.

Program generally indicated benefits to including a glossary and that the glossary improved claim clarity.⁷²

Second, patent applications that include unclear or broadly worded claims, including those that use functional claim language, contribute to challenges with patent quality.⁷³ For example, on the basis of our survey, we estimate that nearly 90 percent of examiners always or often encountered broadly worded claims in applications they reviewed,⁷⁴ and for nearly two-thirds of examiners, applications with broadly worded claims make completing a thorough examination more difficult.⁷⁵ In addition, dealing with functional claims, especially for software-related patents, can be time consuming and difficult especially if examiners are not aware of the applicant's intent to use functional claiming language under section 112, according to a few examiners we interviewed. On the basis of our survey, we estimate that more than 40 percent of examiners experience pressure to avoid making rejections that relate to claim clarity (section 112).⁷⁶ Also, according to our survey data, we estimate that for a smaller percentage of patent examiners (41%) correctly applying

⁷²In 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.

⁷³On the basis of our survey, we found a statistically significant relationship between the amount of time examiners needed to do a thorough examination and the extent to which applications they received were clearly written and understandable.

⁷⁴Based on our survey, we estimate all examiners' responses would be 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.

⁷⁵Based on our survey, we estimate all examiners' responses would be 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.

⁷⁶Based on our survey, we estimate all examiners' responses would be as follows: a lot of pressure, 7 percent; moderate pressure, 9 percent; some pressure, 14 percent; little pressure, 13 percent; no pressure, 53 percent; don't know, 3 percent; and no response, 2 percent.

patentability standards for dealing with functional claims (section 112(f)) was very important compared to the percentage who reported adhering to novelty and nonobviousness standards (sections 102 and 103) was very important (81%).⁷⁷ In a 2015 study, the USPTO economists found that patents with broader claims—patents with fewer words in their claims—had better odds of appearing in patent infringement lawsuits than similar patents.⁷⁸ Further, that analysis found that patents that contained functional claim language had 40 percent better odds of appearing in patent infringement lawsuits than similar patents that did not contain this language.

Some stakeholders we interviewed said requiring “claim charts” in patent applications could help improve patent quality. Claim charts use one column to present the claim and another column to present the limitations and boundaries of that claim (see table 1). These charts, which are commonly used in the federal courts and in PTAB’s post-grant proceedings, provide additional information on the boundaries of a patent claim. Similarly, according to some stakeholders, having applicants include a functional claim check box to indicate whether they were using functional claim language under Section 112(f) could help to improve

⁷⁷These responses were consistent across technology centers. Based on our survey, we estimate all examiners’ responses to the question: “[h]ow important is the proper application of Section 112(f) to an examiner’s advancement at USPTO?” would be as follows: very important, 41 percent; moderately important, 25 percent; somewhat important, 17 percent; slightly important, 9 percent; not important, 3 percent; don’t know, 5 percent; and no response, 2 percent. Based on our survey, we estimate all examiners’ responses to the question: “[h]ow important is the proper application of Section 102 to an examiner’s advancement at USPTO?” would be as follows: very important, 81 percent; moderately important, 11 percent; somewhat important, 4 percent; slightly important, 1 percent; not important, 1 percent; don’t know, 2 percent; and no response, 1 percent. Based on our survey, we estimate all examiners’ responses to the question: “[h]ow important is the proper application of Section 103 to an examiner’s advancement at USPTO?” would be as follows: very important, 81 percent; moderately important, 11 percent; somewhat important, 4 percent; slightly important, 1 percent; not important, 1 percent; don’t know, 2 percent; and no response, 1 percent.

⁷⁸For example, patents with 50 fewer words had 10 percent greater odds of appearing in an infringement suit than otherwise similar patents. According to the study, as the number of words per claim decreases, the boundary of the patent’s property right is less well defined. The less clear the claim boundaries are, the more likely that others will infringe the patent or will continue to infringe when confronted by the patent owner. Uncertainty about the outcome of a trial occurs for many other reasons than just claim interpretation. See: USPTO Office of the Chief Economist, *Patent Litigation and USPTO Trials: Implications for Patent Examination Quality* (January 2015).

patent quality.⁷⁹ If the box is checked it indicates that the examiner should make sure that the functional claim is supported in the patent specification.⁸⁰

Table 1: Example of a “Claim Chart”

Patent #1,234,567

Text from Claim 1	Interpretation
“a unitary molded plastic package-saving device”	A “unitary molded” device “is a device that consists of a part or parts that were formed from a mold, and it functions as a unit or single piece.”

Source: Adapted from “Anatomy of a Patent Case” Federal Judicial Center, 2009. | GAO-16-490

By statute, an application for a patent must particularly point out and distinctly claim the subject matter of the invention.⁸¹ USPTO regulations 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.⁸² 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 claim boundaries, or clearly identify when they are using functional claiming language. 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, provide a claim chart, or indicate the use of functional claims through a

⁷⁹See Menell, Peter S. *Promoting Patent Claim Clarity*. UC Berkeley Public Law Research Paper No. 2171287. Nov. 2012.

⁸⁰Further, a former high ranking USPTO official said that requiring the use of tools such as glossaries and check boxes would improve the quality and clarity of patents, and would also clarify the meaning of the patent if it ever appeared in court. In addition, a senior USPTO official told us in March 2016 that having applicants include a glossary, a claim chart, and a claim check box with each patent application would be beneficial for examiners to do their work and would help to improve patent clarity.

⁸¹35 U.S.C. § 112(b).

⁸²37 C.F.R. § 1.71.

checkbox, the agency is at risk of issuing unclear patents that may not comply with statutory requirements.

Conclusions

The U.S. patent system plays a vital role in our nation's economy by promoting innovation and supporting millions of jobs in innovation-rich sectors. However, the quality of patents issued by the USPTO has come under scrutiny in recent years, and our analysis suggests that some agency policies and practices may negatively affect the quality of the patents USPTO awards. It has taken several actions to elevate the importance of patent quality within the agency, but additional opportunities exist to improve the effectiveness of the agency's patent quality efforts.

USPTO does not have a consistent definition of patent quality that is clearly articulated in agency guidance or fully developed measurable goals and performance indicators to guide and evaluate work towards the agency's quality goals. Without a consistent definition of patent quality, USPTO is at risk of having its staff work at cross purposes to improve patent quality based on their individual definitions of patent quality. Further, without improvements to measurable goals and performance indicators, 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.

USPTO's policies regarding the time allotted to complete patent application reviews and monetary 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. However, USPTO has not analyzed its policies regarding examiner performance incentives and has assessed the time allotted for patent examination only minimally since the 1970s. Without analyzing whether time allotments to complete a thorough examination are sufficient, USPTO is at risk of issuing lower quality patents due to examiners' not having enough time to complete their work. Our report on prior art searching recommended that USPTO reassess the time allotted to perform a thorough prior art search.⁸³ Without analyzing the current incentive structure, USPTO cannot ensure that its incentives are aligned with high-quality work.

⁸³[GAO-16-479](#).

Further, USPTO has limited data available on decisions from the PTAB to assess its patent quality initiatives. The PTAB has reviewed patents and invalidated some, or all, of the claims for hundreds of patents issued by the USPTO. However, the PTAB data and analysis of these decisions are limited in specificity as well as in distribution. Without identifying all of the data fields that would be useful to track, establishing a means for USPTO managers and examiners to easily access information—including information such as why claims were found to be unpatentable—and analyzing the data to identify potential trends, USPTO officials may be overlooking key information that could help them provide additional training or guidance or take other actions to address recurring issues.

Further, other USPTO policies and procedures—namely, compact prosecution, unlimited numbers of patent claims, and requests for continued examination—may affect patent quality, but the agency has not evaluated the effects of these policies. Without evaluating the possible effects of these policies on patent quality, USPTO is at risk of continuing practices that could potentially affect patent quality.

Finally, without requiring greater clarity in applications—through the use of glossaries, check boxes to signal functional claiming language, or claim charts—USPTO is at risk of issuing patents that are overly broad and not clearly worded—and may not comply with statutory requirements—thereby increasing the likelihood that the patent becomes the subject of litigation.

Recommendations for Executive Action

We recommend that the Secretary of Commerce direct the Director of the USPTO to take the following seven actions to help improve patent quality:

- Develop a consistent definition of patent quality, and clearly articulate this definition in agency documents and other guidance.
- Further develop measurable, quantifiable goals and performance indicators related to patent quality as part of the agency's strategic plan.
- Analyze the time examiners need to perform a thorough patent examination. This action could be taken in conjunction with the recommendation in our report on USPTO's prior art search capabilities ([GAO-16-479](#)).
- Analyze how current performance incentives affect the extent to which examiners perform thorough examinations of patent applications.

-
- Establish a process to provide data on the results of the PTAB proceedings to managers and staff in the USPTO's Technology Centers, and analyze PTAB data for trends in patent quality issues to identify whether additional training, guidance, or other actions are needed to address trends.
 - Evaluate the effects of compact prosecution and other agency application and examination policies on patent quality. In doing so, USPTO should determine if any changes are needed to ensure that the policies are not adversely affecting patent quality.
 - Consider whether to require patent applicants to include claim clarity tools—such as a glossary of terms, a check box to signal functional claim language, or claim charts—in each patent application.

Agency Comments

We provided a copy of our draft report to USPTO for review and comment. In its written comments, which are reproduced in appendix III, USPTO generally agreed with our findings, concurred with our recommendations, and provided information on steps officials plan to take to implement the recommendations. USPTO also provided additional technical comments, which we incorporated, as appropriate.

USPTO stated in its response to the first recommendation that USPTO 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 Title 35 as well as relevant case law at the time of issuance, which is consistent with how we define the term for this report. However, in our audit work, we did not find evidence that this definition was clearly articulated in agency documents and guidance or used in its performance indicators and goals. We revised this recommendation to clarify that USPTO should not only define the term, but also make this definition clear in relevant documents.

In response to our second recommendation, USPTO said that it has taken some steps to update and improve its performance indicators and goals related to patent quality. In its technical comments, USPTO suggested that we revise the report to recommend that USPTO further develop its goals and performance indicators. We agree with this suggestion and made the change. 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.

In response to our seventh recommendation, USPTO said that, contrary to the draft report's findings, USPTO's initial conclusion was that a

glossary did not make a meaningful difference in quality during the prosecution of an application, though the USPTO is still analyzing whether the use of a glossary has a long-term impact on a patent. In response to this comment, we revised the statement in the report to more closely align with the information that USPTO officials presented at its March 8, 2016, Patent Quality Chat on the issue.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Secretary of Commerce, the Director of the USPTO, the Commissioner for Patents, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff members have any questions about this report, please contact me at (202) 512-3841 or ruscof@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix IV.

Sincerely yours,



Frank Rusco
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

To examine recent trends in patent infringement litigation, we obtained patent infringement litigation data from two companies—RPX Inc. and Lex Machina—that included all of the patent infringement lawsuits filed in all 94 federal district courts between 2007 and 2015. These data included information on the patents asserted in each suit, the defendants involved, and the federal district court where the suit was filed.¹ We conducted data quality testing on the data from RPX and Lex Machina to look for missing or out of range values, interviewed relevant officials, and reviewed relevant documentation for the data and found the data to be sufficiently reliable to determine recent trends in patent infringement lawsuits. We also conducted 11 semi-structured interviews with stakeholders from technology companies, venture capital investors, and others knowledgeable about recent patent infringement litigation. In addition, we reviewed published literature on the patent system, including reports from patent researchers, the Federal Trade Commission, and the Congressional Budget Office.

To examine what additional opportunities exist, if any, to improve patent quality, we reviewed relevant laws and USPTO documents and interviewed USPTO officials and representatives of the examiners' union—the Patent Office Professional Association. We interviewed four supervisory patent examiners and six patent examiners from a variety of technology areas. We also conducted 11 semi-structured interviews with patent stakeholders who were knowledgeable about patent quality and USPTO, including legal scholars, former high-ranking USPTO officials, and representatives from public interest non-governmental organizations.

¹We also used U.S. patent classification data from Reed Tech and USPTO to ensure that the 3-digit U.S. patent classes were current. We discarded selected observations from our analysis. For example, we did not include declaratory judgment suits in our analysis. In addition, we excluded lawsuits for which the filing date was missing from the suit-level data. We also excluded lawsuits for which the suit-level data did not report any named defendants or any patents asserted. We also discarded patents for which both the filing date and the issue date were missing. We used information about the lawsuits, defendants, and patents to identify likely transfers, or suits that are likely to have been moved to a district court other than the court in which the suit was originally filed. To avoid double-counting the defendants and patents in these suits, we discarded observations pertaining to the court where the case was originally filed. We also used information about the lawsuits, defendants, and patents to identify likely consolidations, or suits that were originally filed separately against more than one defendant but later consolidated as a single suit. To avoid double-counting the defendants and patents in these suits, we kept only the most recently filed (consolidated) suits for our analysis. In our analysis, we assume that, within each lawsuit, every patent is asserted against every defendant.

Two of the 11 stakeholders we interviewed are currently serving in leadership roles as board members of the American Intellectual Property Law Association. In assessing USPTO's efforts, we identified criteria in the federal standards for internal control and USPTO's strategic plan.

In addition, we conducted a web-based survey of a stratified random sample of 3,336 eligible USPTO patent examiners from across 8 of the 11 the technology-based subject matter groups (referred to as technology centers) into which USPTO examiners are divided. Fielded between August and November 2015, the survey was designed to collect information on USPTO's approach to patent quality and how USPTO might improve its patent quality efforts.² To identify our survey population, we obtained from USPTO a list of patent examiners as of May 2015. We excluded examiners from three technology centers, as follows:

- We excluded the Designs technology center because these examiners work on design patents instead of utility patents; design patents are outside the scope of this engagement and have different statutory and administrative requirements than utility patents.
- We excluded examiners who perform "re-examination" work and not initial patent examination.
- We excluded examiners in the patent training academy because these examiners are recent hires who are in a 12-month training program.

We also excluded examiners employed at USPTO for less than one year. We then defined nine strata by technology center, with one technology center separated into two strata, as described in table 2. Specifically, the Transportation, Construction, Electronic Commerce, Agriculture, National Security and License & Review technology center includes a diverse set of technologies, including transportation, construction, agriculture, and business methods. In our review, we separated the art units—subunits of a technology center—focused on electronic commerce and business methods (collectively referred to as business methods) in light of recent

²We administered the survey jointly with a second review focused on prior art issues; therefore, it also addressed challenges that USPTO examiners face in finding relevant prior art and how USPTO could improve in this area. For this review, see GAO, *Intellectual Property: Patent Office Should Strengthen Search Capabilities and Better Monitor Examiners' Work*, [GAO-16-479](#) (Washington, D.C.: June 30, 2016).

legislation and court decisions related to business methods. This resulted in 9 strata with a target survey population totaling 7,825 eligible examiners. From this list, we drew our stratified random sample of 3,336 eligible USPTO patent examiners. We received responses from 2,669 eligible examiners for an 80 percent response rate.³

Table 2: Strata of United States Patent and Trademark Office (USPTO) Examiners Surveyed

Name	Technology Center (TC)	Technology field ^a
Biotechnology and Organic Chemistry	TC 1600	Chemical
Chemical and Materials Engineering	TC 1700	Chemical
Computer Architecture, Software, and Information Security	TC 2100	Electrical
Computer Networks, Multiplex communication, Video Distribution, and Security	TC 2400	Electrical
Communications	TC 2600	Electrical
Semiconductors, Electrical and Optical Systems and Components	TC 2800	Electrical
Transportation, Construction, Electronic Commerce, Agriculture, National Security and License and Review ^b	parts of TC 3600 (business methods only)	Mechanical
	parts of TC 3600 (not business methods)	Mechanical
Mechanical Engineering, Manufacturing, Products	TC 3700	Mechanical

Source: GAO review of USPTO information. | GAO-16-490

^aWe defined these technologies according to how USPTO defined them in its United States Patent and Trademark Office Quality Survey, Summer 2015, OMB No: 0651-0057.

^bTechnology center 3600 includes a diverse set of technologies, including transportation, construction, agriculture, and business methods. In our review, we separated out the art units focused on electronic commerce and business methods (collectively referred to as business methods) in light of recent legislation and court decisions related to business methods.

Because we used 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

³After the survey was fielded, we determined that 11 survey recipients were not eligible because they told us that they are no longer examiners. Those survey recipients are not included in the target population, sample, or respondent totals presented in this report.

quantified the sampling error and express our confidence in the precision of our particular sample's results at 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. We designed our sample to provide percentage estimates with 95 percent confidence intervals that are within upper and lower bounds of 5 percentage points, within each stratum. We oversampled based on an expected response rate of 70 percent; however, because we achieved a higher than expected response rate, the upper and lower bounds for survey results within each stratum are generally less than 5 percentage points. The only estimates for which the upper and lower bounds exceed 5 percentage points are certain results for the business methods stratum. In these instances, the upper and lower bounds are between 5 and 6 percentage points. In this report, our figures containing survey results show the upper and lower bounds for results at the 95 percent confidence interval. For other estimates in the report, we have not provided the upper and lower bounds in the text or tables; however, those details for all survey results are available in the e-supplement related to this report, [GAO-16-478SP](#).

The quality of survey data can also be affected by nonsampling error, which includes, for example, variations in how respondents interpret questions, respondents' willingness to offer accurate responses, nonresponse errors, and data collection and processing errors. To minimize nonsampling error, we took several steps in developing the survey and in collecting and analyzing survey data. Specifically, in developing the survey, we worked with our survey professionals to, among other things, draft questions that were clear and unbiased. We pre-tested the survey in person with five USPTO staff: three examiners who are also representatives to the examiners' union, a supervisory patent examiner, and a quality assurance specialist. We used these pre-tests to check that the questions were clear and unambiguous, used correct terminology, requested information that could be feasibly obtained, and were comprehensive and unbiased. We also obtained comments on the survey from USPTO management and leadership from the examiners' union. In addition, we obtained a quality review by a separate GAO survey methodologist. Based on these activities, we made changes to the survey before administering it. Further, using a web-based survey and allowing examiners to enter their responses into an electronic instrument created an automatic record for each respondent. This eliminated the potential for errors that could have resulted if we had used a manual process to enter respondents' data from paper surveys. In addition, to account for the complex sample design, we used survey software in our analyses to produce appropriate estimates and

confidence intervals, and the programs we used to process and analyze the survey data were independently verified to ensure the accuracy of this work.

To minimize nonresponse error, we made a variety of contacts with the sample of examiners during the survey, including follow-up e-mails to encourage responses. In addition, between October 20 and 23, 2015, we attempted to follow-up via telephone calls to all 1,102 examiners who had neither completed the survey nor told us that they were no longer examiners. We also analyzed nonresponse bias to (1) assess whether any factors were associated with examiners' propensity to respond and (2) to allow our analysis of respondents to properly reflect the sampling universe of eligible examiners. To adjust the sampling weight for potential nonresponse bias, we used standard weighting class adjustments based on the sampling strata and the examiners' years of experience at USPTO. In this report and in the related e-supplement at [GAO-16-478SP](#), we present the survey results using the nonresponse adjusted weights, which are generalizable to the eligible population of examiners.

We analyzed the responses to the survey for all examiners, as well as responses by technology center and by the General Schedule (GS) level of the examiners. We selected three categories of GS levels—less than GS-13, GS-13, and greater than GS-13—because examiners at these levels have different responsibilities and authorities when examining patent applications. Specifically, examiners above the GS-13 level may grant a patent or reject a patent application without additional review; examiners below the GS-13 level must have their actions reviewed and signed by a more senior examiner; and some GS-13 examiners are transitioning from one GS level to the other.

For some other survey questions, we also reviewed examiners' open-ended responses on selected topics. We selected those topics based on our interviews with experts and USPTO officials as well as our analysis of closed-ended survey responses. We selected the questions for which examiners' responses most frequently included keywords we identified for each topic. An analyst conducted a keyword search of all responses to the selected open-ended questions and coded responses containing the keywords. A second analyst verified the initial analyst's coding. Our report provides some examples of examiners' comments based on this review. Examiners' responses to open-ended questions are not generalizable to other examiners. In addition, because we did not conduct a systematic review of all open-ended responses to our survey, we do not report the

exact number of examiners who provided responses on the topics we reviewed.

In addition, we conducted statistical tests of association on the results of certain survey questions; all tests were independently verified to ensure their accuracy. All tests of association were carried out at the 5 percent level of significance and were Cochran-Mantel-Haenszel (CMH) Chi-square tests of general association. The testing was carried out in SUDAAN, which is statistical software appropriate for the analysis of survey data. The null hypothesis was that there is no association between the two tested variables. When the association between two variables, conditional on a third variable, is of interest, this relationship is referred to as the stratum-adjusted CMH test. The test statistic is Wald Chi-Square.

We conducted this performance audit from November 2014 to June 2016 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.

Appendix II: Patent Examination Process at the U.S. Patent and Trademark Office (USPTO) (Corresponds to Fig. 1)

This appendix provides details on steps in the patent examination process, including rollover information, depicted in figure 1.

Table 3: Descriptions of Selected Steps in the Patent Examination Process at the U.S. Patent and Trademark Office (USPTO)

Step in the Patent Examination Process	Description
Receipt of patent application	When the United States Patent and Trademark (USPTO) receives a patent application, it first goes through an extensive review to determine that it is complete. A patent application includes certain key elements, particularly the “specification” and the “claims.” The specification contains a description of the invention, and the claims define the scope of the invention for which the applicant seeks patent protection. Applications can also include an abstract, drawings, and an information disclosure statement of references to “prior art”—sometimes referred to as citations.
Classification	Because of the significant number of patent applications and issued patents in thousands of different technologies, USPTO, using a contractor, classifies patent applications in categories according to their technical subject matter. Patent classification is useful for prior art searches because it allows an examiner to review a class of applications and issued patents to identify prior art in a specific area of technology that the examiner is familiar with.
Assignment to patent examiner	On the basis of its classification, an application is then routed to one of USPTO’s technology centers for examination. These technology centers together cover electrical, chemical, and mechanical technology fields, and each center is organized into smaller art units—clusters of examiners who focus on related technologies. Once an application is routed to a technology center and art unit, USPTO assigns it to an examiner. Then, within the art units, according to USPTO officials, supervisory patent examiners assign applications to examiners based on each examiner’s workload, not the application’s complexity or the examiner’s skills.
Prior art search and examination	During patent examination, the examiner determines whether the invention is novel and not obvious by comparing its claims to relevant prior art—prior patents, patent applications, or nonpatent literature describing a technology, among other things. To do so, the examiner conducts a search to find prior art that, if found, would help the examiner determine that the invention is not novel or is obvious. In addition, the examiner is to determine whether an application’s claims clearly and precisely inform persons skilled in the art of the boundaries of the patent requested. According to USPTO guidance, the scope of the claims must be clear in order to inform the public of the boundaries of the patent, and to clearly indicate what the applicant regards as the invention
Examiner’s first decision on application	In determining if a patent is warranted, USPTO examiners use what are referred to as office actions to convey the outcomes of the patent examination process. Through what is called a first office action, or a First Action on the Merits, examiners initially notify applicants about the patentability of their inventions and are to fully communicate any deficiencies in the applications. The applicant may then amend their applications or otherwise address any deficiencies in order to continue the examination process. Supervisory examiners may also review some office actions.
Examiner’s final decision on application	At the conclusion of the examination, examiners determine whether a patent will be granted in a final office action. If the application is rejected, the applicant may request additional examination. If a patent is to be granted, USPTO issues the patent to the applicant once certain fees are paid. The patent can generally remain in effect for up to 20 years. Supervisory examiners may also review some final office actions.
Office of Patent Quality Assurance reviews	Quality assurance specialists review a subset of first and final decisions after the examiner’s work is complete.
Appeals	Applicants and others can appeal an examiner’s decisions—including issued patents—before the USPTO’s Patent Trial and Appeal Board. In addition, USPTO decisions may be appealed in federal courts.

**Appendix II: Patent Examination Process at the
U.S. Patent and Trademark Office (USPTO)
(Corresponds to Fig. 1)**

Step in the Patent Examination Process	Description
Time from receipt to decisions	Historically, USPTO has faced a backlog of unexamined applications and a lengthy pendency for applications—the amount of time between receipt of an application and USPTO’s preliminary or final decision on it. From fiscal years 2011 through 2015, USPTO reduced the average pendency for first office actions from 28 months to 17 months, and for final office actions from 34 months to 27 months, according to the agency’s fiscal year 2015 performance and accountability report.

Source: GAO analysis of information from U.S. Patent and Trademark documents and officials. | GAO-16-490

Appendix III: Comments from the U.S. Patent and Trademark Office



THE DEPUTY SECRETARY OF COMMERCE
Washington, D.C. 20230

June 16, 2016

Frank Rusco
Director, Natural Resources and Environment
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Rusco:

Thank you for the opportunity to review and comment on the Government Accountability Office's draft report issued on May 23, 2016, entitled *Intellectual Property: Patent Office Should Define Quality, Reassess Incentives, and Improve Clarity* (GAO-16-490). The United States Patent and Trademark Office (USPTO) remains committed to enhancing patent quality and will continue to operate under standards for patent quality dictated by the legal patentability requirements.

On behalf of the Department of Commerce, I have enclosed our comments on the draft report. We concur with the seven recommendations to develop a consistent definition of patent quality; develop measurable, quantifiable goals and performance indicators related to patent quality as part of the USPTO's strategic plan; analyze the time examiners need to perform a thorough patent examination; analyze how current performance incentives affect the extent to which examiners perform thorough examinations of patent applications; establish a process to provide data on the results of Patent Trial and Appeal Board (PTAB) proceedings to managers and staff in the Technology Centers, and analyze PTAB data for trends in patent quality issues; evaluate the effects of compact prosecution and other agency application and examination policies on patent quality; and consider requiring applicants to use additional claim clarity tools in each patent application.

The attached comments describe additional efforts that the USPTO has made and continues to pursue to enhance patent quality. In addition, the comments include technical comments to the draft report.

Please contact Andrew Hirshfeld, Commissioner for Patents, with questions by phone at (571) 272-8800 or via email at andrew.hirshfeld@uspto.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "B. H. Andrews", is written over a horizontal line.

Bruce H. Andrews

Enclosure

Department of Commerce
Office of the Secretary
The United States Patent and Trademark Office
*Intellectual Property: Patent Office Should Define Quality, Reassess Incentives, and Improve
Clarity (GAO-16-490)*

We appreciate the effort you and your staff made in reviewing issues related to patent quality at the United States Patent and Trademark Office (USPTO). The USPTO remains committed to enhancing patent quality and will continue to operate under standards for patent quality dictated by the legal patentability requirements.

We carefully reviewed the seven recommended actions to help improve patent quality that were made in the subject draft report. Our response to each recommendation is discussed below.

Response to Recommendations

GAO Recommended Action (1): Develop a consistent definition of patent quality.

USPTO Response:

The USPTO concurs with this recommendation and already has a consistent definition for patent quality. A quality patent is one that is correctly issued in compliance with all the requirements of Title 35 as well as the relevant case law at the time of issuance. For many years, the USPTO has trained all of our examiners on the legal requirements, including through new examiner training and through mandatory training for all examiners on new developments in the law. The USPTO also has mechanisms in place to ensure that examiners properly apply these legal requirements in a manner that results in issued patents meeting all legal requirements. The USPTO's recent effort on quality, the Enhanced Patent Quality Initiative, is focused on, among other things, enhancing examination processes to make sure that examiners clearly articulate on the record their patentability determinations so the public can better understand how these determinations were made.

GAO Recommended Action (2): Develop measurable, quantifiable goals and performance indicators related to patent quality as part of the agency's strategic plan.

USPTO Response:

The USPTO concurs with this recommendation and will continue to further develop measurable, quantifiable goals and performance indicators related to patent quality. The USPTO notes that, for years, it has had measurable, quantifiable goals and performance indicators related to patent quality. From fiscal year 2011, these individual performance indicators were combined into the Quality Composite Score, and the Agency had goals associated with both the Quality Composite Score and the individual components of the composite score. This year, based on stakeholder feedback received through the Enhanced Patent Quality Initiative, the USPTO has transitioned from combining the individual performance indicators into the Quality Composite Score; however, the Agency has continued to track these individual performance indicators. In addition, the USPTO has focused during this year on improving its performance indicators and goals related to patent quality based, in part, on additional data that the Agency is collecting through improved mechanisms.

GAO Recommended Action (3): Analyze the time examiners need to perform a thorough patent examination. This action could be taken in conjunction with the recommendation in our report on USPTO's prior art search capabilities (GAO-16-479).

USPTO Response:

The USPTO concurs with this recommendation and will continue to analyze the time examiners need to perform a thorough patent examination, including an analysis with respect to patent quality and search. As noted in the subject draft report, as part of the Enhanced Patent Quality Initiative, the USPTO is conducting a project, called the Clarity of the Record Pilot, to study the additional time it takes for examiners to employ best practices to enhance the clarity of the prosecution record. In addition, the USPTO has completed an initial investigation of the time examiners need to perform a thorough patent examination prior art search. This initial investigation found that additional time for searching was warranted in certain technologies, and the USPTO has provided additional examination time for approximately 1000 examiners.

GAO Recommended Action (4): Analyze how current performance incentives affect the extent to which examiners perform thorough examinations of patent applications.

USPTO Response:

The USPTO concurs with this recommendation and will analyze how current performance incentives affect the extent to which examiners perform thorough examinations of patent applications. In particular, the USPTO will assess whether the examiners' incentives support the agency's goal to optimize patent quality.

GAO Recommended Action (5): Establish a process to provide data on the results of the Patent Trial and Appeal Board (PTAB) proceedings to managers and staff in the Technology Centers, and analyze PTAB data for trends in patent quality issues to identify whether additional training, guidance, or other actions are needed to address trends.

USPTO Response:

The USPTO concurs with this recommendation and will establish a process to better provide data on the results of PTAB proceedings to managers and staff in the Technology Centers, and analyze PTAB data for trends in patent quality issues to identify whether additional training, guidance, or other actions are needed to address trends. The USPTO has already taken steps to do this. In the spring of 2016, the USPTO initiated the Post Grant Outcomes Pilot, which is one of the programs of the Enhanced Patent Quality Initiative, to provide examiners with prior art submitted during PTAB post-grant proceedings. In addition, this program is looking at identifying best practices based on data collected from the post-grant proceedings and examiner behavior and providing examiners a periodic review of post-grant outcomes.

GAO Recommended Action (6): Evaluate the effects of compact prosecution and other agency application and examination policies on patent quality. In doing so, USPTO should determine if any changes are needed to ensure that the policies are not adversely affecting patent quality.

USPTO Response:

The USPTO concurs with this recommendation and will evaluate the effects of compact prosecution and other agency application and examination policies on patent quality. As part of this, the USPTO will also look at whether any changes are needed to ensure that the policies are not adversely

affecting patent quality.

GAO Recommended Action (7): Consider whether to require patent applicants to include claim clarity tools, such as a glossary of terms, a check box to signal functional claim language, or claim charts, in each patent application.

USPTO Response:

The USPTO concurs with this recommendation and will continue to consider whether to require patent applicants to include claim clarity tools, such as a glossary of terms, a check box to signal functional claim language, or claim charts, in each patent application. The USPTO has already taken steps to do this. As noted in footnote 63 of the report, in 2007, the USPTO published final rule changes that restricted the number of continuation applications that could be filed based on an initial patent application and the number of claims that may be concurrently presented for one invention. These final rules were the subject of a lawsuit, which ultimately concluded with the USPTO withdrawing the regulation. In addition, in January 2013, the USPTO issued a Federal Register notice to request comments on the preparation of patent applications, including seeking comments on specific proposals to clarify the scope of claims and to clarify the meaning of claims. Further, as noted in the subject draft report, the USPTO previously conducted a Glossary Pilot, in which the USPTO considered how requiring a glossary would affect quality and prosecution. Contrary to the report's findings, our initial conclusion was that a glossary did not make a meaningful difference in quality during the prosecution of an application, though the USPTO is still analyzing whether the use of a glossary has a long-term impact on a patent. In view of these past efforts, the USPTO continues to consider what, if anything, to require of patent applicants as way of claim clarity tools.

We intend to address the recommendations in a timely manner and look forward to working with your office to further enhance and strengthen our systems, tools, processes and practices as they relate to improving patent quality through finding and using the best available prior art during the USPTO's examination of patent applications.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Frank Rusco, (202) 512-3841, ruscof@gao.gov

Staff Acknowledgments

In addition to the contact named above, the following individuals made contributions to this report: Hilary Benedict (Assistant Director), Krista Breen Anderson, Richard Burkard, John Delicath, Cindy Gilbert, Shilpa Grover, Rob Letzler, Rebecca Makar, Rob Marek, Chris Murray, Eleni Orphanides, Shep Ryen, Kelly Rubin, Ardith Spence, Sara Sullivan, and Sonya Vartivarian.

Appendix V: Accessible Data

Agency Comment Letter

Text of Appendix III:
Comments from the U.S.
Patent and Trademark
Office

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THE DEPUTY SECRETARY OF COMMERCE

Washington, D.C. 20230

June 16, 2016

Frank Rusco

Director, Natural Resources and Environment

U.S. Government Accountability Office 441 G Street, NW

Washington, DC 20548

Dear Mr. Rusco:

Thank you for the opportunity to review and comment on the Government Accountability Office's draft report issued on May 23, 2016, entitled Intellectual Property: Patent Office Should Define Quality, Reassess Incentives, and Improve Clarity (GAO-I 6-490). The United States Patent and Trademark Office (USPTO) remains committed to enhancing patent quality and will continue to operate under standards for patent quality dictated by the legal patentability requirements.

On behalf of the Department of Commerce, I have enclosed our comments on the draft report. We concur with the seven recommendations to develop a consistent definition of patent quality; develop measurable, quantifiable goals and performance indicators related to patent quality as part of the USPTO's strategic plan; analyze the time examiners need to perform a thorough patent examination; analyze how current performance incentives affect the extent to which

examiners perform thorough examinations of patent applications; establish a process to provide data on the results of Patent Trial and Appeal Board (PT AB) proceedings to managers and staff in the Technology Centers, and analyze PTAB data for trends in patent quality issues; evaluate the effects of compact prosecution and other agency application and examination policies on patent quality; and consider requiring applicants to use additional claim clarity tools in each patent application,

The attached comments describe additional efforts that the USPTO has made and continues to pursue to enhance patent quality. In addition, the comments include technical comments to the draft report.

Please contact Andrew Hirshfeld, Commissioner for Patents, with questions by phone at (571) 272-8800 or via email at andrew.hirshfeld@uspto.gov.

Sincerely,

Bruce H. Andrews

Enclosure

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Department of Commerce

Office of the Secretary

The United States Patent and Trademark Office

Intellectual Property: Patent Office Should Define Quality, Reassess Incentives, and Improve Clarity (GAO-16-490)

We appreciate the effort you and your staff made in reviewing issues related to patent quality at the United States Patent and Trademark Office (USPTO). The USPTO remains committed to enhancing patent quality and will continue to operate under standards for patent quality dictated by the legal patentability requirements.

We carefully reviewed the seven recommended actions to help improve patent quality that were made in the subject draft report. Our response to each recommendation is discussed below.

Response to Recommendations

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Data Tables

Data Table for Figure 2: Number of Patent Infringement Suits and Defendants, 2007 through 2015

Year	Total Number of Lawsuits	Total Number of Defendants
2007	2019	5295
2008	2036	4864
2009	2045	5197
2010	2197	7056
2011	2898	8204
2012	4775	7879
2013	5514	8505
2014	4446	6915
2015	5188	8235

Data Table for Figure 3: Number of Defendants in Patent Infringement Suits by District Courts for Patent Suits, 2007 through 2015

Year	All Other districts combined	Eastern Texas	Delaware	Central California	Northern California	New Jersey	Northern Illinois
2007	2784	1205	200	434	156	284	232

Year	All Other districts combined	Eastern Texas	Delaware	Central California	Northern California	New Jersey	Northern Illinois
2008	2325	1186	277	387	180	239	270
2009	2406	1146	382	419	353	230	261
2010	2576	2346	524	529	373	364	344
2011	3131	2291	1032	642	433	282	393
2012	2694	2208	1155	834	380	305	303
2013	2874	2643	1536	598	316	297	241
2014	2217	2236	1051	427	411	373	200
2015	2315	4034	635	423	265	400	163

Data Table for Figure 4: Number of Defendants in Patent Infringement Lawsuits by Technology Area, 2007 through 2015

Year	Chemical	Computers & Communications	Drugs & Medical	Electrical & Electronic	Mechanical	Others
2007	414	1990	669	475	636	1339
2008	267	1874	606	594	620	978
2009	405	2295	572	639	472	973
2010	270	3783	858	884	538	959
2011	297	4950	739	801	606	1029
2012	275	4663	977	706	596	843
2013	307	5133	1039	724	533	970
2014	353	3806	873	748	451	873
2015	302	5112	970	699	531	765

Data Table for Figure 5: Number of Defendants in Patent Infringement Lawsuits for Software-Related and Non-Software-Related Patents, 2007 through 2015

Year	Software-related defendants	Defendants not software-related
2007	2474	2821
2008	2411	2453
2009	2784	2413
2010	4357	2699
2011	5449	2755
2012	5287	2592
2013	5730	2775
2014	4199	2716

Year	Software-related defendants	Defendants not software-related
2015	5436	2799

Accessible Text for Figure 6: U.S. Patent and Trademark Office (USPTO) Strategic Goal Related to Patent Quality and Timeliness

U.S. Patent and Trademark Office strategic goal: optimize patent quality and timeliness

Objectives to achieve the goal:

1. Refine optimal patent pendency
2. Increase efficiencies and patent examination capacity to align with the optimal patent pendency
3. Increase international cooperation and work sharing
4. Continue to enhance patent quality
5. Ensure optimal information technology service delivery to all users
6. Continue and enhance stakeholder and public outreach
7. Maintain the Patent Trial and Appeal Board’s (PTAB) ability to provide timely and high-quality decisions

Initiatives to achieve objective

1. Evaluate and refine the measurement of patent quality data
2. Maximize usage of patent quality data
3. Evaluate effectiveness of changes to the count system and performance appraisal plans; make additional modifications as needed and
4. Continually improve and provide timely technical and legal training

Data Table for Figure 7: Estimated Bi-weekly Overtime Worked by Patent Examiners in the Past 6 Months

	Percent of examiners	Lower bound	Upper bound
"None"	19.41	18.142	20.681
"1 to 5"	21.26	19.961	22.561

	Percent of examiners	Lower bound	Upper bound
"6 to 10"	20.91	19.612	22.212
"11 to 15"	12.55	11.488	13.611
"16 to 20"	8.5	7.616	9.39
"21 to 30"	4.17	3.444	5.003
"More than 30"	4.64	3.868	5.504

Upper and lower bounds of the 95 percent confidence intervals for estimates

Related GAO Products

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

U.S. Patent and Trademark Office: Performance Management Processes. [GAO-10-946R](#). Washington, D.C.: Sept. 24, 2010.

Intellectual Property: Enhanced Planning by U.S. Personnel Overseas Could Strengthen Efforts. [GAO-09-863](#). Washington, D.C.: Sept. 30, 2009.

U.S. Patent and Trademark Office: Hiring Efforts Are Not Sufficient to Reduce the Patent Application Backlog [GAO-08-527T](#). Washington, D.C.: Feb. 27, 2008.

U.S. Patent And Trademark Office: Hiring Efforts Are Not Sufficient to Reduce the Patent Application Backlog. [GAO-07-1102](#). (Washington, D.C.: Sept. 4, 2007.

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Intellectual Property: Key Processes for Managing Patent Automation Strategy Need Strengthening. [GAO-05-336](#). Washington, D.C.: June 17, 2005.

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