and economic history, as well as nonpatent areas of law that could have an effect on innovation.

7) Shield some research uses of patented inventions from liability for infringement. It is unlikely that a reasonable common law research exemption will emerge from judicial decisions in current litigation. Congress should consider appropriate targeted legislation, but reaching agreement on how this should be formulated will take time. In the meantime the Office of Management and Budget and the federal government agencies sponsoring research should consider extending “authorization and consent” to those conducting federally supported research under grants as is routinely done with contractors. This action would not ignore the rights of patent holders, but it would shift infringement liability to the government.

In making these recommendations, the committee examined closely the possibility that changes in the patent system to make it more efficient and less costly and to improve its output could never-theless disadvantage individual inventors and small businesses, some of whom have in the past opposed measures such as Open Review, universal publication of applications, and the first-inventor-to-file basis of patent priority. The panel concluded that the evidence for such fears is lacking and that their recommendations would be as beneficial for small entities as for the economy as a whole.

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A PATENT SYSTEM FOR THE 21ST CENTURY
SUMMARY OF A STEP BOARD REPORT
Helping the Law and Institution Keep Pace with Technology

The U.S. patent system is in an accelerating race with human invention and investments in innovation. Progress continues even in well-established technologies, and new technologies are emerging with greater frequency and attracting capital sooner. In many respects the patent system has responded with surprising speed and admirable flexibility, but the strain of continual change is exposing weaknesses. Meanwhile, too little effort has been made to understand how well the system is serving its dual purpose of providing incentives to innovate and disclosing technology that might otherwise be kept secret. In the end, the key question is what changes are needed to ensure that the system is an engine of progress, not an impediment to it.

WHAT’S CHANGED
Since 1980 a series of judicial, legislative, and administrative actions have extended patenting to new technologies (biotechnology) and to technologies previously without subject to other forms of intellectual property protection (software and business methods), encouraged the growth of new players (universities), strengthened the position of patent holders vis-à-vis infringers domestically and internationally, relaxed other restraints on the use of patents (antitrust enforcement), and extended their reach upstream from commercial products to scientific research tools and materials.

As a result, patents are being more zealously acquired, vigorously asserted, and aggressively enforced in court. The U.S. Patent and Trademark Office (USPTO) now receives 300,000 applications a year and issues 180,000 new patents. That represents 100 new patents every working hour, a burden not only on the agency but also potentially on commerce. There are many indications that firms in a variety of industries as well as universities and public institutions are attaching greater importance to patents and are willing to pay the costs of acquiring, exercising, enforcing and defending them, but those costs are rising rapidly.

Curious about the impact of these changes in the patent system on economic performance and concerned about the scarcity of evidence one way or the other, the National Research Council assembled a study committee to evaluate it. The committee included a rich mix of legal expertise—a former federal judge, two patent attorneys in private practice, a corporate attorney, a former patent commissioner, and two legal scholars—as well as economists, scientists, engineers, university administrators, and corporate technology and intellectual property managers (see back page). Patent policy has not been reviewed by a group with equivalent diversity and depth of expertise in more than 50 years.

The committee held three formal conferences, conducted a series of roundtables and heard from interested parties from all sectors. Moreover, dissatisfied with the limited research literature on contemporary patenting, the committee supported new data collection and analysis of patent quality, licensing, and litigation, focusing on information technology and biotechnology. The committee’s report, A Patent System for the 21st Century, contains its findings and recommendations for strengthening the patent system. The research studies are collected in a companion volume, Patents in the Knowledge-Based Economy. The conference proceedings are available on a CD-ROM, Patents in the 21st Century.

SOURCES OF STRESS
The committee’s first task was to identify areas where the patent system is under stress and where it is falling short. The following short list highlights what in the committee’s view are the most pressing concerns.

Maintaining consistent patent quality is difficult in fast-moving fields. Over the last decade the quality of issued patents has come under frequent sharp attack, as it sometimes has in the past. Patent quality is important because patents on non-novel, useless, or obvious inventions may confer market power without consumer benefit, encourage more infringement disputes, and create enough uncertainty to deter investment in research and development of economically important technologies. Some observers have suggested that the standards of patentability—especially the nonobviousness standard—have become too lax as a result of court decisions. Other observers fault the USPTO’s performance in examining patent applications, variously attributing the alleged
deterioration to insufficient time for examiners to do their work, lack of access to prior art information, or the inadequate qualifi-
cations of the examiners themselves. Because the patent system has not kept pace with the increase in workload represented by the escalating number and growing complexity of appli-
cations. Second, patent approval rates are higher than officially reported and higher in some other major nations’ patent offices. Third, changes in the treat-
ment of technological ideas as patentable require an increased number of patent applications, introduced as a result of crit-
icisms of the quality of patents being issued, reduced or at least slowed down the number of patent grants in those fields. And fourth, there does appear to have been some dilution of the applica-
tion of the nonobviousness standard in biotechnology and some limitations on its proper application to business method patent applications. Although quality appears to be more problematic in rapid-
ly moving areas of technology newly subject to patenting and is perhaps corrected over time, the cost of waiting for an evo-
olutionary process to run its course may be too high when new technologies attract the level of investment exhibited by the internet and biotechnology.

Costs are rising and decisions are taking longer, but there are reasons to doubt that they are as result any bet-
ter. The cost to a company of prosecuting a U.S. patent applica-
tion ranges from $10,000 to $30,000 or more and of contesting or defending a patent in an infringement suit anywhere from
$500,000 to $4 million. But it is the double-digit annual rate of
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Some features of the patent system unnecessarily retard the
dissemination of information. In the United States there are
many channels of scientific interaction and technical communica-
tion and eventually achieve mutual recognition of results. Differences that need re-
cognizing include application priority (‘first-to-invent’ vs. ‘first-to-file’), the grace period for filing an application after publication, the “best mode” require-
ment of U.S. law, and the U.S. exception to the rule of publication of patent appli-
cations after 18 months. This should be preserved without formalizing different rules for different technologies, for example in statutes that would be exceed-
ingly difficult to draft appropriately and equally difficult to change if found to be inappropriate. Among the tailoring mechanisms that should be ex-
pected is the USPTO’s development of examination guidelines for new or newly-patented technologies. In developing such guide-
lines, the USPTO should consult widely and maintain a public record of the submissions, and the results should be part of the record of any appeal to a court so that they can inform judicial decisions. This information should be of particular value to the Court of Appeals for the Federal Circuit, which is in most instances the final arbiter of patent law. To keep themselves well informed about relevant legal and economic scholarship, Federal Circuit judges should encourage the submission of amicus briefs and arrange for Federal Circuit judges to invite formal comment from any source familiar with the principles that these aspects of the enforcement system were meant to promote.

4) Modify or remove the subjective elements of litigation.
5) Harmonize the U.S., European, and Japanese patent examination sys-
tems. The United States, Europe, and Japan should further harmonize patent examination procedures and standards. The committee recognizes that differences in examina-
tion and eventually achieve mutual recognition of results. Differences that need re-
cognizing include application priority (‘first-to-invent’ vs. ‘first-to-file’), the grace period for filing an application after publication, the “best mode” require-
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cations after 18 months. This objective should be pursued on a bilateral or multilateral basis. If multilateral negotiations are not practi-
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