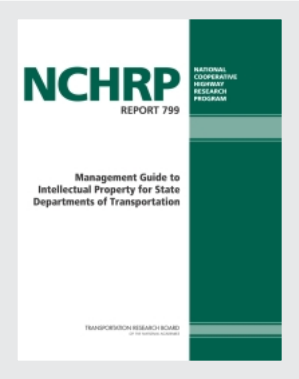

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP REPORT 799

Management Guide to Intellectual Property for State Departments of Transportation

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

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The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and the Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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FOREWORD

By Andrew C. Lemer
Staff Officer
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NCHRP Report 799: Management Guide to Intellectual Property for State Departments of Transportation provides information to assist state transportation agency staff to recognize the potential value of the agency's intellectual assets and the agency's responsibilities in respecting the intellectual property (IP) rights of others. The report presents guidance on how agencies can manage the copyrights, patents, and other IP that may be used or produced as a byproduct of the agency's usual business activities. This guidance is intended to provide agency program staff with an introductory explanation of the nature of intellectual property, the legal framework for defining and protecting intellectual property, and basic principles for its management. The report includes examples and references for cases, tools, and other materials to enhance readers' understanding of the activities likely to be associated with effectively managing an agency's intellectual property.

State departments of transportation (DOTs) are responsible for development and management of facilities and services facilitating the safe and efficient movement of people and goods. In the course of fulfilling these responsibilities, DOT staff, consultants, and contractors may produce novel designs, business procedures, products, software, and methods; these intellectual assets have particular value to the agency and possibly to others as well. For example, a logo or motto may represent the agency in the public's mind; its misuse might damage the agency's credibility. Agency staff may develop a computer software application that solves a problem and significantly enhances some aspect of the agency's performance; other agencies and private-sector contractors might find the software useful as well. In such instances, these intellectual assets may warrant active management and possibly legal protection as "intellectual property."

IP refers to a broad category of intangible rights protecting valuable products of the human intellect and represents a complex and—to the non-practitioner, at least—arcane area of legal practice. Many DOT staff members are unfamiliar with the concepts of IP, the requirements governing IP rights, and the benefits that can be derived from effectively managing those rights. Their agencies may have established neither policies nor procedures for IP management and no mechanisms even to identify their potentially valuable IP.

The objective of this research was to develop a practical guide for state DOT staff on IP management. The Guide is intended to provide practical assistance, particularly to those personnel who may produce or be responsible for management of intellectual assets and who lack formal training in the intricacies of IP protection.

The research was conducted by a team led by Applied Research Associates, Inc., of Champaign, IL. The research team conducted an extensive review of literature on U.S. and international practices relating to IP and its management in the areas of transportation and

transportation research. The team also examined current practices of U.S. and international transportation agencies, particularly regarding IP identification, protection, and commercialization under applicable state and federal laws. The team undertook to characterize the key IP management issues DOTs face and principal strategies for addressing these issues. IP management practices in other areas of technology and sciences were also considered for their potential value in dealing with issues DOTs may typically face.

The primary product of this research is this IP Management Guide. It is an introduction to a complex subject, meant to assist DOT staff to recognize the potential value of the agency's intellectual assets and when managing these assets as IP may yield greater benefits to the DOT and its stakeholders. The Guide also considers the DOT's responsibilities regarding respect for the IP of others that may be used by the DOT or its contractors. In addition to the Guide, the research team produced a summary report of the research and a set of presentation slides that a DOT's research or legal staff might use to present IP management concepts to others. These latter two products are available for download from the NCHRP project web page by going to www.trb.org and searching "NCHRP Project 20-89." A link to the presentation slides is provided in Appendix I of this Guide. Also included in the Guide, Appendix H is a suggested work plan an agency might use for undertaking staff training in IP management.

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Note: Photographs, figures, and tables in this report may have been converted from color to grayscale for printing. The electronic version of the report (posted on the web at www.trb.org) retains the color versions.

CHAPTER 1

Introduction

1.1 Background

State departments of transportation (DOTs) construct, operate, maintain, and manage a highway system and its infrastructure to serve the various needs of the traveling public. They seek to enhance the safety, mobility, commerce, and livability goals of the public they serve. To that end, the DOTs' concerns related to intellectual property (IP) have traditionally focused on avoiding high royalty premiums or avoiding putting their contractors in positions of liability for infringing proprietary IP of other parties (*1*). Certainly, when it comes to state DOT-funded research and development (R&D), DOTs expect to obtain a license to use any IP resulting from those efforts. However, aside from this license, DOTs have not traditionally needed to *own* IP, nor have they typically promoted and marketed IP developed by a contractor using DOT funding.

A review of IP registration activity in the United States Patent and Trademark Office (USPTO) databases suggests that state DOTs have not registered very much IP. State DOTs hold titles to only about 25 patents. State DOTs have registered 213 live trademarks, but it appears that many of these are owned by just a few DOTs that are very active in pursuing trademarks. A search of the copyright database returns 66 registered copyrights.

Given the volume of work and research in which state DOTs invest, it could be argued that there should be a greater representation of IP registration and IP ownership activity, especially if state DOTs are compared to public universities and laboratories that are supported by taxpayers. These institutions have mandates for developing and managing their IP. For example, by registering its IP and retaining ownership of the IP, a public institution may be able to benefit the public by licensing the IP to others. (For more information, see the section on licensing in Chapter 6 of this Guide.) Public benefits from licensing could range from very tangible royalty revenue to the state or less tangible economic activity flowing from marketplace application of the licensed IP (e.g., where marketplace partners need the security of an exclusive license to practice the IP). Clearly, however, most state DOTs are not doing much in this area.

It is probably safe to suggest that IP management is within the scope of a state DOT's responsibility. IP can potentially arise within many operational units of a state DOT, such as information technology, research, design, maintenance, operations, and public communication, just to name a few. Additionally, IP may be generated as a consequence of a number of actions and activities, including the following:

- As a part of a contract with a private sector organization for the provision of goods or services.
- As a result of everyday activities of staff and employees.
- As a result of an in-house R&D program or project.
- As a result of funding an external research program or project (*2*).

To have an effective IP management program, it is important to first have a clear understanding of the key success factors. A thorough understanding begins by answering the following questions:

- What constitutes IP? Why is recognizing IP important?
- What are IP rights? Why are they granted?
- What is IP management?
- How is IP effectively managed by a public entity? Why is effective IP management important for a public entity like a state DOT?

The remaining sections of this chapter address these basic questions and present the background information necessary to interpret the concepts discussed throughout this Guide.

1.1.1 Why Should State DOTs Manage IP?

Typically, IP management is not considered a mission-critical activity for state DOTs; therefore, not a lot of resources are allocated to IP management. This could reflect a belief at most state DOTs that their inventions and creative ideas are owned by the public and should be dedicated to the public domain (*3*). Dedicating IP to the public domain is one aspect of IP management, but IP management also encompasses:

- Sharing innovations.
- Collaborating with others.
- Controlling or ensuring the freedom to use an invention or creative work (thus avoiding associated IP cost).
- Maximizing the financial and nonfinancial benefits of the IP.
- Leveraging IP for economic development.
- Minimizing risks when using or exploiting IP.

Dedicating IP to the public domain could run counter to some of the financial and economic benefits that could flow from retaining ownership of the IP and licensing it to private parties. Each of these aspects should provide a compelling reason for state DOTs to recognize the value of managing their IP.

One benefit often reported in literature is that IP management fosters innovation and invention by driving investment toward society's most pressing needs (*4*). IP is an asset that is protected by law and that allows those individuals and organizations that invested in the development and commercialization of the IP to receive benefits for their investments. The rights afforded by IP laws also give the owner(s) of those rights control over the use of the asset. The use of the rights embodied in the IP requires authorization from the owner of those rights. Another potential benefit of IP is the potential for new revenue creation as a result of licensing the IP or developing a product or service that embodies the IP and releasing the product for sale. (Licensing of IP is discussed in more detail in Chapter 6 of this Guide.)

Proactively managing IP also carries risks, however. For example, if a state DOT plans to manage its IP, it must designate a unit, person, or external organization to oversee these activities, which requires both human capital and financial resources. The state DOT would need to prioritize activities to identify, track, document, and register their IP.

Consequently, state DOTs may put themselves at risk and incur increased cost to the taxpayers if they fail to properly manage their IP. These risks may include:

- Inappropriate or unauthorized use of state DOT IP.
- Liability if a state DOT unknowingly uses others' IP without consent (e.g., if a state DOT employee uses copyrighted material found on the Internet).

At its core, IP management is about maximizing taxpayer value. For the state DOT manager, maximizing value is not only about making key investments in projects and activities to develop new technology, to develop new products, or to support innovations that ensure an efficient highway system. Maximizing value is also about recognizing and managing outcomes of these investments which, in some cases, may be potential IP assets. IP management is not solely about registering IP, but about the strategies used to understand the importance and value of IP to the state DOT.

1.1.2 Definition and Forms of IP

The term *intellectual property* (IP) refers to a broad spectrum of property interests. As a legal term, it has been defined as a category of intangible rights protecting commercially valuable products borne of the human intellect. This definition does not imply that IP encompasses abstract ideas—IP can only arise for tangible physical embodiments of an idea. For example, an invention must be reduced to practice to qualify for patent protection, and a work of authorship must be fixed in a tangible medium of expression to qualify for copyright protection (*5, 6*). Multiple forms of IP protection exist, as do multiple strategies for managing IP that might be applicable to any given invention or creation. For example, certain aspects of a single software product could be protected by patents, trade secrets, copyrights, and trademarks (*7*). Given the variety of strategies and types of protection, it is important to understand the reasons for pursuing IP protection.

Intellectual property (IP) *refers to the creative activities of* literary, artistic, *and* scientific *works,* performances *of performing artists, and* broadcasts*; inventions in all fields of human endeavor;* scientific *discoveries;* industrial design*;* trademarks*,* service marks*, and* commercial names*, designations, protection against unfair competition and all other rights resulting from intellectual activity in the industrial, scientific, literary, or artistic fields.*

—World Intellectual Property Organization (WIPO), 1967, Article 2

The four primary forms of IP are patents, copyrights, trademarks, and trade secrets. These forms of IP cover the creative outputs and activities in all fields of human endeavor. This may include works of literature, works of art, and scientific works, for example. These works may be scientific discoveries, industrial designs, software, construction or maintenance equipment, work zone safety systems, engineering designs, or a host of other items. Table 1 lists some examples of highway transportation-related IP. This list is not exhaustive and it does not suggest that these inventions/creations are actually protected as IP; rather, it identifies categories of inventions or creations potentially found within a state DOT and lists the types of IP protection that may be available for those categories of inventions/creations.

1.1.3 IP Ownership Rights

IP owners, like owners of other types of property, have certain rights. These rights can be sold, bought, licensed, gifted, traded, or used as a security. These rights, in essence, restrict others from using the IP without the consent of, authorization of, and/or remuneration to the creator or owner (typically via a licensing agreement). The law that governs and protects the rights of the IP owner is meant to provide inventors an incentive for disclosing their invention or creation. The incentive is a limited-life monopoly over the control of their IP (*8*). Such exclusionary rights afforded by IP protection are anticipated to give the owner or creator an inducement to disclose a work or introduce it into the marketplace, as well as the potential opportunity to benefit from his or her work, both financially and otherwise. (See Chapter 6 for more detailed information about licenses.)

1.1.4 What Is IP Management?

IP rights are critical legal and strategic instruments for nurturing innovation. Managed judiciously, they balance private rights and public necessity in a manner that can encourage investments in addressing the most crucial needs and challenges in society. A broadly accepted definition of IP management is the *devising of* and *use of* strategies and tactics to realize value

Table 1. Types of potential IP found at a state DOT.

Types of IP Protection	Categories of Inventions/Creations	Potential Examples at a State DOT	Rationale for Protection
Patent	• Products • Devices • Software • Test methods	• Deicing systems • Work zone protection systems • AASHTOWare (software)	• Restrict the rights of other to use, sell, make, or import the claimed invention • Encourage investment and innovation in a particular area
Copyright	• Software • Documents • Training materials • Reports • Photographs • Websites • Jingles • State maps	• State DOT websites • AASHTOWare • State maps created by state DOTs • ASTM Test Standards • AASHTO bridge pavement and highway design documents	• Control access to creative expression • Exclude others from reproducing, adapting, distributing, performing, or displaying a creative work
Trademark	• Logos • Acronyms • Symbols • Slogans	• Slogans (e.g., Texas DOT's anti-litter campaign's "Don't Mess with Texas"), or the national seatbelt enforcement campaign's "Click it or Ticket") • AASHTOWare	• Signal the level of quality of a creation • Protect public from being misled by similar products
Trade secret	• Products for which the value is based on the secrecy of the information	• Methods and procedures for managing snow-covered roads	• Necessary when the secrecy of information makes it valuable

from investments that have led to protectable IP assets (*9*). As has been noted, the value returned to the owner from managing IP may be financial or nonfinancial.

It is anticipated that proactive IP management will improve state DOTs' ability to:

- **Maintain access to research results derived from funded projects or employee inventors and creators.**
  - Document and track the outputs/deliverables of DOT activities (e.g., databases, spreadsheets) to identify what types of IP may be available.
  - Ensure that the contract language between the DOT and any contractor explicitly provides appropriate access to all IP generated from DOT funding.
  - Use employment agreements to ensure that the DOT maintains access to works/inventions created by employees.
- **Protect the interest and IP rights of others, including contractors and employees.**
  - Respect the IP rights of others. It is important that appropriate remuneration be given for the use of others' IP.
  - Reward the creativity of employees. One way of doing so may be by having a process by which the DOT would help apply for IP protection for creative works/inventions by employees. Perhaps the employee could share in any revenue generated from licensing the IP.

- **Reduce the likelihood of IP infringement claims against state DOT contractors by other contractors or third-party owners of IP assets.**
  - Ensure that contractors understand and follow specific procedures to avoid accidental infringement of IP. State DOTs enjoy sovereign immunity from copyright and patent infringement actions, as discussed in detail in Chapter 6. Unlike the federal government, however, state DOTs cannot immunize their contractors and cannot provide authorization and consent for the infringement of others' IP.
  - Ensure remunerations for use of others' IP. DOTs need to track the use and implementation of third-party IP, both internally when used by employees and on projects performed by contractors.
- **Identify contributions to the field by DOTs, including contractors and employee inventors.**
  - Promote creative and intellectual contributions from staff and contractors. IP management can help the DOT to identify the contributions of its contractors and employees. This may be an additional way to reward significant contributions and hard work.
- **Provide a source for outbound licensing/grants of rights to IP.**
  - Support a licensing program. IP management provides a framework that supports the DOT's efforts to track and identify potential valuable IP. By knowing what IP it owns, a DOT can establish a mechanism for licensing IP to other public agencies or private organizations. The license could be for a royalty or be royalty-free. Licensing is addressed in greater detail in Chapter 6.
- **Secure monetary compensation for use of the IP owned by the DOT.**
  - Collect a royalty for use of IP. State DOTs can benefit from IP that they own by licensing it to one or more third parties under a licensing agreement that provides for a royalty payment, as discussed in greater detail in Chapter 6.
  - Provide additional revenue to the state. By owning IP, the state DOT can create a new revenue stream that can benefit investments in other areas.
- **Legally protect a presence in the market space.**
  - Maintain the integrity, quality, and reputation of state-funded IP. Proper IP management provides a mechanism by which the state DOT can maintain control over how its IP is used. This can help to maintain the quality, integrity, and reputation of both the IP and the agency.
- **Encourage investment in technology development and commercialization.**
  - Trigger further development and commercialization. The exclusionary rights given by IP protection help reduce some of the risk and uncertainty around investing in commercializing IP.
  - Support economic development activities. Commercialization activities are very important to both the state and local economy.
- **Avoid becoming "captive" to incumbent contractors with proprietary technology.**

In summary, state DOT investments often result in new and useful processes, products, and technologies, many of which may have unrealized value to both the agency and the public it serves. Widespread implementation of technologies is an important outcome for state DOT programs (*10*). Although the present legal framework for managing IP may not be perfect, it is able to support advancing knowledge creation, knowledge transfer, and innovation (*11*).

1.2 Framework for IP Management

Although no one-size-fits-all approach will work for state DOT IP management, this Guide elaborates on some of the key concepts surrounding IP management and provides a framework that is flexible enough for any state DOT to use in meeting its IP management needs and objectives.

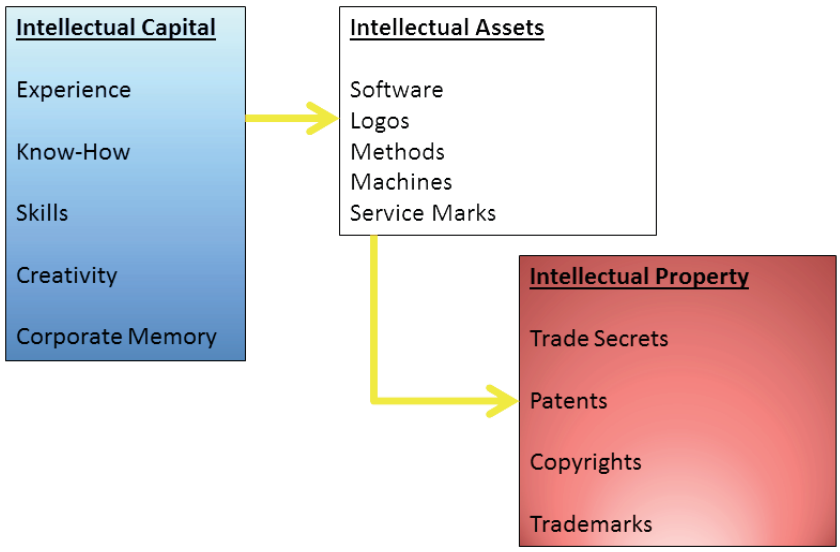

Figure 1. Model for IP creation (12).

Figure 1 shows types of intellectual capital and assets that subsequently can be transformed and converted into IP. That is, intellectual capital resources convert to intellectual assets, which may then be managed as IP.

To be effective, an IP management program must address four key dimensions: legal, technical, organizational, and economic (*13*). Figure 2 shows the framework's broad areas and the factors to consider within each area.

1.2.1 The Legal Dimension

The *legal* dimension is concerned with controlling and identifying protectable assets. It is important to be aware of issues surrounding IP laws and the expressed rights and privileges granted to IP owners. Also, it is important to document and review the use of third-party IP to minimize the risk of infringement. It is necessary to understand the principal forms of IP and

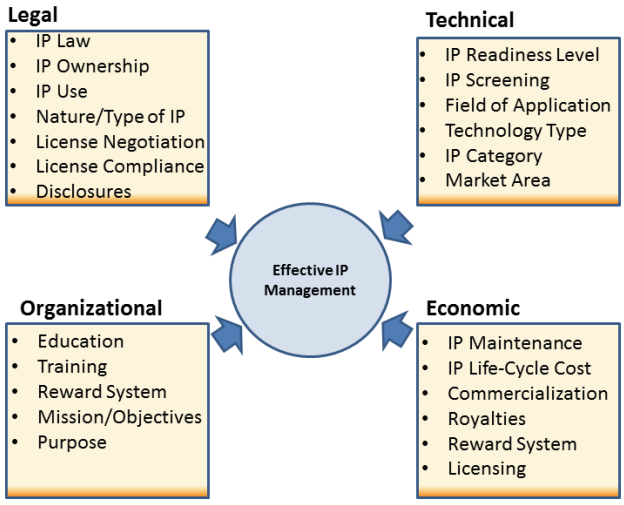

Figure 2. IP management factors.

which are applicable to specific types of inventions. It is necessary to establish a formal disclosure process to screen the results and deliverables from each activity/project to identify protectable assets. Finally, it is necessary to have model contracts to provide guidance regarding potential licensing negotiations and IP ownership issues.

1.2.2 The Technical Dimension

The *technical* dimension is concerned with understanding the field of application of a protectable asset. The fields of application will likely affect which forms of IP protection apply and are considered. Additionally, it is important to understand the likelihood of the IP protection being adopted and implemented. The key is to address whether identifying, protecting, and managing a given asset as IP is worth the investment. It is important to understand if the target users have the complementary assets or organizational structure to successfully practice or use the IP (*14*).

1.2.3 The Economic Dimension

The *economic* dimension is concerned with the economic impact of IP to the agency, general public, contractors, and other potential IP stakeholders. IP management can be an expensive endeavor. There are costs to acquire and maintain the protection (e.g., patent prosecution costs, maintenance costs). These life-cycle costs will have a significant influence on the state DOT's IP management strategy (e.g., IP audit, IP inventory). If IP is licensed, a cost is associated with the license negotiation. After the license has been signed, a cost is associated with monitoring for compliance. A cost-benefit analysis that examines all options (e.g., patent life-cycle cost, royalties from commercialization, or dedicating the IP to the public domain) will be a key decision factor in pursuing IP protection. (For a more detailed discussion of IP audits, see Chapter 2; for more information on licensing, see Chapter 6.)

1.2.4 The Organizational Dimension

The *organizational* dimension is concerned with establishing an IP management agenda and approach (i.e., the organization's IP management policy). At minimum, this includes educating and training employees, as well as contractors, on IP issues that are critical to the IP management policy. Additionally, employees need to know how to recognize IP that may be of value to the organization and to understand their role in managing it, consistent with the IP management policy.

Some state DOTs may have the discretion to establish the IP management policy for their organization, whereas other state DOTs may be subject to an IP management policy established by the state government. Furthermore, the IP management policy for a state DOT must be consistent with state statutes and regulations governing IP with respect to state DOTs. (This topic is discussed in greater detail in Chapter 6.)

It is expected that this framework will help the state DOT focus on the activities that are most important in supporting a successful IP management program.

1.3 Research Objective and Scope

The overall objective of NCHRP Project 20-89 was to develop guidelines to inform and to support IP management within state DOTs. This *Management Guide to Intellectual Property* provides approaches and strategies that DOTs can implement to manage their IP portfolios. It is important to point out that the IP management framework discussed in this Guide continues to evolve; however, the best practices outlined are taken from proven structures, processes, and

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approaches that represent some of the most well-known ideas on managing IP to date. No matter where a given agency currently falls along the IP management spectrum, it is anticipated that this Guide will serve as a resource for decision-makers and practitioners to institutionalize IP management.

1.4 Application of IP Management in the State DOT

Successful IP management requires commitment from all levels within the organization. IP management is about employing strategies and tactics that support the overall goal of the state DOT, which is to put the related innovations into practice for the benefit of the public. As with most business decisions, resources are limited. State DOTs need a structure to guide decision-making and the allocation of resources for IP management activities. Several key elements must be addressed, including:

- **An overall IP policy.** Policies that promote IP management within the state DOT should give priority to advancing the mission and vision of the agency. All other policy components should flow from this mission-driven approach.
- **Which unit, individual, or organization will have overall responsibility for managing IP.** State DOTs can manage these services internally or under contract with an outside consultant or service provider. Depending on the legal framework within which a state DOT operates, the state DOT also might be able to opt to participate in a consortium (perhaps composed of multiple state DOTs or composed of a selection of executive agencies within a single state). The consortium would have agreed-upon management responsibilities with respect to specified IP of the participating state DOTs (*15*).
- **How to create a culture of IP management.** To have a successful IP management program, everyone in the organization must be informed of the importance of IP. Training must be available to inform personnel about IP rights and applications.
- **A mechanism for identifying, submitting, and tracking inventions, ideas, and concepts.** In most mature IP management programs, a disclosure form is the entry point for initiating a review of a new idea, invention, or concept to assess whether it warrants or even qualifies for IP protection.
- **A process for screening, analyzing, and reviewing inventions, ideas, and concepts.** After receiving a disclosure, a review process is needed. This review process will examine the merits of the invention/creative expression/creation, enabling a decision to be made whether to pursue IP protection and, if so, identifying the appropriate form of IP protection to pursue.
- **Parameters for pursuing IP protection.** Each type of IP has its own rules, laws, requirements, and governance. When deciding on the appropriate form(s) of IP protection to pursue, it is important to understand these differences and to set appropriate expectations with regard to costs and the ability to meet the requirements needed to obtain that protection.
- **Disposition of IP rights.** Will licensing IP rights be a significant component of the state DOT's strategy? The disposition of IP rights includes defining the mechanism by which others can obtain the rights to use IP owned by the state DOT; deciding whether dedicating most IP to the public domain will be the standard policy and protecting IP will occur on rare occasions; and deciding if IP rights should be given to an employee inventor/creator or to a contractor.
- **Policies for managing any revenue generated from IP management.** State DOTs may offer royalty-generating license opportunities to third parties. For those state DOTs, having a mechanism in place to manage any revenue received by the state DOT is important. The policies should clarify how funds will be used to support activities in the state and support the taxpaying public, as well as how any revenues will be shared with the inventors, creators, and so forth.
- **Defenses against misappropriation of IP rights.** To be effective in IP management, a state DOT must be willing and able to defend its IP rights from infringers. If the DOT chooses not

to defend its rights, it runs the risk of losing those rights. On the other hand, because a state DOT's mission is to perform activities for the public good, the DOT must recognize that, in some cases, defending the agency's IP rights could have a direct, negative impact on the public.

- **Tools for measuring the success of IP management initiatives.** To assess whether the state DOT is reaching its IP management goals, it is important to have metrics and tools in place for measuring the success of IP management efforts.

1.5 Organization of the Guide

This Guide is organized into 10 chapters that elaborate on the crucial components to developing and executing an IP management program.

Chapter 1 provides a general introduction and cursory review of the material that will be discussed in the later chapters.

Chapter 2 reviews the key elements for IP management. A flow diagram illustrates how these elements are linked to create a complete IP management system.

Chapter 3 discusses the needs and requirements to establish a unit, personnel, or contractor to be responsible for the state DOT's IP management activities.

Chapter 4 focuses on the process of disclosing, screening, and reviewing ideas, concepts, and inventions submitted by employees and contractors.

Chapter 5 introduces the four primary forms of IP protection: patent, copyright, trademark, and trade secret. This chapter defines each form of IP protection and highlights key laws and statutes from which the IP rights derive.

Chapter 6 discusses some of the options afforded to the owners of IP property rights and how others can acquire rights to use state DOT IP. This chapter focuses primarily on the importance of planning to balance the interests of state DOT stakeholders in relation to IP.

Chapter 7 examines what happens if a state DOT decides to sell or license its IP for payment. Mechanisms and procedures are needed for managing how the revenue will be used for the good of the general public.

Chapter 8 discusses metrics and techniques for assessing the effectiveness of an IP program. IP management has many potential benefits to a state DOT and the public it serves. It is important to have a mechanism for measuring whether the program is reaching the goals outlined by the state DOT.

Chapter 9 presents four case studies that highlight the concepts and strategies discussed throughout the document.

Chapter 10 provides a demonstration of the IP management process. This chapter considers four types of IP assets: (1) an electromechanical product that is patented; (2) a slogan that is trademarked; (3) copyrighted material that is dedicated to the public domain; and (4) algorithms that are to be maintained as a trade secret. The goal of this chapter is to show how each type of IP may be managed within a state DOT.

CHAPTER 2

Overview of the IP Management Process

2.1 Overview

Successful IP management requires long-term commitment within the state DOT. Adopting processes and procedures that support the DOT's mission is very important. One early decision is whether to carry out these activities internally or to outsource them via contracting services. This decision will help determine what level of budget and resources will be required to carry out both business and legal IP management activities. Typically, business activities may involve IP marketing and some aspects of licensing negotiations, whereas legal activities will involve IP registration.

The state DOT also needs to establish its goals for IP management. These goals often align with the state DOT's technology transfer initiatives. For state DOTs, it is important to manage IP for the benefit of the public good, not necessarily for maximizing profit. If some IP assets generate revenue, it will be necessary to manage that revenue and re-invest it into the state.

The sections in this chapter briefly present the key components of an IP management process. A flowchart of the process is shown in Figure 3. Knowledge of this process is useful for state DOTs whether they plan to manage IP internally, externally, or using some combination of internal and external resources. It is recommended that any contractor selected have, at a minimum, the capability to perform processes similar to those detailed in Figure 3.

These six steps briefly outline the suggested flow of an IP management process:

Step 1: Identify the person(s) or form an office that will be responsible for handling IP issues within the organization. Although there are several functional units within most state DOTs, it is recommended that a centralized contact be identified from which IP information can be managed and brokered.

Step 2: Establish a disclosure process. The entry point for identifying and documenting IP is the disclosure form. It is recommended that these forms be submitted and revised during periodic reviews of projects or other work activities being conducted by state DOT employees or by contractors working for or on behalf of the state.

Step 3: Screen and review. The screening and review process should include at minimum a review of prior art (when applicable); assessment of the field of application; identification of the key features and benefits of the potential IP; identification of the expected users and key stakeholders; and assessment of the IP's value to the state DOT. Technology assessment (review of competitors, market analysis, and review of similar and substitute technology) should be conducted on a case-by-case basis.

Step 4: Make the decision. It is important that the decision-makers consider the various opportunities presented in terms of social impact, financial impact, and overall long-term

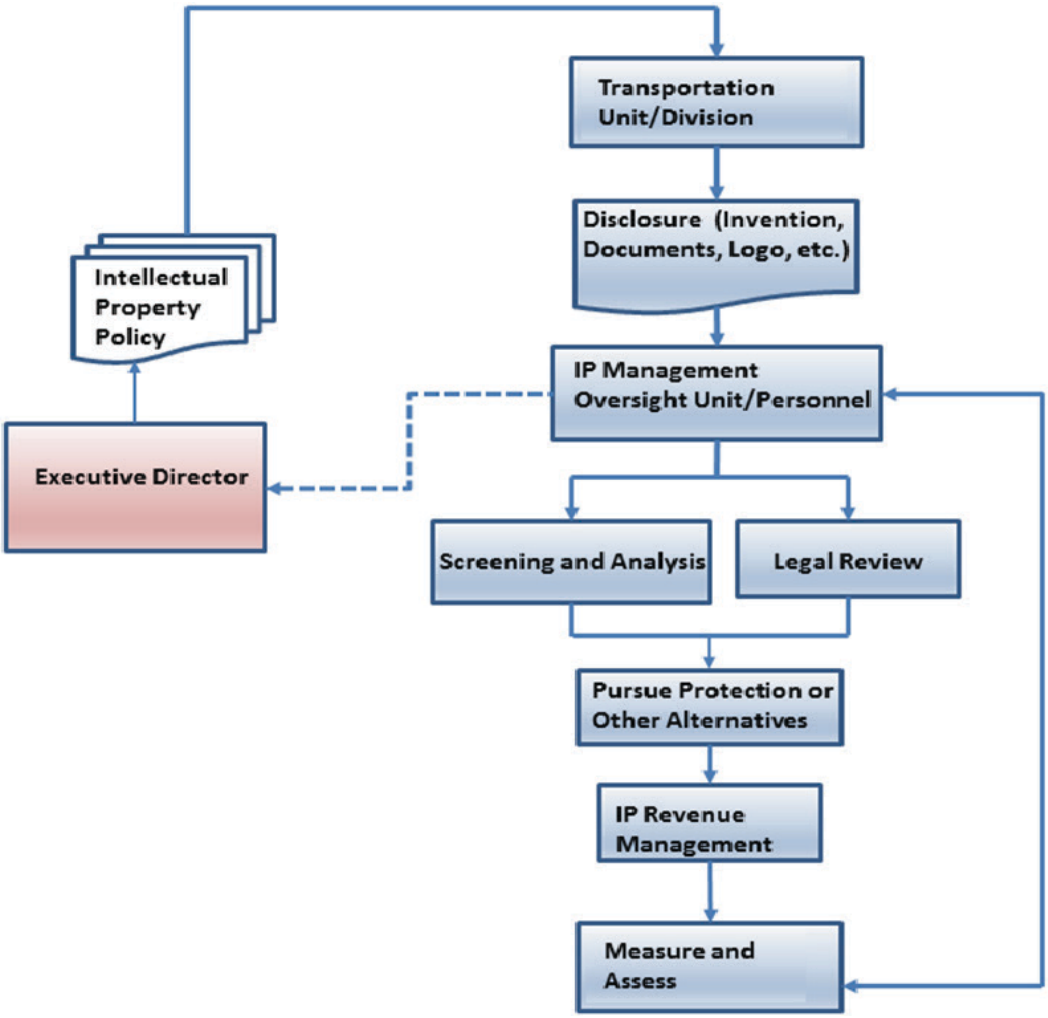

Figure 3. IP management process.

impact on the DOT. For the state DOT, the decision will also be affected by the sources of project or activity funding and their requirements regarding work used on projects or other activities performed by state DOT employees or by contractors working for or on behalf of the state DOT. In the case of activities funded wholly by the state, the DOT has more control over how IP is managed. For activities with mixed funding and federal-only funding, IP management options will be highly restricted by the Bayh-Dole Act (the Patent and Trademark Law Amendments Act of 1980, PL 96-517). Some options are available to a state DOT that is using an alternative contracting method, such as a Cooperative Research and Development Agreement (CRADA). The CRADA is one of the principal mechanisms used by federal laboratories to engage in collaborative efforts with nonfederal partners to achieve the goals of technology transfer. The CRADA, which is not an acquisition or procurement vehicle, is designed to be a relatively easy mechanism to implement, requiring less time and effort to initiate than previous methods for working with nongovernment organizations. The CRADA also is intended to take into account the needs and desires of private industry when commercializing a product. Because each agency and laboratory is free to develop its own CRADA model, technology transfer personnel must ensure that they utilize their agency's specific wording and format for CRADAs. (More information is available at the Federal Laboratory Consortium website, http://www.federallabs.org/home/faqs/).This mechanism provides a template for negotiating some of the rights and access to jointly developed IP.

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In addition to the funding-source constraints, the state DOT must determine what the best forms of IP protection are, and if protections are necessary, who should pursue them (e.g., state DOT, contractor, and/or employee).

Step 5: Performing technology transfer. It is important to determine how the technology will be transferred to the public. Details include:

- Should the IP title and technology transfer responsibilities be taken by the contractor, the employee, or the state DOT?
- Should the IP be distributed freely and shared in the public domain?
- Should the state DOT take title to the IP with a requirement to actively pursue licensing to third parties to transfer the technology?

Step 6: Monitoring. Depending on the technology transfer decision, it may be important to monitor and audit any agreements (e.g., CRADAs) as well as any licensing compliance issues. (Further discussion of IP audits is provided in Section 2.12 in this chapter.) Additionally, it will be important to measure the success of the IP management effort. These assessments may provide a trigger to initiate *march-in rights* (essentially, the right to acquire title if the IP holder is not satisfying certain criteria for commercialization), if applicable.

Each element of the flowchart presented in Figure 3 will be discussed in more detail in subsequent chapters of this Guide.

2.2 State DOT IP Management: Current Guidance

State DOTs lean heavily on the policy guidance provided by FHWA, because the funding of transportation projects involves a large component of federal money. Following the legal guidance for developing, using, and managing IP is required to remain eligible for federal money to assist in the creation of a state's transportation program. Generally, the federal government maintains that an open and competitive process must be utilized to encourage responsible and competitive prices for publicly funded transportation projects.

FHWA regulations concerning the use of patented and proprietary products are contained in 23 CFR 635.411. This updated guidance is posted on the FHWA website: http://www.fhwa.DOT.gov/programadmin/contracts/011106qa.cfm.

In summary, the guidance:

- Clarifies that a state DOT may specify proprietary products when the state DOT certifies that there is no suitable alternative product (such as an innovative product offering better performance) or that the product is needed for synchronization.
- Clarifies that FHWA must approve, through a public interest finding, the specification of a proprietary product when other equally suitable alternatives exist.
- Provides for the Internet posting of FHWA's approval of public interest findings on FHWA's website and encourages the posting of state DOT certifications on the AASHTO Product Evaluation List (APEL) website.
- Clarifies that additional approvals are not required when proprietary products are being evaluated in FHWA-sponsored programs such as Highways for LIFE, the Innovative Bridge Research and Deployment Program, and the Innovative Pavement Research and Deployment Program.

Based on the guidance suggested by FHWA, the research surveys conducted for NCHRP Project 20-89, a review of past and present legal challenges within the state DOT, and interviews with state DOT personnel, it seems that most state DOTs are very concerned with:

- Ensuring that the state DOT has continued access to innovations developed using state DOT funding by employees and/or by contractors.

- Obtaining access (e.g., reciprocal licenses) to innovations developed by other public bodies (e.g., FHWA, other state DOTs, other state agencies).
- Avoiding becoming "captive" to incumbent contractors with proprietary technology.
- Establishing IP management policies that encourage thorough documentation, attribution, registration, and permissions, thus shielding state DOT contractors from IP infringement claims by other state DOT contractors or third-party patent owners.
- Enabling and encouraging the most efficient methods to transfer new innovations to practice.
- Encouraging and supporting the creativity of employee-inventors and creators.

Because state DOTs may operate differently from one another, no one-size-fits-all approach works for IP management. For most, however, the mission and goal have a common theme: to create, maintain, and support an infrastructure for the effective movement of people, goods, information, and services within the state. In pursuing the state DOT's goals, the various operational units each do their part to accomplish the mission of the agency. Naturally, any operational group may have deliverables that are appropriately managed through patent, copyright, trademark, and/or trade secret; but some forms of IP may be more prevalent in certain operational units than in others. Because tasks and duties differ across operational units, certain types of IP may be more relevant for a specific unit. For example, the research and materials groups are more likely to generate IP that is potentially patentable, whereas IP generated by the planning, public communication, and legal groups may be more appropriately protected by copyrights or trademarks.

Table 2 shows some categories of potential IP that may be held by a state DOT and what may be appropriate forms of protection. This list is definitely incomplete, but it should serve as an example of how a state DOT may approach identifying and understanding their IP.

Table 2. Potential IP within DOT functional units.

Research	Materials	Legal	Transit
• Method of testing (*patent*) • Products or devices (*patent*) • Treatise (*copyright*)	• Method of testing (*patent*) • Products or devices (*patent*)	• Slogans (*trademark*) • Databases (*copyright*) • Arrangements of facts (*copyright*) • Logo (*trademark*)	• Names of products and services (*trademark*)
Safety	**Traffic**	**Motor Vehicles**	**Design**
• Cartoon characters (*copyright*) • Public service announcements (PSAs) (*copyright*) • Training materials (*copyright*)	• Databases (*copyright*) • Slogans (*trademark*) • Software titles (*trademark*)	• Software with algorithms (*patent*) • Databases (*copyright*)	• Architectural drawings (*copyright*)
Construction	**Maintenance**	**Operations**	
• Engineering designs/ plans (*copyright*) • Products or devices (*patent*) • Blueprints (*copyright*) • Method of testing (*patent*)	• Products or devices (*patent*) • Training material (*copyright*)	• Training material (*copyright*)	

2.3 Responsibility for IP Oversight

Deciding how to administer IP management begins with a thorough analysis of organizational goals, organizational policies, organizational strategy, resource constraints, regulatory constraints, and legal constraints with respect to IP management (*16*). Among the most important first steps are deciding if any IP management activities will be performed in-house and, if so, determining what activities will be done in-house and what will be outsourced. Determining who, what, how, and why in regards to IP management is important for designating a unit, individual, or an organization to have responsibility for IP management matters for the state DOT.

2.4 Disclosure

It is important to have a mechanism for receiving and documenting inventions, ideas, concepts, and creative works that may or should be managed as IP. A best practice implemented by many mature IP management offices is use of a formal disclosure form. This form is typically submitted by the creator(s) of the idea, concept, document, or invention. On this form, the inventor or creator provides an overview and description of the invention, concept, work, or idea. It is important that the form capture sufficient information for the IP unit to decide appropriately whether to pursue IP protection and, if the decision is yes, to implement a strategy for managing the IP.

2.5 Screening and Reviewing

When disclosure forms are submitted to the unit responsible for IP management, a process is needed for screening and reviewing the inventions, ideas, and/or creative works. This process needs to include a review of similar prior art, a business case analysis, assessment of the type of IP, and documentation of key applications and benefits. This process should have a time limit, ideally 6 to 8 weeks (*17*). In most cases, the screening time needed will be affected by disclosure backlog and the staff available to perform the screenings and review.

2.6 Deciding on IP Protection

Not all creative works that arise from state DOT–funded activities warrant IP protection. The screening and reviewing process helps identify the ones that should be considered more closely. If the state DOT decides not to proactively manage a particular invention or creative work, dedicating it to the public domain is a very suitable alternative. It is important to note that dedicating a creative work to the public domain relinquishes some level of control over that asset. If the invention or creative work is the output of activities performed by a contractor, the language in the contract will dictate the state DOT's jurisdiction over the IP. The contract language should allocate final authority regarding who controls what can or cannot happen with the IP rights.

2.7 Determining the Appropriate Forms of IP Protection and Registration

The four primary types of IP protection are patents, copyrights, trade secrets, and trademarks. Each form covers specific aspects of a subject matter. However, it is fairly common to cover a single invention or creation using multiple forms of IP protection. Additionally, while certain common-law IP rights may arise upon invention (*trade secrets*), creation/fixation (*copyrights*), and/or commercial use (*trademarks*), depending on the form of IP, it is typically necessary to file for patent protection, register a copyright, or register a trademark with the federal government in order to obtain the full scope of IP rights. The content will determine which form or forms

of IP protection will be appropriate; however, it is also important to apply a strategic focus in choosing how to protect IP. To illustrate, consider the following example: Having documented in hardcopy and/or electronic form the steps, methodology, and procedures to perform a process, a state DOT could rightly claim copyright based on the rules of copyright law. However, a copyright will not protect the actual steps and methods used in the process, because a copyright does not protect methods and procedures. If the goal is to protect the right to use the actual steps, procedures, or methods, then the creative work requires patent protection. The takeaway here is that it is very important to understand what rights are covered by the different forms of IP protection and what the strategic reasons are for that form of protection.

2.8 IP Management Options

It is no secret that public funding and public institutions have been at the forefront of new technologies, ideas, and a host of creative content from which private firms have adopted and created significant innovations (e.g., the Internet, global positioning system technology). Many observers have argued that the IP system is not perfect, but it has been somewhat effective at catalyzing growth in new technologies and businesses. For a state DOT, several alternatives may be available for managing such IP. Although the overarching goal is widespread use for the public good, other incentives may include increasing revenue to the state by licensing IP and/or supporting economic development by supporting start-ups and established businesses within the state. The policy that a state DOT puts in place to govern its IP rights will affect how these alternatives can be used to reach the goals and expectations from their IP management program.

2.9 Defending IP Rights

A key benefit of—and in some ways a constraint to—IP protection is control over the utilization of the IP asset. IP protection gives the owner the right to restrict others' use of the IP. This can have the consequence of both enhancing and thwarting innovation. Nonetheless, for an IP management program to work effectively, the state DOT must be willing to defend the rights afforded by the IP protection. Failure to do so could result in losing those protected rights. In the case of a public institution, this may be a very sensitive situation, given the DOT's mission to serve the public. Typically, many options are available when IP rights are being misappropriated, such as negotiation, mediation, arbitration, and litigation. In a given dispute, all of these options can be invoked before the dispute is finally resolved.

2.10 Managing Revenue Earned from IP

If a state DOT decides to use its IP to generate revenue, a mechanism is needed to ensure that the revenue will be returned to the state. The money may go to a general fund, to specific programs to support economic development activities, or may be returned to the taxpayers in some other form. Although state DOTs are not driven by profit maximization, it remains important to recognize that useful technology often attracts licensees. This may represent a substantial future revenue opportunity for state DOTs.

2.11 Measuring the Effectiveness of IP Management Efforts

The success of IP management outcomes should be defined by the mission and goals of the state DOT. If a state DOT has a priority to generate revenue from its investments in technology, then a licensing royalty is important; therefore, one metric of success will be the number

of licensing deals signed to date and the amount of revenue received in these transactions. If widespread use of an innovation is the driving goal, then the number of technology transfer or deployment agreements would be a key metric. A state DOT may want to use a number of metrics or criteria to assess its IP management activities and policy.

2.12 IP Audit

As a precursor to implementing the IP management process discussed at the beginning of this chapter, a state DOT may undertake an IP audit. One primary purpose of an IP audit is to identify the organization's IP assets, including IP that has been registered by the organization (i.e., through patents, copyrights, and trademarks), IP that does not confer rights enforceable against others (e.g., pending patent applications or unregistered copyrights), IP that the organization has acquired or licensed from others, and the organization's trade secrets (*18*).

The IP audit may also be used to evaluate the state DOT's existing formal and informal IP management processes. For example, the IP audit may be used to identify the organization's existing processes for collecting IP assets (e.g., employee disclosure incentives), the organization's existing processes for maintaining IP assets (e.g., nondisclosure agreements and periodic maintenance fee payments), and the organization's existing processes for avoiding the unauthorized use of IP belonging to others (e.g., periodic license renewals) (*19*). Once identified, the existing processes will need to be addressed by and/or incorporated into a comprehensive IP management program.

CHAPTER 3

Responsibility for IP Oversight

3.1 Organizational Structure and Responsibility

Creating an effective IP management group or unit may require repurposing skills that are currently used in state DOT activities, but applying them in a new way. IP management typically involves the convergence of:

- Basic IP law.
- Business and financial principles and concepts.
- Technology transfer.
- Organizational policy and structures.

These are all areas currently found within a state DOT, but they may not be focused primarily in the area of IP management.

IP management is about making the appropriate strategic management decisions about the protection and exploitation of the state DOT's IP and its IP rights. To support success decisions, the state DOT's IPM program will involve many tasks, including:

- Identifying, documenting, and tracking potential IP assets.
- Advising on protecting assets as IP.
- Accessing the value of IP.
- Negotiating and structuring licensing agreements.
- Monitoring the use and deployment of IP, both internally and by third parties.
- Training employees and staff about IP.
- Championing proactive IP management.
- Helping establish and implementing organization-wide IP management policy.
- Working with legal counsel when needed.
- Articulating IP issues effectively to many different stakeholders.

In general, the IP management office should be run by someone who understands the details of running a business. Furthermore, it needs to be staffed by individuals who have some familiarity with the types of IP that might arise within a state DOT. It takes time to build and establish a successful IP management office. The start-up time is typically 5 or more years (*20*). During the start-up phase, most of the resources focus on creating the process for capturing potential IP within the organization, assessing the value and leverageable opportunities of potential IP, marketing IP, and building relationships with potential licensees and other stakeholders. Best practices suggest that a critical mass of R&D activity ($100 million to $500 million) is necessary to justify the cost of a fully-functioning IP management office (*21*). Although an organization may not create a fully functioning IP management office, many components of IP management can be implemented alongside the organization's existing technology transfer processes.

A key decision that a state DOT will need to make is to what extent IP management activities will be administered as an internal operation, or whether activities will be outsourced via a contracting service. State DOTs vary in size, budget, and complexity. Some larger agencies may have significant research units for example, and may administer many IP management activities internally, whereas smaller agencies may outsource most activities. Decisions for how to allocate administration of IP activities will be based on the resources available at the agencies.

Another alternative is for state DOTs to join together, forming a consortium that administers IP management activities for all members of the consortium. In this case, it is important for each participating state DOT to decide which tasks and activities will be performed by the consortium and which will be performed by the state DOT (*22*).

3.2 Operational Cost

A review of the operating budgets of technology transfer offices at universities shows a strong correlation between the total research budget and the technology transfer office operating budget. Organizations with research expenditures ranging from $250 to greater than $500 million had IP management staff ranging from 10 to more than 25 individuals. Some of these organizations' annual budgets approached $10 million (*23*). Much of this includes operational cost, salaries, IP office fees for patents and trademarks, outside counsel fees, patent prosecution fees, marketing activities, and other technology commercialization activities (e.g., licensing, negotiations).

The following tasks and activities are typical for organizations with a well-developed IP management program:

- Establish an IP management office and a director of IP that typically reports to a research administrator, a board of directors, or a standing committee.
- Within the IP management office, employ technology managers/specialists with expertise in a particular technology or IP field, as well as attorneys, marketing specialists, and business development experts.
- Provide lots of educational and training seminars developed by the IP management office for employees and staff. The organization often puts in place an organization-wide education program on IP (*24*).

The organization's IP management office also provides outreach activities to potential licensing and development partners and serves as a clearinghouse for IP issues in the organization.

3.3 Training, Education, and Outreach

To successfully implement IP management within an organization, it is important that all employees and stakeholders be made aware of the importance of managing the organization's IP. For the state DOT, personnel should be trained not only on the relevant IP laws, but also on the process of submitting a disclosure if an employee believes he or she has something that should be protected as IP. Different staff groups require different training programs. Training for a researcher, for example, may focus be on documentation standards and procedures for inventions. For a manager, the training may focus on the implementation of IP policies, processes, and procedures.

Table 3 shows a summary of personnel groups within the state DOT and areas of potential training focus for those groups.

Ideally, state DOTs would develop training materials tailored to their IP management strategy and targeted to each of the personnel groups listed in Table 3. State DOT training resources

Table 3. Targeted training within the state DOT.

Personnel Groups	Training Focus
Researchers, scientists	▪ Organizational IP policy guidelines and procedures ▪ Importance of confidentiality, non-enabling descriptions of inventions ▪ Basics of IP agreements relating to research ▪ Basics on the forms of IP protection ▪ Submitting disclosures to IP management office/personnel
Operations personnel (Finance, Human Resources, Legal)	▪ IP royalty management and accounting ▪ Conflicts of interest ▪ Basics on the forms of IP protection ▪ IP contracts and agreements ▪ Mediation, arbitration, litigation, and negotiation in IP
IP managers	▪ IP contracts and agreements ▪ In-depth knowledge on the forms of IP protection ▪ Reviewing technology disclosures ▪ IP negotiations and marketing ▪ IP licensing
Other personnel	▪ Disclosures and confidentiality ▪ Basics on the forms of IP protection ▪ IP guidelines and procedures
Research managers/directors	▪ Basics on the forms of IP protection ▪ Implementing IP policy and procedures ▪ Benefits of proactive IP management ▪ Investment requirement for IP management
Executive directors	▪ IP policy ▪ Investment requirement for IP management ▪ Benefits of proactive IP management ▪ IP management risks

are limited, however; it may be cost-prohibitive to send all members of a personnel group to a class for a day, and the state DOT's legal counsel may not have the time or expertise to develop and provide the targeted training. Therefore, an important consideration in developing an IP management strategy for a state DOT will be how to implement the strategy given the state DOT's available training resources. One option is to integrate IP training into existing in-house training activities such as mandatory human resources training. For state DOTs that provide or reimburse for continuing education coursework for professional employees, another option could be to steer appropriate employees into IP training courses that are, preferably, tailored to the state DOT's IP management strategy.

3.4 Outsourcing Alternatives for IP Management

Although a state DOT may desire to prioritize IP management, resource constraints and higher-priority activities may take the focus away from IP-related activities. An important consideration in developing an IP management strategy for a state DOT will be what resources are available to implement the strategy. Organizations that do not have the resources to dedicate to IP management need to explore other alternatives. Most discussions found in the literature focus on building resources internally to manage IP; however, two primary alternatives are sometimes cited—contracting services and building a consortium with similar organizations. It is important to note that these external IP management options may or may not be viable for a particular state DOT given the legal framework (e.g., state statutes and regulations) within which the state DOT must operate. (Chapter 6 addresses state-specific legal issues.)

A number of IP management service organizations exist with which a state DOT may contract to successfully manage its IP. Such organizations may currently manage IP activities for universities, colleges, and firms that do not have the needed in-house capabilities. As in any contract

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Table 4. Choosing an IP management contractor.

Decision Factor	Key Questions
Contractor capability and reputation	• Does the contractor understand the transportation sector and the key factors of effective IP management?
Contractor core competencies	• In what areas does the contractor have experience and know-how (e.g., patents, copyrights, and/or trademarks)? • What are the contractor's key technical areas of competency (e.g., materials, electronics, wireless, sensors, etc.)?
Contractor IP management experiences	• What processes and procedures does the contractor have in place to support the numerous IP management tasks?
Contractor service offerings	• Does the contractor offer IP management training? • Is the contractor only an IP broker, or does this organization also engage in product/service development using third-party IP? • Does the contractor provide sublicensing services? • Do decision-makers and other staff at the state DOT understand the business model of the contractor? • Does the contractor offer IP policing and monitoring services?

agreement, there are risks and costs. It is important that the state DOT assess the risks and understand the total cost (e.g., operational cost, transactional cost) before committing to a contract with a service organization.

Table 4 suggests key decision factors for the state DOT to consider when choosing a contractor to manage IP.

Before outsourcing IP activities, it is important that the state DOT decide which tasks should be managed internally and which should be outsourced. Outsourcing may offer many benefits, such as lower overhead costs or less-expensive access to required skills, but outsourcing may not allow personnel at the state DOT to acquire and practice the skills that build competency in managing IP proactively.

Several key activities are involved in proactive IP management, such as:

- **IP audit.** An IP audit focuses on identifying IP assets that are used and owned by the organization to assess the importance of specific IP to the organization's current and future activities. An IP audit also should include a review of any licenses and agreements with third parties to ensure that sufficient agreements are in place to protect the agencies from potential infringements. (See Chapter 2 for more information on IP audits.)
- **IP inventory.** An IP inventory should provide a comprehensive assessment of all forms of IP owned by the organization. This assessment may include expiration dates, maintenance fee due dates, license agreements with licensees, conception dates, and potential IP in the pipeline.
- **IP valuation.** IP valuation focuses on placing a financial value on an IP asset. IP valuation is important if the state DOT wishes to sell the IP, license the IP, or even donate the IP. Three common valuation methods are used in practice: the income approach, the market approach, and the cost approach (*25*).
- **IP protection.** A threshold determination is made by assessing the best form of IP protection to pursue for each IP asset (patent, trademark, trade secret, or copyright). Additionally, the state DOT must consider and decide whether or not to release the IP asset to the public domain.

- **IP licensing.** IP licensing focuses on negotiating the rights to an IP asset either as a licensee or licensor. The license can be structured in a number of ways; the key requirement is that all parties understand the terms of the agreement.
- **IP commercialization.** IP commercialization focuses on exploiting the IP rights in new business opportunities. Ideally, commercialization activities are undertaken to create a revenue stream.
- **IP management training.** IP management training consists of programming designed to educate employees, contractors, and affiliates with the organization's IP management policy, processes, and engagements.
- **IP management policy development.** IP management policy development focuses on the rules and strategies that will govern how issues regarding IP will be addressed by the organization.

An IP management services contractor typically can carry out most of these activities, except perhaps IP management policy development. Most contractors can provide guidance on policy development and can manage the outcomes that result from the policy; however, the policy itself should be developed and administered by the state DOT. Having an outside firm evaluate each potential IP asset can benefit the state DOT through application of an unbiased viewpoint, which can be helpful in identifying new opportunities for the state DOT's IP that may not be considered by an internal team only.

Whether or not a state DOT plans to outsource IP management services, it is important that the DOT develop and communicate clear objectives for its IP management program. For any state DOT that chooses to outsource all or a portion of its IP management, a thorough understanding of the state DOT's objectives will help the IP management services contractor better focus its activities and provide the best value to the state DOT.

CHAPTER 4

Disclosure, Screening, and Reviewing

4.1 Disclosure Forms

A crucial step in managing IP is getting an idea of what valuable IP the state DOT may possess. A state DOT may have a treasure trove of potentially protectable assets (e.g., inventions or creative works). State DOTs need to identify the potential IP assets that they may already own, to which they may need to acquire or enforce their rights. Examples of potential IP assets are specific technologies, training materials, media productions, reports, or databases.

A best practice observed in many organizations that manage IP is the development of a document, typically called a disclosure form, which inventor(s)/creator(s) can submit to the IP management office. The disclosure form should provide a fairly detailed overview of the invention or creative work. A disclosure form is an effective document for eliciting and documenting potential IP arising from state DOT–funded projects and activities.

Disclosure forms are submitted for new inventions, creative works, logos, and other assets. Appendix C to this Guide shows a sample disclosure form prepared by AASHTO. The form should be a standalone form that the IP management staff can use to assess the potentially protectable work that has been submitted.

4.2 Disclosure Review, Screening, and Analysis

After receiving a disclosure form submission, one best practice observed by many university and government laboratory IP management offices is to arrange a meeting with the inventor(s)/creators(s) to discuss the content of the form. This meeting is helpful in generating more details that can support the evaluations made by the IP office staff as they decide how to manage a particular IP asset.

Questions to be addressed during the disclosure review process include:

- What is the technology, invention, or creative work? How can it be described (if applicable)?
- What does it do? What are the key features and benefits?
- Are there any national security concerns?
- At what stage of development is the technology, invention, or creative work? What is its commercialization readiness? Its manufacturability?
- Could the technology, invention, or creative work described in the disclosure be protected by IP?
- What is the funding source (state-only, federal-only, or mixed funding)?
- What is the target industry or market? What is the market size?
- What are the appropriate criteria for identifying, selecting, and prioritizing the technology, invention, or creative work for IP protection and technology transfer, and how best can resources be allocated?

The disclosure review process should have a time limit. Some organizations report that they take 6 to 8 weeks per disclosure (*26*). The disclosure review timeline will be affected by the number of resources available for review, by policies that may prioritize specific categories of fields of application for a specific technology or concept described in the disclosure, and by impending deadlines (e.g., if a patent application needs to be filed within a very short timeframe). For example, policy may direct that state DOT logos that could be trademarked have priority over, and are therefore reviewed before, copyrightable content—or vice versa. In another scenario, multiple researchers in private and public organizations may be working on similar technologies, so it may be important to be the first inventor to file. The review timeline also will be impacted by the number of disclosures received by the IP management office and the amount of resources dedicated to reviewing the disclosures.

The outcome of the review process should produce next-step action items. Some of the content commonly found in a review report includes:

- Description of the problem and/or challenge being addressed.
- Description of the IP.
- Key features and benefits of the IP.
- Potential applications.
- IP disposition decisions (e.g., dedicate to public domain, pursue IP protection, proactive technology transfer, licensing).

The review report should provide enough information to support the IP management group and state DOT in making the disposition decisions about the IP.

4.3 Disposition Decisions

After completing the disclosure review and screening, options for the disposition of the IP are considered, including whether to:

- Register or apply for registration of the IP (if applicable).
- Assume common law rights (where appropriate).
- Allow the employee or contractor who submitted the disclosure to move forward with the invention, concept, or creative work.
- Dedicate the IP asset to the public domain.

Each option has risks and benefits.

4.3.1 Registering IP

Although certain common-law IP rights may arise at invention (e.g., trade secrets), authorship and fixation (e.g., copyrights), or use in commerce (e.g., trademarks), depending on the form of IP, an IP owner typically must register patents, copyrights, and trademarks with the federal government in order to obtain the full scope of IP ownership rights. For example, with regard to patents, copyrights, or trademarks, formal registration is typically required for an IP owner to take legal action against an entity making unauthorized use of the IP. Trade secrets provide a unique form of IP protection in which the value is derived from the secrecy of information. A state DOT will need to demonstrate that procedures are in place to protect these secrets and that the state DOT is proactively managing its trade secrets.

Table 5 shows the categories of potential IP that may arise from DOT-funded activities. It's important to note that a state DOT's ability to register IP or to protect trade secrets will be limited by the legal framework (e.g., state statutes and regulations) within which the

Table 5. Applicable IP protection and categories (adapted from the California Council of Science and Technology).

Potential Output of R&D and Improvement Projects	Definition	Applicable IP Protection
Patentable inventions	Discoveries and inventions that enable new useful applications, machines, devices, processes, methods, etc.	• Patent • Trade secret
Research tools	Inventions that are expected to facilitate subsequent research. If the owner of the research tool seeks to control dissemination and use of the tool, model agreements can be structured.	• Patent • Trade secret
Computer programs	Computer programs for a variety of applications. For programs containing algorithms for specific output or attached to a machine, a patent may be possible.	• Patent • Trade secret • Copyright
Databases	Compilation of data and potential new ways of presenting the data in charts, graphs, maps, etc.	• Trade secret • Copyright
Research articles	Publishable scientific articles.	• Copyright
Business processes and methodologies	Ways of doing business, new business models, monetization of assets, real-time pricing models.	• Patent • Trade secret

state DOT must operate. Chapter 6 addresses state-specific legal issues with respect to these forms of IP.

An important consideration in developing an IP management strategy for a state DOT will be what resources are available to register IP. If a state DOT should choose not to register or to proactively manage its IP, or if the state DOT's ability to register or manage its IP is limited by resources or by state law, there is the risk of losing control over how the IP may be used in the future. One state DOT representative reported that they have encountered at least two situations of a business misappropriating the state DOT's IP assets. In at least one interview, the state DOT had not registered its IP and attempted to take legal action, only to be ruled against. The DOT had to subsequently attempt to reclaim the rights and then pursue litigation at another time. Unfortunately, failure to register the IP tied the hands of the state DOT in regard to its options to bring enforcement against the party that was misappropriating the IP.

4.3.2 Release to the Public Domain

Most state DOTs have commonly dedicated to the public the outcomes of state DOT–funded activities (e.g., research, projects). The rationale behind this approach is that public funds are used for these state DOT projects, so rights to the outcomes (i.e., the IP) should be given back to the public (*27*). If a goal for the state DOT is to utilize and manage its IP in the best interest of the public, however, another way to approach this goal is to maximize value—which, in some cases, may require taking ownership of some outcomes and proactively managing them as state DOT–owned IP.

4.3.3 Release to the Employee-Inventor or Contractor

For some projects, or in the course of their day-to-day work, an employee or contractor for the state DOT may create something that could be protected as IP. After screening and reviewing a disclosure form submitted by the employee or contractor, the state DOT may decide that the details of the technology or creative work discussed in the disclosure are not of interest to the state DOT. The state DOT's IP management policies should include an option that allows the employee or the contractor to proceed with pursuing IP protection and commercializing the invention or creative work if they desire to move forward separately from the state DOT. Governance should be in place to resolve any conflicts of interest and provide royalty-free use for the state DOT if needed.

CHAPTER 5

Forms of IP Protection and Registration

This chapter describes the key forms of IP available to a state DOT. It is important to understand what types of creations and inventions are protectable by which forms of IP protection, and how IP protection is established.

5.1 IP Protection Considerations

In deciding whether to pursue IP protection and ownership, a few critical factors should be considered. These factors include whether and to what extent the state DOT wants to:

- Exclude others from use.
- Control future use.
- Ensure that the IP remains in the public domain.
- Avoid potential future license fees.
- Control the commercialization process.
- Establish a revenue stream.

5.1.1 Exclude Others from Use

When faced with the decision to protect IP, the state DOT must ask itself whether it needs the rights to exclude others from using the IP. In most efforts performed by or on behalf of a state DOT, the goal is to transfer any outcome (new technology, invention, or creative expression) for public use and widespread adoption. Overwhelmingly, state DOTs will not desire to exclude others from practicing an invention or using a creative work.

5.1.2 Control Future Use

A state DOT may wish to protect IP created from work it has funded in order to prevent others from claiming ownership. It is recommended that the state DOT perform a technology assessment to gather information on the market and competitors that may be developing any similar technologies. If private companies are developing similar and substitute technologies and products, it may be desirable to pursue a patent. This is especially important if the IP is a core technology or invention for anticipated future projects and activities.

As an initial step in the case of an invention, the state DOT may need to file a provisional patent application after the screening and reviewing process if an invention looks promising and there are known threats from other entities that may wish to claim ownership of the technology. A provisional patent application gives the applicant 1 year to decide if pursuing a nonprovisional application will have any value. Filing of a provisional application reduces the risk that others may claim title and ownership.

5.1.3 Ensure the IP Remains in the Public Domain

A state DOT may pursue protection on an invention or creative work to ensure that it remains in the public domain. It may seem somewhat paradoxical that a state DOT might apply for a patent to make sure that a patent remains in the public domain. Moreover, this approach would not work in all cases, as state laws or policies may prohibit devoting state assets such as patents to the public domain. However, if technology developed through state DOT–funded research is very similar to technologies being developed by private companies, the private organizations will most likely consider their technologies and products highly proprietary and may be very aggressive in their patenting strategy. Defensive patenting by the state DOT may be a strategic way to protect the DOT's investment in its own R&D.

Alternatively, a state DOT may decide to pursue a defensive publishing strategy. In this case, the state DOT would disclose an *enabling description* of a technology to the public. The enabling description provides sufficient information for someone in the field to be able to make or use the technology. This would establish the invention as prior art in the public domain. This strategy eliminates any organization—including the state DOT—from being able to obtain a patent on the technology or invention.

5.1.4 Avoid Potential Future License Fees

A state DOT may pursue IP protection to avoid potential future license fees. This is especially important for technologies, inventions, or creative works developed by employee-inventors or employee-authors, and those developed by contractors. Taxpayers should not have to pay for the invention twice (once to develop it, then again for the state DOT to use it or to have it used on behalf of the state DOT). It is recommended that the state DOT specify in employment agreements and contracts that the state DOT will take, at a minimum, a nonexclusive, nontransferable, paid-up license for its use of IP developed in performance of state employment or a state DOT contract.

5.1.5 Control the Commercialization Process

If the state DOT wants to control the commercialization process, it will typically have to establish its IP rights, or at least establish march-in rights (the right to acquire title if the IP holder is not satisfying certain criteria for commercialization). For example, the state DOT might pursue a patent for an invention but then license the patent to commercial partners to bring competing products to the market. If the state DOT has march-in rights to the invention, if the commercial partner fails to bring the products to market, the state DOT may assert its march-in rights, take title to the invention, and, potentially, pursue commercialization on its own or with other partners.

In some cases, too much state DOT control can inhibit the commercialization process, and it might be more effective for the DOT to relinquish title (or at least grant a broad license) to a private-sector partner. Different commercialization approaches may be more effective in different cases, depending on the specific details of the IP and the market. These details can be better teased out through a technology assessment.

5.1.6 Establish a Revenue Stream

Typically, a state DOT must own title to IP in order to collect a royalty or licensing fee. However, where a state DOT has funded a project that results in a protectable asset, a revenue stream may be established in the initial agreement between the state DOT and an employee-inventor/author or contractor that will take ownership of the IP. Such an agreement can mandate the

percentage of total revenue that would be given to the state DOT. The risk in this model is that the state DOT's revenue stream is completely dependent on the marketing and commercialization efforts of the IP title holder. It is recommended that, if the state DOT intends to establish a royalty stream, the state DOT should take title in order to control the process. For example, the Texas DOT has registered the trademarked phrase, "Don't Mess with Texas®" and receives revenue from this IP.

In summary, when a state DOT is making important decisions about IP ownership, the state DOT should evaluate the six critical factors cited in Sections 5.1.1 through 5.1.6 of this chapter. The end result of this evaluation may be a decision to pursue one or more forms of IP protection, keeping in mind that aspects of a single state DOT work product may be subject to more than one form of IP protection. The balance of this chapter presents the primary forms of IP protection to be considered, and special considerations for the state DOT with respect to each form.

5.2 Patents

A state DOT may find itself facing patent issues in any of its operational units, but especially in the research unit, where there is the likelihood of inventing machines, test methods, processes, and various other useful devices.

When a state DOT has to decide whether to file for patent protection, allow others the right to use a patent controlled by the DOT, pursue rights to a patented technology owned by a third party, or establish rights in relation to a contractor or a state DOT employee-inventor, it's best to start by considering the bundle of rights included.

- Does the state DOT need the right to exclude others?
- Does the state DOT need the right to practice the invention, maybe for a limited time or in limited circumstances?
- Are there issues of freedom to operate without potential patent challenges?
- Is it consistent with the state DOT's interests and mission to allow an outside party to exclude others, as long as the state DOT retains the right to practice the patent?

A state DOT typically will need to establish policies and strategies for handling situations involving the following types of key stakeholders:

- State DOT employee-inventors.
- State DOT contractors.
- Third-party owners of patented technology.
- Third parties that want to use state DOT technology.

Understanding how to manage relationships with these stakeholders is very important. Certain strategies and critical factors should be considered, depending on the type of stakeholder.

Before addressing these particulars, however, the state DOT takes some critical steps to develop an overall strategy. The state DOT will:

- Learn the definition of a patent.
- Learn the rights that are afforded by a patent.
- Learn how to acquire patent rights.
- Understand the issues and challenges that typically arise regarding patent rights.

This chapter highlights some recommendations for state DOTs in addressing issues and challenges regarding patentable assets. Appendix A provides key resources for searching patent data.

5.2.1 What Is a Patent?

A patent is a property right granted by the government to the inventor for a limited time in exchange for public disclosure of the invention. These rights allow the inventor to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing a claimed invention into the United States or other country where the asset is protected.

In the United States, there are three basic types of patents: utility, design, and plant:

- A **utility patent** covers the functionality aspects of machines, processes, compositions of matter, and/or articles of manufacture. This type of patent is the most common and usually provides the most value and protection for a given invention.
- A **design patent** covers the ornamental design of manufactured artifacts, not the process or methods of manufacture.
- A **plant patent** covers new varieties of asexual reproducing plants, either invented or discovered.

A single invention may be covered by more than one type of patent. For example, a utility patent may cover the functionality of an invention, and a design patent may cover the unique ornamental design of the same invention. One product that may be familiar to most people is the iPod. Patents cover both the ornamental design of the device (design patent) and the operational aspects of functionality (utility patent).

Certain requirements must be satisfied to be granted a patent. The invention must be new (35 U.S.C. § 102), useful (35 U.S.C. § 101), non-obvious (35 U.S.C. § 103), and fully disclosed (35 U.S.C. § 112). Reviewing these criteria in more detail, the invention must be:

- **New.** The present invention cannot be covered in any prior art. Prior art pertains to information that (a) may inform the claim that the invention is original, and (b) was available to the public before the filing of the patent application. The invention must not be published, be on sale, or be in use more than 1 year before the patent application filing date (35 U.S.C. § 102).
- **Useful.** The present invention must explicitly show that it will achieve a particular benefit. The invention must not be immoral or contrary to public policy (35 U.S.C. § 101).
- **Non-obvious.** The present invention must be creative or distinct enough that an individual of ordinary skill in the relevant subject-matter field would not be able to readily deduce the invention from publicly available resources (35 U.S.C. § 103 and *28*).
- **Fully disclosed.** The inventor must provide a description of the invention, the manner and process of making and using the invention, and the best manner of practicing the invention that is known to the inventor. These criteria must be met in such a way that someone of ordinary skill in the field can comprehend (35 U.S.C. § 112). Figure 4 shows a simple flowchart for assessing the patentability of an invention (*29*).

- *A **utility patent** covers the functionality aspects of machines, processes, compositions of matter, and/or articles of manufacture. This is the most common type of patent and typically provides the most value and protection for a given invention.*
- *A **design patent** covers the ornamental design of manufactured artifacts, not the process or methods of manufacture.*
- *A **plant patent** covers new varieties of asexual reproducing plants, either invented or discovered.*

5.2.2 Acquiring a Patent

For inventions, a patent is available to "[whoever] invents or discovers any new and useful process, machine, manufacture, or composition of matter, design, plant, or any new and useful improvement thereof" (*30*). A patent does not arise automatically upon invention—the inventor must disclose the invention in an application for patent to the USPTO. An examiner will consider the application in light of the prior art and may reject the application (based on obviousness, or lack of novelty or utility), requiring amendments by the applicant. A patent will issue only after the examiner is convinced that the application describes a new and truly useful invention (*31*).

The typical costs associated with filing a nonprovisional patent application include the USPTO fees (e.g., application fees, office action fees, issuance fees) and legal fees. Other fees also

***Patentable inventions** may be:*

- *Machines.*
- *Processes.*
- *Methods.*
- *Compositions of matter.*
- *Articles of manufacture.*

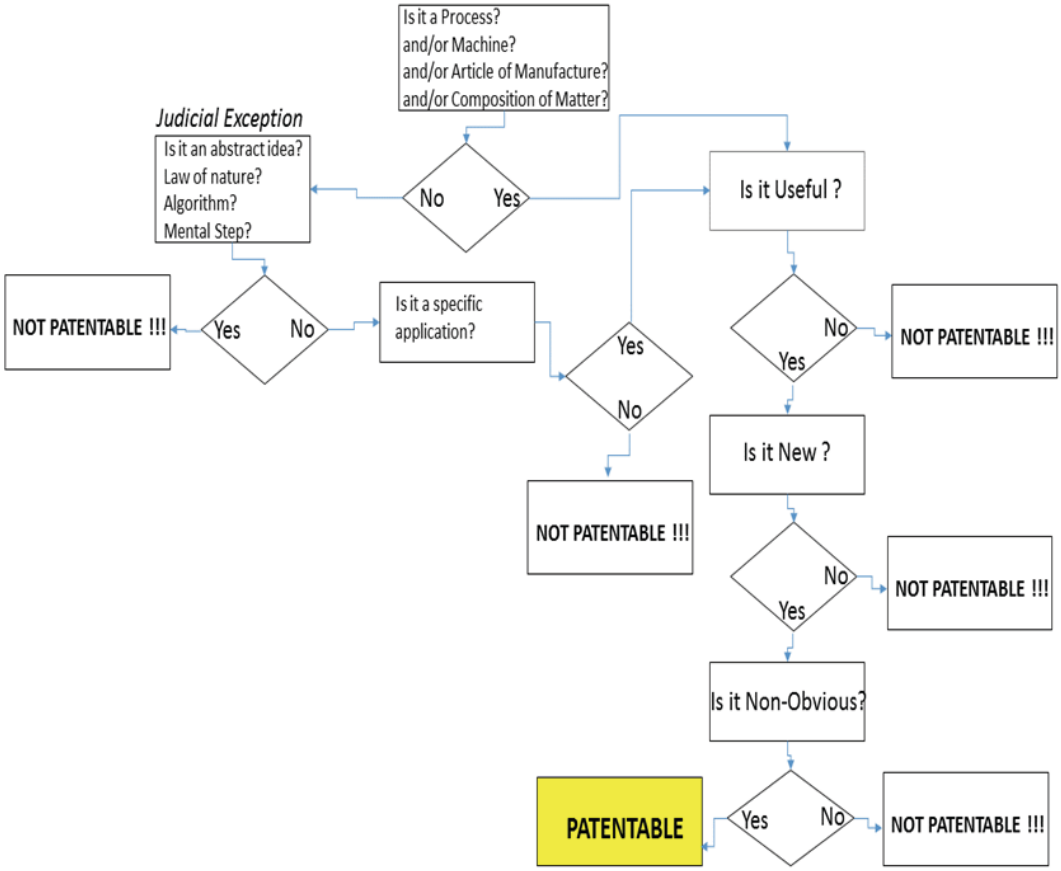

Figure 4. Patentability assessment (29).

may apply. For example, if the patent is granted, there are additional maintenance fees or subsequent continuation fees will accrue, and possibly litigation fees over the lifetime of the patent. Costs vary across organizations. University technology management directors and some private enterprises IP directors indicated that their costs typically ranged from $20,000 to $30,000 per patent application for patent prosecution, although the cost can vary widely depending on the circumstances of a given application.

Because patents rights extend for a limited amount of time, it is important to know the duration of each type of patent. Utility and plant patents are granted for a term that begins with the date of the grant and usually ends 20 years from the date on which a person/organization first applied for the patent. The duration of the patent is subject to the payment of the required maintenance fees. Information regarding maintenance fees can be found at the USPTO website (www.uspto.org). Design patents extend for 14 years from the date the patent is granted.

The six standard types of patent applications are:

- Provisional application.
- Nonprovisional application.
- Divisional application.
- Continuation application.
- "Continuation-in-part" application.
- Abandonment application.

Appendix A addresses the various types of patent applications in greater detail.

5.2.3 Special Cases for Patents

In three areas—software, biotechnology, and business methods—patents may be granted that may extend the requirements of utility, design, or plant patents (*32*).

- A **patent for software** may be granted for a program containing a mathematical algorithm that:
  - Controls something external to the computational processes (a useful process).
  - Manipulates numbers representing real values (e.g., electrocardiograph signals).
  - Is claimed in relation to an identifiable product, machine, or process.
- A **patent for biotechnology inventions** is granted in consideration of naturally versus unnaturally occurring organisms. Living organisms often are patented as products or methods. For example, there are at least 281 patents on mice and more than 442 patented living organisms (*33*).
- A **patent for business methods** generally relates to data processing operations and technologies such as point-of-sale systems or financial transactions support systems.

5.2.4 Infringement and Protection of Patent Rights

Unauthorized use of a patented invention is known as infringement. Lack of knowledge is not a defense against charges of infringement. Also, there is no statute of limitation on filing an infringement suit. However, past damages in the infringement suit may be capped at the previous 6 years of infringement. Future use of the invention in the case of an infringement can be negotiated between parties. In the case of an infringement, the patent owner may seek:

- Damages.
- Injunctions of infringing product.
- Impounding of infringing product.
- Destruction of infringing product.
- Negotiation of a licensing agreement (contract).

A state DOT that learns an entity is infringing has several options for recourse. These options may range from litigation, arbitration, mediation, negotiation, or to do nothing. Significantly, these options are not exclusive of one another. More than one approach may be necessary, and taken, to resolve a given dispute.

Litigation will probably be the most expensive approach. Some statistics on patent litigation are:

- Legal fees and expenses for litigation through trial for cases where $500,000 to $1 million is at stake average about $500,000 for each side.
- Legal fees and expenses for litigation through trial for cases where $1 million to $10 million is at stake average about $1.3 million for each side.
- The average time to resolution of patent suits is 1.1 years.
- Of patent suits, 76 percent settle, whereas 17 percent are transferred or dismissed on pretrial motion.
- Patentees prevail 58 percent of the time at trial. Factoring in pretrial losses, patentees' overall success in litigation is only about 49 percent.
- Patentees win 68 percent of the time before a jury if they file suit first, whereas they win only 38 percent of the time before a jury if the accused infringer files first.
- Judges dismiss 15 percent of cases before trial, and roughly half of the cases are an attempt to invalidate a patent.
- At trial, patentees face a 33 percent chance that their patents will be invalidated.

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- Of published decisions that validate a patent, 44 percent are appealed.
- Of infringement-related verdicts, 37 percent are appealed, and the U.S. Court of Appeals for the Federal Circuit overturns 20 percent of them (*34*).

These statistics are included for information purposes only. A decision to litigate a given patent dispute should be made in consultation with the state DOT counsel, and should be based on the circumstances of that dispute and the strength of the claim.

The state DOT must be proactive in monitoring and protecting its patents from infringement. Regardless of the dispute resolution approach that the DOT may choose (litigation, arbitration, mediation, negotiation, or some other option), it is important to take action. Failure to confront patent infringers (the "do nothing" alternative) can result in the patent protection being lost. This will negate all the early effort and expense of applying for protection in the first place.

State DOTs pursuing patent protection on inventions need to understand the funding source that supported the work that resulted in the invention. If any of the work used federal funding or a mix of federal and state funds, Bayh-Dole provisions will apply. On the other hand, if only state funds are used, the state DOT has more control over next steps regarding an invention.

5.3 The America Invents Act: Significant Change to the Patent System

Recently, the patent system has undergone significant reform with the passage of the America Invents Act (PL 112-29, the Leahy-Smith America Invents Act, or AIA) in 2011. This law will have a significant impact on managing patentable inventions and creations in the future. The balance of this section discusses these changes and new requirements.

Historically, the United States has had what is known as a *first-to-invent* patent system. Applicants were entitled to patents as long as they actually invented the subject matter and the invention was not previously known or used by others in this country before it was invented by the applicants (*35, 36*).

On September 16, 2011, President Barack Obama signed the AIA into law (*37*). The most comprehensive restructuring of United States patent law in some time, the AIA implements what is known as a *first-inventor-to-file* system for patent registration, covering patent applications received on or after March 16, 2013. Recognizing that an invention could be developed independently by different individuals close in time, the AIA provides that *the first patent application describing the invention that is either filed by or authorized by an inventor* is entitled to the patent (*38*). Prior knowledge or use of the invention by other inventors is no longer an absolute bar to the patent if the other inventors have failed to file a patent application in a timely fashion.

Under the AIA, however, applicants are not entitled to a patent if it is determined that the supposed inventors named in the application actually learned (or *derived*) the subject matter from the true inventors (*39*). In that case, it is the true inventors who are entitled to the patent even if the derivers were the first to apply for the patent.

Historically, because only the first inventor was entitled to a patent in the United States, any prior art that proved that the subject matter was *known* or *used* in this country by others before its "invention" by the applicant would disqualify the applicant from obtaining a patent (*40*). If the invention was privately known or used by others before its invention by the applicants, then the applicants were not considered the original inventors and, thus, were not entitled to a patent.

Furthermore, applicants could lose their right to patent the invention if the subject matter was published anywhere in the world, or if the invention was otherwise disclosed (by public use or sale) in the United States more than 1 year before the application for the patent was filed—even if such prior disclosure was made by the applicants themselves (*41*). As a way of countering the risk of having an application blocked by public disclosures during the 1-year grace period immediately preceding the application, inventors could file a declaration showing that they had invented the subject matter before any such disclosures—a practice called *swearing behind,* or *swearing behind the reference.* Having filed such a declaration, it would be presumed that the applicants' invention predated any recent disclosures.

Under the AIA first-inventor-to-file system, private *use* or *knowledge* of the subject matter by others before its invention by patent applicants is no longer an absolute bar to a patent. However, public disclosure (in the form of publication, public use, or sale) before the filing of a patent application will bar the patent, unless such public disclosure was made by the inventor named in the application in the year immediately preceding the application (*42*). Therefore, the 1-year grace period now only applies only to public disclosures by the inventor named in the application, which eliminates the applicant's ability to swear behind public disclosure by other inventors. An applicant has no means to swear behind another inventor who files a prior patent application. A prior patent application by other inventors will bar a patent to applicants who file later in time, even if the later applicants invented the subject matter first.

In effect, the AIA both reduces and expands the scope of prior art that may be used to deny a patent application. Prior invention by others no longer bars an applicant from obtaining a patent, but prior public disclosure by others does. Therefore, the AIA may encourage inventors to publicly disclose an invention (by publication, public use, or sale) as soon as they decide to pursue a patent for the invention, in order to preclude a patent by others.

The AIA expands the types of administrative options available to third parties seeking to invalidate patents or patent applications filed by others. The AIA also thus expands the role of the USPTO's Patent Trial and Appeal Board (PTAB) in considering disputes, which are likely in situations with multiple independent inventors.

The AIA provides for *preissuance submissions* (also called third-party submissions) by which any person who is not the patent applicant may submit other patent applications or publications that disclosed the subject matter prior to the patent application (*43*). (Historically, third parties have only been permitted to submit pertinent patents and publications after a patent has been issued [*44*].) Furthermore, under the AIA, the person filing a preissuance submission is allowed (actually, required) to include a statement explaining why the submitted materials are relevant to the patentability of the application. Generally, preissuance submissions must be made within 6 months of the publication of the patent application that is being contested.

The AIA also creates a *derivation proceeding* by which an applicant for a patent can petition the PTAB to rule that an earlier patent application for the same subject matter was actually derived from the petitioner's invention (*45*). The purpose of the derivation proceeding is to ensure that the first applicant (to whom the patent will ultimately be issued) is truly an inventor (or someone authorized by an inventor), and not merely someone who has learned (or derived) the subject matter from the true inventor.

The derivation proceeding replaces the historical interference proceeding that had been established to resolve disputes among patent applicants as to who invented the subject matter first (*46*). Historically, the purpose of the interference proceeding was to ensure issuance of the patent to the first inventors. Under the AIA, however, the patent need not be issued to the first inventors; rather, it is issued to the first inventors to apply. Therefore, the derivation proceeding is concerned with ensuring that the first applicant was truly the inventor.

The AIA creates a new *post-grant review* procedure by which any person who is not the patent owner can challenge the validity of a patent (*47*). The petition for a post-grant review must be filed within 9 months after the patent is issued.

The AIA also creates a new *inter partes review* procedure by which any person who is not the patent owner can contest the validity of a patent on the basis of select prior art (either printed publications or other patent applications that predate the applicant's filing date) (*48*). A challenger may petition for an inter partes review of a patent either (a) after the conclusion of a post-grant review or (b) 9 months (or later) after the issuance of the patent. Because a patent need not be issued to the first inventor under the AIA, the scope of the new inter partes review is a very limited array of prior art; even prior sales by other inventors are insufficient to invalidate a patent at the inter partes review stage.

The AIA also retains a limited form of the historical inter partes reexamination procedure (*49, 50*). Historically, any person who was not the patent owner could use the inter partes reexamination procedure to contest the validity of a patent on the basis of any prior art. Under the AIA, inter partes reexamination can be used by any person to contest the validity of an issued patent on the basis of *select* prior art (either printed publications or other patents). If the petition raises a substantial new question of patentability, then the patent will be reexamined and some claims may be invalidated. If that happens, the patent owner's recourse is to appeal to the PTAB.

Although the basic ex parte reexamination process was not affected by the AIA, the AIA clarifies that, henceforth, any party wishing to appeal the final decision of the PTAB in any post-grant review, inter partes review, ex parte reexamination, or derivation proceeding must appeal to the U.S. Court of Appeals for the Federal Circuit (*51*). (Historically, the patent owner who lost patent rights as a result of an ex parte reexamination was also able to appeal to the U.S. District Court for the District of Columbia (*52*) which, as a trial court, was able to hear new evidence presented by the patent owner.) Because the Federal Circuit is an appellate court, it must afford certain deference to the decision of the PTAB (*53*), making it less likely that the patent owner can have an unfavorable decision overturned.

In summary, the AIA primarily changes the U.S. patent system from a first-to-invent to a first-inventor-to-file system, so that the USPTO can be less concerned with whether the patent applicant was the original inventor. Other changes (primarily to the bearing of prior art and to administrative proceedings) were introduced to help the USPTO determine (and other inventors prove) whether the patent applicant actually invented the subject matter or merely derived it from the work of the true inventor(s).

*A **copyright** is a statutory privilege that grants a limited or mini-monopoly to a creator or author(s) of an original work fixed in a tangible or permanent means of expression. There are no registration requirements to lay claim to copyright authorship. A copyright may arise automatically without the need for a notice, publication, or registration. However, in the event of an infringement action, registration with the U.S. Copyright Office is required.*

5.4 Copyrights

Given the types of content covered by a copyright, many works created by state DOT employees and contractors are copyrightable. Appendix B provides key resources for searching copyright data.

5.4.1 What Is a Copyright?

The U.S. Constitution authorizes Congress to "secur[e] for limited Times to Authors . . . the exclusive Right to their respective writings" (*54*). Federal copyright protection is therefore available for "original works of authorship fixed in any tangible medium of expression" (*55*). Copyright protection includes the exclusive right to reproduce, distribute, and/or perform the original works, and to prepare derivative works. However, copyright protection does not "extend to any idea, procedure, process, systems, method of operation, concept, principle, or discovery" (*56*).

A copyright is a statutory privilege that grants a limited or mini-monopoly to a creator or author(s) of an original work of authorship fixed in a tangible or permanent means of expression.

Copyright law is federal law. There are no state copyright laws. The current law is set forth in Title 17 of the United States Code and is referred to as the Copyright Act of 1976 (or simply the Copyright Act) even though it has been amended several times.

Registration is not required to lay claim to copyright authorship. A copyright may arise automatically without the need for a notice, publication, or registration. To be eligible for a copyright, a work must:

- Meet a minimum level of creativity. No definitive rule exists by which to judge an acceptable, or minimum, level of creativeness. Although mere facts and even ideas are not copyrightable, their expression, arrangement, or compilation generally may be copyrighted as long as the work contains at least a "modicum of creativity"—some "creative spark" (*57*).
- Be fixed in a "tangible medium of expression," that can be perceived by the "lay" observer.
- Be an original. The work must be unique, but copyright does not require novelty, ingenuity, usefulness, or aesthetic value. The threshold for originality is thus lower for copyrights than for patents. Obviously, the work is not original if it is an outright copy of the pre-existing work of another author. To satisfy the originality requirement, the new work must have some "substantial" or "distinguishable variation" (i.e., more than a trivial variation) over the pre-existing work. The new work also must have "more than a modicum of originality" (*58*). For example, original compilations of existing non-original works may be eligible for a copyright (i.e., the preexisting materials must be arranged in a new or novel format). In this example, previous works that are contained within the compilation are not covered by the compiler's copyright, and the compiler may need to license the pre-existing works to include them in the compilation, if the included works themselves constitute copyrighted material.

Copyrights are available for a wide range of works that involve artistic expression and/or written words. Examples of protected works include:

- Literary works (which include computer software and electronic databases).
- Training materials.
- Public service announcements, including any accompanying music.
- Building documents.
- State maps.
- Architectural works.

Copyrightable works *are:*

- *Articles, novels, works of non-fiction.*
- *Training materials.*
- *Public service announcements.*
- *Building and engineering documents.*
- *State maps.*
- *Architectural works.*

In 1988, Congress enacted copyright legislation by which the United States joined the Berne Convention for the Protection of Literary and Artistic Works (the Berne Convention) (*59*). Originally an attempt to create a universal, international copyright law, the Berne Convention has evolved into a set of minimum protections that copyright holders in one participating country are entitled to receive in other participating countries. The central feature of the Berne Convention was to prohibit participating countries from using formalities to deny protection to works copyrighted in other participating countries (*60*). As a result of the U.S. adopting the Berne Convention, the use of a copyright notice is no longer required under federal law. In addition, the use of a notice does not require advance permission from the U.S. Copyright Office.

Typically, a notice of copyright appears at the beginning of the work and provides the word "Copyright" and/or the copyright symbol © (known as the *copyright bug*), followed by the year of first publication and the name of the copyright owner or an alternate name by which that copyright owner is generally recognized. The copyright symbol for sound recordings is ℗. Although the copyright notice is no longer required, it is still advisable to include it because it overcomes

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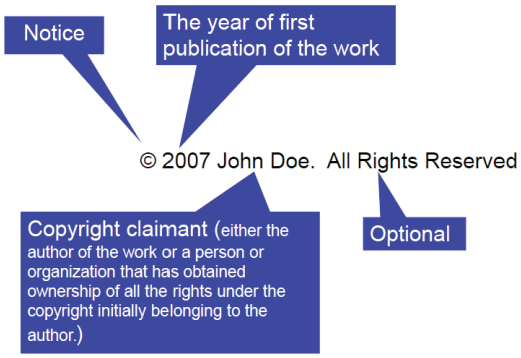

Figure 5. Copyright notice example (62).

any legal defense by an infringing party that he or she was unaware of the copyright (*61*). It is also advisable to include the phrase, "All Rights Reserved" to reaffirm the bundle of rights accorded a copyright owner (see Figure 5).

Notices can be updated when new material is added to a work. The common practice is to include multiple years in the copyright notice. For example, if a work was published in 2000 and new content was added in 2002, the notice would designate: "2000, 2002." Also, given that the current law protects both published and unpublished works, the author of an unpublished work can include a notice by inserting the word "unpublished" before the traditional copyright symbol.

5.4.1.1 Rights Accorded to Copyright Owner

Similar to a patent, a copyright gives the author and/or owner of a copyrighted work certain exclusive rights:

- To reproduce the work.
- To distribute the work to the public.
- To prepare derivative works.
- To perform the work publicly.
- To display the work publicly.

To practice these rights may, however, require licensing and adhering to the rights of other owners/authors of copyrighted material that may be a part of a work.

Several categories of copyrightable works merit additional discussion: derivative works, joint works, and collective works.

5.4.1.2 Derivative Works

One of the most important rights accorded the copyright owner is the right to prepare derivative works. A derivative work is based on pre-existing work(s) but incorporates substantially new original work that allows it to be viewed as original authorship. An example of a derivative work may be a public service announcement or educational animation for public broadcast that has been based on a state DOT public safety training manual.

5.4.1.3 Joint Works

Joint works are prepared by two or more authors. The intent of a joint work is that the authors' contributions are merged into inseparable or interdependent parts of a unitary whole. The authors of joint works are co-owners of the copyright, with all rights and privileges conferred with the copyright.

5.4.1.4 Collective Works

Collective works also are prepared by two or more authors. The intent of a collective work is that the authors' contributions are separable assets. The authors/contributors to collective works own only their specific contributions.

5.4.2 Acquiring a Copyright

For creative works, copyrights are available for "original works of authorship fixed in any tangible medium of expression" (*63*). In the United States, copyright ownership for the author arises immediately upon fixation (not publication). That is, subject to certain limitations, as a matter of federal law the author has the exclusive right to reproduce, distribute, display, and perform the work. A copyright confers the right to exclude others from reproducing works or preparing derivative works and distributing those copies or derivations to the public, or even to exclude others from viewing public performances or displays of the copyrighted work (*64*). Formal registration is not mandated by the Copyright Act. Until the author registers his or her title in (creation/ownership of) the work with the U.S. Copyright Office, however, the author has limited ability to prevent others from infringing the work (i.e., from reproducing, distributing, displaying, and/or performing the work in violation of the author's exclusive right to do so). After registering the work, the author can maintain an action for infringement against others (i.e., exclude others from reproducing or distributing copies of the work) (*65*).

An author or copyright owner may assign his or her title to the copyright to another party by virtue of a signed agreement (*66*). Upon execution of the assignment agreement, the assignee obtains the rights of the author or previous owner, including the right to maintain suit for copyright infringement (provided the work is registered with the Copyright Office) (*67*). The signed assignment agreement may also be recorded with the Copyright Office, and such recordation is effective to provide legal notice of the assignment of rights provided (1) the work itself is registered with the Copyright Office and (2) the assignment agreement clearly identifies the work (e.g., by registration number) (*68, 69*).

Although registration is not required to obtain a copyright, there are reasons to register a work and to proactively manage copyrights:

- Registration allows the owner to maintain control over the use of the work.
- Registration is a prerequisite to filing a copyright infringement claim against a third party.
- If a work is infringed, the registered copyright owner is entitled to statutory damages if the work was registered within 3 months after the work was first published or distributed to the public.

As a general rule, since passage of the Copyright Term Extension Act (CTEA) of 1998, the duration of a copyright in the United States has been set as the lifetime of the author plus 70 years. If a corporation is the author of a work (including works made for hire), the duration is either 95 years from first publication or 120 years from creation, whichever is earlier. Generally, the terms of copyrights may be extended for an additional 20 years. The extension legislation, however, does not restore copyright protection to any works already in the public domain. Additional information on renewal and duration of copyright may be found in Circular 15 and Circular 15a, available at http://copyright.gov/circs/.

The costs for registering and managing copyrights may vary. Consult the copyright fee tables at www.copyright.gov.

5.4.3 Special Cases in Copyrights

A few scenarios exist in copyright protection in which some limitations and special conditions apply. These scenarios include works made for hire, fair use, and first sale.

5.4.3.1 Works Made for Hire

*In **works for hire,** the copyright belongs to the party that commissioned the work. When the work is created by the employee in the course of performing work for the employer, the copyright belongs to the employer.*

The general rule of copyright law is that the copyright owner is the individual who authored or created the original work. Only the author or any individual or entity deriving rights through the author can lay claim to copyright ownership.

In the case of a *work made for hire* (sometimes simply *work for hire*), however, the copyright belongs to the party who commissioned it or—when the work is created by an employee in the course of performing work for his or her employer—to the employer. The employer could be a firm, an organization, or an individual. The Copyright Act defines works for hire as follows:

- Works prepared by an employee within the scope of employment.
- Commissioned works (works created by an independent contractor) that fall within the following categories set forth in the Copyright Act and that are the subject of a written agreement:
  - Contributions to a collective work.
  - Parts of a motion picture or other audiovisual work such as a screenplay.
  - Translations.
  - Supplementary works prepared as an adjunct to a work prepared by another person, such as a foreword, index, appendix, chart, illustration, and/or map.
  - Compilations.
  - Instructional texts.
  - Tests or answer keys.
  - Atlases.
  - Sound recordings.

Whether a particular work is a work for hire depends on the relationship between the parties. The closer an employment relationship comes to resemble regular, salaried employment, the more likely it is that a work is created within the scope of that employment and would be deemed to be a work made for hire. To ensure protection, when dealing with a non-employee independent contractor, the entity commissioning the work should enter into a legally binding agreement before the work is created, expressly providing that the work is a "work made for hire" and that the commissioning entity shall be the author of the work entitled to copyright in the work (*70*).

By definition, a work made for hire is limited to the types of works enumerated above. If the commissioning entity wants to take title to a work created by an independent contractor that does not fall under the enumerated categories, the creating party must expressly consent to assign the copyright to the commissioning entity. Therefore, any entity that wishes to own a work developed by an independent contractor that does not fall into one or more of the categories listed needs to obtain an assignment of the copyright from that contractor.

Fair uses:

- *Certain publicly beneficial, non-commercial, and minimal uses of copyrighted material are "fair uses" and not infringement, even without consent of the copyright owner.*
- *Fair use should not be assumed.*
- *Factors that impact fair use:*
  - *The purpose and nature of the use.*
  - *The nature of the copyright.*
  - *The amount and substantiality of the portion used in relation to the copyrighted work as a whole.*
  - *The effect of the use on the potential market for or value of the copyrighted work.*

5.4.3.2 Fair Use Doctrine

Section 107 of the Copyright Act establishes that certain publicly beneficial, noncommercial, and minimal uses of copyrighted material are *fair uses* and not infringement, even without the consent of the IP owner (*71*). Because fair use is not infringement, it is an affirmative defense to an infringement claim. Fair uses include "uses for purposes of" criticism, comment, news reporting, teaching, scholarship, or research. Other purposes may also qualify for the fair use defense to infringement, although whether the purpose actually constitutes fair use is fact-specific and subject to evaluation on a case-by-case basis. Given an infringement claim, the affirmative defense of fair use will be evaluated on the following factors:

- **The purpose and nature of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes.**

- **The nature of the copyrighted work.** This factor considers whether the work is informational or entertaining.
- **The amount and substantiality of the portion used in relation to the copyrighted work as a whole.** This factor focuses on whether the heart or true intent of the work has been copied.
- **The effect of the use on the potential market for or value of the copyrighted work.** This factor focuses on the effect on the actual and potential market for the copyrighted work and assesses whether the new work is actually competing with the existing one and appeals to the same audience as the original.

State DOT employees may inadvertently run counter to the fair use doctrine if they obtain a single paid subscription to a newsletter or journal and disseminate copies of the publication, or parts of the publication, to colleagues. To the extent that it is made for commercial advantage or to avoid obtaining multiple subscriptions, much business-related photocopying could constitute an infringement of copyright and claims of infringement would apply to the government sector as well as in the private sector.

5.4.3.3 Challenges Related to Digital Technologies

The evolution of digital technologies has added significant complexity to copyright issues. Some challenges include retaining control over the distribution chain, tracking the IP in the digital ecosystem, and unauthorized distribution through file sharing. Additionally, digital material can be obtained from multiple jurisdictions, each with its own IP laws. Rights and privileges in one jurisdiction may not hold in another. One such example is the European Union Database Directive. This directive grants the database creator (a) the right to prevent unauthorized use of the database and (b) the right to prevent unauthorized acts of extraction and reutilization of the contents of a database. A database is protected for 15 years from date of creation. Although facts that are available in the public domain cannot be copyrighted, charts, figures, graphs, maps, and other original creations that use these facts may be copyrighted (*72*).

Professionals engaged in the management of copyrightable materials must be diligent in understanding who owns what, who can use what, and how it can be used. It is critical to understand any licensing agreement and what rights are available to both the licensee and the licensors. The Uniform Computer Information Transaction Act (UCITA) has rules for licensing digital information.

5.4.3.4 Obtaining Permission to Use Copyrighted Material

Obtaining permission to use copyrighted material typically requires structuring an agreement with the owner of the rights to that material. Questions that need to be considered when making a decision on copyright use agreements include:

- What is the risk of not seeking permission? Is the material in the public domain? Could fair use apply? It can be risky to assume that material is in the public domain. In fact, materials that are commonly assumed to be in the public domain (e.g., materials from U.S. government publications or old publications) often are not. Interpretations of fair use also can prove tricky. Generally, the safest approach is to request permission for use of all reproduced materials.
- Who owns the copyright? The owner may be the author or an organization or individual to which the rights have been assigned.
- What specific rights are needed? Taking the steps to identify the rights needed can help streamline negotiations and manage the cost for using the copyrighted material, unless the material is royalty-free for use.
- Will the rights be exclusive or nonexclusive?
- What are the terms of use? For example, is it necessary to obtain (and will the copyright holder grant) rights worldwide, in all media, in more than one language, and in printed, electronic, and/or alternative formats (as may be needed to meet requirements for accessibility)?

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5.4.3.5 First Sale Doctrine

The first sale doctrine, spelled out in Section 109 of the Copyright Act, limits the rights of a copyrighted work's owner when the work was lawfully acquired. The purchaser of a copy of the work generally has the right to lend, sell, dispose, or destroy the work as desired (*73*). For example, if an entity legally purchases state maps that are copyrighted by a state DOT, this entity has the right to resell these maps to other interested parties.

A different legal framework exists for digital media. In the case of purchases of computer software and sound recordings, for example, the purchaser is not generally entitled to resell or otherwise dispose of the media for commercial advantage (*74*). The law thus effectively presumes that the purchaser of software or recorded music is really purchasing a limited-purpose, nontransferable license for the purchaser's private use.

There are on-going legal debates centered on the first sale doctrine. It is important to keep in mind, however, that Section 109 only establishes the default rules regarding the resale of copyrighted materials, and the seller and purchaser can agree by contract to different terms. For example, the purchaser of digital media will regularly negotiate licenses that provide for the duplication and distribution of some number of copies (e.g., so that several employees can have installations of the same software program) (*75*). Likewise, in the sale of print media (such as maps), the copyright owner and purchaser could agree by contract that the media may be used by the purchaser only for specified purposes. In that case, the purchaser is effectively purchasing only a nontransferable license to use the media, and might not be able to freely resell it.

5.4.4 Infringement and Protection of Copyright

Copyrights are important to the state DOT. Many of a DOT's day-to-day work product deliverables are copyrightable (e.g., pamphlets, training materials, designs, blueprints.) In general, most copyrightable material generated within a state DOT is never registered or formally recognized as copyrightable material, largely because, historically, the state DOT has not intended to commercialize its copyrightable work products. Even if this trend continues, it is recommended that a state DOT at minimum use a notice of copyright on key documents even if the material is freely distributed to the public (as long as the state DOT is not proscribed by state law from taking a copyright). By taking a copyright, the state DOT can retain the right to control how the material is to be distributed (e.g., prevent commercial actors from duplicating and distributing the state DOT work product for commercial advantage). In regard to employees, work-for-hire rules should cover creative works developed as a product of employment. Additionally, employees should be educated on copyright clearance when using third-party materials if the agency is unsure that they have rights or unsure if the information is in the public domain. When working with contractors, it is important to obtain a signed agreement clarifying that the work is a work made for hire and that the contractor assigns all rights to the material (including copyrights) to the state DOT.

5.4.5 Open-Source Software and Berkeley Software Distribution (BSD) Licenses

Because open-source software continues to be widely adopted for use in both the private sector and the public sector, understanding its governance and how its governance may impact freedom to use is very important. As a state DOT seeks to efficiently manage taxpayer resources, implementing open-source systems may be a potentially cost-effective strategy.

Free open-source software typically refers to software for which the source code is made freely available for use, for further development, and for adapting or updating by many

different users. In general, open-source software has minimal restrictions. A user is allowed to manipulate the software as much as possible or desired without any anticipated legal or financial restriction. The Free Software Foundation provides four primary tenets for free software users—users can:

- Run the program, for any purpose.
- Study how the program works and change it to perform a desired behavior.
- Redistribute copies of programs.
- Redistribute copies of their modified versions of the programs.

The foundation has created the GNU General Public License (GNU GPL). Developers can use this license in the distribution of the software they develop based on open-source code. Use of the license signals that the software is free and the developer has the intent that it will remain that way.

Although the perceived intent of free open-source software is for the software to remain free, some classifications of licensing provide some proprietary-like software options. These license classifications are important because they may relate to IP management.

One such classification is the *permissive free software license.* This class of license has minimal requirements regarding the distribution of adapted or updated software based on the original open-source material. These licenses make no guarantee and set no expectation that future generations of the software will remain free. This is a very significant departure from standard clauses or tenets of free open-source software for which copies, modifications, and adaptations of the code can be freely distributed.

The Berkeley Software Distribution (BSD) license is a type of permissive free software license. A BSD license allows users to retain an option of commercializing with minimal legal cost and restrictions (*76*). Code distributed with this license can be sold or included in proprietary products without any restriction to make the proprietary code available. The general structure of a BSD license is shown in Figure 6.

The BSD license is considered very synergistic for transferring research results with the intent to facilitate wide adoption and deployment. Research-funding organizations, which would include state DOTs, are encouraged to use the BSD license in many research endeavors.

Unlike the GPL, the BSD license places minimum restrictions on open-source development. Multiple future options are available, which could provide flexibility to a state DOT and reduce the unexpected need to pay high fees for use of some proprietary software technologies. Additionally, a BSD license could provide potential commercialization opportunities in the future, which could be value-adding for the taxpayers.

Trademarks:

- *Prevent competitors from stealing the goodwill that a company has established based on the quality and reputation of its products and services.*
- *Ensure that consumers are not confused by products or services that would have similar-sounding names or other similar attributes.*

5.5 Trademark

A trademark may be useful in validating services and products offered and developed by or on behalf of a state DOT. Protecting the value and reputation embodied by the trademark should be important to a state DOT.

5.5.1 What Is a Trademark?

A trademark identifies the source of a product or service without being descriptive of the product's function or the type of product. Unlike copyrights and patents, trademarks have no express authorization in the U.S. Constitution. Instead, the rights associated with trademarks

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The BSD License

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Figure 6. General structure of a BSD license (77).

derive from the common law. State legislatures have enacted statutes that codify, and in some cases modify, the common law of trademarks within their states. Also, Congress has periodically enacted federal legislation in attempts to codify and unify the common law of trademarks across the country, and (to a lesser extent) to enact new substantive law strengthening trademark rights (*78*). Because Congress is not expressly authorized by the Constitution to regulate trademarks, the federal legislation is enacted under Congress' authority to regulate interstate commerce. Unlike federal law regarding copyrights and patents, therefore, federal trademark law does not preempt state trademark law, and federal legislation may be wholly inapplicable to cases not involving interstate commerce or federal registration. Trademarks are thus governed by both state and federal law, and by both statutes and common law.

Both state and federal law may prevent another provider from marketing a competing product using the same or similar trademark, where doing so would confuse the consuming public as to whose product is being purchased. In essence, the trademark serves two main purposes:

- Prevent competitors from stealing the goodwill that a company has established based on its qualities and reputations of its products.
- Ensure that consumers are not confused by products or services that would have similar-sounding names or other similarity in attributes (*79*).

In 1946, via the Lanham Act, Congress established a national registration system for trademarks that are actually used in commerce (*80*). Once a trademark is nationally registered, its

owner can hold competitors liable for economic damages for using a similar trademark in commerce to market a competing product in such a way that is likely to create confusion in the marketplace (*81*). Once the mark has become associated with the owner's product on a national level, the trademark owner can legally prevent others from using the trademark with respect to certain classes of goods or service, even if there is no evidence that the other's use of the trademark is likely to create marketplace confusion or to cause economic damage to the trademark owner (*82*).

A trademark may take the form of a specific word, slogan, picture, or other symbol that is used to identify and distinguish one seller's goods from another's. Trademarks may also encompass other identifying marks, such as:

- **Service marks.** A service mark identifies a service (as opposed to a product, or goods). It functions the same way as a trademark.
- **Collective marks.** A collective mark is used by member or a cooperative, an association, or other collective group or organization. It indicates membership in that organization.
- **Certification marks.** A certification mark is used by an entity other than the creator/owner of the goods and/or services to certify material, mode of manufacture, quality, accuracy, or other characteristics of the goods and services. A certification mark may be canceled if the certifying party engages in production or marketing, permits use of the mark for purposes other than to certify, or discriminately refuses to certify any person who maintains the standards or conditions which such mark certifies.
- **Trade names.** A trade name is the name under which a business operates. A trade name can also function as an identifying mark where goods and/or services are sold under or provided in connection with the same words.
- **Trade dress.** Trade dress has to do with the unique appearance and image of the product. It can include features such as size, shape, color, color combinations, textures, or graphics.
- **Nontraditional trademarks.** Nontraditional trademarks may include sounds, such as the three chimes for NBC or the five-tone progression used by Intel. These marks may even include a unique aroma (*83*).

A mark must be distinctive. The four basic categories of trademark distinctiveness are:

- **Arbitrary or fanciful.** An arbitrary or fanciful mark bears no logical relationship to the underlying product. Arbitrary marks are the most distinctive and therefore typically the easiest to register.
- **Suggestive.** This mark evokes or suggests a characteristic of the underlying good. The mark may contain clues or hints about the nature of the product without actually describing the product or its function. Suggestive marks are less distinctive than completely arbitrary marks, but still are presumptively registrable.
- **Descriptive.** This mark directly describes a characteristic or quality of the underlying product. Although descriptive marks are useful for educating the consumer about the product or its function, they are less useful for distinguishing the product from the competitor's product (which is the primary purpose of trademark protection). Because descriptive marks are less distinctive, they can only be registered if they have acquired a secondary meaning. The consumers must associate this mark with a particular producer rather than the underlying product in order to acquire a secondary meaning.
- **Generic.** This identifier describes the general category to which an underlying product belongs. In other words, a generic mark would describe most or all products in the general category, and is not at all distinctive. A generic mark is unregistrable as a trademark (*84*).

Table 6 summarizes important qualities of various types of trademarks.

Table 6. Trademark examples (*85*).

	Type			
	Generic	**Descriptive**	**Suggestive**	**Arbitrary/ Fanciful**
Legal status	Unregistrable	Distinctive only with secondary meaning	Distinctive	Inherently distinctive
Trademark strength	Nonexistent	Weak	Strong	Strongest
Example	Deodorant	Ultra-Dry™	Degree™	Ban™

5.5.2 Acquiring a Trademark

Trademark protection arises when a mark is actually used in commerce to brand or market a product, and the trademark becomes associated in the public mind with that product or its source. Trademarks make it easier for consumers to quickly identify the source of a good or service. The trademark laws govern the property rights associated with trademarks. In the United States, the primary federal statute is the Lanham Act (15 U.S.C. § 1051 et seq.), but protection also is afforded through state laws. Trademarks are administered by the USPTO.

A mark shall be deemed to be in use in commerce when it is affixed in any manner on goods or their containers or the displays associated therewith or on the tags or labels affixed thereto or, if the nature of the good makes such placement impracticable, then on documents associated with the goods or their sale. With regard to trademarked services, the mark is considered to be in use in commerce when it is used or displayed in the sale or advertising of the services.

Use of a mark in promotion or advertising before the release of a product or service is provided does not qualify as use in commerce for purposes of obtaining trademark rights.

Unregistered trademarks may include a ™ or SM after the name or logo on the artifact that is used in commerce. Only marks fully registered (not pending) with the USPTO may use the ® symbol. Although the symbol carries some significance, it is important to note that the use of the mark itself, not the use of the symbol, confers the rights of the mark. However, lack of use of the ® may limit the damages that can be recovered in an infringement suit.

Trademark rights can be lost if the mark becomes too generic as a result of abandonment, improper licensing, or improper assignment of the mark. A trademark may be considered abandoned when its use is discontinued with no intent to re-establish use. Lack of use for 3 consecutive years is considered evidence of abandonment. Furthermore, as the quality associated with a mark diminishes—meaning that licensed or assigned uses of the mark have diminished its effectiveness as a distinctive identifier—there is increasing likelihood that the trademark protection will be canceled out. Finally, if a mark becomes more generic in terms of coming to represent a category of products (as opposed to being associated with a specific good, product, or service from a specific provider), then the trademark rights can be lost (*86*).

Although unregistered marks are protected under common law in the United States, registration represents a nationwide notice to others that a mark is taken. An application for a mark is typically based on two conditions:

- The mark is already in use in commerce.
- There is the "intent to use" the mark in commerce.

A successfully registered mark will appear on one of two federal registers, as follows:

- The **Principal Register.** Registration of a mark on the Principal Register conveys the important substantive rights associated with federal registration and, therefore, is the preferred method of federal trademark protection. Someone who later initiates use of the same or a confusingly similar trademark may be presumed by the courts to be a "willful infringer" and therefore liable for money damages.
- The **Supplemental Register.** The Supplemental Register is for marks capable of identifying the source of goods or services that do not meet the requirements for registration on the Principal Register. Registration of a mark on the Supplemental Register is not evidence of the owner's exclusive right to use the mark in connection with the goods or services, and the owner of a mark on the Supplemental Register cannot use the power of the Customs services to stop importation of infringing goods.

State DOTs may register their identifying marks and those that identify their products; however, federal registration provides little protection for most state DOT uses because trademark protection is available only for marks that are "used in commerce." In general, although state DOTs have a tremendous influence on the marketplace, they are not traditional market participants (i.e., commercial actors) and have not traditionally been in the position of marketing products or services in competition with commercial providers. Even where state DOTs participate in commerce (e.g., toll facilities), the government is typically the only service provider, so a trademark does not serve to distinguish it from marketplace competitors. Although state DOTs clearly have an interest in preventing private parties from confusing the general public into believing that they are government representatives, that sort of confusion or misrepresentation is generally handled by state statutes and common law, and trademark registration may be unnecessary.

Furthermore, as is the case with copyright, trademark protection is not available for functional capabilities. State DOTs are typically concerned with providing functional performance at the lowest cost to the public, and in cases where two potential contractors have similar functional capabilities but one has superior trademark recognition, state DOTs are free to hire the lower bidding contractor without paying a premium royalty to the contractor with the superior trademark. This situation is illustrated by *TrafFix Devices, Inc. v. Marketing Displays, Inc.*, in which a manufacturer of temporary highway signs (e.g., "Road Work Ahead" or "Left Shoulder Closed") sued a competitor for trademark infringement (*87*). Originally marketed under the name WindMaster, the signs included a spring mechanism for which the patent had expired, and the competitor was selling similarly functional signs to highway departments under the name WindBuster. The name WindBuster was held to infringe the WindMaster trademark, due to the likelihood of marketplace confusion. Although the WindMaster trademark owner contended that its competitor should not be able to market the sign under any name—arguing that its spring mechanism gave its signs a distinctive appearance that had become a trademark unto itself, serving to identify the manufacturer of the signs—the U.S. Supreme Court held that the spring mechanism served a functional purpose and was not subject to trademark protection. Where the unique features of a product or service consist of patentable subject matter, they are presumed to be functional, and the burden is on the party seeking trademark protection to establish that the feature serves marketing purposes rather than functional purposes.

Because state DOTs are generally concerned with functionality (whether in R&D or in providing transportation services), they do not often have to be concerned with trademark infringement. A contractor can practically always (by definition) satisfy functional specifications without infringing the proprietary trademarks of another. However, state DOTs are not immune from state court lawsuits for trademark infringement (*88*). Therefore, some caution must be taken when devising trademarks for technology developed with state DOT funding, to

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ensure that the marks are not likely to cause confusion with other products in the commercial marketplace.

Use of trademarks by state DOTs will vary widely depending on the individual state's statutes regarding state ownership of IP. Trademarks are intended to help the commercial consumer identify the source of a product or technology. If technology was developed with state funding, it may be misleading for a private contractor to affix its trademark to the technology because the state DOT was also a source of the technology. On the other hand, it may be inappropriate for a state DOT to affix its own trademark to the technology because doing so might create the appearance of the state government endorsing a product in the commercial marketplace. In the end, the ability of a state DOT to transfer technology to the commercial marketplace and the process by which it does so will depend heavily on its ability to participate in the marketplace under existing state legislation.

5.5.3 Infringement and Protection of Trademarks

Infringement is the unauthorized use or imitation of a protected mark. As with other types of IP, lack of knowledge by an infringing party is not a defense. However, in some instances fair use may be used as a defense in regard to trademarks (*89*).

In considering whether trademark infringement has occurred, the standard is "likelihood of confusion" to the consuming public. This standard for infringement is judged on a number of factors, including:

- The strength of the mark.
- The proximity of competing goods.
- The similarity in marks of competing goods.
- Evidence of actual confusion by the consuming public.
- The intent of the alleged infringer. For example, is the infringer attempting to pass off its product or service as the product or service of the mark's owner?

It is important to note that using the same term on a completely unrelated product is not likely to be considered infringement.

5.6 Trade Secrets

Use of trade secrets within a state DOT presents a unique challenge. The critical importance of trade secrets for the state DOT may come into play when maintaining the secrecy of information provided by a contractor in the performance of a state DOT contract, or perhaps in the development of transportation technologies that are important to national security.

5.6.1 What Is a Trade Secret?

*A **trade secret** constitutes confidential information that confers an economic advantage. Its value is derived from its secrecy.*

Patent protection allows an inventor to establish a monopoly on an invention or discovery for a limited time in exchange for disclosing the invention or discovery to the public (and thus contributing to public knowledge and advancing the state of practice). In some cases, an inventor may feel that the trade-off is not worth the required disclosure and may elect to forego the other forms of IP protection and instead protect the invention as a trade secret. Doing this has the advantage of allowing the inventor to potentially maintain the monopoly for a longer time than the term of a patent, provided the invention or discovery can be maintained as a trade secret. However, if the trade secret can be discovered by another party through fair means, such as by independent invention or by reverse engineering of a product

obtained through the marketplace, the original inventor loses the right to exclude others from using the invention.

Trade secrets encompass a large array of assets that may be covered (e.g., drawings, methods, business methods, technical data, vendor lists, and schematics). Unlike patents or copyrights, a trade secret is not a limited-life monopoly. A trade secret can be enforced as long as it remains secret. The value of a trade secret is in the fact that the IP is not widely known or cannot be easily ascertained. To be protected by law, the trade secret must be identified and treated as confidential by all persons who are permitted access to it. Trade secret information should be:

- Marked as *secret, restricted, confidential,* or using any word or phrase that signals that the information is meant to be kept private.
- Kept locked in a secure place or restricted area, by either physical or digital means, whichever is most applicable.
- Disposed of in a very controlled manner (*90*).

In addition, all employees, collaborators, partners, contractors, and so forth should be put on notice regarding the intent for secrecy.

If the holder of a trade secret believes that his or her valuable information has been compromised and stolen, the holder must prove that the information was acquired illegally. There may be no legal recourse if the secret information is independently obtained or reverse engineered.

5.6.2 Acquiring and Protecting a Trade Secret

Trade secret protection is largely governed by individual state laws, and the vast majority of states have adopted statutes modeled after the Uniform Trade Secret Act (UTSA) drafted by the Uniform Law Commission. The UTSA essentially codifies the state common law as it relates to trade secrets, consistent with federal court decisions (*91*). These state statutes typically formalize the liability and penalties that accrue when a company's employee or business partner discloses the company's trade secrets to a competitor in violation of a nondisclosure agreement or other contract. To enforce state trade secret protection, the company typically must demonstrate that it took steps to actually protect the trade secret from disclosure, so that its competitor could not have discovered the trade secret but for the breach of contract by the company's (former) employee or business partner. Because each state defines the scope of its trade secret protection differently, however, court decisions differ regarding what constitutes a trade secret and what constitutes sufficient measures to protect the trade secret from disclosure.

U.S. courts are proactive in enforcing trade secret protection. However, some cases are highly scrutinized, such as if a noncompete agreement with an employee is so strict as to bar and restrict the employee's right to work in a chosen industry, or to limit the use of information in a particular industry. The expectation of the courts is to balance the desire for a company to protect its confidential information with the rights of an individual to use his or her experience that may have been gained over many years of working in a particular industry.

In the case of trade secret litigation, the trade secret owner must demonstrate five key factors:

- Notice regarding the trade secret was provided to the defendant.
- The defendant had access to the trade secret content.
- The secret information is not readily ascertainable.

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- Reasonable secrecy measures were taken.
- Evidence exists of economic value of the secret information (*92*).

Given these hurdles, the owner of a trade secret faces a key question: When should maintaining a trade secret be considered, as opposed to a filing for a patent? Some factors to consider in making this decision are:

- Can the subject matter be easily reverse engineered? Can it be easily developed by another entity?
- What is the economic value of the trade secret? Given the subject matter, can its value be sustained longer than the 20-year duration of a patent?
- How easy will it be to demonstrate that the trade secret has been misappropriated?

Once a nonprovisional patent application has been filed, the contents of the application will be made public *even if the patent is subsequently denied.* It is important to think strategically about possibly using patents and trade secrets conjointly. For example, if a state DOT has a product invention and has optimized a way of producing the product, a potential strategy may be to patent the product but maintain the optimal production process as a trade secret. In this case, if a competitor develops and introduces a similar product that does not infringe on the state DOT's patent, the state DOT could potentially maintain a comparative advantage using the trade secret–protected production process.

When it comes to deciding whether or not to maintain a trade secret, it is important to note that, because there is no registration process, trade secret protection can be obtained without delay or undue cost of registration. Many other forms of IP protection come with registration fees and other expenses (e.g., legal fees) because of the challenges of registration. This does not mean that trade secret protection is inexpensive, however; a trade secret must be *proactively* protected, which means the organization must invest in measures to protect the secret. Furthermore, even with measures in place to protect the secret, there is always the risk of independent creation of the trade secret by others.

5.6.3 Crafting a Trade Secret Policy

Regarding trade secrets and the internal policy that governs this form of IP protection, the devil is in the details. Failure to develop proper policy can expose an organization to the loss of very valuable IP. At a minimum, policies governing trade secrets should cover these four areas:

- **New and existing employees.** It is imperative that the state DOT discuss what should and should not be distributed and/or discussed externally (and even, in some cases, internally) with both existing employees and new hires. When hiring competitors' former employees, the state DOT also must be proactive to ensure that they protect the trade secrets of competitors, contractors, and others.
- **Material screening.** Materials that are to be discussed, transmitted, or disclosed to the public or to a third party should be screened for confidential information.
- **Security.** The state DOT should be diligent in controlling access to trade secret information. It is important that information that should remain secret be clearly marked and that employees be aware of the intent to maintain secrecy.
- **Licensing policy.** The state DOT needs to ensure that third-party trade secret information is being protected and that such information is protected in any request for proposal notice and during contract negotiations (*93*).

Table 7. Principal forms of IP protection.

	Copyright	Patent	Trademark	Trade Secret
What is protected	Original works	Processes, machines	Business identifiers	Processes, methods
Symbols	©, Ⓟ	patented...	™, SM, ®	None
Registration	Copyright Office	USPTO	U.S. Patent and Trademark Office (USPTO)	Not applicable
Tests	Originality (implicit)	Unique, novel, non-obvious	Use in commerce, avoidance of confusion	Actual protection as a secret
How obtained	Publication and fixation (registration available)	Examination and registration by USPTO	Use in commerce (registration)	Maintain secret
Duration	life + 70 years; 95 years (1998 changes)	20 years (utility and plant patent); 14 years (design patent)	While in use	While secret
Law of	Federal (mostly civil)	Federal (civil)	State, federal (civil)	State (civil & criminal)

5.7 Summary: Types of IP

When reviewing disclosures and the different types of creative outcomes or inventions resulting from state DOT internal activities or contract work, it is important to understand what is being covered/protected and what will be the best form of IP protection to use.

Table 7 recaps the principal forms of IP; however, it is important to keep in mind that aspects of a single work may be protected by different forms of IP.

CHAPTER 6

Understanding IP Management and Options

For the state DOT, as with most organizations, understanding the impact of IP management decisions on the key state DOT stakeholders is very important. This chapter highlights some of the key factors and stakeholders involved in IP management decisions for the state DOT.

6.1 State DOT Employees

In the course of their employment, state DOT employees create, invent, and develop work products that potentially constitute valuable property interests and may be protected as IP.

What property interests do state DOTs take in the IP created by their employees? Even if state DOTs have the legal right to take title to IP developed by their employees, are there good reasons to allow the employees to take title instead? This section considers several questions state DOTs should consider as they develop policies and strategies concerning ownership, protection, and management of employee-generated IP.

6.1.1 What Defines the IP Ownership Interests?

The U.S. Constitution authorizes IP rights such as copyrights and patents to the authors and inventors, respectively (*94*). That is, absent some legal mechanism (e.g., a contract employment agreement) that modifies the presumption, it is generally presumed that the individuals who develop the IP, and not a corporate entity or agency, have the right to obtain title to the IP, typically by way of registering the IP.

However, in the case of IP developed by employees in the course of their employment and using the employer's resources, valid reasons exist why the employer might be entitled to some interest in the IP. This may be especially true in the context of government agencies such as state DOTs, for which the interests of both the employer agency and the taxpaying public come into play. Aspects of the legal framework to be considered in determining who has the right to take title to IP developed by state DOT employees include:

- Common law and shop rights.
- Policies on royalty revenue.
- Employment agreements and assignment agreements.

6.1.1.1 Common Law and Shop Rights

Although the constitutional authority providing for IP rights focuses on individuals, the law has historically recognized the employer's contribution (facilities, equipment, materials, employee compensation, etc.) toward employees' creations and inventions. Therefore, some

common law doctrines exist to protect the rights of employers in IP generated by employees in the course of their employment.

- **Inventions.** With respect to inventions made by employees in the course of their employment, in the absence of a written employment agreement or assignment agreement clearly stating that such inventions are the property of the employer, employers should not presume that courts will find such an agreement was implied (*95*). Especially if the employee was not specifically hired to perform R&D, courts would likely find that the employee-inventor, and not the employer, has the right to apply for patents for inventions made in the course of employment (*96*). By default, therefore, the employee typically has the right to patent the invention, but this default presumption may be modified by the circumstances of hiring, by the terms of the contract or employment agreement, or by statute (particularly in the case of state employees). Moreover, in most cases, even when the employee is entitled to the patent, the employer is entitled to "shop rights" in the invention (*97*). Shop rights convey a nonexclusive license to practice the invention in the course of the employer's business without having to pay royalties or being subject to an infringement action brought by the employee.
- **Creative expressions (work for hire).** With respect to creative expressions, on the other hand, the presumption is that the copyright to such material developed by employees in the course of their employment belongs to the employer and not the employee. This common-law work-for-hire doctrine has been encoded in federal statute, which provides that "the employer or other person for whom the work was prepared is considered the author [and] owns all of the rights comprised in the copyright" (*98*). The statute also specifically defines work made for hire to include "a work prepared by an employee within the scope of his or her employment" (*99*). However, it can sometimes be unclear whether the author is an employee acting within the scope of employment at the time the work is prepared. If either the employment relationship or the employee's scope of duties is unclear, the determination of rights typically reverts to the common law of agency to determine whether the work was prepared in the context of an employment relationship (*100*). As with patentable inventions, the language of contracts or employment agreements, as well as statutes (particularly in the case of state employees), may clarify that the state DOT takes title to certain creative works of its employees, thus avoiding the uncertainty of having a court apply the common law.
- **Trademarks.** In the case of trademarks, the trademark identifies the provider of goods or services—typically the employer, not the employee. Even though the value of a trademark often lies in the marketplace goodwill developed by the employee's efforts, the trademark is typically the employer's IP. For example, a former state DOT employee going to work for a private employer would not be allowed to continue to provide goods and services using trademarks that were used to identify the individual's work for the state DOT, because that could create marketplace confusion that the private employer's work is affiliated with or endorsed by the state DOT.

6.1.1.2 Policies and Royalty Revenue

The common law of IP ownership often is modified by statute to confer rights to government agencies, especially as it pertains to employee rights to copyrights and patents for IP developed in the course of employment. For patentable inventions, it is not uncommon for state statutes to specify that the state government is entitled to own title to any invention developed by state employees in the performance of their jobs (*101*). Where such statutes exist, they reverse the common-law presumption that the state DOT retains only shop rights.

In some of these states, although the state takes title, the employee has a statutory right to share in any revenue from the state's commercial exploitation of the invention or creative work (*102*). In other states, although there is no statutory right to revenue sharing, it may be the policy

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of the state DOT to share revenue with the employee (*103*). Although it is not as authoritative as a statute, in the absence of a controlling statute, a state DOT policy covering ownership and revenue sharing from IP developed by employees can be effective to reduce uncertainty and ensure that similarly situated employees receive consistent treatment from the state DOT.

Such revenue-sharing provisions certainly provide incentive for state DOT employees to be creative and inventive on the job, and to disclose potentially valuable IP. It is unclear, however, whether this model is more likely to result in a successful commercial product than the federal model, by which federal government employees often patent their employment-related inventions and enter into cooperative agreements to commercialize them (to the extent that there is no conflict of interest) (*104*). In the federal model, the employee may have greater incentive to invent and commercialize his or her invention, but the government employer might not receive any royalties.

An ideal policy might give the state DOT the authority and flexibility, on a case-by-case basis, to decide whether to retain title for the state DOT or to transfer title to the employee (with a license retained by the state DOT). For example, one approach may be to presume that the state DOT owns title to the IP, but that an employee is entitled to petition or request the right to take title. Such petition could be heard by an IP management review group (preferably a board of decision-makers) within the state DOT or elsewhere in state government. In any such policy or procedure, the criteria for granting title to employees should be well-defined to reduce uncertainty and ensure consistent treatment of similarly situated employees. For example, if the invention is closely related to the state DOT's mission, that factor may weigh heavily toward the state DOT retaining title. If the employee failed to disclose the invention or creation in a timely manner, that factor also may weigh heavily toward the state DOT retaining title.

6.1.1.3 Employment Agreements and Assignment Agreements

It is common for employees of private companies to be required (as a condition of employment) to assign to the employer title to all IP developed in the course of employment. Such IP assignment agreements often are combined with nondisclosure agreements (preventing the employee from disclosing the employer's trade secrets) and with covenants not to compete (preventing the employee from using certain IP or know-how acquired in the course of employment in competition with the employer). State law generally upholds IP assignment agreements, subject to certain limitations that vary from state to state. For example, some states restrict an employer's ability to require its employees to make a present assignment of rights to IP yet to be developed in the course of employment (*105*).

However, IP assignment agreements do not appear to be a widespread practice among state DOTs. In response to a survey conducted in the development of this Guide, only 15 percent of state DOTs acknowledged requiring employees to enter into an IP assignment agreement, whereas 85 percent responded that their state DOT has no such requirement. The very low rate of assignment agreements at these agencies (in comparison to private employers) may be attributable to a variety of factors. An assignment agreement may be unnecessary if a statute or state policy (such as an employee handbook) addresses IP ownership. The state DOT may not have the authority to require its employees to assign their IP (e.g., because of union agreements). Finally, a state DOT may have made a conscious decision that it has no intent to commercialize the IP of its employees, so it does not need to take title to it.

6.1.2 Considerations for the State DOT

Ideally, a state DOT would have a documented approach (statute, regulation, or policy) for determining ownership, managing, and commercializing employee-developed IP. A standard

approach, preferably enforceable by law, reduces uncertainty and disputes over IP rights, but can also mean less flexibility for the state DOT to make decisions on a case-by-case basis. A recommended approach for a state DOT would provide the flexibility for the DOT to decide to take title, otherwise assist the employee in commercialization, or simply take a hands-off approach, depending on the circumstances and according to documented criteria. For a state DOT, the ideal approach will provide the highest value to the taxpaying public. At a minimum, it should provide that the state DOT retains rights to use the IP created by state DOT employees for state DOT purposes. Beyond that, an approach to handling employee-created IP should be tailored to the state DOT's IP objectives and commercialization mandates. The ideas discussed in Chapter 3 and Chapter 4 of this Guide should be considered, along with the following factors specifically related to employee-developed IP.

6.1.2.1 Future Needs

Typically, a paid-up, permanent, nonexclusive license to use the IP developed by employees (or to have the IP used on behalf of the state DOT) will satisfy most future needs of a state DOT to use the IP. Provided the state DOT obtains such a broad license, it typically will not adversely affect DOT operations to allow employees to obtain title to IP they develop. The primary consideration is whether the state DOT needs the right to exclude others from using the IP. For example, if the state DOT has the intention and authority to commercialize the IP, then the state DOT probably needs to keep ownership (and perhaps pay its employee a percentage of the royalties as compensation for the employee's loss of registration rights). (See Chapter 5 for additional discussion about the right to exclude others from using IP.)

6.1.2.2 Types of IP

The type of IP is an important factor to consider when deciding whether to grant state DOT employees title to IP that they develop. For example, a state DOT generally will not want to grant employees title to trademarks. If a mark is initially developed by an employee to identify products and services of the state DOT, the potential for marketplace confusion exists if the employee (or the employee's licensee) later uses the mark, or a similar trademark, to market commercial products and services.

As discussed in Section 6.1.1, it is common for state DOTs to deny employees title to patentable inventions developed with state DOT resources (*106*). Patents may be the form of IP most likely to have commercial potential, and the state DOT may see patent royalties as a form of revenue. Even if the state DOT does not intend (or have the authority) to commercialize the patents, however, the DOT or state legislature may prevent state DOT employees from taking title to patents simply to avoid the private commercial exploitation of public resources, effectively donating the IP to the public domain.

It is less common for state DOTs to deny their employees a copyright in works created in the course of employment. Like the federal government, state DOTs might deny their employees a copyright in works that represent an official views or statements of the state DOT or works that the state DOT is obligated by statute to create (*107*). Furthermore, where the employee is tasked to produce work product intended to generate state DOT revenue, the DOT typically will retain title itself. For example, if the DOT wants to generate mass copies into the foreseeable future (such as with highway system maps) it typically will not allow its employee to register a copyright. However, for research papers, books, and so forth—especially those expected to have a limited distribution—it can be in the state DOT's interest to allow its employee to register a copyright. This employee right can incentivize the employee to document the work of the state DOT, as well as to seek a wider audience for the work (as the employee attempts to commercially exploit the copyright). The end result

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would tend to be enhanced dissemination for the state DOT and enhanced credentials for the employee-author.

Because of public records and open government laws, the development of true trade secrets by employees in the course of their state DOT employment is rare. If the employee develops sensitive information or knowledge (i.e., information or knowledge that is critical to the nation's transportation infrastructure), the employee typically is prohibited by law or regulation from disclosing it or otherwise personally exploiting the secret (*108*). On the other hand, there is typically no way to prevent the employee from "owning" the know-how gained in the course of employment. State laws typically favor allowing the employee to apply his or her trade (including skills developed working for the state DOT) after leaving employment. To avoid conflicts of interest, however, state statutes may restrict a state DOT employee's ability to go to work for a private company that did business with the state DOT employee. Such legal restrictions on state DOT employees are analogous to nondisclosure agreements, covenants not to compete, and state unfair trade practices laws that allow private employers to protect their trade secrets.

6.1.2.3 Incentives to Employees

Statutes or employment agreements requiring state DOT employees to surrender their work-related IP to the DOT can have the adverse effect of hindering IP development. State DOT employees who develop ideas in the course of employment that have commercial potential generally will have little incentive to fully develop those ideas if they know the DOT will take title to any such work or invention. The employee might even attempt to withhold the idea from the state DOT and pursue commercialization independently or decide not to disclose IP that could have potential high value.

It is common for state statutes to require state employees to disclose registrable IP to the state employer and to assist the state in obtaining registration (*109*). However, these statutes typically are binding on the employee only after the employee's idea has been reduced to practice or tangible media (given that it generally cannot be registered otherwise). Therefore, when formulating approaches to address IP developed by employees, state DOTs should consider incentives to employees for creating and disclosing potentially valuable ideas developed in the course of employment, as well as compensated time and resources to fully develop the ideas. The incentives may be incorporated into a state DOT's existing internal R&D program, to which employees can submit proposals, with only those ideas that best fit the state DOT's R&D objectives selected to receive state DOT resources for further development. Additional incentives might include bonuses for patents issued, a share of the revenues earned by licensing the IP, or a transferable license that would allow the employee to license the IP to a commercial interest to develop it, even while the state DOT retains title. Available incentives are, of course, limited by budget concerns and may need to be expressly authorized and funded by the state legislature.

6.1.3 Potential Approaches

6.1.3.1 Employee Assignment Agreements

If the state DOT expects to manage employee-developed IP, assignment agreements can be invaluable. Even in states where state statutes or common law suggest that the state DOT takes title to IP developed by its employees, assignment agreements can reduce uncertainty and encourage the employee's cooperation.

6.1.3.1.1 Legal Issues. State DOTs considering the use of assignment agreements should consult their legal counsel. Legal counsel can determine what IP rights the state DOT has in the absence of an assignment agreement (e.g., by statute) and help determine what additional rights may be

obtained by agreement. Legal counsel can also determine whether state courts have imposed any constraints on IP assignment agreements in other contexts (e.g., private employment).

The state DOT's legal counsel will determine what authority the state DOT has to require its employees to assign IP rights. Some state employees may have the right to take title to IP that they develop on the job. A statutory employee right may or may not prevent the state DOT from entering into a contract with the employee transferring the right to the state DOT.

The enforceability of an IP assignment agreement will depend in large part on whether the state DOT is attempting to extract IP rights from its existing employees, or whether the IP assignment is a condition of new employment. If the employee is currently employed, a new IP assignment agreement might have to be supported by additional consideration (e.g., a bonus payment) to be enforceable. Union contracts may impose additional restrictions against IP assignment agreements in some states.

6.1.3.1.2 Sample Language. In crafting a new employee assignment agreement, it is generally advisable to closely follow forms that have been upheld as enforceable, particularly in the courts of the state where the DOT exists. The sample language shown in Figure 7 (combining an IP assignment with nondisclosure and noncompetition agreements) is commonly used by federal government laboratories (*110*).

Ideally, the employee will be required to sign or otherwise acknowledge the agreement upon beginning employment. Later, once the employee has developed IP that the state DOT wishes to register, the state DOT may want the employee to execute additional assignment agreements, suitable for recordation with the Copyright Office or USPTO, that specifically identify the IP to which title is assigned. Therefore, the state DOT may wish to include language in the new employee assignment agreement obligating the employee to "execute any instruments necessary to give full effect to this agreement."

By accepting employment at [State DOT] you acknowledge that:

- All intellectual property created as a result of your employment is owned by [State DOT].
- All rights in the intellectual property created as a result of your employment to [State DOT] are assigned to [State DOT].
- You are obligated to do the following:
  1. Inform [State DOT] prior to the filing of any patent application in which you are listed as an inventor during your employment and for a year afterwards.
  2. Cooperate with [State DOT] in obtaining the rights to intellectual property created as a result of your employment.
  3. Keep accurate documentation of your work, including up-to-date laboratory notebooks.

You are prohibited from:

- Disclosing [State DOT]'s proprietary information.
- Entering into agreements which compromise [State DOT]'s rights to intellectual property created as a result of your employment.

You are entitled to:

- A share of the royalties gained from commercializing intellectual property created as a result of your employment.
- Maintain the rights to any intellectual property which is unrelated to your employment and created solely on your own time without the use of any [State DOT] resources.

Figure 7. Sample language combining IP assignment with nondisclosure and noncompetition agreements (111).

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6.1.3.2 Employee Revenue Sharing

Where the state DOT takes title to IP developed by its employee, the employee generally should receive something in return. As discussed in Section 6.1.2, this helps ensure that the assignment is enforceable and encourages employees to disclose inventions or creations. Private employers often pay employees a fixed bonus for every patent that the employee receives. If a state DOT intends to retain title and perhaps market the IP itself, a practical approach would be to pay the employee a fixed percentage of the royalties earned (after registration expenses, considering that registration expenses may exceed the eventual royalties, especially in the case of patents). The percentage of royalties earned by state DOT employees (after registration expenses) generally ranges from 20 percent to 50 percent with the remainder paid to the state DOT or another state agency responsible for technology transfer (*112, 113, 114, 115*).

If state DOTs allow employees the right to retain ownership to IP developed on the job, they may want to institute procedures that allow the state DOT some oversight of the commercialization process. Oversight helps protect the DOT against employee conflicts of interest. For example, if a federal government employee personally profits from inventions in the course of his or her employment, the employee generally is allowed to do so only in the context of a Cooperative Research and Development Agreement (CRADA) between the federal employer and one or more outside parties, which may include commercial interests, nonprofit organizations, or even state DOTs (*116, 117*). A CRADA is not a funding agreement, so traditional rules about ownership of IP developed with federal funding do not apply. Under the CRADA, all terms are open to negotiation, including the percentage of royalties to be assigned to the employee-inventor and the government employer. However, the entire CRADA process is subject to approval by the government employer (*118*). This type of program may be ideal when state DOTs do not want to be directly involved in the commercialization process. Because it involves employee profits and agency discretion, however, the state legislature typically would have to formally authorize the state DOT to institute such a program.

6.2 State DOT Contractors

Contractors often generate IP in the performance of their contracts for state DOTs. Especially in the context of research and development contracts, state DOTs generally will want to retain a license to use this IP. However, state DOTs may follow dramatically different approaches regarding the rights that the contractor is allowed to take. This section discusses considerations for state DOTs developing policies and strategies concerning ownership, protection, and management of contractor-generated IP.

State DOTs enter into a wide variety of funding agreements with outside entities—both commercial firms and nonprofit entities. Although some contracts are more likely than others to result in IP interests, the potential always exists. The state DOT's flexibility to allocate ownership rights to IP developed by a contractor in any given situation often is limited by the legal framework governing a particular type of contract, as well as the expectations of the parties. Factors that can influence the IP rights taken by the state DOT and its contractors include types of contractors, the definitions of IP ownership interests, state statutes, and other considerations.

6.2.1 Types of Contractors

A wide variety of outside entities enter into contracts to receive funding from state DOTs. All of these entities are technically state DOT contractors, but the DOT's approach with respect to IP developed by the contractor will depend in part upon where the contractor falls on the following spectrum.

6.2.1.1 Service Contracts

State DOTs regularly contract for standard services (e.g., janitorial services) that do not lend themselves to IP generation. On the other hand, it may be that the state DOT has the most leverage (and legal authority) to assert rights to any IP developed by the contractor while performing work for the DOT in these situations. To the extent allowed by the state's procurement law, the standard terms and conditions of such services contracts should provide that the state DOT takes title to such IP. Such a provision is rarely invoked due to the non-innovative nature of this work. Depending on the state, such a boilerplate provision may even be unenforceable if challenged by the contractor (due to the state DOT's superior bargaining power). But in the absence of a judicial determination otherwise, it creates a presumption that the state DOT takes title to innovations that it pays for.

6.2.1.2 Contracts with Suppliers

Typically, supply contracts must conform to standard specifications (e.g., aggregate gradations or asphalt mix criteria), leaving little room for innovation. Furthermore, applicable procurement regulations may restrict the state DOT's ability to contract for nonstandard materials or supplies in which some proprietary interest may exist. As with standard services, in standard supply situations it is unlikely that IP will be developed in the performance of the state DOT contract. The state DOT is more likely to be concerned with ensuring that the supplier is not supplying products that infringe against a third party's IP interest, and the supply contract may require the supplier to provide a certification to that effect (and perhaps to indemnify the state DOT against any claim by a third-party rights-holder). In certain specialized situations, however, where the state DOT has a demonstrated need for a product that is innovative or experimental, IP considerations will come into play. In those cases, the state DOT should consider treating the procurement as an R&D contract (described in more detail in Section 6.2.1.5).

6.2.1.3 Construction Contracts

Construction contractors typically are required to construct facilities strictly according to designs and specifications prepared by design professionals. Therefore, there usually is little opportunity for innovation and invention by construction contractors. More likely, the state DOT contract will require the construction contractor to certify that it has not infringed the IP of any third party in the course of construction and to indemnify the DOT against any claim made by any IP rights-holder (*119*). For standard construction services, the state DOT typically has the leverage to demand title to any IP developed by the contractor in the course of construction (via a standard provision in the contract terms and conditions), although it is rare that such a provision would be invoked. However, with the emergence of design-build project delivery methods, the line between a construction contractor and design professional has blurred; in a design-build situation, additional considerations come into play.

6.2.1.4 Contracts with Design Professionals and Professional Consultants

Design professionals (e.g., architects) and professional consultants (e.g., engineers) are increasingly cognizant and protective of their IP that is delivered under contract (*120*). These contractors tend to have significant bargaining power, and statutes infrequently dictate who takes ownership to IP developed by design professionals and professional consultants under state government contract. State DOTs may have to negotiate IP rights most frequently with this type of contractor.

At minimum, the design professional typically expects to be able to register a copyright in any plans or drawings prepared under a state DOT contract. Historically, this practice did not create concerns for the state DOT because the copyright only extended to the graphical representation

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of the design, not the utilitarian aspects of the architectural work. However, with passage of the Architectural Work Copyright Protection Act in 1990, a copyright in an architectural work can prevent others from using a copyrighted design to construct a similar structure (*121*). Therefore, state DOTs should negotiate, to the extent allowed by law, for a license to use the design delivered on one state DOT contract in the performance of future contracts regardless of whether the same design professional is hired for the future contract.

Aside from the right to use design deliverables in the future, architect-engineer services do not typically present an IP concern for the state DOT. For example, under the federal acquisition regulations (FARs), federal agencies do not address patent rights in architect-engineer contracts for "standard types of construction" (*122*)—those where the distinctive features are expected to involve only variations in size, shape, or capacity of conventional structures, or where the anticipated innovations are expected to be purely aesthetic or artistic (as opposed to functionally significant). If the federal agency is contracting with the design professional to design "novel structures, machines, products, materials, processes, or equipment (including construction equipment)," however, or if the agency is contracting with an engineer or other professional consultant to perform test and evaluation studies, the contract is treated like an R&D contract. State DOT IP policies should distinguish between standard architect-engineer services and R&D contracts with design professionals.

6.2.1.5 R&D Contracts

If a contractor is hired specifically to perform R&D or other experimental work, the strong potential exists that IP interests with commercial viability could be generated under the contract. Recall that when employees are hired specifically to perform inventive work, patentable IP developed in the course of the employment will likely belong to the employer. In the case of government contractors, however, the reverse is often true. As described in Section 6.2.2, in federal contracts for experimental, developmental, or research work, the R&D contractor (rather than the contracting agency) typically is entitled to obtain a patent in inventions developed under government contract.

State DOT contracts may deviate from the federal model—some state statutes and policies will provide that the state takes title to inventions made with state funds. Nonetheless, changing contractor expectations resulting from the federal model, as well as state initiatives to promote commercialization of state-funded inventions, have resulted in a trend in favor of granting R&D contractors the right to inventions made with state DOT funds.

6.2.1.6 R&D Contracts with Universities

Universities are most likely to contract with state DOTs as R&D contractors, often as research grant recipients. Even if the state DOT's standard approach is not to grant its R&D contractor title to IP developed on a state DOT contract, this standard approach may not apply to universities. Universities often demand title to IP that they develop under government contract, and state statutes often provide that state universities (or their employees) are entitled to such rights (*123*).

6.2.2 What Defines the IP Ownership Interests?

6.2.2.1 Funding Source

Before 1980 it was generally presumed that the government took title to IP that was developed with government funds (*124*). In that year, however, Congress passed the Bayh-Dole Act, which granted to small businesses, nonprofit organizations, and universities the right to obtain patents in most inventions made with federal funding (*125*). In 1987, by executive order, these patent

rights were formally extended to all federal contractors, regardless of size or for-profit status (*126*). If the federal contractor elects to take title to the invention, the federal government retains a paid-up, nonexclusive license to use the invention. If the federal contractor does not elect to take title, or fails to take appropriate steps to commercialize the invention, the federal government can reclaim title to the invention using march-in rights (*127*).

Although the Bayh-Dole Act does not apply to copyrightable material, a similar model applies to creative works developed under federal contract (at least with respect to the contractor's rights). The Copyright Act expressly prohibited copyright protection for "any work of the United States Government," including works of federal employees created in the course of their employment (*128*). The legislative history indicates, however, that Congress intentionally decided not to expressly prohibit federal *contractors* from taking a copyright for works prepared with federal funding, as long as the contractors were not simply used as an alternative to having federal employees prepare the work (*129*). The FAR provides that the contractor can obtain a copyright except in certain situations, such as when the contractor's work product represents "the official views of the agency" (*130*). As a result, contractors generally have been able to register a copyright in creative works (reports, software, and so forth) prepared under government contract, with the government retaining an unlimited license to use and reproduce the works.

Although the federal model allows federal contractors to retain IP rights in works funded by the federal government, this is not necessarily true for works developed under contract to state DOTs. State DOTs and their contractors should be aware that the laws and policies concerning contractor rights vary widely from state to state; however, the Bayh-Dole model—granting IP rights to government contractors—has become widely accepted and adopted by government bodies both within the United States and internationally (*131*). In the absence of any specific state law or policy, the Bayh-Dole model may be persuasive authority suggesting a presumption in favor of contractor rights to title in IP (with a license retained by the government).

If the state DOT contracts to spend federal funds, the Bayh-Dole model probably applies (as illustrated by the guardrail end terminal case study included in Chapter 9 of this Guide). In other words, when a state DOT project is funded in part by the federal government, the state DOT contractor probably has the right to take title to the IP developed by the contractor for the state DOT, and the federal government has a nonexclusive, nontransferable license to use the IP (*132*). At least with respect to patentable inventions, this generally rules out the state DOT's right to take title or even to take advantage of the federal government's license. The state DOT's only option is to bargain with its contractor for a license of its own.

With respect to creative works, given that no federal statute specifically prohibits or grants contractors the right to copyright federally funded works, either the contractor or the state DOT may be able to register a copyright in such works (*133*). Whether the copyright belongs to the state DOT or the contractor will depend on state law, policy, or contract language.

Even if the contractor has the right to certain IP developed under state DOT contract, its IP interests generally will be limited to those that can be registered. Contractors generally are not allowed to protect state DOT–funded IP as trade secrets, in part because public records laws may make it difficult to keep the technology secret. However, some state statutes now allow state agencies to have trade secrets, so it is not out of the realm of possibility that contractors could develop trade secrets in the performance of state DOT contracts (*134*).

6.2.2.2 State Statutes and Policies

The Bayh-Dole framework applies to state DOT contracts that involve federal funding. State legal frameworks governing ownership rights in other funding situations are wide ranging. Although few state statutes clearly address who is entitled to own IP developed by state DOT

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contractors with state DOT funding, those that do are likely to provide that any IP developed through state DOT contracts becomes state property, not the property of the contractor (*135*).

If there is a discernable trend at the state level, it is in the direction toward a Bayh-Dole type approach. The California Council on Science and Technology Intellectual Property Study Group and the New York State Science and Technology Law Center have proposed policies for their respective states that are similar to the Bayh-Dole Act but would retain stronger rights for the state government (*136*). Under these proposed approaches, the state DOT would retain an unlimited license to use patented technology developed by the contractor as well as march-in rights should the technology not be effectively commercialized by the contractor, and the state DOT could also receive a portion of the revenues from any royalty that the contractor charges non-state actors for the use of the IP.

The existence of a state statute or standard policy governing IP developed by state contractors is generally helpful in clarifying the relationships and rights among the contracting parties. Although an enforceable, standardized approach could reduce the flexibility of the state DOT to negotiate IP rights tailored to a given situation, it could also confer the benefit of ensuring that all state DOT contractors, regardless of bargaining power, receive consistent treatment in similar circumstances with respect to rights in IP that they develop. A statute or standard policy also helps reduce the likelihood of misunderstandings, false expectations, and disputes as to who owns the IP developed under state DOT contracts.

6.2.2.3 Contract Language

In the absence of a controlling statute, ownership rights to IP developed by state DOT contractors will be determined by the contract language and by the state common law that governs interpretation of the contract. To reduce uncertainty and the likelihood of disputes, state DOT contracts should clearly state who will take ownership to IP developed by the contractor in the course of the contract, as well as what interest (e.g., license) will be taken by the state DOT.

Even in states that do not have statutes granting title to the state, it is common for standard state contract terms to provide that the state takes title to all IP developed under state contracts (*137*). Depending on the type of contract and the circumstances surrounding the contract, the state DOT may or may not have the authority to negotiate modifications to these standard terms.

Ideally, the state DOT's IP contract provisions would be standardized, by regulation (like the FAR) or otherwise, to ensure consistent treatment of similarly situated contractors. California, for example, has adopted a "Rights in Data" clause similar to that in the FAR, which provides that IP developed by the contractor over the course of the contract is the "exclusive property" of the contractor, with the state government obtaining a paid-up, nonexclusive, and irrevocable "government purpose" license to use that IP. Nonetheless, even the California procurement regulations provide that the standard "Rights in Data" clause can be modified in the contract statement of work (*138*).

In the case of creative works, it is not presumed that the state DOT takes ownership to the copyright, unless the contract unequivocally states that it is a work made for hire (*139*). Standard terms in contracts with state DOTs often go further, expressly providing that contractors are to grant the state DOT complete and unrestricted rights in all reports, data, or other work product (*140*).

In some cases, the contractor may bring pre-existing proprietary IP to the state DOT project. Even if a statute exists granting the state DOT a license to use any IP developed under contract with the state DOT, that statute typically will not address the pre-existing IP. A state DOT could discover, for example, that it does not have a paid-up license to use a new technology developed under a state DOT contract because the DOT only funded an *improvement* to pre-existing

technology of its contractor, which cannot realistically be practiced without a license to also use the pre-existing technology.

State DOTs are advised to proactively consider whether they want to require their contractors to license pre-existing technology to the state DOT, at least when used in conjunction with the proposed improvement being funded by the state DOT. State DOTs also may benefit by considering the adoption of standard procurement regulations similar to the FAR, which require a contractor to make upfront disclosures regarding any proprietary IP that will be used in performance of the state DOT contract. This approach ensures that all contractors receive consistent treatment, and it leaves fewer IP rights subject to negotiation.

If the state DOT has the authority or mandate to encourage commercialization of IP developed with state DOT funding, the DOT policy or procurement regulations could be crafted to give the DOT flexibility to negotiate IP rights in situations conducive to commercialization. For example, the federal government is authorized to enter into CRADAs with state DOTs "and their agents to conduct joint transportation research and technology efforts" (*141*). CRADAs are not subject to Bayh-Dole, so under this framework, the state DOTs or their contractors could negotiate for exclusive title to IP developed partially with federal resources. Likewise, the scope of the license taken (by the federal government, the state DOT, or the contractor) is negotiable.

6.2.3 Considerations for the State DOT

Except for federally funded R&D, no general rule that controls the distribution of IP rights between a state DOT and its contractors is applicable to all state DOTs. In states that do have clear rules, the framework is generally preliminary. As state legislatures and state DOTs develop statutes, regulations, and policies covering ownership of IP developed by contractors, they should consider the following factors.

6.2.3.1 Is the State DOT Statutorily Excluded from Ownership?

6.2.3.1.1 State Statutes. Only a few states expressly authorize their DOTs to take ownership of IP (*142*). In some states, state agencies other than DOTs are expressly authorized to own IP and engage in commercialization efforts. This situation could be taken to imply that the state DOT does not have that authority. Typically, if the state has a technology transfer agency of some sort that is authorized to own IP, that agency would act as a surrogate for the state DOT with respect to commercializing IP developed under a state DOT contract (*143*).

6.2.3.1.2 Federal Statutes. The U.S. Constitution and the U.S. Patent Act (35 U.S.C. §§ 1–376) generally grant patent rights to the inventor, not to the funding agency. Historically, this could have prevented a state DOT from obtaining a patent if the inventor (contractor or employee) refused to cooperate with the application. However, under the AIA, a government agency or a business entity (such as the inventor's employer) can obtain the patent as long as the inventor "is under an obligation to assign the invention" (*144*). Therefore, the question will be whether the contractor is obligated (by statute or contract) to assign the patent to the state DOT, and possibly whether the contractor's employee is obligated (by the terms of the employment agreement) to assign any invention to the contractor. If these obligations to assign the patent are not in place, then the state DOT may be unable to obtain a patent even under the AIA.

For federally funded contracts, the state DOT is generally required to allow its contractor to take title to IP developed in the course of the contract. Furthermore, the federal government takes a nontransferable license to the IP. Therefore, the state DOT has no statutory right to title or license and should negotiate its own license. (For an example, see the guardrail end terminal case study included in Chapter 9 of this Guide).

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6.2.3.2 Is There a Need to Control Future Use of the IP?

The state DOT's primary concern in crafting an IP policy should be to maximize value to the taxpaying public. Certainly, this means that the state DOT should retain a license to use any IP developed in the course of a DOT contract. This concern may also obligate the state DOT to maximize use of its IP (i.e., to seek out opportunities to use licenses earned through prior state DOT contracts). Whether the state DOT needs additional rights depends largely on the state DOT's authority and mandate to commercialize IP developed under state DOT contract. In crafting a policy regarding IP developed by state DOT contractors, the main factors to consider are (1) the need to ensure that the public can perpetually benefit from the IP, (2) the need to ensure that other state DOTs can benefit from the IP, and (3) the need to ensure that the IP is commercially developed.

6.2.3.2.1 Ensure the Benefit to the Public. The paid-up, unlimited license taken by the federal government under Bayh-Dole allows the federal government to perpetually use the federally funded IP, or to direct others to use the IP on behalf of the federal government. For IP that will be developed in part through state DOT funding, the state DOT will most likely have limited rights, the details of which can be worked out in the contract. If a state DOT elects not to retain title to IP developed in part or in whole through state DOT funding, the state DOT should at least retain a paid-up, unlimited license so that it will not have to pay royalties on the IP to the same contractor in the future. Taking this step protects the interests of the taxpaying public.

If the state DOT wants to dedicate the IP developed by its contractors to the public domain, then it needs to retain greater rights (i.e., title). Although this arrangement would appear to be in the best interests of the taxpaying public, it could have the adverse effect of discouraging contractors from performing work for state DOTs, and it also could discourage commercialization (because the contractor is unable to take title to the IP). Clearly, there are competing public interests at stake, and a given state DOT or legislature could determine that the public interest dictates one approach or the other.

6.2.3.2.2 Ensure Benefits to Other State DOTs. State statutes and policies modeled on Bayh-Dole (e.g., regarding a nontransferable license) might provide that only the state DOT that funded the work is entitled to use the paid-up license, and other state DOTs have to pay royalties to the contractor. In drafting state DOT statutes and policies, decision-makers should consider whether they want other states to benefit from work funded by the state DOT. For example, in the guardrail end terminal case study included in Chapter 9, the contractor granted a license to *all* state DOTs. Alternatively, a state DOT policy could provide that the funding state DOT takes a *transferable* government-purpose license, allowing the funding DOT to grant a license to other DOTs on a case-by-case basis (e.g., to state DOTs entering into a cooperative pooling agreement).

If the state DOT wants other DOTs to benefit from IP developed by its contractors, it probably should not take title. State DOTs may be prohibited by law from "gifting" free licenses to other state DOTs to use IP to which the state owns the title (*145*). Therefore, establishing the transferable license rights in the contract is more likely to meet the objective of having the IP widely adopted by other state DOTs.

6.2.3.2.3 Ensure that the IP Is Commercially Developed. Another significant factor in a state DOT's decision to take ownership (title) or to take a license to IP developed by its contractor is whether the DOT expects to control the commercialization process. If the state DOT expects to direct the commercialization process, it typically will need to retain ownership, or at least march-in rights.

The taxpaying public will often expect the state DOT to retain ownership to IP that it funds, or even to devote that IP to the public domain. However, the public at large can benefit from IP developed by state DOT contractors even if public or other private actors have to pay for future non-DOT uses of the IP. For example, technological innovations developed under state DOT contracts and marketed by the contractors may result in increased economic activity and increased quality of goods in the commercial marketplace.

With respect to patentable inventions, if state DOTs have the right to title, they will have the flexibility to consider whether a given technology would benefit from being patented and, if so, who should hold the patent to best promote commercial development. In some cases, the existence of a patent can hinder commercial development, because the patent owner has a monopoly on the base technology and its competitors may be unwilling to invest in improving the technology given the license fees that would be owed to the patent owner. In other cases, private interests may be unwilling to invest in commercialization of the product unless a patent exists, giving them some assurance that there will be limits to the number of their marketplace competitors.

If a patent is required to ensure the technology is commercially developed, state DOTs should consider whether widespread licensing would hinder the technology's development. If state DOTs are the only realistic customer for a particular technology and state DOTs will all receive a paid-up license to use it, then the inventor will have little incentive to develop the technology.

If a state DOT wants to ensure the commercial development of IP developed on its behalf, it will at minimum want to retain some march-in rights similar to those the federal government retains under Bayh-Dole. March-in rights allow the state DOT to proceed with commercialization if the contractor has not taken steps to do so in a reasonable time, or allow the state DOT to license or transfer title to another contractor if necessary. For example, if a state statute or state DOT policy allows a contractor to patent an invention but the contractor is not taking the necessary steps to do so, then the march-in rights stipulated in the contract could allow the state DOT to proceed with registration. The march-in rights should be expressly stated in the state DOT contract, because a patent is a creation of federal law and, lacking such an express statement, rights granted to the state DOT by a state statute could be pre-empted by federal law in certain situations. If a contractor has already obtained a patent, but is not effectively commercializing the product, then the state DOT would prefer to have a contract remedy to retrieve title to the patent (because the patent registration would presumptively vest title in the contractor).

6.2.4 Potential Approaches

6.2.4.1 Model Statute Language

The model statutory language presented in Figure 8 is adapted from legislation that was introduced in New York in 2007 but has not yet been enacted into law (*146*). The proposed statute would allow each state agency, such as a state DOT, to craft its own IP management policy conforming to certain principles. Generally speaking, the proposal would reserve to the state much stronger rights to the IP of its contractors than the federal government takes under Bayh-Dole. The proposal also reflects a desire for the state to be actively involved in commercialization of the IP and to obtain revenue from the IP where possible, which is very different from the federal model.

6.2.4.2 Model Contract Language

As described herein, federal government R&D contracts typically provide that the contractor may retain title to IP developed under government contract, with the federal government retaining a license to use the IP. However, federal agencies may elect to retain title "in exceptional circumstances" when they determine that doing so would better achieve the commercialization

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Any state agency policy governing the management of intellectual property resulting from research conducted in state facilities, by state employees, or with state funds shall conform to the following principles:

A. The state shall retain a nonexclusive, royalty-free license to use the intellectual property for noncommercial purposes;

B. If a state agency or its contracting partner does not pursue commercialization or patent rights within reasonable time limits, the state must be able to take title to the invention;

C. When intellectual property is not dedicated to the public domain, good faith efforts in demonstrable outreach, such as active technology transfer offices and outreach to business associations including venture capital networks should be made to commercialize the technology within the state;

D. If intellectual property is sold or licensed to private businesses, and a sufficient revenue stream is generated, the state shall receive a return on its investment and, when intellectual property is sold or licensed to private businesses not resident within the state, the state shall obtain a higher return on its investment than it would if the product resulting from the intellectual property were commercialized within the state; and

E. When research is conducted directly by a state agency, the individual whose research leads to the discovery of a patentable invention should share in any proceeds resulting from the sale or license of the invention.

Source: N.Y. Assembly Bill 8787, 2007–08 Session.

Figure 8. Model statutory language.

and technology transfer objectives of Bayh-Dole. In that case, federal agencies are authorized by the FAR to use a different contract clause that confers title to the government, while providing a mechanism for the contractor to request title upon presenting the government a commercialization plan in writing (*147*). For state DOTs seeking more control over the commercialization process, this latter approach may be preferable to merely retaining a paid-up license. The model contract language shown in Figure 9 is based on the FAR clause for patent ownership by the funding agency.

The actual contract language adopted by any state DOT should be developed in consultation with legal counsel, to ensure that it is enforceable under state law and that it is consistent with procurement regulations applicable to state DOTs.

6.3 Third-Party Owners

State DOTs often are in the position of wanting or needing to use IP that the state DOT has no existing right to use. This section discusses considerations for the state DOT in deciding whether to acquire rights to use IP owned by a third party. For the purposes of this discussion, a *third party* is defined as a party that has developed or acquired title to IP (or possibly an exclusive license) outside of a contractual relationship with a state DOT (i.e., the party is not a state DOT employee or contractor.

The primary reason for registering IP (or for protecting it as a trade secret) is to maintain control over the exploitation of the IP in the marketplace. Given that spending by federal, state, and local governments has risen to approach 40 percent of the nation's gross domestic product in recent years, IP rights-holders typically prize commercial relationships with their government customers. Likewise, government agencies like state DOTs can benefit from using the IP of third-party commercial actors, because doing so often provides access to the best, state-of-the-art means for accomplishing the state DOT's work. The key for the state DOT in such situations is to determine under what terms it will be in the best interest of the DOT (and the taxpaying public) to acquire the right to use the IP.

(a) Ownership

(1) Assignment to [State DOT]. The Contractor shall assign to [State DOT] title throughout the world to each subject invention, except to the extent that rights are retained under paragraph (a) (2) of this clause. Subject invention means any invention of the Contractor made in the performance of work under this contract.

(2) Greater rights determinations. The Contractor, or an employee-inventor after consultation with the Contractor, may request greater rights in a subject invention. The request for greater rights must be submitted to [State DOT] at the time of the first disclosure of the subject invention as required under paragraph (b)(2) of this clause, or not later than six months thereafter, unless a longer period is authorized in writing by [State DOT] for good cause shown in writing by the Contractor. Each determination of greater rights under this contract normally shall be subject to paragraph (b) of this clause, and to the reservations and conditions deemed to be appropriate by [State DOT].

(b) Minimum rights acquired by [State DOT].

(1) Regarding each subject invention to which the Contractor retains ownership, the Contractor agrees as follows:

(i) [State DOT] will have a nonexclusive, nontransferable, irrevocable, paid-up license to practice, or have practiced for or on its behalf, the subject invention throughout the world.

(ii) [State DOT] has the right to require the Contractor to license the subject invention upon a finding that such requirement would better promote State DOT policies and objectives.

(iii) Upon request, the Contractor shall submit periodic reports no more frequently than annually on the utilization, or efforts to obtain utilization, of a subject invention by the Contractor or its licensees or assignees.The reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Contractor, and any other data and information as [State DOT] may reasonably specify. To the extent data or information supplied under this section is considered by the Contractor, or its licensees, or assignees to be privileged and confidential and is so marked, [State DOT], to the extent permitted by law, will not disclose such information to persons outside the Government.

(iv) When licensing a subject invention, the Contractor shall ensure that no royalties are charged on acquisitions involving [State DOT] funds.

(v) When transferring rights in a subject invention, the Contractor shall provide for [State DOT]'s rights set forth in paragraphs (b) (1) (i) through (b) (1) (IV) of this clause.

(2) The Contractor shall disclose in writing each subject invention to [State DOT] within two months after the inventor discloses it in writing to Contractor personnel responsible for patent matters or, if earlier, within six months after the Contractor becomes aware that a subject invention has been made, but in any event before any on sale (i.e., sale or offer for sale), public use, or publication of the subject invention known to the Contractor. The disclosure shall identify the contract under which the subject invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding of the subject invention. The disclosure shall also identify any publication, on sale, or public use of the subject invention and whether a manuscript describing the subject invention has been submitted for publication and, if so, whether it has been accepted for publication. In addition, after disclosure to the agency, the Contractor shall promptly notify [State DOT] of the acceptance of any manuscript describing the subject invention for publication and any on sale or public use.

Figure 9. Model contract language for patent ownership by funding agency (based on FAR clause).

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6.3.1 Benefits and Considerations for State DOTs Using Third-Party IP

In a number of scenarios, state DOTs may consider acquiring the right to use third-party IP. State DOT employees or managers may simply become aware of commercial or proprietary products or services for which the state DOT might have a general use, without devoting the IP to any specific application. Research for solutions to specific state DOT needs may identify one or more providers of proprietary products or services. In response to a solicitation, the state DOT may receive a bid from a potential contractor to provide a proprietary product or service (perhaps as a proposed alternative to bid specifications). This section addresses factors that may affect state DOTs' decisions when considering the use of third-party IP.

6.3.1.1 Does the State DOT Need to Use the IP?

A state DOT should consider its options—including the option to "do nothing"—before deciding to use the proprietary IP of a third party. Questions to ask include:

- What would be the impact on the state DOT of not using the proprietary IP?
- Could the state DOT meet its objectives using its standard, nonproprietary methods or by using other IP to which it already has rights?
- What outcomes would be expected with and without using the third-party IP?

Making such questions a part of the decision-making process when a state DOT considers using third-party IP may help clarify whether doing so is necessary or if it will be beneficial.

If it becomes clear that third-party IP is needed, the state DOT should consider more than one third-party provider. A state's competitive bidding laws often will require the state DOT to seek out lower-priced alternatives, which may or may not involve proprietary IP. Furthermore, if federal funds are involved, there will be restrictions against the state DOT using the federal funds to pay "for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project" (*148*). (For an example of this situation, see the spray paver case study in Chapter 9 of this Guide.) That said, the federal government can reimburse the state DOT for any such premium or royalty in the following situations:

- Where it was obtained as a result of competitive bidding with "equally suitable unpatented items."
- Where the state DOT certifies that the IP "is essential for synchronization with existing highway facilities."
- Where the state DOT certifies "that no equally suitable alternate exists."
- Where the state DOT uses the IP for research or experimental purposes (*149*).

Working through this list of exceptions forces the state DOT to consider alternatives to the proprietary IP. These alternatives may be less functional but still suitable for the state DOT's needs. It will generally be possible to draft bid specifications broadly enough to encompass the third-party IP as well as functionally similar alternatives, without formally specifying any specific proprietary product or service. Drafting specifications broadly enough to cover multiple products or services often has the effect of reducing the premium or royalty price for the proprietary IP, as the third-party rights-holder will be forced to compete for the state DOT's business.

6.3.1.2 Is It Cost-Effective to Use the IP?

The functional advantages of using third-party proprietary IP typically are offset to varying degrees by the additional cost (the premium or royalty). For example, public domain software is generally cheaper but has less functionality than proprietary software algorithms that come with an expensive license. The competitive bidding process described above will help clarify the cost-benefit analysis for proprietary IP in the context of a given solicitation. In evaluating

the alternatives, however, state DOTs also need to consider the long-term, life-cycle costs of contracting for third-party proprietary IP. This analysis will account for the scope of the license being acquired. Questions to consider might include:

- If the state DOT incorporates proprietary technology into a project, will the third-party rights-holder have a monopoly on future maintenance contracts (if other contractors do not have the proper license or know-how to maintain the proprietary technology)?
- If the state DOT acquires a license to use proprietary software, will compatible alternatives be available in the future that allow the state DOT to continue accessing work initially generated using the proprietary software?
- What are the renewal terms likely to be once the initial license expires (or will the proprietary IP become public domain by that time)?
- Is the license to be acquired broad enough to be used for other state DOT work, resulting in potential cost savings recognized beyond a single procurement?

6.3.1.3 Does the State DOT Need to Hire the IP Owner to Perform the Contract?

State DOTs will encounter a wide variety of commercialization models used by third-party IP owners. At one extreme, they may encounter nonpracticing entities who acquire title to IP (typically patents) and merely charge royalties or license fees for use of the IP by others. At the other extreme, the IP rights-holder (or its exclusive licensee) may refuse to allow the IP to be practiced by anyone but itself, in order to reduce competition and preserve monopoly prices. The latter is almost always the commercialization model followed when trade secrets are involved.

Both of these extreme commercialization models create concerns for state DOTs in light of competitive bidding requirements and restrictions against use of proprietary IP. However, once a state DOT has determined that there is no suitable alternative to acquiring certain proprietary IP, the focus shifts from considering alternatives to minimizing the monopoly costs associated with the proprietary IP. The state DOT will want to determine the cost of obtaining the IP (or a license to use the IP) from the third-party rights-holder. The rights-holder may offer a government-purpose license at more favorable rates and terms than its standard commercial license.

If the federal government is unable to negotiate a license agreement with an IP rights-holder, the federal government can "authorize and consent" to another contractor's use of the proprietary IP on its behalf (*150*). Both the contractor and the federal government are then immune from an infringement lawsuit by the rights-holder. In these situations, however, the federal government is generally required to pay a "reasonable" royalty for using IP that was not developed using federal funds. The value of the royalty in a given situation is determined by the U.S. Court of Federal Claims, and it is often much less than the IP owner would ordinarily charge for commercial use of the IP (*151*).

Unlike the federal government, state DOTs do not have authorization-and-consent authority. Although the state DOT is immune from suit in federal court for IP infringement of patents or copyrights, its contractors are not. Also, the state DOT could be liable to a claim to compensation by the rights-holder for *takings* (a government entity's taking of private property for public use) or even for misappropriation of the third party's IP under state law (*152*). Generally, then, unlike the federal government, the state DOT will have to negotiate a license with the rights-holder in order to use the IP.

Ideally, the state DOT should separate the license acquisition process from procurement of goods and services so that the state DOT's exposure to monopoly costs will be limited to the license fee negotiated with the IP rights-holder. Further, the state DOT can realize efficiencies (e.g., by negotiating a license that covers multiple projects). After a state DOT has negotiated a

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license from the rights-holder allowing the IP to be used on behalf of the state DOT, the DOT could enter into a competitive bidding process with multiple contractors (possibly including the licensor) to provide the goods or services covered by the license. This two-step process introduces a measure of competition that may satisfy a state's competitive procurement requirements even though proprietary IP is being used.

Although this two-step procurement process may be available for federally registered IP, it will typically not be available if the IP is being protected as a trade secret or corporate know-how. A third-party rights-holder may be willing to license its patented or copyrighted IP to be used by another contractor in the performance of a state DOT contract because the licensor knows that the other contractor's use of the IP will be limited to the scope of the license. On the other hand, disclosing its trade secrets to the state DOT's other contractor in the context of a state DOT contract would create the risk of losing the trade secret. For example, a third party may be willing to license its executable software to a state DOT and even provide an application programming interface allowing other contractors to create custom applications for the state DOT using the software. That same software rights-holder may be unwilling to provide its source code to the state DOT's other contractor, however, because the source code could disclose proprietary algorithms and other secret information, possibly enabling the other contractor to develop competing software. The third-party IP rights-holder would typically only consent to this kind of arrangement under a nondisclosure agreement with stiff enforcement penalties.

At the same time, fewer competitive bidding concerns arise when contracting with a third party to use its own trade secrets (as opposed to its registered IP) in the third party's self-performance of a state DOT contract. The restrictions related to federal funding only apply if the state DOT is contracting to obtain a "patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project." The third party may have internal trade secrets or corporate know-how that enables it to accomplish the state DOT's plans and specifications more effectively than less-experienced contractors. When this is the case, there may be a fine line between the state DOT contracting for a "proprietary" process and simply selecting the contractor with the strongest technical rating. When the contractor does not request that any of its project deliverables be withheld from disclosure in response to public records requests, there typically would be no concerns that hiring the contractor equates to contracting for a proprietary process.

6.3.1.4 What License Options Are Available?

Before purchasing a license to use third-party IP, the state DOT should consider whether it already has a formal license or common-law right to use the IP for its intended purposes. This section discusses some situations in which such license or right may exist.

6.3.1.4.1 Was the IP Generated with Government Funding? The state DOT may have obtained a license to use the proprietary IP if it was developed in part under a previous state DOT contract. As has been discussed, whether the state DOT previously obtained a license will depend on the state statutes and/or contract provisions in effect at the time of the previous contract. A statewide IP inventory (or at least a state DOT–wide inventory) will be invaluable in determining whether the DOT already has a license, so that it can avoid paying twice for the same IP.

The federal government will have a paid-up license if the IP was developed with federal funding, but the state DOT typically is unable to take advantage of it (because the federal license is generally nontransferable) (*153*). State DOTs may, however, negotiate their own licenses to IP developed with federal funding under a state DOT contract (*154*). As in the guardrail end terminal case study included in Chapter 9, the terms of one state DOT contract may provide that all state DOTs are able to take a license to use the resulting IP. If the IP was developed in whole

or in part with government funding, it is worth determining the scope of any licenses granted to the federal and/or state governments and agencies under the funding agreement.

6.3.1.4.2 Does Fair Use Apply? The state DOT (and its employees or contractors on behalf of the DOT) may have a defense to certain unlicensed uses of IP, especially where use does not affect the commercial significance of the IP. Although legal counsel should be consulted to discuss the specific circumstances of any unlicensed use, the discussion in this section covers some general guidelines.

The Copyright Act provides that certain uses of copyrighted materials may constitute fair use (*155*). The statute lists factors that are to be considered to determine whether any given unlicensed use is a fair use, including:

- The "purpose and character of the use" (i.e., whether it is commercial or nonprofit and educational).
- The proportion of the copyrighted work that is used.
- The "nature of the copyrighted work" (i.e., whether it is commercial/published, and where it lies on the spectrum between creative and factual).
- The effect of the unlicensed use on the commercial value of the work (*156*).

Historically, a similar "experimental use" defense has been used with respect to patents, allowing the unlicensed use of patented inventions for strictly scientific inquiry. However, courts typically have been unwilling to extend this defense to any use that is in any way commercial in nature. For example, nonprofit universities are not immune from infringement claims when they conduct research projects using patented inventions, because these projects are conducted in furtherance of the university's commercial objectives (obtaining grant funding) (*157*). Although state DOTs are not traditional marketplace participants (i.e., commercial actors), they certainly have a tremendous role in the marketplace, and most unlicensed uses of patented inventions in furtherance of the state DOT's lines of business would not be covered by the common-law experimental use defense. Although the Patent Act provides an experimental use defense for certain limited public-interest situations, such as medical experimentation, these situations typically would not apply to uses by the state DOT (*158*).

6.3.1.5 Potential Legal Claims by IP Owner

6.3.1.5.1 Federal Law (Liability for State DOT Contractors). Traditionally, the federal government has not needed to own IP because federal agencies have the authority to authorize and consent to IP infringement by their contractors in the performance of federal contracts. Thus, any contractor (not just the IP rights-holder) can use the IP for the federal government without concern about being held liable for infringement. If registered IP is infringed under those circumstances, the federal government is responsible for paying the IP owner a "reasonable" royalty (which is not necessarily the premium that the IP owner would ordinarily charge a non-federal actor wishing to use the IP).

A completely different legal framework applies to state DOTs. With respect to IP that is federally registered, state DOTs benefit from immunity under the 11th Amendment to the U.S. Constitution, which generally provides that state governments cannot be sued in federal court without their consent (*159*). Patent and copyright infringement actions can only be brought in federal court, as these areas of law are generally understood to be pre-empted by the federal government. Therefore, state DOTs can use federally registered IP without being liable for infringement (*160*).

Immunity does not, however, extend to contractors for state DOTs. Contractors may be sued for infringement for the use of federally registered IP on a state DOT project even if the use

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occurs with the express knowledge and direction of the state DOT. Furthermore, when state DOTs are involved in the development of IP, the license taken by the DOT may or may not include the right to have the IP used *on behalf of* the DOT. Therefore, contractors for state DOTs occasionally find themselves being sued for infringement of IP in the performance of a state DOT contract, even though the DOT itself funded the development of the IP under a previous contract (*161*). In most cases, this complication can be avoided if, as part of the original contract involving the IP, the state DOT contracts to obtain a license to have the IP used on its behalf, and requires its original contractor to flow the license requirement down to all its subcontractors. When a state DOT knows that a contract will require the use of third-party IP, the state DOT owes it to its contractors either (a) to ensure that the state DOT has a license to have the IP used on its behalf, including under future contracts, or (b) to make it clear that the contractor must obtain proper licenses.

6.3.1.5.2 State Law (Liability for State DOTs). Federal and state courts have recognized that IP rights-holders may be able to obtain remedies against state DOTs in state courts, under state law, for unlicensed use of their IP by state DOTs (*162*). For example, a state-level process typically is established by which an IP rights-holder can assert a takings claim or a *conversion claim* to compensation from a state DOT. (Slightly different from a takings claim, a conversion claim asserts intentional use of a rights-holder's property that interferes with the rights-holder's control over and use of the property.) Attempts by Congress to provide states with sovereign immunity against such claims have been declared unconstitutional by the U.S. Supreme Court (*163*). State DOTs should not treat sovereign immunity as a license to infringe IP without consequence.

State DOTs may also be liable under state law for misappropriation of trade secrets. When a state DOT hires a contractor based on its trade secrets or corporate know-how, the state DOT will have to take steps to avoid disclosure of the contractor's trade secrets. For example, the state DOT is generally required to not disclose contractors' trade secrets in response to public records requests. State DOTs should consider adopting procurement regulations similar to the FAR, requiring the contractor to disclose (at the time of contracting) what it considers to be its trade secrets that will be used or delivered in performance of the state DOT contract. Doing this puts the initial burden on the contractor, creating a presumption that any materials not identified by the contractor are not trade secrets. When the contractor identifies or marks certain IP according to the documented procedure, however, the state DOT will need a process in place to ensure that such materials are properly protected from disclosure.

6.3.2 Potential Approaches to IP Protection

6.3.2.1 Statewide Inventory of IP Ownership or Licenses

When making a decision about whether to use third-party proprietary IP, it would be useful for a state DOT to be able to refer to a centralized inventory of IP, within the DOT or possibly across state government, to which the state DOT has title or license. Ideally in database form, such an inventory can help the DOT avoid spending money to purchase licenses to use IP to which it already has established rights. Even if the database indicates that licenses have expired, or that existing licenses do not cover the state DOT's intended use, the inventory can provide information about rates paid for similar licenses in the past, which can be useful information in negotiations and in cost-benefit analysis. The database should be sufficiently well-organized, with descriptive text fields and standardized search functionality, to allow the state DOT to identify available IP interests that provide a similar functionality to the proprietary IP under consideration.

Effective use of this approach would require an IP management function (employee or office) as described in Chapter 3, either within the state DOT or elsewhere in state government, responsible for maintaining, populating, and searching the database. A policy also would be needed

requiring the state DOT to submit a request to IP management before contracting to acquire new rights in IP. Furthermore, IP management would need to have contract review authority and to actually review most contracts of the state DOT, both to ensure that the state DOT is not paying unnecessary premiums or royalties for IP already available to the state and to identify new IP interests that may arise from any given contract. Functions of IP management would include recording new licenses that the state DOT acquires, as well as identifying contracts likely to result in IP and following up with the contract officer to ensure that any such IP interests are recorded.

6.3.2.2 Assign Freedom of Information Act (FOIA) Manager to Protect Third-Party IP

Although a central IP management function can be helpful to ensure that state DOTs maximize their rightful use of the proprietary IP of third parties, another function of IP management should be to ensure that the DOT does not exceed the scope of its existing licenses. For example, under the scope of most licenses, state DOTs should be entitled to grant their contractors access to the IP for certain state DOT purposes (i.e., to use the IP on behalf of the state DOT). However, the state DOT can be liable under state law if the contractor uses the IP for unlicensed purposes.

This situation is perhaps most likely to arise in the context of public records requests. State public records law typically will not require (or permit) a state DOT to disclose the trade secrets of its contractors or third parties. Therefore, state DOTs need to review public records requests carefully to ensure that they do not inadvertently trigger disclosure of trade secrets. It can be most effective to centralize this process, possibly within the IP management office. Ideally, as under the FAR, state DOTs will have a process requiring their contractors to mark or otherwise identify IP that the contractor considers to be a trade secret (e.g., proprietary technology developed with private funds but delivered or improved under a state DOT contract). These trade secrets would ideally be tracked in a state DOT (or state government-wide) database, with a public records employee assigned to ensure that no identified trade secrets are disclosed in response to public records requests. Clearly, security concerns would come into play in the development and maintenance of such a database, and steps would need to be taken to limit access to both the database and the underlying trade secrets themselves.

6.3.2.3 Build IP Disclosure Requirements into Contracts

When a state DOT contracts for the delivery of third-party proprietary IP, both the DOT and the contractor will want to clearly understand what the contractor considers to be proprietary. The federal government has multiple procurement provisions covering this situation (*164*), generally requiring the contractor to make an upfront disclosure of proprietary IP before the contractor can assert that the federal government's rights to the IP are limited and impose nondisclosure requirements. The model contract provision for state DOTs that appears in Figure 10 is adapted from the Defense Federal Acquisition Regulation Supplement (DFARS) (*165*). It puts the initial burden on the contractor to identify proprietary IP, although once the contractor has done so, the state DOT has constructive knowledge of information that it should not disclose in response to public records requests.

6.3.2.4 Execute Nondisclosure Agreements (with Employees)

Employees of the federal government generally are prohibited from disclosing "any information coming to [them] in the course of [their] employment or official duties, which information concerns or relates to the trade secrets, processes, operations, style of work, or apparatus, or to the identity, confidential statistical data, amount or source of any income, profits, losses, or expenditures of any person, firm, partnership, corporation, or association" (*166*). Similar state laws may apply to state DOT employees.

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[STATE DOT] RIGHTS IN PROPRIETARY CONTRACTOR DATA

(a) Limited rights in technical data

(1) [State DOT] shall have limited rights in technical data—

(A) Pertaining to items, components, or processes developed exclusively at private expense and marked with the Limited Rights legend prescribed in paragraph (c) of this clause; or

(B) Created exclusively at private expense in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes.

(2) The Contractor acknowledges that—

(A) Limited rights data are authorized to be released or disclosed to covered [State DOT] support contractors;

(B) The Contractor will be notified of such release or disclosure; and

(C) The Contractor may require each such covered [State DOT] support contractor to enter into a non-disclosure agreement directly with the Contractor regarding the covered [State DOT] support contractor's use of such data.

(b) Identification and delivery of data to be furnished with restrictions on use, release, or disclosure.

(1) Technical data that the Contractor asserts should be furnished to [State DOT] with restrictions on use, release, or disclosure are identified in an attachment to this contract (the Attachment). The Contractor shall not deliver any data with restrictive markings unless the data are listed on the Attachment.

(2) Generally, the development of an item, component, or process at private expense, either exclusively or partially, is the only basis for asserting restrictions on [State DOT]'s rights to use, release, or disclose technical data pertaining to such items, components, or processes. The Contractor shall indicate whether development was exclusively or partially at private expense. If development was not at private expense, the Contractor shall indicate the specific reason for asserting that [State DOT]'s rights should be restricted.

(3) When requested by [State DOT], the Contractor shall provide sufficient information to enable [State DOT] to evaluate the Contractor's assertions. [State DOT] reserves the right to add the Contractor's assertions to the Attachment and validate any listed assertion at a later date.

(c) Marking requirements. The Contractor may only assert restrictions on [State DOT]'s rights to use, modify, reproduce, release, perform, display, or disclose technical data to be delivered under this contract by marking the deliverable data subject to restriction.

(1) General marking instructions. The Contractor shall conspicuously and legibly mark the Limited Rights legend on all technical data that qualify for such markings. The authorized legend shall be placed on the transmittal document or storage container and, for printed material, each page of the printed material containing technical data for which restrictions are asserted. When only portions of a page of printed material are subject to the asserted restrictions, such portions shall be identified by circling, underscoring, with a note, or other appropriate identifier. Technical data transmitted directly from one computer or computer terminal to another shall contain a notice of asserted restrictions. Reproductions of technical data or any portions thereof subject to asserted restrictions shall also reproduce the asserted restrictions.

(2) Limited rights markings. Data delivered or otherwise furnished to [State DOT] with limited rights shall be marked with the following legend:

LIMITED RIGHTS

Contract No. _____

Contractor Name _____

Contractor Address _____

[State DOT]'s rights to use, modify, reproduce, release, perform, display, or disclose these technical data are restricted by the [State DOT] Rights in Proprietary Contractor Data clause contained in the above identified contract. Any reproduction of technical data or portions thereof marked with this legend must also reproduce the markings. Any person, other than [State DOT], who has been provided access to such data must promptly notify the above named Contractor.

(End of Legend)

Source: Adapted from the Defense Federal Acquisition Regulation Supplement (DFARS).

Figure 10. Model contract provision for state DOTs.

In addition to statutory prohibitions, however, state DOTs may require employees and contractors who are given access to third-party proprietary IP to sign nondisclosure agreements. Although such agreements may appear superfluous in light of applicable statutes, they have the advantage of putting the employee or contractor on notice that they are being given access to proprietary third-party IP for state DOT purposes only, and encouraging the employees or contractors to handle such third-party IP with appropriate care.

It is understood that as part of my official duties as an employee of [state DOT], or as an employee of an official contractor of [state DOT], I may come in contact with procurement sensitive information or proprietary business information from other contractors (e.g., trade secrets or financial data).

I certify that I will not disclose, publish, divulge, release, or make known, in any manner or to any extent, to any individual other than an appropriate or authorized employee of either [state DOT] or official contractor of [state DOT], the content of any procurement sensitive information provided during the course of my employment. I understand that for the purpose of this agreement, procurement sensitive information is to include procurement data, contract information, plans, strategies, and any other information that may be deemed sensitive and that is designated as procurement sensitive, proprietary, or Limited Rights information at the time of its disclosure.

I further certify that I will use proprietary business information only for official [state DOT] purposes, and will disclose such information only to those individuals who have a specific need to know in performance of their official [state DOT] duties. I agree not to disclose to others any contractual information, including, but not limited to, proprietary information, trade secrets, financial data, and technical proposals which will be presented to me by [state DOT] and designated as procurement sensitive, proprietary, or Limited Rights. I agree that the described information is "inside information" and shall not be used for private gain by myself or another person, particularly one with whom I have family, business, or financial ties. For the purposes of this agreement, "inside information" means information obtained under [state DOT] authority which has not become part of the body of public information. I specifically will not disclose any such information to employees of any company (including my own employer) or any other contractor employees who have not signed this agreement. I will take all reasonable precautions to prevent the unauthorized disclosure and use of such information, and will immediately report any such unauthorized disclosure to [state DOT].

Sources: Adapted from U.S. Geological Survey, Contractor Employee Non-Disclosure Agreement and U.S. General Services Administration, Non-Disclosure Agreement.

Figure 11. Model nondisclosure agreement language (167).

The model nondisclosure agreement language shown in Figure 11 has been adapted from various nondisclosure agreements used by federal government agencies:

The actual language of any nondisclosure agreement should be developed in consultation with legal counsel, to ensure that it is enforceable under state law and that it is consistent with applicable statutory nondisclosure requirements applicable to state DOT employees and contractors.

6.3.3 Potential Approaches to IP Sharing

A state DOT research contract may provide that a paid-up license in any resulting IP will be retained not just by the state DOT funding the work, but by all state DOTs nationwide. (For an example, see the guardrail end terminal case study in Chapter 9 of this Guide.) It is unclear how widespread this contracting practice might be, but it presents the possibility that state DOTs may obtain the right to use certain third-party IP royalty-free despite having no role in its creation.

Such a license is only valuable to the extent that the nonfunding state DOTs know that it exists, a factor that weighs in favor of creating a formal pooling agreement between state DOTs by which each participating DOT agrees to share the IP rights that it is in a position to share, and agrees to publish all such IP rights to the other participating DOTs.

A proposed pooling agreement might provide that each participating state DOT has a royalty-free license to use any IP to which the state DOT has title or will take title. The pooling agreement might further provide that, in future R&D contracts, each state DOT must provide that the other participating DOTs (or all state DOTs nationwide, as in the guardrail terminal case study) will

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receive a paid-up, nontransferable license to use any IP developed under the contract. For IP to which a state DOT has obtained only a nontransferable license, rather than title, the state DOT generally will be unable to make that license part of the pooling agreement (because doing so would impact the rights of the previous R&D contractor).

The decision to enter into a pooling agreement with other state DOTs may depend on each DOT's objectives with respect to commercialization. Where the IP is transportation-specific, so that state DOTs are the only realistic end customers or potential sources of royalty payments, granting a paid-up license to all state DOTs could have the effect of essentially devoting the IP to the public domain. If contractors are unwilling to commercialize the IP absent monopoly rights, a broad pooling agreement could have the unintended consequence of discouraging commercialization. Therefore, state DOTs entering into pooling agreements might consider retaining the ability to withhold IP from the pool under certain circumstances.

6.4 Dedication to the Public Domain

Although dedication to the public domain is not considered one of the four principal forms of IP protection, its use by the public sector needs some attention, especially in a Guide that focuses on IP management for state DOTs. This section elaborates on some of the implications, challenges, and benefits of dedicating IP to the public domain.

6.4.1 What Is the Public Domain?

*The **public domain** refers to information, of varying types, that is free for everyone to use. This information may have never been protected, or it may have entered the public domain upon expiration of one of the principal forms of IP protection.*

The public domain refers to information of varying types that is free for anyone to use. This information may have never been protected or may have entered the public domain upon expiration of one of the principal forms of IP protection (e.g., copyright or patent). Release to the public domain effectively eliminates the IP creator's or owner's control over the use of the IP (although some exceptions exist in using creative commons rules). Many public-sector organizations feel the obligation to dedicate their protectable IP to the public domain because much of the work is funded by taxpayer dollars. Although the risk exists of losing control over the use of IP assets in the public domain, this approach has some value. Samuelson identified eight "values" that can arise from information and works in the public domain:

- Building blocks for the creation of new knowledge, such as data, facts, ideas, theories, and scientific principles.
- Access to cultural heritage, such as through information resources like ancient Greek texts and Mozart's symphonies.
- Promoting education, through the spread of information, ideas, and scientific principles.
- Enabling follow-on innovation, such as by using works with expired patents and copyright.
- Enabling low-cost access to information without the need to locate the owner or negotiate rights clearance and pay royalties through, for example, expired copyrighted works or patents, and non-original data compilation.
- Promoting public health and safety through information and scientific principles.
- Promoting the democratic process and values through news, laws, regulation, and judicial opinion.
- Enabling competitive imitation through, for example, expired patents and copyright, or publicly disclosed technologies that do not qualify for patent protection (*168*).

For state DOTs, dedicating their IP to the public domain can help support transportation innovation by allowing inventors/creators to continue to build on the incredible amount of work that has be completed over many decades.

6.4.2 Public Domain Decisions

When deciding whether to dedicate protectable IP assets to the public domain, it is recommended that the state DOT consider what will best achieve the public good. Potential factors to consider include the following:

- In some cases, delivering the public good can require public ownership (e.g., public parks, public museums). Ownership of IP in the best interest of the public by a public institution provides control over use and provides IP to trade with others.
- The public good in other cases may be best achieved by private commercial investments, requiring some form of IP protection to entice potential commercial licensees and continual development.
- Outcomes of research expected for public good cannot be readily practiced if the research infringes on the IP of a third party. Proper IP management can provide guidance to avoid these types of pitfalls.
- It is a legitimate public good to receive a monetary return for IP owned by the public institution that is used by a third party. However, the monetary return should be invested in other projects that serve the public good.
- When publications are the best means for delivering public good, the ability to publish should never be prevented. Should IP protection (and/or recognition of others' IP rights) be appropriate for any material that will be published, however, it is strongly recommended that the necessary steps be taken to screen and register or acknowledge the protected IP *before* disclosure or publication. Ensuring proper attribution and protection of existing IP rights prevents complications, preserves trust, and promotes broader dissemination of ideas in the public interest.
- Governments may also fund the creation of assets for the public good but require that the public pay for use of the asset (e.g., public transportation) (*169*).

Dedicating an IP asset to the public domain should be an available option in all deliberations on matters of IP management within the state DOT. However, the decision to dedicate an asset to the public domain should be well informed.

One benefit of dedicating IP to the public domain is to eliminate barriers to acquiring and using state DOT technology. If the IP is dedicated to the public, it becomes accessible to everyone. Dedicating the IP to the public also restricts others from subsequently taking ownership of IP that was funded by a state DOT. Once the IP is dedicated, however, the state DOT for the most part has limited control on future uses of the IP.

6.4.3 How to Dedicate IP to the Public Domain

Dedicating an IP asset to the public domain literally makes the work or invention ineligible for IP protection. Some state DOTs may intend to dedicate most of the IP that they generate to the public domain, whereas other state DOTs may intend to obtain the highest level of IP protection possible. It is important to understand, however, that whether IP has been dedicated to the public domain is a legal determination that is generally made irrespective of the intent of the IP owner.

Dedication to the public domain typically is accomplished by some form of publication of the work to the general public without benefit of registration. For example, a trade secret loses its character as an IP asset as soon as the secret is publicly disclosed, at which point it effectively becomes information in the public domain. Inventions covered by patents become public domain when the registration expires (no further publication being necessary, given that the invention is considered published through the act of registration). Likewise, a work with

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a registered copyright becomes dedicated to the public domain on expiration of the statutory copyright term (no further publication being necessary, given that the work was previously made public by registering it with the Copyright Office).

Otherwise patentable subject matter is ineligible for registration if it is disclosed prior to patent application (taking into account applicable statutory grace periods for public disclosure, as discussed in Chapter 5 of this Guide), effectively dedicating that invention to the public domain. Historically, an otherwise copyrightable work could similarly be dedicated to the public domain—and thus be ineligible for copyright protection—if the work was "made available to members of the public at large without regard to who they are or what they propose to do with it," or disseminated "among the public as justifies the belief that it has been dedicated to the public and rendered common property" (i.e., was published without notice of copyright and without registration) (*170*). As discussed previously, however, as a result of the 1988 adoption of the Berne Convention in the United States, publication of a work without notice of copyright and without registration no longer constitutes dedication to the public domain and loss of copyright.

Inventions, therefore, are dedicated to the public domain as a matter of law if the invention is disclosed to the public prior to applying for a patent (taking statutory grace periods into account). Patents may not be issued to others for that invention after it is in the public domain. As a practical matter, however, it should be understood that patents often are issued or upheld over the objections of previous inventors or others who believe that the invention was previously disclosed but who fail to convince the USPTO or the courts of that fact. Therefore, to prevent others from obtaining a patent and removing an invention from the public domain, a state DOT might obtain a patent on an invention that it wants to make available for practice by the public. Although there is no provision in federal patent law to dedicate a validly issued patent to the public domain (short of its expiration), the state DOT may be able to accomplish the same result by issuing a public notice that the state DOT declines to enforce its patent and encourages others to practice the invention. If others are unwilling to practice the invention because of concerns about infringing the state DOT's patent, the state DOT could grant practitioners royalty-free licenses to practice the patent, provided that doing so is permitted by state law. If state law prohibits the gifting of licenses by state DOTs, the state DOT could potentially grant licenses to practitioners conditioned on some fair consideration made to the state, such as the state receiving a license to practice any improvement made by the practitioners.

With respect to works of authorship, the adoption of the Berne Convention in 1988 probably rendered obsolete the traditional concept of dedicating an otherwise copyrightable work to the public domain via general publication. Publication of a work without registration and without notice of copyright is expressly inadequate to dedicate it to the public domain, and the Copyright Act makes no further provision for dedicating a work to the public domain. A state DOT may be able to accomplish the same purpose, however, by making the work freely available (e.g., via the Internet). The ideas expressed in the work are not protected by copyright and thus enter the public domain immediately upon publication. If the state DOT wants to dedicate the work itself to the public domain (meaning that the general public is free to duplicate and distribute the actual work), then the state DOT may be able to achieve this goal merely by incorporating a notice into any such publication that the state DOT encourages the duplication and distribution of the work by others and will decline to enforce its copyright (perhaps conditioned on attributing the work to the state DOT).

As with patentable inventions, even if the state DOT intends to make the information in works of authorship freely available, the state DOT may register a copyright in such works merely to preempt a claim to the copyright by others. If the state DOT registers a copyright, others may be unwilling to duplicate and distribute the work because of concerns about copyright infringement, even if the work incorporates the permission notice described above. In such cases, if state

law permits, the state DOT may grant others a royalty-free license to duplicate and distribute the copyright-protected work (similar to the licenses available via Creative Commons). Doing this has the same effect as a dedication of the work to the public domain (*171*).

6.5 Licensing

A license is a legal contract in which the licensor grants a licensee the right to use his or her IP. Almost anything can be licensed as long as it contains a protectable property right. These rights are legally protected through the use of patents, trademarks, copyrights, and trade secrets. A license allows a person, organization, or entity to use the protected rights under the terms and conditions established in a license agreement (*172*).

A license agreement defines exactly how the granted rights can and should be used. These agreements typically consist of:

- A clear statement of the licensed subject matter and the scope of rights being granted by the owner/licensor to the licensee.
- Identification of specific terms and conditions about the scope of the license (e.g., exclusive or nonexclusive), the field in which the licensed activities may be conducted, and the duration of the agreement. Licenses typically will be nonexclusive, but the contracting parties generally are free to negotiate an exclusive license as long as that would not breach licenses that have been granted to other parties.
- A statement regarding the specifics of the compensation provided by the licensee for use of the IP rights (running royalty, lump-sum payments, fixed payments, or nonmonetary).
- Additional terms and conditions as needed.

Typically, these license agreements are negotiated between the interested parties. Several factors should be considered in the negotiation:

- The strength and scope of the protected IP.
- The expense necessary for a license to reach full production.
- The cost of any additional R&D required.
- The exclusivity or non-exclusivity of the licensing agreement. (Licenses typically are non-exclusive, but the contracting parties are generally free to negotiate an exclusive license provided that would not breach licenses that have been granted to other parties.)
- The geographic scope of the license.
- The competitive product, process, and technology available to the perspective licensee.
- The total market and its estimated growth.
- Common industry or standard license rates.
- Whether the license covers all or part of a process or product.

Licensing offers a number of benefits, especially from the perspective of the state DOT. Licensing may provide:

- A mechanism to commercialize technology.
- An additional revenue stream.
- An opportunity to incentivize employee-inventors.
- An opportunity to further support economic development for the state.

6.5.1 Licensing at the State DOT

The state DOT does not need to own title to IP in order to use it—typically, a nonexclusive license from the IP owner will be available and sufficient for most state DOT needs. A license

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to use IP is similar to the concept of an easement over real property—an interest short of title that nevertheless allows the state DOT limited use of the property for specific purposes or for a specific timeframe.

When IP is registered with the federal government, it is typically with an eye toward commercially exploiting that property. The title holders are therefore usually more than willing to negotiate to provide a license to a state DOT. Payments may be made to the title holder, which then allows the licensee to use the IP within the negotiated terms of the license.

Licenses are highly flexible and can be crafted to convey a wide range of interests in the IP. The scope of a license may be unlimited (i.e., the full scope of the title holder's usage rights), limited to certain IP (e.g., only to improvements made with state DOT funding), limited to specific applications, limited to certain frequencies of use, limited to certain users (e.g., exclusive and/or nontransferable), and/or limited to certain timeframes (e.g., permanent, or with an expiration date). Licenses will typically be nonexclusive, but the contracting parties are generally free to negotiate an exclusive license as long as that would not breach licenses that have been granted to other parties.

The scope of a license often is defined by contract (e.g., between the IP owner and the state DOT). Therefore, the scope of a license can be tailored, within the procurement authority of the state DOT, to meet the state DOT's objectives and budget. At the broader end of the spectrum, the license may be transferable and provide for unlimited use of the IP by the licensee. This is typically the case when purchasing commercial off-the-shelf products such as machines or software—the purchaser typically has a license to use that product as often as is necessary, in whatever manner is desired. The licensee typically is not authorized to make unlimited copies of the product, but especially in the case of software, a typical license may provide for a fixed number of installations or copies. The purchaser typically can transfer the license (e.g., by selling the product), at which point the original purchaser's license to use the IP typically expires. Although this is the most common form of license, an almost limitless variation of license terms could conceivably be negotiated:

- The IP owner may make the license nontransferable (e.g., to keep the IP out of the hands of competitors).
- The license may expire after a certain time limit, or after a certain number of uses. The state DOT as licensee may prefer this approach in certain situations, such as if the state DOT anticipates that the technology will be obsolete at the end of the license term, so that a longer term is not warranted.
- The licensor owns a collection of IP rights (patents, copyrights, trademarks, and even trade secrets) that it bundles into a single license package. If the state DOT can determine what subset of IP it really needs, it may be able to negotiate a license to a limited subset of the IP at a reduced price.
- The IP owner may offer a license to the state DOT at a reduced price over its commercial rates but limit the license to government purposes only.
- The IP owner may limit the license to a specific project or application, such as projects on which the state DOT engages the IP owner as a contractor. This often is the case when the IP owner's commercialization model is to self-perform the work rather than license the IP to other service providers, perhaps to avoid disclosing trade secrets or know-how associated with the work. (See the mechanically stabilized earth [MSE] wall case study in Chapter 9 of this Guide.)

Because the state DOT's bargaining power will typically be much stronger than that of the average consumer of IP, an almost limitless variety of licenses could conceivably be constructed

between a state DOT and third-party IP licensors. There will be two primary limitations on the scope of the license:

- First, the license will be limited by the title holder's property interest. For example, if the title holder holds a patent in an improvement or a copyright in a derivative work, the title holder's property interest may be very "thin," so that the IP cannot be used without an additional license from the title holder of the underlying IP.
- Second, statutory limitations on the state DOT's ability to contract for proprietary commercial products may exist.

If the state DOT has played a role in creation of the IP, a license may arise by statute rather than (or in addition to) by contract. For example, under federal law, the federal government typically takes a license to use IP developed with federal funding. For inventions made with federal funding and patented by the federal contractor, the federal government "shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice, or have practiced for or on its behalf, the subject invention throughout the world" (*173*). For data (other than software) developed with federal funding, the federal government receives "a paid-up, nonexclusive, irrevocable, worldwide license in such copyrighted data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly by or on behalf of the [g]overnment" (*174*). For software developed with federal funding, the federal government takes a similar license, although the license does not include the right to distribute copies of the software to the public.

State statutes may or may not provide similar license rights to state DOTs for IP developed under state DOT contracts. Obtaining the right for the state DOT to continue to use IP developed with public funding may be one the most important reasons for IP management by state DOTs. Therefore, contract documents should clearly provide that the state DOT takes a paid-up, unlimited license to use IP developed with state DOT funding or to have the IP used on behalf of the state DOT.

More complex licensing issues arise when pre-existing proprietary IP is improved with state DOT funding, or when state DOT products build upon pre-existing proprietary IP. Under the federal model, the contractor who intends to assert ownership of pre-existing proprietary IP, developed solely at private expense, is required to disclose the existence of the proprietary IP and obtain approval from the federal government to incorporate it into the government contract. Then, the government will typically take what is known as a limited license, restricted license, or government-purpose license. These types of licenses allow the government to use the deliverable but can restrict the government from further development of the IP without the participation of the IP owner. For example, if a contractor incorporates technology protected by patent or copyright, or as a trade secret, into its government contract, and properly discloses and marks the proprietary IP, the government may be unable to continue development using a different contractor without first negotiating with the IP owner for a broader license than was initially provided.

It is important that state DOTs consider the scope of the license required, not just to perform a current project or contract, but also in relation to whether incorporating licensed proprietary IP into a state DOT project or contract will create licensing problems in the future. At a minimum, contractors should be required to disclose to state DOTs the scope of proprietary IP that the contractor intends to use or deliver in performance of a state DOT project. Apart from the licensing considerations, the state DOT may be restricted by state statute from contracting for proprietary IP. Also, if use of proprietary IP is permitted, the state DOT needs to know whether the contractor is supplying proprietary IP so that the state DOT can properly exclude the contractor's trade secrets from public records requests.

6.5.2 Reasons the State DOT Might Take a License

A license is a more limited option than outright IP ownership. Generally speaking, a licensee does not have the right to exclude others from exercising the IP. For most operations, a state DOT will not need the right to exclude others from using the IP. A license generally will suffice if the state DOT only needs the right to use the IP. Otherwise, whether a license will be sufficient depends largely on the state DOT's objectives with respect to IP management and commercialization.

Government policy often requires that government-funded IP be transferred to the commercial sector to promote economic development (*175*). This policy is perhaps the most likely reason that agencies such as state DOTs might elect not to retain title to IP funded by the agency, but rather transfer the title to a commercial interest while retaining a paid-up license. As discussed in greater detail in Section 6.2, federal agencies generally are required by statute to grant their contractors title to IP developed by the contractors with federal funds, to better promote commercialization of the IP. However, the commercialization success of this federal approach has been mixed (*176*). Generally, state DOTs and state legislatures have the freedom to craft different policies and statutes that better conform to the state DOT's commercialization objectives.

In the survey of state DOTs conducted during the development of this Guide, when queried on their role in the commercialization of technology generated from funded work, 53 percent of respondents indicated that the state DOT does not involve itself in commercialization activities; however, 32 percent of respondents reported that the state DOT may actively encourage commercialization by pursuing IP protection, assisting its contractors in commercialization activities via licensing for a fee, or encouraging the commercial use of the technology royalty-free. The wide range of approaches revealed by the survey suggests that state DOTs may reach very different decisions regarding taking title or license to IP, depending on their commercialization objectives and priorities.

CHAPTER 7

Managing Revenue Earned from IP

7.1 IP Revenue Management and Revenue Sharing

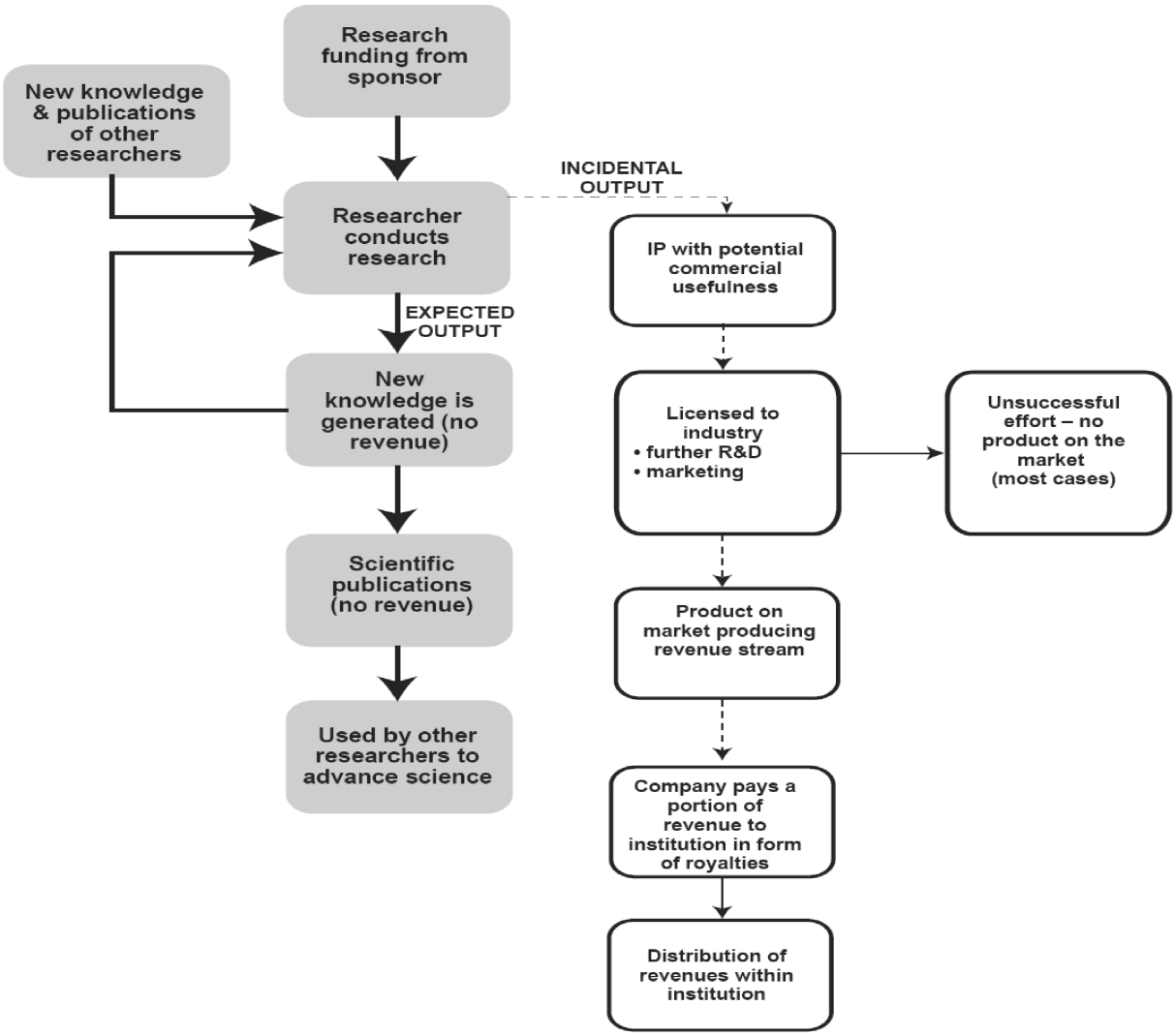
Typically, an organization must own the IP rights to collect a royalty or licensing fee. If, however, a state DOT has funded a project that results in a protectable asset, a revenue stream may be established in the initial agreement with a party (e.g., employee, contractor) that will take ownership of the IP. The agreement can mandate a percentage of the financial returns that would be given to the state DOT. The risk in this model is that the state DOT's revenue stream from IP completely depends on the marketing and commercialization efforts of the IP holder.

In many cases, placing the burden and risk of the commercialization on another party is in the best interest of the state DOT and the IP. However, it is recommended that if the state DOT intends to establish a revenue stream from a particular IP asset, the state DOT should take title in order to control the process (e.g., commercialization, march-in rights). For example, the Texas Department of Transportation (Texas DOT) reportedly licenses and receives revenue for the trademark "Don't Mess with Texas®." The state DOT has control over its use and only gives permission for uses that fit with their plans in exploiting this IP.

When IP that is sponsored or owned by a state DOT generates a financial return, it is important to have a policy in place for sharing the revenue. In the event that the IP is of no interest to the state, the technology may be released to an employee-inventor, who then is allowed to pursue IP protection. Effective IP management can create a win-win situation in economic development for both the general public and the state. Many university and federal laboratory-based technology management offices have policies that mandate the percentage of any revenue earned by the IP asset to be shared with the inventor or creator of the IP assets. Some of these policies have distribution sharing as high as 40 percent, after IP registration and processing costs have been deducted. Common practices found in private companies are less-often based on a percentage of licensing revenue. Rather, they are based on specific amounts. For example, if an invention is awarded a patent, the inventor may receive $10,000. When the distribution to the inventor/creator is attached to a licensing revenue stream, however, the total distribution value may be capped (e.g., the policy might state that the amount of money paid to the inventor/creator will not exceed $1,000,000).

Unlike companies in private industry, public agencies need to manage licensing revenue in a way that returns this economic value back to the state. Figures 12 and 13 show flowcharts of an IP management framework and revenue-sharing process suggested by the California Council on Science and Technology.

For those state DOTs that view their research and development as the highest potential opportunity for IP, Figure 14 shows the interdependencies between the funding and the transfer of technology at the National Renewable Energy Laboratory (NREL). In this model, NREL is funded by taxes via the federal government. Researchers at the lab develop technologies and



Source: California Council on Science and Technology Intellectual Property Study Group.

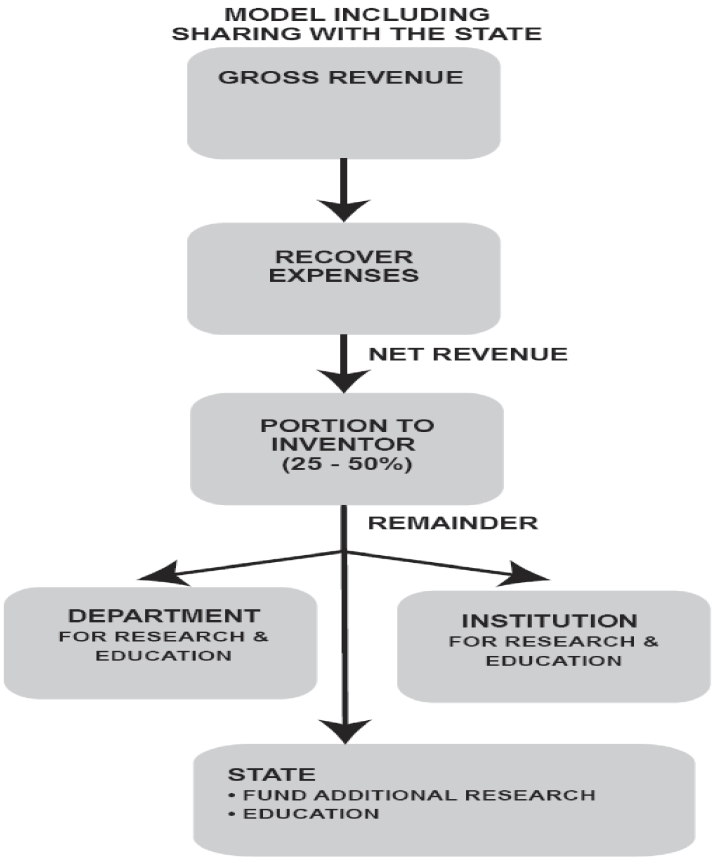
Figure 12. IP management framework for state-funded research.

create publications that are released to the public. For some technologies, IP is pursued by the technology transfer office. The transfer office subsequently attempts to license the technology to companies who will then commercialize the technology. If revenue is received by the technology transfer office, it is shared with the researcher.

These examples demonstrate the coexistence of a new knowledge-creation model through research and publishing with the commercialization and exploitation of any resulting IP. This model could be used by state DOTs developing IP management revenue management programs. The model also demonstrates how a state DOT could expand its support for economic development through more proactive IP management.

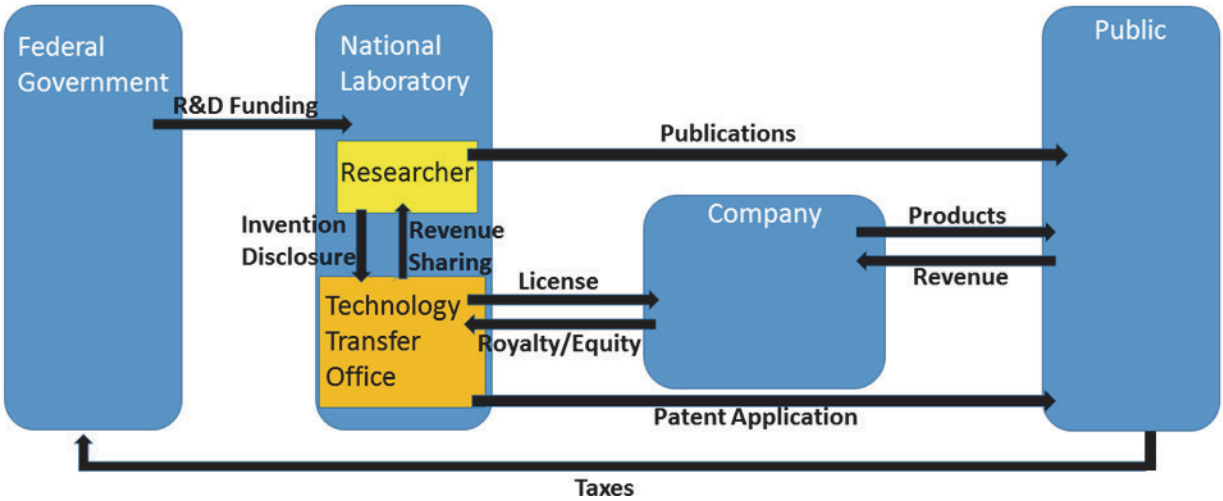
7.2 Future Investments

In 2008, FHWA, AASHTO, and NCHRP sponsored a scan of international transportation research programs to assess international practices and identify ways to make transportation research programs in the United States more effective. A common theme identified in other



Source: California Council on Science and Technology Intellectual Property Study Group.

Figure 13. Revenue sharing for state-funded research.



Note: Model of technology transfer used in many federal laboratories.

Figure 14. IP management.

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countries was the conclusion that the U.S. needs to "figure out its IP issues" with respect to government-funded transportation research (*177*). This comment appeared to be directed largely at the lack of patents issued as a result of government-funded transportation research in the United States. In the European and Asian countries surveyed, patents were one measure of the effectiveness of transportation research programs and were seen as keys to national economic growth.

The idea that the United States still needs to "figure out its IP issues" with respect to government-funded research may at first come as a surprise, because the U.S. government now has decades of experience with technology transfer and commercialization of federally funded IP. For example, considerable thought and effort have been put into the federal acquisition regulations (FARs) governing IP ownership for federally funded research. In the transportation arena, however, much R&D is performed at the state level or funded by state governments, in which case the federal mechanisms may not apply.

It is fair to consider whether the federal framework is well suited for transportation R&D and improvement projects, many of which are conducted at the state DOT level.

Many federal, state, and local government entities support technology transfer from academic and nonprofit research institutions to private businesses. They may do so through technical assistance to establish and enhance small businesses, technology transfer through partnerships among businesses, academic, and nonprofit research institutions, or by helping small businesses apply for funding and technical assistance.

A review of a state DOT's website quickly reveals the on-going projects sponsored by that state DOT. States sponsor projects related to materials, sensors, traffic analysis, traffic data, and various software applications. Because state DOTs are major investors in the creation and development of IP, they undoubtedly view IP as a key asset.

As noted in the discussion of public domain in Chapter 6, there need not be a conflict between IP ownership by the state and dedicating the IP to public domain. Even if IP is not considered a significant revenue stream for the state DOT, proactive management can help establish and clarify issues of ownership and accessibility, and also support and encourage innovation by sharing the results and outcomes of state DOT projects.

State DOTs' responsibilities include managing the risks associated with investment in their many transportation products. Risks may be associated with the expectation to have continued access to innovations developed with state DOT funding; becoming captive to incumbent contractors with proprietary technology; ensuring consistent use of proper procedures to shield state DOT contractors from potential IP infringement claims by other state DOT contractors or third-party patent owners; and/or encouraging the most efficient methods of technology transfer. Ample examples—including the case studies presented in Chapter 9 of this Guide—suggest that these risks are real. Additionally, research shows that proactive IP management may be able to mitigate some risks.

Although risk management is a very important motivator, some state DOTs also may be motivated to use their IP as a revenue generator. Some of the best practices in IP management from federal laboratories, universities, and the private sector may provide adaptable models for state DOTs. Also, as state governments move toward more privatization, IP issues may become more prominent, and the need for effective IP management will be pertinent.

CHAPTER 8

Measuring the Effectiveness of IP Management Efforts

8.1 Monitoring IP Management Progress

It is important to monitor and audit the various types of agreements (e.g., CRADAs) a state DOT may have in place, as well as any licensing compliance. (For more information, see the discussion of IP audits in Chapter 2.) It is also important to measure the success of the state DOT's IP management program. Among other things, these assessments may provide a trigger to initiate march-in rights, if applicable.

The guidance provided in this chapter borrows from the model used by the White House Office of Management to assess the success of a policy, adapting it for use in IP management (*178*). The model considers four key metrics: inputs, outputs, outcomes, and impacts. The discussion highlights how these concepts may be applied to IP management:

- **Inputs:** Numbers of IP disclosures, patent applications, copyright applications, trademark applications, and registrations. The applications and registered IP may include IP from both employee-inventors who were given the option to pursue IP protection for a technology and contractors/consultants who have filed for IP protection.
- **Outputs:** Numbers of licenses, technology transfer agreements, licensing income, and royalty-free agreements, or even potential lives saved due to a state DOT innovation.
- **Outcomes:** Numbers of new products (derivatives) in the market using protected IP, including protected technology. The products may be based on technology developed directly from the state DOT, or may be based on technology that was licensed and further developed by a contractor or employee who subsequently commercialized a product. An additional outcome may be the aggregate number of states, counties, and cities that have implemented or deployed the IP. Outcomes also may encompass the number of publications, number of new research projects funded by revenue from IP management, and new knowledge creation.
- **Impacts:** New jobs created, payroll from jobs, and regional economic development.

These types of assessments have been undertaken by organizations such as the U.S. Department of Defense (DoD) and the U.S. Navy to better understand the nationwide economic impact of their technology transfer and IP management efforts. In a study conducted by DoD and the Navy, the research data suggests that the economic impact of DoD technology transfer and IP management over the period 2000–2009 was $729 million, and that 4,290 new jobs were created. The impact of the Navy's technology transfer and IP management over the period 2005–2009 was $545 million, and 2,630 new jobs were created (*179*).

Having an effective way to measure the outcomes of a state DOT's IP management program is important. Traditionally, many measures of the success in IP management programs have been based on licensing revenue and new product development has been the key benchmark. For the state DOT, the value that is created by its IP assets may be linked far more to social benefits, such

IP management helps state DOTs:

- *Maintain access to results derived from funded projects or employee-inventors/creators.*
- *Protect the interests and IP rights of others.*
- *Shield state DOT contractors from IP infringement claims by other contractors or third-party patent owners.*
- *Identify contributions to the field by DOTs, including contractors and employee-inventors/creators.*
- *Secure monetary compensation for use of state DOT–owned IP.*
- *Encourage investment in technology development and commercialization.*
- *Avoid becoming "captive" to incumbent contractors with proprietary technology.*
- *Provide a mechanism for outbound licensing of rights to IP.*

Goals

- *Ensure that state DOTs have continued access to innovations developed with state DOT funding.*
- *Obtain access (e.g., reciprocal licenses) to innovations developed by other public bodies (e.g., FHWA, other state DOTs, other state agencies).*
- *Reduce constraints imposed by third-party proprietary technology.*
- *Shield state DOT contractors from IP infringement claims.*
- *Encourage efficient transference of new inventions/innovations to practice.*
- *Support economic development (and perhaps spur economic growth) in the state/nation.*
- *Maximize the return on taxpayer dollars.*

as the estimated number of accidents circumvented or prevented and/or the number of lives saved by state DOT innovations. Two such innovations are truck-mounted attenuators and rumble strips. These technologies have been successfully researched, developed, and deployed to the benefit of many motorists and transportation employees (*180*). Furthermore, these technologies have been managed with an intent to accelerate their adoption and implementation. Had these technologies been managed with a defensive and protection-based IP strategy, their adoption and use could have been slowed and/or hampered, which in turn would have limited the benefits of these technologies. IP management has played a significant role in the exploitation of these technologies. Although most monitoring efforts may focus on numerical factors to gage success (as in the case of the U.S. Navy and the DoD reviews), it is important that social metrics also be considered to ensure a balanced appraisal of success.

The specific goals for measuring and assessing the impact of IP management will vary from one state DOT to another, but the aforementioned metrics provide the flexibility for multiple objectives.

CHAPTER 9

Case Studies

This chapter details five important case studies that illustrate IP management challenges. These cases provide practical examples of the information discussed throughout this Guide.

9.1 Mechanically Stabilized Earth Wall

During the early 1970s, the Georgia Department of Transportation (Georgia DOT) began allowing its contractors to use mechanically stabilized earth (MSE) retaining walls as alternatives to traditional cast-in-place (CIP) concrete retaining walls. At the time, MSE retaining walls were understood to be subject to patents issued to French inventor Henri Vidal (*181*). In 1971, Vidal established a U.S. corporation, the Reinforced Earth Co. (RECO), as the exclusive U.S. licensee of his patents (*182*).

The RECO retaining wall used a cruciform-shaped facing block with steel straps extending into the retained backfill as reinforcement. However, RECO and Vidal would aggressively challenge other variants of MSE walls (such as those using different facing blocks and different reinforcement methods). In some cases, RECO obtained rulings that its competitors' products infringed the Vidal patents, which effectively stopped use of the infringing products in the United States (*183*). In other cases, RECO challenged the validity of its competitors' patents (citing the Vidal patents as prior art), and its competitors claimed that the resulting "cloud" on their patents impinged their ability to develop a marketable product (*184*). RECO also sued its competitors for misappropriation of RECO's trade secrets, such as aspects of its proprietary design and construction methods that were not disclosed in the Vidal patents (*185*). As a result, there was very little competition for MSE walls; RECO effectively had a monopoly on MSE retaining wall construction for all state DOTs (*186*).

Use of the MSE retaining wall as an alternative to CIP walls was effective at reducing the cost of construction for the Georgia DOT in the early 1970s, from $\$60/ft^2$ for CIP walls to $\$45/ft^2$ for MSE walls (*187*). However, Georgia DOT contractors were required to subcontract with RECO to design and build the proprietary system. The Georgia DOT began to believe that the RECO walls were more expensive than they needed to be, and that some competition was needed to reduce prices. The Georgia DOT also believed that RECO's proprietary design methodology was overly conservative, further increasing the price of the RECO walls.

In the early 1980s, the Georgia DOT developed an alternative MSE wall, known as the Georgia Stabilized Embankment (GASE) wall. This technology was developed by Georgia DOT employees with the understanding that the Georgia DOT (and not its employees) would own all IP rights (although the Georgia DOT did not attempt to patent the system). Relying on large-scale laboratory test results performed by the California Department of Transportation (Caltrans) on the effectiveness of wire mesh for earth anchoring, the GASE wall used a steel grid (rather than RECO steel strips) as the reinforcement material (*188*). The GASE wall also used a more rounded

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facing block than did the RECO wall. The Georgia DOT developed its own method of analyzing the GASE wall based on traditional soil mechanics (*189*), and developed a computer program to design GASE walls independent of the proprietary RECO design methodology. Nevertheless, RECO believed that the GASE design infringed the Vidal patents and threatened legal action.

The Georgia DOT and RECO reached a settlement in which Georgia DOT was required to pay a royalty of $1/ft^2$ for every GASE wall, with royalty payments made directly to Vidal, not to RECO (*190*). In exchange, RECO granted Georgia DOT a sub-license to the Vidal patents. The sub-license arrangement was in force through August 1989 (*191*).

The Georgia DOT considers this experience to have been a success, as it created competition for MSE walls. Contractors had the choice to subcontract with RECO to build the proprietary Vidal wall, or the contractors could build the GASE wall (and include $1/ft^2$ for royalty fees in their bid price). Contractors electing to use the proprietary RECO wall would take on design-build responsibilities, whereas the Georgia DOT would design the GASE wall (using its internally developed software and methods) for contractors electing to build the GASE wall. This arrangement was effective in reducing the price of MSE walls, from approximately $45/ft^2$ for the RECO wall in the late 1970s, down to an average of $32.74/ft^2$ for the RECO wall (and $29.61/ft^2$ for the GASE wall) in 1984 (*192*). It also created a local cottage industry for manufacturers who supplied the facing block and reinforcing grid for the GASE wall.

The GASE wall was not adopted by other state DOTs (although the GASE wall was based in part on the stabilized earth system developed by Caltrans, suggesting that other state DOTs were taking similar approaches to work around the Vidal patents). In the early 1990s, shortly after the RECO sub-license agreements (and certain Vidal patents) expired, contractors stopped opting to build the GASE wall. By that time, competitors were able to bring their own variants of the MSE wall to market using non-metallic geotextiles or polymer geogrids as the reinforcement material, without concerns about infringing the Vidal patents. To some extent, the research and innovation by state DOTs that was conducted during the time the Vidal patents were active facilitated entry into the marketplace by competitors once the patents had expired.

9.1.1 Case Analysis: MSE Wall

The GASE case study illustrates a state DOT actively seeking a workaround to avoid the monopoly costs (to itself and its contractors) created by the U.S. patent system. It also shows the IP management strategy of many private entities. In many cases, private organizations seek to aggressively protect their IP and to leverage it via product development and licensing. The private firm RECO was able to capitalize on its IP in an industry where the key customers were state DOTs. Although the Georgia DOT was successful in introducing a competing technology, RECO was still able to profit from the new technology as a result of its IP ownership.

It can be argued that the success of GASE was due in part to the fact that the Georgia DOT and Caltrans did not attempt to protect their IP but effectively devoted their innovations to the public domain. Also, the Georgia DOT recognized potential legal conflicts over IP ownership and resolved those conflicts with the patent owner and licensee, shielding its contractors from potential liability. It is significant that the Georgia DOT was proactive in managing this technology in order to help decrease cost and to bring new innovation to the marketplace.

9.2 Paver Placed Surface Treatment

In approximately 2000, the Vermont Agency of Transportation (VTrans) identified paver placed surface treatment (PPST), or chip-seal, as a potentially cost-effective alternative to the traditional mill-and-fill method of resurfacing highways (*193*). VTrans understood the PPST

method to be covered by a U.S. patent (*194*), which describes first coating the road with a layer of bituminous binder, followed by a thin layer of aggregate coated with a bituminous paste. The French patent owner also registered the trademark NovaChip in the United States (*195*), and the patented chip-seal method was marketed as NovaChip by SemMaterials, L.P. (in certain parts of the United States) and by Midland Asphalt Materials, Inc. (in certain other parts of the United States) under licenses with the patent owner. The licensees (SemMaterials, in particular) actively enforced their licenses by filing patent infringement lawsuits against contractors who furnished chip-seal resurfacing under contracts with state DOTs in the licensees' respective territories (*196*).

Generally speaking, FHWA regulations do not permit federal funds to be used by state DOTs to pay the costs of royalties or premiums for the use of patented or proprietary technology (*197*). Exceptions to the general rule include research applications "on relatively short sections of road for experimental purposes," or when the state DOT is willing to certify that the "patented or proprietary item is essential for synchronization with existing highway facilities, or that no equally suitable alternate exists." If acceptable alternatives to the patented technology are available, then the state DOT can generally obtain federal funding for the price that would result from competitive bidding involving both the patented technology and the unpatented alternative (*198*).

VTrans experimented with the use of NovaChip, first on an entirely state-funded resurfacing project in 2001, then on a federally funded experimental demonstration project in 2006. After concluding that NovaChip was a desirable replacement for traditional mill-and-fill techniques, in 2007, VTrans obtained federal funding and issued a solicitation for resurfacing a portion of I-89 (*199*). The solicitation specifically required the use of "paver placed surface treatment," although it did not identify NovaChip by name. VTrans included the following pro-competition provision in its solicitation:

> NOTICE TO BIDDERS. All bid proposals submitted for this project shall be non-proprietary. The State of Vermont will not recognize proprietary bids or other single source proposals (*200*).

VTrans received three bids: two from contractors (Gorman Bros., Inc., and All States Asphalt, Inc.) who held sub-license agreements with Midland Asphalt to use NovaChip, and one from Pike Industries, Inc., which had received subcontractor bids from both Gorman and All States. Gorman bid a price of $\$2.25/yd^2$ for the NovaChip work, and All States bid a price of $\$2.65/yd^2$ for the NovaChip work. Pike's bid proposed to use Gorman as its subcontractor (*201*).

Gorman was the overall low bidder, but apparently Midland Asphalt's sublicense agreement with All States gave All States the exclusive right to provide NovaChip in the territory where this resurfacing project was located. Midland would not allow Gorman to perform the contract, so Gorman withdrew its bid, forfeiting its bid bond of $32,095.60 (*202*). When Gorman informed VTrans that All States had an exclusive sublicense agreement to provide NovaChip in the territory, VTrans also disqualified All States for violating the "pro-competition" provision (*203*). That left Pike as the only remaining bidder. However, Midland Asphalt would not allow Gorman to perform the subcontract work for Pike, given Midland Asphalt's exclusive sublicense to All States for that territory. Nevertheless, Pike executed the contract with VTrans in June; then, in July, Pike filed a claim with VTrans for the additional cost of hiring All States as its subcontractor (i.e., an additional $\$0.40/yd^2$, plus Pike's additional overhead and profit, for a total claim of $57,600) (*204*). The claim was denied by VTrans, and Pike appealed to the Vermont Transportation Board (the Board).

On appeal, the Board concluded that Pike was not entitled to a contract adjustment (*205*). Pike was aware at the time of its bid that NovaChip was proprietary, as Pike had performed other NovaChip projects elsewhere in the United States under a sublicense from SemMaterials. Pike also knew at the time that it executed the contract with VTrans that Gorman did not have a valid sublicense for that territory. Pike could have attempted to recover its damages from Gorman

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(given that Pike's contract price was based on representations from Gorman that Gorman had a valid NovaChip sublicense). Pike could have requested to be disqualified (like All States) for offering to supply a proprietary product, or alternatively, Pike (like Gorman) could have declined to execute the VTrans contract (and forfeited its own bid bond). However, by executing the contract with full awareness of the IP constraints, Pike voluntarily took on the responsibility for the license fee.

Although the Board concluded that Pike was not entitled to a contract adjustment, it observed that VTrans had in effect created an "impossible" situation for Pike by soliciting a proprietary product while simultaneously providing that no proprietary proposals were permitted (*206*). The approach taken by VTrans appeared to be aimed at obtaining federal funding for the entire project, including the NovaChip royalty, violating the spirit of FHWA regulations related to patented or proprietary materials. In order to require the use of NovaChip and still obtain federal funding, VTrans could have certified "that no equally suitable alternate exists," or sought a ruling from the FHWA that requiring NovaChip was "in the public interest." Alternatively, VTrans could have solicited traditional mill-and-fill resurfacing, with PPST listed as an acceptable alternative. Then, if a NovaChip licensee prevailed in a competitive bid against the non-proprietary resurfacing methods, there would be no problem awarding the bid to the NovaChip licensee. However, if VTrans received a lower bid for a non-proprietary method, federal funding would be limited to the amount of the lower bid.

9.2.1 Case Analysis: PPST

The PPST case study illustrates the very limited protection afforded by sovereign immunity regarding patent infringement. State DOTs still must be concerned about patent royalties because their contractors can be liable for patent infringement, and the state DOTs themselves can be liable under state law claims. If the state DOT realizes that its solicitation includes proprietary technology, this should be made clear in the solicitation so that the contractor clearly understands its potential liability. It is also recommended that the state DOT specify acceptable nonproprietary alternatives whenever possible, if for no other reason than to justify federal reimbursement for patent royalties.

In an interesting postscript, the PPST patent was subsequently acquired by Road Science, LLC, a successor of sorts to SemMaterials (which was dissolved in bankruptcy). Road Science has continued the aggressive strategy of SemMaterials of suing state DOT contractors for patent infringement for chip-seal resurfacing work performed without a NovaChip license (*207*). Although the original PPST patent has expired, Road Systems has obtained a new patent describing a similar but purportedly improved method (*208*). Road Systems has marketed this product as BondTekk, and continues to market NovaChip licenses bundled with BondTekk licenses. Road Systems has informed various state DOTs, as well as contractors purchasing spray pavers, that certain uses of spray pavers and chip-seal treatments may require a NovaChip/BondTekk license. One condition of the license is that the licensee may *only* use the Road Systems licensed methods for chip-seal treatment, even though the original PPST patent has expired. Roadtec, Inc., a manufacturer of spray pavers whose customers have solicited to purchase licensing agreements from Road Systems, has sued Road Systems in an attempt to have the new Road Systems patent invalidated (*209*). However, this illustrates that the loss of patent protection does not automatically make the technology available royalty-free to state DOTs. Technology providers are increasingly relying on non-patent methods, including the use of trade secrets, trademarks, and private agreements, to maintain proprietary control of technologies that could benefit state DOTs.

In the PPST case, state DOT contractors were encumbered by the third-party owner of the IP, which was very willing to enforce its rights. There are cases in which third-party IP is needed or

desired. Legal mechanisms and instruments (contracts, licensing agreements, etc.) are in place to facilitate gaining access to third-party IP; however, it is important that state DOT research and development be forward-looking to ensure that state DOT R&D investments target key areas where privately funded R&D is ongoing.

9.3 Guardrail End Terminal

In 1990, employees of the Texas Transportation Institute (TTI) of the Texas A&M University System (TAMU) obtained a patent on a guardrail end terminal designed to improve highway safety (*210*). The terminal, to be installed on the end of a W-beam steel guardrail, included a narrowing throat section. If the terminal was impacted by a vehicle, the W-beam guardrail would be squeezed through the narrowing section, causing the W-beam to flatten and then bend. This reduced the potential for the W-beam to impale the vehicle. The patent was assigned to TAMU upon issuance, and then licensed to Trinity Industries, Inc. Trinity marketed the patented guardrail end terminal to state DOTs as the "ET2000" impact head.

The ET2000 impact head was the result of a study proposal funded under a 1985 Cooperative Research Agreement between TTI and the Texas Department of Transportation (Texas DOT) (*211*). Under the Cooperative Research Agreement, the Texas DOT provided funding for approved research to be conducted by TTI. The funding included state highway planning and research (HPR) funds from FHWA, as well as significant funding from the state of Texas. Under the Cooperative Research Agreement, TTI granted all state DOTs the "right to practice" and "distribute" inventions made with Texas DOT funding (*212*).

In 1992, one of the inventors of the ET2000 impact head, Dr. Dean Sicking, left TTI to become the director of the Midwest Roadside Safety Facility (MwRSF) at the University of Nebraska-Lincoln (*213*). At MwRSF, Dr. Sicking continued to perform R&D related to guardrail end terminals, obtaining patents on impact heads including the Sequential Kinking Terminal (SKT) (*214*), Flared Energy Absorbing Terminal (FLEAT) (*215*), and Beam Eating Steel Terminal (BEST) (*216*) systems. SKT and FLEAT were licensed to Road Systems, Inc., and BEST was licensed to Interstate Steel, Inc., of which Road Systems and Interstate Steel were affiliated Texas corporations.

Trinity and TAMU sued Interstate Steel, Road Systems, their common owner, and Dr. Sicking for patent infringement (*217*). The U.S. District Court for the Eastern District of Texas conducted a Markman hearing (a kind of pretrial hearing) to construe the claims of the ET2000 patent. Trinity and TAMU sought a ruling that the narrowing throat of the ET2000 impact head was not a necessary element of its patent, because the SKT, FLEAT, and BEST systems did not have a narrow throat, but rather used different methods to kink or otherwise deflect the guardrail beam. In September 2000, however, the court ruled that the "squeezing" element of the ET2000 patent necessarily involved "narrowing," so that any impact head must include a narrowing element to infringe on the ET2000 patent (*218*). More than 2 years later, in December 2002, the court relied on its Markman claim construction to rule that the SKT, FLEAT, and BEST devices did not literally infringe the ET2000 patent, saying: "There is no evidence that the accused devices contain a narrowing structure" (*219*). However, the Court held open the possibility that the SKT, FLEAT, and BEST devices might constitute patent infringement under the "doctrine of equivalents," under which a patent may be infringed by a device that effectively performs the same function in the same way (*220*). The parties reached a settlement shortly thereafter, before the court ruled on the infringement issue (*221*).

The more significant impact of this case is a September 2002 ruling in which the court ruled that the federal government obtained a paid-up license in the ET2000 guardrail terminal

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under the Bayh-Dole Act (*222*). The accused infringers (including Dr. Sicking) asked the court to rule that the ET2000 patent was invalid on the grounds that the inventors—including Dr. Sicking—had failed to disclose to the patent office, as required by the Bayh-Dole Act, that the ET2000 invention was developed with federal funds. Trinity and TAMU argued that the ET2000 invention was not covered by the Bayh-Dole Act because it was developed under a contract (the Cooperative Research Agreement) with the Texas DOT. However, the court ruled that FHWA's HPR funding to Texas DOT was a "funding agreement" subject to the Bayh-Dole Act. Furthermore, by accepting HPR research grant funds under the Cooperative Research Agreement between the Texas DOT and TTI, TTI became a "subcontractor" to the Texas DOT subject to the Bayh-Dole Act (*223*). Therefore, the federal government had a "nonexclusive, nontransferable, irrevocable, paid-up license" in the ET2000 patent, and TAMU was required to disclose the federal government's interest at the time it applied for the patent. The court ruled that this did not invalidate the patent (there was no indication that the USPTO would have denied the patent if it had known about the federal funding). However, the determination that the federal government had obtained a paid-up license to the ET2000 patent by operation of law, simply because Texas DOT funded its development with a combination of state and federal funds, has important implications.

Shortly after that ruling, the defendants filed a number of new affirmative defenses and motions to dismiss, based on the position that the ET2000 patent could not be infringed by sales of SKT, FLEAT, and BEST devices to federal or state governments. Among other things, the defendants claimed immunity under 28 U.S.C. § 1498, which immunizes contractors who infringe patents on behalf of, and with the authorization and consent of, the federal government (*224*). The logic behind this argument is that if the federal government obtained a license to the patent by providing funding for a state DOT research contract, then federally funded state DOT contracts to install the infringing devices might also be "on behalf of" the federal government. This would be analogous to the court's earlier ruling that TTI was a federal subcontractor when it received federal funds through a contract with the Texas DOT. Although a ruling on this argument would be of tremendous importance to state DOTs, the court declined to consider the argument, ruling that the defendants did not raise it in a timely manner. The parties settled shortly thereafter without a ruling on whether the SKT, FLEAT, and BEST devices infringed the ET2000 patent.

9.3.1 Case Analysis: Guardrail End Terminal

This case study has many implications for state DOTs hoping to develop commercial products from research funded by state DOTs. Most significantly, if other courts adopt the position that a state DOT contractor who receives federal funds from the state DOT is a federal subcontractor, then a patent owner might not be able to sue the contractor for patent infringement. Second, it is very important to determine the source of all funds used to develop a patentable invention. If federal funding was used to develop the invention, then (following the logic of this court), the invention is probably covered by the Bayh-Dole Act and the federal government has a paid-up license in the invention. Finally, even if federal funding is not used, state law or state DOT grant conditions may confer licenses to the state DOT, other state DOTs, or the federal government. Any such government license could have a major impact on the ability to commercialize the invention, so state DOTs should identify any such license long before the commercialization process begins, or even before making a decision to pursue a patent. (Immediately after the September 2002 ruling in the Trinity Industries case, Dr. Sicking began to make affirmative statements in his subsequent patent applications that the Bayh-Dole Act was "not applicable" to subsequent guardrail terminal inventions, presumably taking the position that no federal funding was involved in the subsequent work [*225*].)

9.4 Mural on Highway Overpass

In the early 1980s, in preparation for the 1984 Summer Olympics, the Los Angeles Olympic Organizing Committee commissioned 47 murals to be painted along the Los Angeles freeways (*226*). One of these murals, *Going to the Olympics,* was painted by artist Frank Romero on the Alameda Street underpass of California Highway 101 (the Hollywood Freeway). The underpass was considered property of Caltrans. According to Caltrans, all artists painting murals on Caltrans property signed contracts with Caltrans, making the artist responsible for maintaining the murals. "If they don't, Caltrans has the right to correct the problem in its own way," said William Koval, head of the Caltrans office overseeing the murals (*227*).

At the time the mural was painted, California had recently enacted the first modern "moral rights" statute in U.S. IP law, the California Art Preservation Act (CAPA) (*228*). CAPA authorized artists to bring lawsuits seeking damages for the defacement or alteration of recognized works of "fine art," or to bring lawsuits seeking injunctions to prevent such defacement or alteration, even where the artist did not retain title to the artwork. CAPA also contained a notice provision for works of art that are "part of [a] building," where the building owner was required to notify the artist before defacing or altering the artwork, in which case the artist would have 90 days to remove the artwork at the artist's expense and reclaim title to the artwork (*229*). In 1990, after the mural was painted, a similar provision was enacted in federal copyright law, known as the Visual Artists Rights Act (VARA) (*230*). VARA authorized artists to bring lawsuits to prevent the intentional modification of *any* work of visual art, even where the artist did not retain title to the artwork (as long as the artist had not transferred title prior to the 1990 enactment of VARA). VARA also provided that, for visual art that is "part of a building," the building owner was required to notify the artist (via registered mail to the artist's address on record with the Register of Copyrights) prior to removing the artwork, giving the artist 90 days to remove the artwork at the artist's expense (*231*).

In 1998, the highway overpass mural was vandalized with graffiti. At the time, the Caltrans policy was to notify both the artist and the Mural Conservancy of Los Angeles, and give them 45 days to clean or repair the murals at their expense. Caltrans notified the Mural Conservancy "to correct it or else" (*232*). However, Romero said that he was never notified by either Caltrans or the Mural Conservancy (*233*). (Caltrans acknowledged having no written record of notice to Romero, but said that it attempted to contact Romero by phone [*234*].) When no action was taken to clean or repair the murals, Caltrans painted over the bottom third of the mural with gray paint. At the time, questions were raised as to whether the Caltrans policy and actions complied with VARA and CAPA (*235*). In May 2001, Caltrans revised its graffiti policy, agreeing in the future to notify artists by certified mail when their murals were vandalized, and putting a temporary moratorium on the practice of painting over the graffiti with gray paint. While the moratorium was in place, Caltrans considered new guidelines for artwork on Caltrans property, including requiring the artist to post a performance bond to cover artwork maintenance for a specified number of years (*236*).

In 2002, the state of California allocated $1.7 million to Caltrans for the purpose of restoring and preserving the murals. Caltrans ultimately transferred the funds to the Los Angeles Department of Cultural Affairs to apply a protective coating to 17 of the murals (*237*). Romero's mural was restored using a $20,000 donation from the Amateur Athletic Foundation of Los Angeles (*238*), then covered with the protective coating. However, according to Caltrans, "the process proved almost futile" as graffiti returned "[b]efore we could even have the completion ceremony" (*239*). In July 2006, Caltrans crews covering graffiti again painted over Romero's mural. According to Caltrans, the 2006 incident was accidental (*240*). To make matters worse, the protective coating did not work as intended, and the paint could not be easily removed without damaging the artwork underneath (*241*).

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In June 2007, after determining that Romero's mural could not be salvaged, Caltrans again painted over it (*242*). This time, Caltrans notified the Department of Cultural Resources the day after the mural was painted over (*243*). Romero filed suit in federal court in California alleging violations of VARA. Although state governments are traditionally understood to be immune from suit in federal court as a result of the Eleventh Amendment to the U.S. Constitution, Romero argued that the Copyright Remedy Clarification Act of 1990 (CRCA) provided for state governments to be sued for violations of copyright laws such as VARA. Furthermore, Romero argued that Caltrans had waived its right not be sued in federal court by accepting federal highway funds, some of which (according to Romero) were appropriated for mural restoration (*244*).

The federal court disagreed. Although the court agreed that a state agency such as Caltrans could waive its sovereign immunity as a condition of accepting federal funds, there was no evidence that such a condition was attached to the federal highway funds received by Caltrans (*245*). Furthermore, in dismissing Romero's lawsuit, the court held that CRCA itself was unconstitutional. In order to abrogate the states' constitutional rights under the Eleventh Amendment, Congress must have found evidence of a pattern of state abuses of copyright laws for which the copyright owners had no remedy. Instead, congressional hearings on CRCA turned up only sporadic evidence of copyright infringement by state governments, mostly by state universities, not state DOTs. "Also, there was no evidence that Congress considered other possible remedies in state courts—for example, claims for the unlawful taking of private property by the state government or breach of contract claims" (*246*).

Taking his cue from the federal court opinion, Romero immediately filed suit against Caltrans in California state court (*247*). The focus of Romero's lawsuit was not uncompensated takings or breach of contract, but rather violations of CRCA (because CRCA provided for punitive damages in addition to the costs of repairing the mural). It is questionable whether a state court judgment on CRCA violations would be enforceable, given that copyright law has been preempted by the federal government and one typically cannot bring a copyright action in state court. It appears that Romero and Caltrans arrived at a mutual settlement before any judgment could be reached. In 2011, with the support of Caltrans, the Mural Conservancy began a 15-month-long effort to restore Romero's mural. Although Caltrans did not concede liability and did not contribute funds to the mural's restoration, Caltrans did "coordinate permits and logistics, such as coning off sections of the freeway so that work [could] be done." "It's definitely a working partnership," said a Caltrans spokesman (*248*).

9.4.1 Case Analysis: Mural on Highway Overpass

The Olympics mural case study illustrates the general rule that a state DOT cannot be liable even for a pattern of intentional infringement of federal copyright law. However, the case illustrates that contractors working on behalf of the state DOT may be liable, and the state DOT could find itself subject to suit for state law violations such as uncompensated takings, breach of contract, or even state "moral rights" violations. Best practice would be to assume that any applicable federal or state copyright laws might apply, and to obtain the necessary waivers, permissions from the copyright owner, or (preferably) title to the copyright as a condition of commissioning any copyright-protected work. If copyright or license was not obtained from the creator as a condition of performance, then the state DOT should attempt to conform to applicable copyright law (e.g., pay the royalty fee to obtain a license, or provide the notice required under moral rights provisions) to shield itself from suit in state court, or to shield its contractors from suit in federal court.

CHAPTER 10

IP Management Application Examples

This chapter presents some examples of how a state DOT might manage potential IP assets. The scenarios provided cover patents, trademarks, copyrights, and trade secrets. These examples are not exhaustive, but they provide valuable insight into how IP management may be practiced for a particular IP asset.

10.1 The Work Zone Alert Water Curtain: Patent

A state DOT maintenance unit has funded research to develop new technologies and innovations to make work zones safer for its work crews. The contractor working for the state DOT has developed what seems to be an effective approach to addressing this problem. This new technology projects safety alert messages onto a water curtain. The water curtain projections are non-intrusive, do not impede the traffic flow, and are very effective in calling the attention of a driver to the safety messages. The technology borrows from the techniques that are often used at light shows.

After seeing and using the product in a demonstration, the state DOT has decided to adopt and implement this product for use in its work zones. Additionally, the contractor sees opportunities for this product in other markets and for other purposes.

The contractor has submitted a disclosure document discussing the technical details of the technology and the product to the program manager at the state DOT. Additionally, the contractor has approached the state DOT regarding options that would allow the contractor to use this technology for other opportunities.

The R&D that resulted in this technology was supported by state funds only; no federal funds were used. There are no Bayh-Dole implications and restrictions. Per the language in the contract, the state DOT owns the ownership right to the technology and product; therefore, the option to pursue IP protection also lies with the state DOT.

- **Option 1.** The state DOT could decide to relinquish the rights to the contractor in exchange for a non-transferable, irrevocable, paid-up license to use the technology in the state's transportation-related activities, and the contractor could then pursue IP protection via a patent. If the state DOT takes this option, it will have freedom to use this technology on future transportation projects with no additional IP-related cost.
- **Option 2.** Alternatively, the state DOT could dedicate the technology to the public domain, which would allow the contractor or anyone else to use the technology for free. This option may create new competition for the contractor, thus dis-incentivizing the contractor to invest in this potential innovation, because the future economic opportunity is now limited.

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- **Option 3.** The state DOT also could pursue IP protection and subsequently license the IP to the contractor and others in exchange for royalty payments. In this scenario, the state DOT would have the responsibility for commercializing or managing the commercialization of this technology through licensing and other IP management activities. This option may add more cost in the short run but could prove to be profitable in the long run.

The state DOT is interested in managing some of its IP as a new revenue stream. Because the state DOT has been approached by the contractor regarding options for using the technology, there may be an opportunity for licensing the technology for a royalty fee.

Some key questions for the state DOT to consider are:

- Should the state DOT pursue IP protection and then license?
- What is the cost-to-benefit of this strategy?

Having received the disclosure, the state DOT needs to perform due diligence. This includes considering the expected costs of patent protection, which include initial filing fees and prosecution, maintenance fees, allowance fees, costs of reviewing potential prior art, and any potential future marketing or litigation expenses.

Two of the state DOT's goals are (1) to manage its IP for the public good and (2) to maximize taxpayer value. Economic development may fall within those goals. Therefore, licensing IP to the contractor seems to be a suitable option. After a comprehensive due diligence and evaluation of the technology, it seems that the technology is something that is new, useful, and patentable. In this case, the state DOT decides to pursue patent protection.

After filing the nonprovisional patent application with the USPTO, the state DOT can open discussions about licensing the technology to the contractor. A number of licensing options are available (as briefly discussed in Chapter 6 of this Guide). The license can be exclusive or non-exclusive, limited to a specific geographical area or by field of application, and be given in exchange for a royalty or be royalty-free. When considering a royalty, it is important to identify the royalty base—that is, whether the royalty will be calculated on net, gross, or a pre-determined annual payment.

In this scenario, the state DOT negotiates an exclusive license with the contractor that gives rights to all geographic territories and fields of application. Having conducted a market review of royalty agreements of similar technologies, the state DOT establishes a royalty rate of 5 percent based on gross sales of products embedding the technology. The state DOT reserves march-in-rights and gives the contractor the right and support to take legal action against any potential infringers. Anticipating that a patent will be granted on the technology, should a future legal case be brought to invalidate the patent on the technology, the state DOT agrees to work with the contractor to bring these issues to a resolution.

One key assumption in this scenario is that the patent application has been filed but no patent has yet been granted. The assumption is important because the state DOT is acting proactively in pursuing commercial opportunities for its IP. If a patent is not granted, however, details of the patent applications will remain public—so the value of the technology as an IP asset will be lost. The risk that a state DOT would need to recognize is that the cost of obtaining a patent may not be recovered via licensing or other opportunities. This risk must be considered in the cost-benefit analysis when evaluating dispositions for technologies and outcomes from state DOT-funded R&D or other activities.

If the licensed technology is successfully commercialized and generates income, the state DOT also must decide how this new revenue will be used. The revenue could be placed in a general fund, used for other activities (including other economic development activities), or passed back to the taxpayers as a refund.

Had the state DOT relinquished ownership rights to the contractor, the contractor could have received financial gains without any compensation to the state DOT. In terms of maximizing taxpayer value, this may not have been the most desirable strategy.

10.2 Now That's How to Drive: Trademark

A state DOT has launched a new campaign to educate new drivers on good driving skills and practices. The public communications (PC) unit within the DOT has developed a catchy slogan for its marketing and promotions campaign: "***Now That's How to Drive***." The PC unit has submitted the slogan to the legal department to verify that this slogan is not being used by any other organization, and that it has not been trademarked. The results of the trademark search were negative, and the slogan has been approved for use in this new campaign.

In this scenario, the state DOT decides to move forward with federal registration of a trademark for the slogan. The state DOT could have made the decision to use the slogan without seeking trademark protection, but they consider this campaign a significant investment. The state DOT wishes to ensure that any potential assets that could be helpful to this campaign are protected, if possible.

Several other state DOTs seeking to launch similar initiatives are interested in using this slogan. They would like to license the trademark from its owner. As fellow state DOTs, they hope to negotiate for a royalty-free agreement. The owner of the trademark decides to create a boilerplate license agreement for other state DOTs. In this agreement, any interested state DOT will receive a royalty-free license for use of the slogan as it pertains to their safe-driving-skills initiatives. If a state DOT desires to use the slogan for any other initiative, however, there will be a $1,500 fee for each other use. In this case, imposing a royalty for uses other than safe-driving initiatives operates less as a strategy for obtaining revenue and more as a disincentive to use of the slogan in other ways, thus protecting the distinctiveness of the mark. As a result of this strategy, it is anticipated that the widespread adoption of the slogan will increase all motorists' awareness about the importance of learning and practicing safe driving skills.

In this scenario, the widespread use of the slogan and its popularity have gained the interest of certain private and commercial entities. The state DOT has been approached by a golf-club and golf-ball manufacturer regarding using the slogan as a part of their new product's promotional campaign. What should the state DOT do?

The marketing value of a trademark lies in how it is perceived by the consumer. The state DOT must consider whether they would like individuals to think of safe driving and/or golf equipment when they hear the slogan. Of course, licensing the trademark could create an additional revenue stream, but it could devalue the intent of the trademark especially as it relates to transportation and transportation safety. It will be the responsibility of the state DOT to protect the value of its trademark and to police the use of it.

The intent of IP management is to implement strategies to maximize taxpayer value. There will undoubtedly be trade-offs as a DOT attempts to define what maximizing taxpayer value really means on a case-by-case basis.

10.3 Sharing the Road with All Stakeholders: Copyright

A state DOT traffic unit has documented several best practices on sharing the roadway. The final report may have value for many stakeholders including motorists, pedestrians, cyclists, and others. Some of these best practices have been gathered from surveys and interviews, new ideas

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and thoughts of the authors, and other published works. Although fair use may apply to much of the work included in the state DOT's document, the state DOT has been careful to cite all works from which they extracted material and has requested copyright clearance for works that they believe to be copyright protected.

In this scenario, all copyright holders contacted have granted permission for use of their materials without charging a royalty. (If any of the copyright owners wanted to be paid a royalty, the state DOT would then have to decide whether to keep the material in its report and pay the requested royalties or to take the copyrighted material out of the state DOT's publication.)

Because the state DOT's overarching desire is to release the report to the public domain, there is no need to allocate resources to monitor the use of the material. The state DOT elects to take a common-law copyright and places the copyright notice on the final report. It has decided not to register the copyright with the federal government. The finished report is made available online to anyone who would like to download it for free. If a hard copy is requested, a flat $5.00 fee is charged per copy, primarily to cover the costs of reproduction and mailing.

Although the state DOT has decided not to officially register a copyright on this material, a nominal revenue stream has been created from any hard copies requested. Given the ubiquity of digital publishing and digital document sharing, the revenue stream is unlikely to be significant at any time.

Had the state DOT chosen to register its copyright in the material and to aggressively monitor any potential infringements, it would likely have needed to allocate some resources to track the use of the publication, thus accruing additional IP management costs. Similarly, had the owners of copyrighted material being reproduced in the state DOT's publication insisted on receiving royalties for the use of their material—and had the state DOT elected to keep the material in the report—resources would be needed to ensure that the necessary royalties were paid.

Copyrights are very easy to infringe unintentionally, especially because the limitations on fair use are easy to misunderstand. This scenario highlights the importance of requesting copyright clearance on any material that may belong to others. Taking the proper steps to verify copyright permission—and knowing whether a royalty is expected—helps ensure that publication does not come with a costly surprise. Failure to secure copyright permissions when they are needed could result in infringement claims once a document or report is made available to the public, even if the publication is made available online and free of charge.

10.4 A Method for Predicting Icy Roadway Conditions: Trade Secret

A state DOT has issued a request for proposals for the development of a decision-support system for predicting icy roadway conditions. Ideally, this decision-support system will provide forecast data regarding when a road will become icy, when it may defrost, what the current conditions are, and other helpful information that may impact traffic flow.

The state DOT would like to use this information both to manage its winter maintenance activities and to share the content (the forecasts) with motorists. It is expected that motorists will be able to use the information to make more informed decisions about travel during inclement winter weather.

One bidder has submitted a proposal that includes a fairly detailed description of its trade secret algorithms and methodology for making predictions and forecasting roadway conditions. The bidder has requested that this information be kept confidential and guarded as an organizational trade secret.

Given the number of proposals that the state DOT receives each year, the absence of controlling federal regulations, and variations across state laws with regard to trade secrets, it is essential that a state DOT have policies in place to guide decisions about managing proprietary IP it may receive as part of a bid or proposal—particularly if the proposal contains self-identified trade secret information.

Questions the state DOT may consider include:

- What responsibilities, if any, does the state DOT have for keeping the contractor's trade secret secure?
- Are the state DOT's regular safeguards for proprietary proposal information sufficient, or are additional safeguards needed? For example,
  - Should the state DOT monitor and track all the individuals with access to the proposal?
  - Must all proposals be marked "secret" (or in some other way that signals the information is not to be shared).
  - If available in electronic form, should the proposal be transferred only as a password-protected document?
  - How will copies of the proposal be safely discarded after the contract has been awarded?

If the contractor's proposal is judged to best meet the purposes of the state DOT, care also needs to be taken in developing the contract. Here the goal is to eliminate uncertainty and reduce the likelihood of potential future disputes. What rights to the existing IP does the contractor wish to retain? What rights to any new IP adapted or developed under the state-funded contract will the state DOT acquire? Are federal funds part of the funding stream, and how will that affect licensing? Ideally, the contract will clearly address which rights in the IP remain with the contractor and which rights and interests (e.g., license) will be taken by the state DOT. (To review pertinent details and issues relating to trade secrets, see Chapter 5.)

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97. *U.S. v. Dubilier Condenser Corp.*, 289 U.S. 178, 188–89, 1933: "Since the servant uses his master's time, facilities, and materials to attain a concrete result, the latter is in equity entitled to use that which embodies his own property and to duplicate it as often as he may find occasion to employ similar appliances in his business. But the employer in such a case has no equity to demand a conveyance of the invention, which is the original conception of the employee alone, in which the employer had no part. This remains the property of him who conceived it, together with the right conferred by the patent, to exclude all others than the employer from the accruing benefits. These principles are settled as respects private employment."
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the regular business of the hiring party; whether the hiring party is in business; the provision of employee benefits; and the tax treatment of the hired party."

101. See, e.g., Conn. Gen. Stat. § 4-61a, 2012: "The state shall be entitled to own the entire right, title and interest in and to any invention [of state employees] in which such invention is conceived in the course of performance of customary or assigned duties of the employee inventor or inventors . . ."; N.M. Stat. § 57-3C-3, 2012: "Inventions, innovations, works of authorship and their associated materials that are developed by a state employee . . . within the scope of his employment or when using state-owned or state-controlled facilities or equipment are the property of the state."
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107. See, e.g., 48 C.F.R. § 27.404-3(2)(i), 2012.
108. See, e.g., 73 Fed. Reg. 74,570, Dec. 8, 2008.
109. See, e.g., Conn. Gen. Stat. § 4-61a, 2012: "[T]he employee inventor shall be deemed to be obligated, by reason of his employment by the state, to disclose his invention fully and promptly to an authorized executive of the state; . . . and to give all reasonable aid in the prosecution of such patent applications and the procurement of patents thereon. . . ."
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114. See, e.g., Fla. Stat. § 334.049(3), 2012; Tex. Transp. Code Ann. § 201.205(b), 2012.
115. See, e.g., Okla. Stat. § 85.60, 2012; Or. Rev. Stat. § 291.042(1), 2012.
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project. The FHWA reserves a royalty-free, nonexclusive and irrevocable right to reproduce, publish, or otherwise use, and to authorize others to use, the work for Government purposes."

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Glossary

America Invents Act (AIA)	The Leahy-Smith America Invents Act (PL 112-29) represents the most significant change to the U.S. patent system since 1952. One of the most substantial changes is that the U.S. system switches from first-to-invent to first-inventor-to-file. Under the AIA, the persons filing must still demonstrate that they are true inventors of the invention.
Assignment agreements	Agreements that transfer the rights vested in the intellectual property (IP). The result is that the assignee is now vested with rights of ownership to the IP.
Bayh-Dole Act	The Bayh-Dole Act (PL 96-517, Patent and Trademark Act Amendments of 1980) changed the ownership of inventions created using federal funding. Prior to passage of the Bayh-Dole Act, inventions made under federal grants and contracts were assigned to the federal government. With the passage of the Bayh-Dole Act and additional amendments, universities, small businesses, not-for-profit entities, and for-profit entities working under federal funding can claim rights to an invention.
Berne Convention Treaty	An agreement among the countries that have adopted the Berne Convention provides automatic protection for works first published in other member countries and for unpublished works whose authors are citizens of or residents in such other countries. http://www.wipo.int/treaties/en/text.jsp?file_id=283698.
Commercialization	A series of steps and actions taken to introduce a new product to market and/or to take a technology or product from the laboratory to the market.
Common-law property rights	Certain property rights given to individuals without the necessity of state or federal registration.
Conflict of interest	A situation in which financial or nonfinancial considerations may compromise or appear to compromise a person's judgment.
Contract	A legally binding agreement between two or more parties which obligates each party to certain requirements and activities covered in the agreement.

Cooperative research and development agreement (CRADA)	A research and development agreement between the government and a private party. There is no exchange of money, but other considerations are common, such as use of data, laboratory space, and so forth.
Copyright	A form of IP protection that covers the expression of concepts. These forms of expression may include literary works, musicals, motion pictures, computer programs, and so forth. Copyright protection does not extend to the concept itself—the underlying idea, method, or process embodied by the protected expression is not itself subject to copyright protection.
Creative Commons	Nonprofit organization that releases "Creative Commons" copyright licenses. This platform allows an author to reserve particular rights to his or her work. Typically, a copyright will have all rights reserved, or perhaps all rights dedicated to the public domain.
Defensive publishing	Disclosing and enabling description of a technology or invention to the public in order to establish the technology or invention as prior art in the public domain.
Disclosure form	Formal written description of potential IP. This document typically is submitted to the responsible party within an organization. It should serve as a first alert of something that may be novel, useful, and/or creative.
Enabling disclosure or description	A description of an invention that provides sufficient detail to enable a person "ordinarily skilled in the art" to replicate the invention.
Fair use	Provides a legal mechanism for the unauthorized use of a copyrighted work. Fair use should never be assumed. It is recommended that the owner of the copyright be contacted and authorization be obtained prior to any use of copyrighted material.
Infringement	Refers to the unauthorized use of IP rights.
Intellectual property (IP)	Something created by human intellect that has some value that is eligible for protection under patent, copyright, trade secret, or trademark.
Inventor	The individual(s) who contributed to the conception of an invention. Conception involves the mental exercise in the creation of an invention. The act of reducing an invention to practice is not sufficient to claim ownership.
IP aggregators	Entities that purchase portfolios of IP, in some cases around particular subject matter. The typical intent is to leverage the portfolio via licensing agreements with several other organizations.
IP exchanges	A platform somewhat similar to a stock exchange by which clients can invest in various IP assets for use within their organizations. An IP exchange better shares the risk between a licensee and licensor.

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IP management	Strategic and proactive approaches to maximize an investment in IP.
License	A contractual agreement that authorizes the use of the IP rights of protected IP. The owner of the IP rights may grant these rights for either financial or nonfinancial compensation. A license is typically nonexclusive (meaning that the IP owner can grant similar usage rights to others) but the contracting parties are generally free to negotiate an exclusive license.
March-in rights	Granted rights to issue new, or revoke existing, licenses to IP. This is usually applied to cases where the commercial development of IP is lagging within the current operations of a licensee.
Material transfer agreement	A contractual agreement that governs and determines the terms in the transfer of research materials between organizations.
Noncompete agreement	An agreement forbidding former employees from direct competition or sharing of confidential information. These agreements normally have a time limit and are scrutinized if the requirements have an impact on the ability of an individual to secure employment in a field in which they have skills and experience.
Nondisclosure agreement (NDA)	A confidential agreement restricting the sharing of confidential information between parties. The NDA may also be known as a confidentiality agreement (CA).
Nonpracticing entities	An entity holding the rights to IP but that is not practicing the IP.
Patent	An IP right granted by some national governments, including that of the United States, to exclude others from making, using, offering for sale, or selling the invention throughout the United States, or importing the invention into the United States for a limited time.
Patent Cooperative Treaty (PCT)	A multinational agreement that assists applicants seeking international patent protection for their inventions. By filing one international patent application under the PCT, applicants can simultaneously seek protection for an invention in 148 countries.
Prior art	Any available material prior to the current IP for which novelty and newness of the current creation is compared.
Reduced to practice	The IP has been demonstrated in some tangible form of a product or services offering.
Royalty	A payment or consideration received by the IP owner in exchange for rights to use the creation.
Shop rights	An implied right of a firm to use a patented invention that was invented by an employee in the scope of their employment using the resources of the firm.

Swearing behind	Historically, a way of countering the risk of having a patent application blocked by public disclosures during the 1-year "grace period" immediately preceding the application. Inventors could file a declaration showing that they had invented the subject matter before any such disclosures. Having filed such a declaration, it would be presumed that the applicants' invention predated any recent disclosures. Also called *swearing behind the reference.*
Technology assessment	A thorough business case analysis for a technology or invention. In this analysis, the analyst researches applicable markets, competing technologies, and the IP profile, financial analysis, and go-to-market strategies for a given technology or invention.
Trademark	A form of protection intended to be used to identify and distinguish the goods/services of competing providers. The primary goal is to indicate the source of the goods or services.
Trade secret	Information in which the value is derived from the secrecy of the information. Trade secrets may cover many forms of creativity or ingenuity.
Work made for hire (work for hire)	Copyrightable works that are owned by the employer and not the employee. These include works prepared by an employee within the scope of her or his employment or works specially ordered or commissioned for use, such as a contribution to a collective work, a part of a motion picture or other audiovisual work, a translation, a supplementary work, a compilation, or an instructional text.

APPENDIX A

Patent Search and Information Resources

Types of Patent Applications

Provisional Application

A *provisional application* for patent is filed in the United States Patent and Trademark Office (USPTO) under 35 U.S.C. § 111(b). It allows filing without a formal patent claim, oath, or declaration, or any information disclosure (prior art) statement. It provides the means to establish an early effective filing date in a later filed non-provisional patent application (discussed next) filed under 35 U.S.C. § 111(a). It also allows the term "Patent Pending" to be applied in connection with the description of the invention.

A provisional application has a pendency lasting 12 months from the date the provisional application is filed. The 12-month pendency period cannot be extended**.** Therefore, an applicant who files a provisional application must file a corresponding non-provisional application within 12 months in order to benefit from the earlier filing of the provisional application. In accordance with 35 U.S.C. § 119(e), the corresponding non-provisional application must contain or be amended to contain a specific reference to the provisional application.

Non-provisional Application

This application is examined by a patent examiner and may be issued as a patent if all the requirements for patentability are met.

A non-provisional utility patent application must be submitted in English or be accompanied by a translation in English, a statement that the translation is accurate, and have payment of the fee set forth in 37 CFR § 1.17(i). If an applicant files a non-provisional utility application in a language other than English without the translation, statement, or fee, the applicant will be given a notice and time period to submit the missing item(s).

A non-provisional utility patent application must include a specification, including a description and a claim or claims; drawings, when necessary; an oath or declaration; and the prescribed filing, search, and examination fees.

A complete non-provisional utility patent application should contain the elements listed below, arranged in the order shown:

- Utility Patent Application Transmittal Form or Transmittal Letter.
- Appropriate Fees.
- Application Data Sheet (see 37 CFR § 1.76).
- Specification (with at least one claim).
- Drawings (when necessary).
- Executed Oath or Declaration.
- Nucleotide and/or Amino Acid Sequence Listing (when necessary).
- Large Tables or Computer Listings (when necessary).

Divisional Application

For some non-provisional application filings, the patent examiner may consider that the current application has more than one distinct or independent invention. In this case the inventor may elect which claims to prosecute under the current application and which would be subdivided into additional divisional applications. The divisional applications generally have the same specification as the parent applications, claim the priority date of the parent, but have a different set of claims (Legal Information Institute, 2013).

Continuation Application

After filing a non-provisional application, the inventor may wish to add more or different claims to the native application. The continuation application provides the mechanism to add this additional information. The continuation uses the same specification as the native application, claims the priority date of the parent, and generally names at least one of the same inventors as in the parent. This type of application is often filed when a patent examiner has allowed some but rejected other claims in an application, or where an applicant feels that he or she has not exhausted all useful ways of claiming different embodiments of the invention during the prosecution of the native application (Legal Information Institute, 2013).

"Continuation-in-Part" Application

A continuation-in-part application provides substantially the same specification as the non-provisional application but has disclosed additional subject matter that was not included in the non-provisional application. For a continuation-in-part application, claims to subject matter that was also disclosed in the native are entitled to the native's priority date, while claims to the additional subject matter are only entitled to the filing date of the continuation-in-part application. Continuation-in-part applications are generally used to claim enhancements that were developed after the non-provisional application was filed (Legal Information Institute, 2013).

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Abandonment Application

Patent applications may become "abandoned" for a number of reasons (e.g., because the applicant has failed to respond to a required action or missed a deadline; failed to file required documentation; or provided an incomplete response to a request for information or documentation). When this occurs, the applicant may apply to revive, reinstate, or otherwise continue the patent application. The specific forms and process by which an applicant petitions for reinstatement will vary according to the reason the original application was abandoned. Details on petitioning to revive or reinstate abandoned patent applications are available online at www.uspto.gov.

Internet Resources

United States Patent and Trademark Office
http://www.uspto.gov

A clearinghouse for critical information related to U.S. Patents and Trademarks. Includes a search tool to review U.S.-granted patents and patent applications.

Google Patent Search Engine
http://www.google.com/patents

World Intellectual Property Organization
http://www.wipo.org

A clearinghouse of information regarding global intellectual property (IP), policy, and challenges.

World Intellectual Property Organization IP Search Tool
http://www.wipo.int/sme/en

Espacenet
http://worldwide.espacenet.com/advancedSearch?locale=en_EP

Provides access to more than 80 million patent documents worldwide. A service of the European Patent Office.

MicroPatent Patent and Trademark Information
http://www.micropat.com

Global Patent and Innovation Quality
http://www.bustpatents.com

APPENDIX B

Copyright Search Resources

Fair Use Evaluator
http://librarycopyright.net/fairuse/

This online tool can help determine if the use of a protected work is a fair use. It helps users collect, organize, and document the information they may need to support a fair use claim.

Columbia University Fair Use Checklist
http://copyright.columbia.edu/copyright/files/2009/10/fairusechecklist.pdf

Public Domain Slider
http://librarycopyright.net/digitalslider/

This tool can help determine the copyright status of a work first published in the United States.

Exceptions for Instructors eTool
http://librarycopyright.net/etool/

Guides users through educational exceptions in U.S. copyright law, helping explain and clarify rights and responsibilities for the performance and display of copyrighted content in education.

Section 108 Spinner
http://librarycopyright.net/108spinner/

Section 108 of the U.S. Copyright Code allows libraries and archives, under certain circumstances, to make reproductions of copyrighted materials without the permission of the copyright holder. This simple tool can help determine whether a particular reproduction is covered by this exemption.

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U.S. Copyright Office
http://www.copyright.gov/

The U.S. Copyright Office is the official government body that maintains records of copyright registration in the United States. This site can help users attempting to clear a chain of title for copyrighted works, and it has information circulars, forms for copyright registration, links to copyright law, and links to other copyright organizations.

Creative Commons
http://creativecommons.org

Creative Commons was founded in 2001 to help expand the range of creative works available for others to build upon legally and to share. Creative Commons has released several copyright licenses known as Creative Commons licenses free of charge to the public. These licenses allow creators to communicate which rights they reserve, and which rights they waive for the benefit of recipients or other creators.

Copyright Clearance Center
http://www.copyright.com/

A nonprofit founded in 1978 to provide collective copyright licensing services for corporate and academic users of copyrighted materials. The Copyright Clearance Center procures agreements with rights holders, primarily text publishers and authors, both for print and online, and acts as agent for them. The Center manages over 400 million rights to works in all formats.

Stanford Copyright and Fair Use
http://fairuse.stanford.edu/

Copyright Crash Course (University of Texas Libraries)
http://copyright.lib.utexas.edu

Educause: 15 Copyright Tutorials
http://www.educause.edu/Resources/Browse/CopyrightTutorials/36099

Copyright Advisory Office (Columbia University)
http://copyright.columbia.edu/copyright/

APPENDIX C

Sample Invention Disclosure Document

AASHTOWare Contractor Invention Disclosure Policy and Procedure

I. Purpose

AASHTO has established this Contractor Invention Disclosure Policy and Procedure for the protection of inventions developed in the course of the design, development, and implementation of its software products. AASHTO's primary purpose in seeking to protect such inventions is to ensure AASHTO and its licensees continued freedom to use AASHTO's software products and to discourage litigation that might drain funds or otherwise distract from AASHTO's mission. The following procedures are intended to accomplish these goals as efficiently as possible so as not to distract from software development activities.

II. Distribution

This procedure pertains to any contractor engaged by AASHTO to design, develop, or implement software products. As discussed below, such contractors should identify a Disclosure Review Liaison and distribute this procedure to persons fulfilling this role.

III. AASHTO's Retention of Rights

AASHTO retains all right, title and interest including, without limitation, all patent, trademark, copyright, trade secret, and other intellectual property rights, in and to all work, inventions, discoveries, concepts, ideas, improvements, materials, and information developed, produced, or created in the course of the design, development, and implementation of its software products (collectively, "Proprietary Materials"). The agreements between AASHTO and its contractors require the contractors to transfer and assign to AASHTO all rights, title, and interest to such Proprietary Materials. Further, contractors agree to execute or cause to be executed such agreements, assignments, or other documentation as may be necessary to secure and confirm AASHTO's patent, trademark, copyright, trade secret, and other intellectual property rights in and to such Proprietary Materials. For example, contractors are responsible for securing such rights from their employees and agents who have access to such Proprietary Materials. Therefore, contractors should have an employment contract or other agreement in place with their employees and agents that requires the employee or agent to transfer and assign such rights to the contractor. The contractor can then in turn transfer and assign the rights to AASHTO.

IV. Invention Disclosure

According to U.S. patent law, a patentable invention can be "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." Most software inventions involve new or improved processes for accomplishing an objective (often embodied in a series of instructions executed by one or more processors), but such inventions may also include new or improved systems, interfaces, data structures, modules, or components, or new or improved ways to configure system or network components. Software inventions may also include new or improved protocols for communication or coordination of various system or network components. The examples given here are not exhaustive; other types of inventions may be patented.

Software engineers and subject matter experts employed by contractors often add value to AASHTO's software products by conceiving of such new or improved processes, systems, interfaces, data structures, or other inventions. Such innovations can be abstract, such as conceiving of a new way to organize useful information, or more concrete, such as designing a novel user interface. Any employee or agent of a

contractor who conceives of a new and useful idea in the course of working on AASHTO's software products should complete an Invention Disclosure Form (Appendix A) fully describing the idea and submit the form to the contractor's specified Disclosure Review Liaison.

V. Timing of Review and Disclosure

Under U.S. patent law, an inventor's public dissemination of information about an invention more than one year before filing a patent application to protect the invention may preclude patent protection of the invention. Therefore, as a general rule, in order to preserve AASHTO's rights and interests, an Invention Disclosure Form for an invention should be transmitted to AASHTO for its consideration before any software release containing the invention or any description of the invention is circulated outside the contractor and the Technical Review Team or Task Force working on a related project. Therefore, any Invention Disclosure Forms related to a project should be submitted to AASHTO before any detailed specifications or requirements for the project are disseminated outside the contractor and Technical Review Team or Task Force. Such dissemination may take many forms including, but not limited to: software releases; circulation of specifications, requirements, or other documentation; conferences and other meetings; publication of software or mockups on preview sites; and newsletters or web articles regarding new functionality. If the Disclosure Review Liaison has any questions regarding what information may be disseminated before disclosure, they should contact AASHTO's Patent Attorneys for clarification.

VI. Disclosure and Project Review

The design, development, and implementation of AASHTO's software products is the top priority of all contractors hired to perform such services for AASHTO; however, the disclosure of potential inventions allows AASHTO and its members to protect their investment in the contractors' work product. Therefore, such disclosure needs to be integrated into the work performed by the contractors. To accomplish this objective, each contractor should specify a Disclosure Review Liaison. The Liaison should have substantial experience in software development, oversight of the contractor's work for AASHTO, and a broad perspective on the software industry and innovation. Multiple persons can contribute to this role as long as the division of responsibility is clear and appropriate to experience and skill level, and each are accessible to AASHTO and its Patent Attorneys as needed. As further discussed below, the contractor's Disclosure Review Liaison is responsible for soliciting Invention Disclosure Forms, reviewing them, and submitting them to AASHTO for consideration.

In addition to collecting Invention Disclosure Forms submitted by employees and agents, the Disclosure Review Liaison should solicit additional Invention Disclosure Forms as the Liaison becomes aware of undisclosed innovations conceived of in the course of the design, development, or implementation of AASHTO's software products. The Liaison should establish appropriate internal procedures to ensure complete and timely disclosure of all inventions. For example, the Liaison should educate likely inventors/contributors regarding the Invention Disclosure Form and this procedure. Moreover, for each software project undertaken by the contractor, the Liaison should review the System Requirements Specification (SRS), Functional Design Specification (FDS), and Technical Design Specification (TDS) to identify any new inventions developed during the course of the project. If inventions are identified, the Liaison should solicit disclosure forms from the inventors/contributors. As further discussed below, such review and disclosure should take place before any software release or dissemination of information regarding the software project. As a general rule, a review of the SRS and FDS should be completed before the *Functional Design Review Gate* (defined in AASHTO's Deliverable Planning and Acceptance Standard) is passed, and a review of the TDS should be completed before alpha testing begins.

The Disclosure Review Liaison is also tasked with reviewing all submitted Invention Disclosure Forms. First, the Liaison should ensure that the form is complete and provides a full description of the invention. Questions should be answered with an eye toward the broadest possible application of the invention, not merely how the invention is to be embodied in the contractor's work product. If the form is incomplete, the Liaison should return it to the inventors/contributors for further information or elaboration.[1] Second, the Liaison should investigate whether the documented invention is new when compared to existing AASHTO products, contractor products, or other products within the knowledge of the Liaison and the inventors/contributors. If other products are found with similar features, the closest examples should be identified and described in the Disclosure Form, but the Liaison and inventors/contributors should avoid expressing a written opinion regarding the novelty or nonobviousness of the invention. Third, the Liaison should provide the completed Disclosure Form to AASHTO and prepare to orally discuss the attractiveness of the technology for patenting.

During the joint review of the documented invention(s) between the Liaison and AASHTO, consideration will be given to the breadth of the likely claims, their defensive value within the software field occupied by AASHTO, and the cost of the public disclosure required to obtain such protection. Where details required to make or use an invention are not apparent from the software interface or documentation and a competitor is unlikely to independently develop the invention, trade secret protection may be sufficient to protect the invention. Again, the Liaison and inventors/contributors should not communicate any opinion regarding the attractiveness of patent protection in writing. Instead, these considerations should be orally discussed with AASHTO.

VII. Patent Attorney Review and AASHTO's Decision

If AASHTO decides patent protection of an invention may be warranted, AASHTO will submit the Invention Disclosure Form to it's Patent Attorneys. Once AASHTO's Patent Attorneys receive an Invention Disclosure Form they will analyze the disclosed invention in terms of its patentability and attractiveness for patenting, conferring with AASTHO, the Disclosure Review Liaison, and the inventors/contributors as needed. The Patent Attorneys will present the results of their analysis to AASHTO along with an estimate of the cost for preparing and filing a patent application covering the disclosed invention. The Patent Attorneys will then wait for approval from AASHTO before proceeding to prepare and file an application.

VIII. Preparation and Filing of Application

Once AASHTO has approved an application for filing, AASHTO's Patent Attorneys begin preparing the application. Additional disclosure and other materials may be required from the inventors/contributors at this time. This disclosure may require telephone or in-person meetings with the inventors/contributors, provision of background or related materials, preparation of additional figures or written materials, among other activities. In obtaining such disclosure, the Patent Attorneys will do their best to work around the inventors/contributors' schedules and work commitments. Once a draft application is prepared the inventors/contributors will be asked to review the draft, provide any revisions or corrections, and confirm their part in conceiving the claimed invention. When the application is ready for filing with the U.S. Patent and Trademark Office (USPTO) and a formal Inventorship determination has been made, the inventors will be asked to sign needed documents including a declaration, power of attorney, and assignment.

APPENDIX D

Invention Disclosure from the Virginia Department of Transportation

Agency _____ Code _____ No. ___
Title _____
Date _____
Time of Filing _____

OFFICE OF THE SECRETARY OF ADMINISTRATION INVENTION DISCLOSURE

Instructions

This form is for reporting all inventions in accordance with the Intellectual Properties Policy. Any classified, exempt, full-time, part-time, or hourly employee of an executive branch agency who has invented any potentially commercially valuable intellectual properties, such as processes, devices, techniques, or methods, during the working hours, within the scope of employment, or when using state-owned or state-controlled facilities is required to disclose that fact. When the form is completed, please send it to your agency head who will forward the form to the Secretary of Administration for review.

Expeditious processing of the invention is very important. It is essential that the inventor(s) complete this report promptly in order to meet critical patent deadlines* and to facilitate an evaluation by parties interested in financing or furthering its development, patent coverage, or use by industry.

If unable at this time to answer one or more of the questions, so indicate on the form, but do not delay submitting your report for that reason.

*Any prior publication and sometimes public use or placing "on sale" before the application is filed may prevent the Commonwealth of Virginia from obtaining a patent in most foreign countries and, if more than one year, in the United States.

TO: Secretary of _____

Administration Post Office Box 1475,
Richmond, VA 23212

FROM: Name (s) _____

_____

(Please print or type)

(Agency or Institution): Agency _____

(Address): _____

Phone: _____

Comments and recommendations by agency's Intellectual Property Representative:

1. Title of the invention:

_____

2. Brief description of the invention:

_____
_____
_____
_____

(Use additional sheets to elaborate; attach descriptive material including reports, sketches, drawings, photographs, and blueprints that help illustrate the description. If a model, prototype, or film has been made, please indicate where it may be seen or obtained.)

3. How does the invention differ from present technology? What problems does it solve, or what advantages does it possess?

_____
_____
_____

4. If not indicated above, what are possible uses for the invention? In addition to immediate applications, are there other uses that might be realized in the future?

_____
_____
_____

5. Does the invention possess disadvantages or limitations? How can they be overcome?

_____
_____
_____
_____
_____

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6. If further research and development are necessary or desirable before this product can be marketed, please discuss, indicating the estimated cost and length of time, if possible.

7. Please list publications pertaining to the invention. Include theses, reports, preprints, reprints, manuscripts for publication (submitted or not), news releases, feature articles, and items for internal publications. Please include publication dates and provide copies whenever possible.

8. If laboratory records and data are available, please provide reference numbers and physical location, but do **not** enclose the records or data.

9. Please list any related patents or other publications of which you are aware.

10. Please indicate the date and place the invention was conceived (identify persons and records to support date and place).

11. If the invention has been disclosed in public (meeting, conference, etc.) or published, or such public disclosure or publication is planned in the next 12 months, please indicate the date, place, and circumstances.

12. If the work that led to the invention was sponsored, please provide the following information:

    a. Name of Sponsor

    _____

    b. Grant or Contract Identification (if any) _____

    c. Title of Project _____

    d. Principal Investigator _____

13. Please indicate any known commercial or market interest in the invention at this time. Please provide company names and names and titles of persons interested. (Under **no** circumstances are employees to seek marketers without the specific authorization of the Secretary of Administration.)

    _____

    _____

    _____

14. Please suggest any other firms that might be interested in the invention.

    _____

    _____

    _____

15. In the opinion of both the inventor(s) and his or her immediate supervisor, was the invention conceived, actually reduced to practice, constructively reduced to practice, or developed during a time when the inventor was an employee of the Commonwealth of Virginia other than an employee of an institution of higher education? (In the event that there are multiple inventors, the supervisor of the employee with the largest percentage of interest in the invention should respond where indicated below, and if there is equal interest shared among two or more inventors, the supervisor having the most seniority should respond where indicated below.)

    _____Yes/_____No (Employee)
    _____Yes/_____No (Employee's Immediate Supervisor)

16. If the answer to Question 15 was "Yes" (for either respondent), please answer the following:

    a. Did the invention result from a specifically assigned project?

    _____Yes/_____No (Employee)
    _____Yes/_____No (Employee's Immediate Supervisor)

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Question 16, continued

b. Was the invention conceived, reduced to practice, or developed (1) during working hours, or (2) within the scope of the inventor's employment, or (3) when using state-owned or state-controlled facilities?
_____Yes/_____No (Employee)
_____Yes/_____No (Employee's Immediate Supervisor)

17. In the event that the Commonwealth decides not to seek protection on this invention, would the employee want the Commonwealth to surrender any of its intellectual property rights to the invention?

a. ____Yes/_____No

b. If yes, please describe the intellectual property rights that the employee desires (e.g., full rights, partial rights, or a license).

_____
_____
_____

18. By signing below, the inventor(s) certifies that the answers herein are accurate to the best of his or her knowledge and that he or she will give all further assurances and any further information required by the Secretary of Administration. If there is more than one inventor, please indicate the percentage of interest they recommend for allocation among themselves of any income accruing to them on the invention.

Inventor(s) % Interest

a. Name_____ _____
Title_____
Date_____
Address_____
_____

Phone and Signature
_____
_____

b. Name _____ _____
Title _____
Date_____
Address _____
_____

Phone and Signature
_____
_____

(If there are additional inventors, they should be shown on an attached sheet.)

19. Witnesses*

This invention was disclosed to and understood by me:

Signature _____ Date _____

Signature _____ Date _____

*Witnesses should be persons who are able to understand the technical aspects of the invention.

Reviewed and Approved:

_____ (Employee's Immediate Supervisor)

_____ (Agency Head)

APPENDIX E

Non-Disclosure Agreement (NDA) from the New York State Department of Transportation

New York State

Department of Transportation

NON-DISCLOSURE AGREEMENT

Date: _____ / _____ / _____
With: _____ (Hereinafter the "Vendor")

The Vendor acknowledges that during the course of the contract with NYS DOT, there may be Confidential Information disclosed to certain Vendor staff consisting of, but not necessarily limited to:
a. Technical information: Methods, processes, formulae, systems, techniques, computer programs and research projects
b. Business information: Vendor lists, customer lists, customer addresses, constituent lists, benefit data, strategic plans, or information regarding NYS DOT's business dealings and relations with other vendors
c. NYS DOT Decision Support System information: Pre-letting, letting and post letting data involving but not limited to all data and code tables, the result of any models, reports and maps of any kind
d. Future Procurements: Any information, specifications or confidential information related to conducting future competitive procurements
e. Any inquiries, reports, investigations of any kind or discussions with agencies external to NYS DOT including but not limited to any state or federal department or agency

This Agreement sets forth the terms and conditions under which the parties will treat Confidential Information:

1. Information Gained: Vendor agrees to treat all information gathered by its staff in the course of its contract with NYS DOT as Confidential Information, unless provided written release from this designation for specified information by authorized NYS DOT staff.

2. Vendor agrees: That all Vendor staff now working for NYS DOT, and all future staff who may be assigned to NYS DOT have or will be instructed (i) to protect the Confidential Information from unauthorized use or disclosure with the same degree of care that Vendor uses to protect its own confidential information of a similar nature; (ii) to use the Confidential Information only for the purpose of the projects or assignments they are performing for NYS

DOT; (iii) not to reproduce the Confidential Information in any form except as necessary for the Project; (iv) not to disclose the Confidential Information or otherwise permit access thereto except to employees and/or consultants designated by the NYS DOT, with the explicit understanding that this prohibition includes disclosure of Confidential Information by Vendor staff employed by NYS DOT to Vendor sales, marketing, management, and any other Vendor staff not directly employed by NYS DOT. Vendor agrees not to disclose the nature of the work to any third party without prior DOT consent, At the DOT's request, Vendor will destroy any material received from DOT immediately. All products, whether physical or intellectual, produced in this relationship are DOT property and the Vendor has no rights to claim, distribute, or market such any product or related information without prior written consent from DOT Management. Vendor will comply with all DOT security policies, procedures and standards and follow good industry accepted security practices.

3. Exceptions: Confidential Information shall not include information to the extent that it (i) is or becomes, through no act or omission of the Vendor or an employee or agent of the Vendor, publicly known by third parties in the same trade or business as the Vendor; (ii) is lawfully received from a third party having the right to disseminate the information without restriction on disclosure, (iii) is furnished to others by the disclosing party without restriction on disclosure, (iv) is independently developed by the Vendor without reference to Confidential Information, or (v) is disclosed by the Vendor under proper judicial or governmental process with reasonable prior notice to the other party.

4. Upon termination of the business relationship: Vendor agrees to return any material received from NYS DOT to DOT and destroy any copies, whether electronic, paper, or other media within 1 week of Agreement termination.

5. Possible Sanctions: Violation of this Agreement could involve penalties, up to and including, relationship and/or Agreement termination, and civil and criminal prosecution in accordance to NYS Law.

Vendor Representative: _____ Vendor: _____

Title: _____ Date: _____

NYS DOT Representative_____ Title:_____ Date:_____

APPENDIX F

Private Industry: Non-Disclosure Agreement (NDA) from Applied Research Associates (ARA)

Non-Disclosure Agreement — Proprietary Information

This Non-Disclosure Agreement (the "Agreement") is made as of <mm/dd/yyyy> ("Effective Date") and entered into by and between Applied Research Associates, Inc., a New Mexico Corporation having a place of business at 4300 San Mateo Blvd. NE, Suite A-220, Albuquerque, New Mexico 87110 ("ARA"), and <enter company>, a <enter state> corporation, having a place of business at <enter address> ("Company"). Under this Agreement, ARA and Company (the "Parties") plan to engage in discussions and exchange information among and between themselves, including discussions and disclosures of information considered by the disclosing party to be proprietary and/or confidential (the Information), for the purpose of <enter purpose>. Accordingly, the Parties desire to protect the confidentiality of any Information (as further defined below) disclosed or exchanged pursuant to this Agreement.

1. The Information is defined as knowledge, facts or material concerning techniques, processes, inventions, research and development, cost data and other information deemed by the disclosing party to be confidential or proprietary, in written form, marked with an appropriate legend indicating its confidential and/or proprietary nature and delivered by one party to another or, if first disclosed orally with notice of its confidential/proprietary character, such information that is subsequently confirmed in writing with an appropriate legend within 20 days of the oral disclosure.

2. Each party agrees not to use the other's Information for any purpose other than for the performance of this Agreement. Any other use of such Information by the recipient shall be made only upon receipt of the prior written consent from an authorized representative of the disclosing party.

3. Recipients agree to protect the Information of the other Parties, restricting disclosure only to those individuals in their organizations and their attorneys requiring the Information for the purposes expressly authorized by this Agreement, and who have first been made aware of and agree to the terms of this Agreement.

4. Recipients agree to use and protect the Information by exercising the same degree of care normally used to protect their own proprietary/confidential information, but no less than a reasonable degree of care.

5. The above restrictions on use and disclosure of the Information shall not apply with respect to Information that falls in to one of the following categories:

a. Information that, at the time of receipt, was in the public domain;

b. Information already known to the recipient without restriction on further disclosure as evidenced by its written records;

c. Information rightfully obtained by recipient from a third party under circumstances permitting its disclosure without restrictions;

d. Information disclosed or used by the recipient with the prior written consent of the other party, provided the disclosure complies in all respects with the terms of the consent;

e. Information independently developed by the recipient, without the aid or inclusion of Information provided by the other Parties, as demonstrated by written records; or

f. Information disclosed by recipient pursuant to a judgment of a court of competent jurisdiction, but only to the extent of such judgment and provided prompt written notice is given to the other party.

6. Each party shall designate, in writing, an individual within its organization as the point of contact responsible for control of the Information disclosed under this Agreement. The points of contact are as follows:

Party	POC Name	Email	Address
ARA	<ARA name>	<Email>	<Address>
Company	<Company name>	<Email>	<Address>

7. The effective date for the protection of the Information provided hereunder is the date that the Agreement becomes fully executed. Unless extended by mutual agreement of the parties, this Agreement shall expire three (3) years from the date of full execution of this Agreement. Any Information disclosed by the parties as a result of this Agreement will be protected for three (3) years from the end of the Agreement.

8. The Parties hereby acknowledge receipt of notice that some or all of the Information, including data, or other material provided or exchanged pursuant to this Agreement, may be technical data within the meaning of the International Traffic in Arms (ITAR) regulations, 22 CFR sections 120 – 130, or the Export Administration Regulations (EAR), 15 CFR sections 768 - 799. Accordingly, ***the Parties shall not disclose, provide or export such Information to any foreign person or entity***, whether within the U.S. or abroad, without obtaining appropriate export authorization in advance. The Parties acknowledge their awareness that intentional violation of such export requirements may constitute a crime.

9. Information disclosed under this Agreement shall be and remain the property of the disclosing party and no ownership rights are conveyed or received through this Agreement. Upon termination or expiration of this Agreement, each party will, within a reasonable period of time thereafter, return all Information received to the other parties or destroy such Information and certify such destruction in writing. The substance of the Information shall remain proprietary after the return or destruction of such Information.

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10. It is agreed that no license under any patent, copyright or trade secret of any party hereto is granted by this Agreement.

11. Neither this Agreement nor the disclosure or receipt of Information shall constitute or imply any promise or intention to enter into a partnership, agency or joint venture between the Parties, or to make or purchase products or services by any party.

12. It is agreed that breach of this Agreement would cause immediate and irreparable harm to the disclosing party and that, in the event of such breach, the non-breaching disclosing party shall be entitled, in addition to any other right or remedy, to seek equitable relief without the necessity of proving actual damages or posting a bond or other security.

13. Any dispute arising under this Agreement shall be brought in and decided by a court of competent jurisdiction in the State of New Mexico.

14. This Agreement represents the entire agreement between and among the Parties relating to the Information.

15. No party may assign or transfer its rights or obligations under this Agreement to a third party.

16. If any provision of this Agreement is found to be invalid or unenforceable in whole or in part, the Parties agree the remaining provisions of this Agreement shall remain valid and enforceable to the maximum extent compatible with existing law.

In witness whereof, the Parties hereto have caused this Non-Disclosure Agreement to be executed by each of their duly authorized representatives.

Applied Research Associates, Inc.		**Company**	
By:	_____	By:	_____
Name:	_____	Name:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

APPENDIX G

Intellectual Property Management Checklist

As the details in this Guide would suggest, intellectual property (IP) management is an intensive process. There are significant details and resources required to develop a highly operating IP managing organization. However, for many state DOTs resources may be limited and IP management cannot be a very high priority due to other responsibilities and tasks. However, in such instances what are some effective things that state DOT managers can do to manage their IP? It is first and foremost important to understand that any level of proactive IP management will require some time and some commitment. The checklist below provides some suggestions that should provide guidance although they are not exhaustive.

Identify potential IP assets

- Identify outcome(s) that may potentially be protected as IP.
  - Review projects at the very beginning. Based on the expectation of the project, document what are possible outcomes.
  - Review projects periodically, for example at the midpoint or at the point of a major deliverable to assess any potential IP.
  - Review projects near the end to check that any potential IP has been accounted.
  - Identify the value of a specific outcome.

Understand the value of the outcome and its importance

- Does managing this outcome really matter?
  - Who other than the state DOT may care about the outcome (other stakeholders)?
  - Understand the broader goal or purpose for initiating a particular project.

Understand the contracts and agreements with a third party if necessary.

- Structure agreements within the projects to provide flexibility in managing IP.

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Decided if there is really any potential IP at all

- Classify the outcomes
  - Is it software?
  - Is it a test method?
  - Is it a machine?
  - Is it a public service announcement?
  - Is it a video?
  - Is it …..?

- Classify the potential IP protection for the outcome
  - Patent?
  - Copyright?
  - Trademark?
  - Trade secret?

Understand the funding source (Bayh-Dole implications)

- How is this project funded?
  - State only funds
  - Federal only funds
  - Combination of state and federal funds

Strengthen the relationship with the inventors/creators

- Ask the creator/inventor their suggestions on how the potential IP may be managed. They are very knowledgeable about how their creation is different from current state-of-the-art. This may include both internal staff as well as contractors.

APPENDIX H

Training Work Plan

Background

State departments of transportation (DOTs) are charged with finding solutions that often result in new processes and products that may have additional value to the agency and the public they serve. This additional value may be better realized if new creations are protected and managed as intellectual property (IP). However, many state DOTs are unfamiliar with the requirements governing intellectual property rights and the benefits that can be derived from appropriately managing those rights. They may not have policies and procedures that manage intellectual property and, consequently, have no mechanisms to implement intellectual property for the benefit of the public.

Although training needs may vary from one state DOT to another, there are some core concepts that should be discussed in any training on intellectual property management. This training work plan focuses on those core concepts, with a specific focus on training state DOT personnel. The work plan emphasizes developing a shared-learning experience, which will lead to more informed and knowledgeable state DOT personnel on matters of intellectual property.

Partners

At the beginning of the training activity, the trainer(s) should acknowledge participating organizations, sponsors, and supporters of the training experience.

Training Objectives

- Provide quality training in intellectual property management for state DOT personnel.
- Introduce core concepts and definitions that will inform state DOT staff in identifying and managing IP.
- Provide a framework for thinking through the challenging issues of IP and state DOT operations.
- Deliver training at every level of the organization.

Training Materials and Format

- Lecture presentations.
- Case studies.
- Group discussions.

Anticipated Training Outcomes

- Identification of the principles of IP management.
- Application of IP principles to State DOTs.
- Utilization of IP principles in the correct situations.
- Application of general framework and methodology of IP management.
- Identification and implementation of useful resources for IP management.

Core Training Topical Areas and Suggested Modules

Module 1 - Core Concepts and Fundamentals of Intellectual Property Management (IP Management)

- This module will focus on the basics of IP protection, IP rights, and IP management.

Module 2 - IP Management Strategies for Public Organizations and Institutions

- This module will focus on the opportunities for public organizations using IP management practices.
- Intellectual property management when working with contractors and/or third parties.
- Fundamentals of the public domain. The risks and benefits of dedicating IP to the public domain. Dedicating IP to the public is a strategy often used by public organizations.
- Intellectual property management and the state DOT employee.
- Risks and benefits of managing or not managing IP.

Module 3 - Importance of an IP Management Policy

- This module will focus on the necessity for organizations to have some type of policy, in writing, which will establish norms for dealing with IP management issues.
- The state DOT and the economic development benefits of IP management.
- Synergy between technology transfer and IP management.
- Outsourcing state DOT IP management to a contractor.

Targeted Training, Topical Areas

It is important to have specific targeted training for all levels or groups within the state DOT, including examples provided in Table 1.

Table 1. Targeted personnel training.

Personnel Groups	Training Focus
Researchers, Scientists	▪ Organizational IP policy guidelines and procedures ▪ Importance of confidentiality, non-enabling descriptions of inventions ▪ Basics of IP agreements relating to research ▪ Basics on the forms of IP protection ▪ Submitting disclosures to IP management office/personnel
Operations Personnel (Finance, Human Resources, Legal)	▪ Intellectual property royalty management and accounting ▪ Conflicts of interest ▪ Basics on the forms of IP protection ▪ Intellectual property contracts and agreements ▪ Mediation, arbitration, litigation, and negotiation in IP
Intellectual Property Managers	▪ Intellectual property contracts and agreements ▪ Depth knowledge on the forms of IP protection ▪ Reviewing technology disclosures ▪ Intellectual property negotiations and marketing ▪ Intellectual property licensing
Other Personnel	▪ Disclosures and confidentiality ▪ Basics on the forms of IP protection ▪ IP guidelines and procedures
Research Managers/Directors	▪ Basics on the forms of IP protection ▪ Implementing IP policy and procedures ▪ Benefits of proactive IP management ▪ Investment requirement for IP management
Executive Directors	▪ Intellectual property policy ▪ Investment requirement for IP management ▪ Benefits of proactive IP management ▪ Intellectual property management risks

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Training Evaluation

The assessment measures should be determined by the objectives and expectations of training participants. Evaluators should include the participants, instructors, and any sponsoring organizations. Below are a few example questions for an evaluation form.

Instructions: Please indicate your level of agreement with statements 1 through 5 and complete questions 1, 2, and 3.

Evaluation Statements

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The objectives of the training were clearly defined.					
2. The topics covered were relevant to me.					
3. The content was organized and easy to follow.					
4. The training experience and information covered will be useful in my work at the state DOT.					
5. The trainer was well-prepared.					

Questions

1. What did you like most about this training?

2. What aspects of the training could be improved?

3. How do you expect your current IP practices will change as a result of this training?

APPENDIX I

PowerPoint Summary of NCHRP Project 20-89

A PowerPoint file summarizing the final research report is available on the NCHRP Project 20-89 webpage. To access the PowerPoint, go to www.trb.org, search for "NCHRP Project 20-89," and scroll down the page to a link titled "*NCHRP 20-89 Summary Brief 20140905.pptx.*"

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation