SUMMARY

Costing Asset Protection: An All Hazards Guide for Transportation Agencies (CAPTA)

This report provides transportation owners and operators with resource allocation guidelines for safety and security investments. This consequence-based approach, called "**C**osting **A**sset **P**rotection: An All Hazards Guide for **T**ransportation **A**gencies" or "CAPTA," allows an executive to consider multiple modes of transportation and assess those modes and assets that merit resource allocation above and beyond what might be available through routine capital allocation processes. This project fills a void in infrastructure protection approaches and allows owners and operators to make better informed decisions across all modes within their jurisdictions or under their influence. The consequence-based methodology underpinning CAPTA uses a rational, transparent process. The CAPTA process brings greater objectivity to the resource allocation process by using asset attributes to the greatest extent possible, thus avoiding heavy reliance on judgments. Objectivity enables decision makers both to achieve budgetary consensus across multiple modes and to make a more defensible case before legislative bodies that make budgetary decisions.

The primary result of this project is the CAPTA methodology, which provides users with a means to analyze assets, relevant threats and hazards, and consequence levels of interest in a common framework. The methodology is implemented through a computer-based Microsoft® Excel spreadsheet model that assists the user through the evaluation and resource allocation process.

This methodology was developed by a team of experienced transportation designers, builders, and operations personnel who worked with risk and security experts to determine questions that transportation owners and operators want answered, and then sought to answer these questions in a clear, concise manner. The chief question was "What adverse impacts can I not address adequately with current policies, infrastructure, and resources?" or, stated another way, "What consequences concern me most in my transportation system?" Beginning with this question designed to identify "thresholds" of concern, the project team sought to simplify the current assessment approaches by reducing the number and complexity of inputs (especially those calling for judgments) while focusing on objective attributes for comparing assets and modes.

While CAPTA does require the user to determine which assets and which threats and hazards are of greatest concern, the primary judgment required from the CAPTA user is the point (or "threshold") at which adverse consequences would merit allocation of additional resources to avoid or mitigate the effects of the consequential event. CAPTA is an iterative process, so decision makers can evaluate capital investment and other resource allocation options by varying the consequence threshold to determine both where they can apply available resources most efficaciously and what level of resources is needed to achieve a desired improvement in asset protection.

The substantive questions concerning adverse effects or consequence to an agency executive require answers to the following supporting questions:

- What hazards or threats do I face?
- What event(s) concern me most?
- What assets of high consequence do I have?
- How can I avoid these hazards and threats?
- How can I prepare myself for this disturbance if it does occur?
- Where and when should I commit resources to address my concerns?

The last question, concerning how best to allocate available resources in a resource-constrained environment, provides the motivation for the CAPTA methodology. The methodology considers categories of consequences, the numbers and types of threats and hazards, and the transportation modes to be included in order to obtain a coherent method for allocating resources among competing interests and competing modes.

The countermeasure recommendations presented in this report are intended for implementation by transportation owners/operators and are generally within their purview and control. This implementation may occur in part or whole based upon local conditions and, importantly, the level of risk faced by the owners/operators. Owners/operators will also need to balance implementation of structural or operational countermeasures with funding constraints. The project team is aware of these constraints and has packaged countermeasures as a menu of items from which the owners/operators may select, based upon risk level and available funding. Detailed cost estimates for implementing countermeasures for a specific asset are outside the scope of this methodology.

Objective

CAPTA supports ***mainstreaming*** an integrated, high-level, all-hazard, National Incident Management System–responsive, multimodal risk management process into major transportation agency programs and activities. CAPTA provides state DOTs and other users with a convenient and robust planning tool to develop estimates of both capital and operating budget implications of measures intended to reduce risks to levels that can be managed using resources typically available to operating agencies.

The goal of CAPTA is to provide users with a ***capital planning and budgeting tool*** that incorporates five major objectives:

- Demonstrate the budgetary effects of various agency consequence threshold levels chosen by the user.
- Examine the merits of various countermeasure additions and enhancements, including capital and operational measures—both singly and in combination.
- Develop an order-of-magnitude estimate for a user-chosen collection of risk mitigation strategies (countermeasures). This order-of-magnitude estimate serves as a starting point for budgeting purposes. These estimates apply in a multimodal, multiasset agency context.
- Indicate the assets for which more detailed risk analysis is needed.
- Provide guidance in an objective, transparent manner.

CAPTA provides a means to evaluate a wide range of assets and transportation modes based on generic asset attributes. CAPTA assesses threats and hazards and their potential consequences in a common framework. The initial consequence threshold established by the users at the start of the process establishes a baseline from which excursions can be run. A countermeasures database built into CAPTA provides owners with choices and evaluation criteria. This combination enables decision makers to determine appropriate risk mitigation actions and to estimate their costs.

CAPTA may be employed by a range of agencies responsible for risk management across transportation modes in an all hazards environment. The users may be

- Regional entities, such as port authorities, toll authorities, or transit authorities;
- Statewide entities, such as departments of transportation or state emergency management agencies; or
- Local entities, such as departments of public works or county highway departments.

The CAPTA methodology is applicable across agencies with risk assessment and management functions over fixed assets. The methodology and computer-based tool developed on behalf of transportation agencies can also be used by local, state, or regional emergency management agencies responsible for allocating budgetary resources to reduce adverse consequences. The CAPTA methodology described herein does not replicate or replace more detailed asset- or mode-specific methods and analytical tools developed by federal agencies or private sector entities.

CAPTA evolved in response to several emerging realities in the transportation environment:

- Current available risk management strategies are asset specific, mode specific, and threat or hazard specific. These *tactical* approaches do not accommodate *strategic,* high-level, multimodal, all-hazard considerations needed for overall agency-level planning and budgeting.
- The full range of risks faced by a transportation owner/operator forms a continuum. This range of risk requires a systematic, cohesive risk management approach that encompasses all modes.
- Transportation owners/operators are aware of the risks their systems face—from natural disasters to intentional harm (terrorism). CAPTA uses this knowledge as input to the assessment process.
- Many hazards and threats are addressed in established design standards and operational planning. New hazards and threats may exceed established practice or standards. Established and newly apparent risks must be met with mitigation measures consistent with the National Incident Management System (NIMS) and the National Infrastructure Protection Plan.

Audience

The anticipated audience for the guide includes

- Transportation executives or asset owners,
- State and local transportation departments and agencies responsible for multiple modes, and
- Transportation officials with capital budgetary discretion.

Organization of Report

This report is organized as shown in Table 1.

Part I describes the genesis of this project and the development of the CAPTA methodology. This overview provides the rationale for pursuing the consequence-based approach and summarizes other approaches and models considered by the project team before arriving at the CAPTA methodology. This opening section also identifies the outlook of the project team, assumptions made in the CAPTA methodology, the intended users, and the terms underpinning the approach.

Part II offers a step-by-step action plan for users of the Costing Asset Protection Tool (CAPTool), the spreadsheet-based product that implements the CAPTA methodology. The methodology is implemented in a "basic" and an "expanded" form so that users may apply the tool in a manner that reflects available data and the level of analysis required. Part II also provides guidance on which

Table 1. Report organization.

Part	Title	
I	Chapter 1	Project Rationale and Approach
	Chapter 2	CAPTA Development Path
	Chapter 3	CAPTA Components
	Chapter 4	Results Summary
	Chapter 5	Conclusion
	Appendix A	Costing Asset Protection: An All Hazards Guide for Transportation Agencies (CAPTA) Test Preparation
	Appendix B	Summary Report for the CAPTA Pilot Test with the Maryland DOT, October 17, 2007
	Appendix C	Summary Report for the CAPTA Pilot Test with MBTA, November 16, 2007
	Appendix D	Summary Report for the CAPTA Pilot Test with the Virginia DOT, February 13, 2008
	Appendix E	List of Acronyms
	Appendix F	Glossary of Terms used in CAPTA
	Appendix G	Recommended Further Reading
II	CAPTool User Guide for the CAPTool Spreadsheet Tool and Data Model	

version of the tool may be most applicable to the user. CAPTool is available from the TRB website (www.trb.org/news/blurb_detail.asp?id=9579).

Project Team

The project team is composed of analysts and engineers from Science Applications International Corporation (SAIC) and PB Consult. These individuals have worked with numerous owner agencies to identify primary and secondary safety- and security-related hazards or threats, identify critical locations, suggest structural improvements at critical locations, and describe countermeasures. Team members have also worked with national organizations such as the American Association of State Highway and Transportation Officials (AASHTO) to develop transportation infrastructure hazard/threat and vulnerability assessment guidelines and guidance for owner agencies. Team members are also leaders in the transit and transportation industry.