Public Safety and Security Response Capability Calculator: Overview

Contents

Purpose of the tool 2

Types of teams and perimeters 2

How to use the tool 3

Tool limitations 3

What are life-cycle costs? 4

Terminology 4

Cost drivers 6

Software requirements 6

Disclaimer 6

Appendix A: Cost factors by resource type 9

Appendix B: Default cost factors by resource type 11

Document last updated September 12, 2012

Purpose of the tool

This free tool estimates the resources a jurisdiction may need to execute a public safety and security response (PSSR) to a large event (e.g., a concert or sporting event) or an incident (e.g., a riot or terrorist attack).[1,2] The calculator also estimates the costs associated with a PSSR.

The tool calculates initial and life-cycle costs for acquiring and maintaining the PSSR capability. Users can customize the types, costs, and quantities of personnel and equipment to reflect their jurisdiction's needs. The tool helps estimate jurisdiction-specific costs to assist with budget forecasting and grant investment justification.

Types of teams and perimeters

PSSR teams are capable of managing large-scale operations during an emergency or a public event. Critical operations conducted by these teams include crowd management, traffic control and enforcement, and establishment of a general saturation presence.[3] Through these operations, PSSR teams maintain order and preserve the peace. Teams are trained to operate in a variety of environments, including environments that have sustained chemical, biological, radiological, and nuclear (CBRN) exposure.[4] PSSR teams engage in routine training to maintain an advanced skill level.

There are two different categories of PSSR resources included in this calculator:

Crowd Control Team:[5] A Crowd Control Team must be prepared to manage crowds, control traffic, and maintain a general saturation presence in an effort to maintain order and preserve the peace. Crowd Control Teams are prepared to operate in CBRN environments.

Perimeter and Checkpoint Team:[6] A Perimeter and Checkpoint Team must be prepared to manage crowds, control traffic, and secure the area's perimeter using perimeter patrols and checkpoints.

The tool allows users to decide between using a single or double perimeter for access control. There are many factors to consider when making this decision, including:

---

[1] U.S. Department of Homeland Security. Federal Emergency Management Agency. "Public Safety and Security Response." *Target Capabilities List 2.0*. 2007.
[2] Wardell, Clarence. "Emergency Public Safety and Security Response (EPSSR) Capability: Estimation of Scenario-based Resource Requirements and Gaps." CNA report 13535. Jun. 2010.
[3] U.S. Department of Homeland Security. Federal Emergency Management Agency (FEMA). "Typed Resource Definitions—Law Enforcement and Security Resources." 2007. http://www.fema.gov/pdf/emergency/nims/508-6_Law_Enfor_Secur_Resources.pdf (last accessed August 31, 2012) p.58.
[4] Ibid.
[5] Ibid.
[6] Wardell, Clarence. "Emergency Public Safety and Security Response (EPSSR) Capability: Estimation of Scenario-based Resource Requirements and Gaps." CNA report 13535. Jun. 2010.

- different levels of access/credentialing (i.e., is the event open to the general public as well as ticketholders?);
- the need to filter different types of traffic (i.e., vehicular vs. pedestrian); and
- different levels of security screening (i.e., metal detectors vs. x-ray units).[7]

How to use the tool

Jurisdictions enter their risk factor information on the page entitled "Your Info." The tool generates suggested numbers of PSSR teams by team type, based on the desired officer-to-attendee ratio. There are many factors to consider when choosing this ratio. For example, the crowd type can vary; a spectating crowd may require fewer officers than a demonstrator crowd. Other factors include crowd composition, possible crowd catalyst events, crowd density and throughput, and criminal or terrorist risks.[8]

Default quantities and costs of equipment, personnel, and training already populate the tool, but users can change these numbers to reflect the actual costs and needs of their own jurisdiction, as well as add new rows for equipment not already included on the list. The tool presents costs in terms of both the initial investment costs (purchase/acquisition costs), as well as annualized life-cycle costs (maintenance/sustainment costs).

For more on how to use the tool, please refer to the "Emergency Public Safety and Security Response Capability Calculator: Technical Guide," which is available on the CNA website, www.cna.org.

How to use the results

The calculator supports planners, decision-makers, and grant-writers by helping them to forecast costs and justify investments with a systematic, risk-based estimate of how many PSSR teams their jurisdiction might need.

Tool limitations

This tool examines the team-based resource requirements of capabilities. It does not take into account other parts of preparedness, such as developing plans to implement the PSSR capability, or exercising the capability to keep it operational and effective.

The tool does not specify the source of the officers required for event security. In many cases, the number of officers required for a major event or response will exceed the capability of a single jurisdiction. Additional officers may come from mutual aid

[7] Connors, Edward. Department of Justice, Office of Community Oriented Policing Services. "Planning and Managing Security for Major Special Events." March 2007. Available online: http://www.cops.usdoj.gov/Publications/e07071299_web.pdf (last accessed September 4, 2012).
[8] U.S. Department of Homeland Security, Federal Emergency Management Agency. "Special Events Contingency Planning: Job Aids Manual." 2005. Available online: http://training.fema.gov/EMIWeb/downloads/is15aSpecialEventsPlanning-JAmanual.pdf (last accessed September 4, 2012).

agreements with neighboring jurisdictions, from federal sources, or from private security firms or volunteers.[9]

The tool includes a pre-populated list of default cost estimates based on CNA's literature review and representative vendor suggested prices. However, costs may vary across jurisdictions, so CNA advises that users take care in using these default cost values.

What are life-cycle costs?

Life-cycle cost (LCC) analysis is a cost-accounting methodology used to account for and control costs in private-sector and defense budgeting.[10] In the private sector, it is important for businesses to accurately forecast the costs of developing, manufacturing, and selling a new product to determine whether doing so would be a good investment. Likewise, consumers who depend on the new product have to account for the initial and ongoing costs of buying, using, and replacing the equipment that they purchase. If producers consider only the initial investment, or if consumers consider only the face value of their purchase, they each risk being blindsided by unforeseen costs. The same principle applies to planning for emergency preparedness.

CNA analysts adapted the LCC methodology for use in homeland security and emergency management.[11] In this document, we present: 1) the terminology of the LCC methodology; 2) detailed descriptions of costs and cost factors, and their default values in the tool; and 3) a chart of cost factors, which vary according to whether the costs derive from vehicles, equipment, or supplies.

Terminology

Emergency planners can use the following LCC concepts to forecast the annual sustainment cost of their jurisdiction's investments:

1. **Unit Cost** is the purchase price of a single unit of an item.

2. **Initial Cost** is the Unit Cost multiplied by the number of units purchased.

3. **Energy Cost** accounts for the costs of gas, oil, and electricity necessary for an item's use. Equipment items requiring gas, oil, or electricity incur this cost, as do vehicles. Equipment items are assumed to incur energy costs as a fixed percentage of the unit cost by default. In the tool, default vehicle energy costs are based on a Minnesota Department of Transportation (MDOT) study that breaks out energy costs for a variety of commercial and private vehicles, calculated in cents per mile.[12] Users may edit the values for

---

[9] Connors, Edward. Department of Justice, Office of Community Oriented Policing Services. "Planning and Managing Security for Major Special Events." March 2007. Available online: http://www.cops.usdoj.gov/Publications/e07071299_web.pdf (last accessed September 4, 2012).
[10] Emblemsvag, Jan. "Life-cycle Costing: Using Activity-based Costing and Monte Carlo Methods to Manage Future Costs and Risks." Hoboken, New Jersey: Wiley & Sons, Inc., 2003.
[11] Hall, Robert and Erica Dusenberry Dimitrov. "The Application of Cost Management and Life-Cycle Cost Theory to Homeland Security National Priorities." *Homeland Security Affairs.* Vol. V, no. 2, May 2009. http://www.hsaj.org/?article=5.2.6 (last accessed July 27, 2012).
[12] Barnes, Gary and Peter Langworthy. "The Per-Mile Costs of Operating Automobiles and Trucks." St. Paul, Minnesota: MDOT, 2003.

estimated annual vehicle mileage and energy cost per mile.

4. **Operating Cost** accounts for the expenses of operation, storage, and administrative and logistical support. Operating costs for equipment items are assumed to equal a fixed percentage of the unit cost by default. Operating costs for a vehicle include storage and administrative costs associated with owning the vehicle. The tool defaults to the vehicle operating cost value found in the MDOT study. The default annual operating cost is $1,200, representing the approximate cost of leasing or purchasing storage space.

5. **Repair Cost** accounts for periodic routine maintenance, repair, and calibration. Repair costs apply to major purchases expected to last a number of years (e.g., vehicles) or equipment that requires regular safety review and calibration (e.g., oxygen tanks and self-contained breathing apparatus). Repair costs do not apply to consumables or supplies that are more likely to be discarded at the end of their useful lives than to be repaired (e.g., uniforms, tires). Annual repair costs default to a fixed percent of the unit costs, following National Institute of Justice estimates for a variety of personal protective equipment.[13]

6. **Upgrade Cost** accounts for updates, patches, and upgrades to software and hardware systems, in excess of the cost of simply replacing the software (captured in Replacement Cost, described below).

7. **Shelf Life** accounts for the number of years for which an item is expected to function (i.e., the time until it needs to be replaced). In practice, these values vary, with major purchases like vehicles likely to last 10 to 20 years, equipment from 5 to 10 years, and very sensitive equipment (e.g., personal protective equipment) and consumables (e.g., medications) from 1 to 5 years. CNA analysts used applicable guidance from DHS and vendors to estimate default values for shelf life.[14]

8. **Replacement Cost (R-Cost)** is the amortized replacement or re-purchase cost of an item. The tool assumes that the replacement is simply a new unit identical to the original item, purchased at the same Unit Cost. The tool calculates R-Cost as Initial Cost divided by the Shelf Life of the item.

9. **Annual Cost** is the sum of Energy Cost, Operating Cost, Repair Cost, Upgrade Cost, and R-Cost for a single year. This cost is incurred every year that the capability is maintained.

---

http://www.cts.umn.edu/Publications/ResearchReports/reportdetail.html?id=670 (last accessed September 1, 2011)

[13] National Institute of Justice Publications. (1) "Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders." NIJ Guide 100-00, Volume II, June 2000; (2) "Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders." NIJ Guide 103-00, Volume II, October 2001. (3) "Guide for the Selection of Personal Protective Equipment for Emergency Responders." NIJ Guide 102-00, Volume I, November 2002.

[14] U.S. Department of Homeland Security. "Appendix I: Life Cycle Cost Estimates (LCCE), Independent Cost Estimates (ICE) and Cost Estimating Baseline Documents (CEBD)." https://acc.dau.mil/adl/en-US/496504/file/62577/App%20I%20%20Life%20Cycle%20Cost%20Estimate%20%28LCCE%29%20%28Signed%29.pdf (last accessed, July 27, 2012).

10. **Total Cost** is the sum of *all* Initial and Annual Costs in a year.

Cost drivers

The PSSR capability annual costs are primarily driven by a few "big ticket" equipment items. Vehicles and communications equipment constitute the majority of total equipment costs for the Crowd Control Team, and the mobile checkpoint guard booth makes up most of the equipment costs for the Perimeter and Checkpoint Team. However, these types of equipment are likely to have been purchased for general use by the local police department. Therefore, these equipment costs would not necessarily be borne by the PSSR capability. In that case, the user can enter zero for the unit cost for those items to reflect that fact.

Software requirements

The tool runs exclusively in Microsoft® Excel. Using the tool requires no add-on programs, only the standard installation of Excel for Windows with Visual Basic for Applications (VBA) enabled. For best performance, the tool should be run using Excel 2007 or 2010.

Depending on the user's default security settings, the program may ask the user if they would like to "enable macros." This tool relies on macros written in VBA to run. Therefore, the tool will not work properly when macros are disabled. For information on how to enable macros, please refer to the Excel help files or to the Microsoft® support website.

Please be aware that CNA has not validated the tool's performance in any version of Excel for Mac.

Disclaimer

The Capability Calculator contained herein is general in nature, is provided free of charge for informational purposes and should not be construed as legal or professional advice. CNA Corporation cannot guarantee that such information is accurate, complete, or timely. Laws of a particular state or laws which may be applicable to a particular situation may have an impact on the applicability, accuracy, or completeness of such information. Such federal and state laws and regulations are complex and are subject to change and such changes may have a material impact on the predictive results. CNA makes no express or implied warranties with regard to the use of the Capability Calculator or the results obtained by its use. CNA disclaims any liability arising out of your use of, or any position taken in reliance on, such information. CNA MAKES NO WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR RELATING TO THE USE OF THE CAPABILITY CALCULATOR.

The Capability Calculator is the property of CNA Corporation and is protected by applicable copyright laws. Accordingly, you may not copy, distribute, modify, post, or frame-in CNA's website including any text, graphics, video, audio, software code, user interface design, or logos. To avoid confusion if you do link from another web site to

CNA's top-level homepage, your website, and the link itself, may not suggest that CNA endorses, sponsors, or is affiliated with any non-CNA website, entity, service, or product, and may not make use of any CNA trademarks or service marks other than those contained within the text of the link. All trademarks and service marks on the CNA site belong to CNA Corporation, except any third-party trademarks and service marks displayed on the CNA site, which remain the property of their respective owners.

References

Barnes, Gary and Peter Langworthy. "The Per-Mile Costs of Operating Automobiles and Trucks." St. Paul, Minnesota: Minnesota Department of Transportation (MDOT), 2003.

Connors, Edward. Department of Justice, Office of Community Oriented Policing Services. "Planning and Managing Security for Major Special Events." March 2007. Available online: http://www.cops.usdoj.gov/Publications/e07071299_web.pdf (last accessed September 4, 2012).

Emblemsvag, Jan. *Life-Cycle Costing: Using Activity-based Costing and Monte Carlo Methods to Manage Future Costs and Risks.* Hoboken, New Jersey: Wiley & Sons, Inc., 2003.

Hall, Robert and Erica Dusenberry Dimitrov. "The Application of Cost Management and Life-Cycle Cost Theory to Homeland Security National Priorities." *Homeland Security Affairs* Vol. V., no. 2, May 2009. http://www.hsaj.org/?article=5.2.6 (last accessed July 27, 2012).

National Institute of Justice Publications. (1) "Guide for the Selection of Chemical Agent and Toxic Industrial Material Detection Equipment for Emergency First Responders." NIJ Guide 100-00, Volume II, June 2000; (2) "Guide for the Selection of Chemical and Biological Decontamination Equipment for Emergency First Responders." NIJ Guide 103-00, Volume II, October 2001. (3) "Guide for the Selection of Personal Protective Equipment for Emergency Responders." NIJ Guide 102-00, Volume I, November 2002.

U.S. Department of Homeland Security. "Appendix I: Life Cycle Cost Estimates (LCCE), Independent Cost Estimates (ICE), and Cost Estimating Baseline Documents (CEBD)." https://acc.dau.mil/adl/en-US/496504/file/62577/App%20I%20%20Life%20Cycle%20Cost%20Estimate%20%28LCCE%29%20%28Signed%29.pdf (last accessed, July 27, 2012).

U.S. Department of Homeland Security. Federal Emergency Management Agency. "Special Events Contingency Planning: Job Aids Manual." 2005. Available online: http://training.fema.gov/EMIWeb/downloads/is15aSpecialEventsPlanning-JAmanual.pdf (last accessed September 4, 2012).

U.S. Department of Homeland Security. Federal Emergency Management Agency (FEMA). "Typed Resource Definitions—Law Enforcement and Security Resources." 2007. http://www.fema.gov/pdf/emergency/nims/508-6_Law_Enfor_Secur_Resources.pdf (last accessed August 31, 2012) p.58.

U.S. Department of Homeland Security. Federal Emergency Management Agency. "Public Safety and Security Response." *Target Capabilities List 2.0*. 2007.

Wardell, Clarence. "Emergency Public Safety and Security Response (EPSSR) Capability: Estimation of Scenario-based Resource Requirements and Gaps." CNA report 13535. Jun. 2010.

Appendix A: Cost factors by resource type

Vehicles

Energy Cost

Fuel costs drive energy costs for vehicles, so energy costs are based on annual mileage.

Large vehicles get lower mileage per gallon than small vehicles, so they have higher per-mile costs than small vehicles. Energy Cost for large vehicles defaults to $0.36/mile for 12,000 miles driven annually.

Small vehicles get more mileage per gallon than large vehicles, so they have lower per-mile costs than large vehicles. Energy Cost for small vehicles defaults to $0.30/mile for 12,000 miles driven annually.

Operating Cost

All vehicles must be sheltered when not in use. This requires that they be housed in leased or owned space. Since it can be hard for leased or even owned space costs to be reduced in proportion to the amount of space used, both large and small vehicles incur the same Operating Cost. Operating Cost defaults to an arbitrary estimate of $100/month, totaling $1,200 annually.

Repair Cost

Vehicle size does not matter for routine and periodic maintenance costs. Hence, repair costs increase in proportion to mileage.

Large vehicles incur fixed annual repair costs of $0.15/mile for 12,000 miles driven annually.

Small vehicles incur fixed annual repair costs of $0.15/mile for 12,000 miles driven annually.

Equipment

Energy Cost

Equipment can incur energy cost either 1) by drawing power directly from fuel or an electrical outlet, or 2) from energy stored in a battery. In either case, costs increase in proportion to the number of the pieces of equipment and their prices. Prices are important as a possible measure of how sophisticated the equipment is, as sophisticated equipment is more likely to require substantial power. Batteries for specific pieces of equipment are explicitly included in the equipment list when the item and its associated costs were found on a price list representative of an equipment vendor. Otherwise, Energy Cost for equipment defaults to 5 percent of Initial Cost.

Operating Cost

Equipment incurs operating cost for logistics, storage, and administration, in proportion to its cost and quantity. More equipment requires more space, and more expensive equipment may require higher-quality space. For example, although batteries may be stored on a shelf, a costly grenade launcher may be kept in a room with a special security system. Operating Cost for equipment defaults to 5 percent of Initial Cost.

Repair Cost

Relatively expensive equipment, such as a spectrometer, incurs repair costs for regular wear and tear and operational damage. Repair Cost for equipment defaults to 10 percent of Initial Cost.

Supplies

Energy Cost

Supplies do not require energy, except for commodities that need to be stored at a certain temperature (e.g., food, medicine).

Operating Cost

Supplies incur operating costs in proportion to the volume of space they occupy. Operating Cost defaults to 5 percent of Initial Cost.

Repair Cost

Supplies are consumable items that would likely be re-purchased rather than repaired. This fact should be reflected in a shorter shelf life. However, when appropriate, (for example, grenade launchers, Repair Cost defaults to 10 percent of Initial Cost.

Appendix B: Default cost factors by resource type

The table below provides the default cost factors for equipment and supplies within this life-cycle cost analysis.

	Energy	Operating	Repair	R-Cost
Large Vehicle	$0.36 per mile	$100 per month	$0.15 per mile	Initial Cost ÷ Shelf Life
Small Vehicle	$0.30 per mile	$100 per month	$0.15 per mile	Initial Cost ÷ Shelf Life
Equipment	5% of Initial Cost, as appropriate	5% of Initial Cost, as appropriate	10% of Initial Cost, as appropriate	Initial Cost ÷ Shelf Life
Supplies	None	5% of Initial Cost, as appropriate	None	Initial Cost ÷ Shelf Life