Carnegie Mellon University
Software Engineering Institute

# Approach to Skilling the Cyber Workforce

## SEI/CERT Cyber Mission Readiness (CMR)

**THE SHORTAGE OF SKILLED OPERATORS** needed to fill critical cybersecurity work roles is a continuous struggle. Attracting and adequately training talent is a multifaceted challenge that has been dissected and detailed for decades. Proposed solutions, such as those highlighted in *The National Cyber Workforce and Education Strategy*, call for a transformation of cyber education into a model that better addresses immediate demands of the constantly evolving domain.

The Software Engineering Institute (SEI) CERT Division's approach to cultivating a skilled cybersecurity workforce answers the call by applying strategies that ensure effectiveness for today's learners while providing the flexibility agencies need for re-skilling requirements in the ever-changing cyber landscape. Knowledge and skill-building content is designed in tightly scoped digestible lessons that employ immersive and interactive activities to reinforce objectives. Studies have shown that active learners retain more information than passive learners by a measurable amount. CMR builds upon that retention through engaging content and relatable application of the concepts.

CMR's concise model for instruction affords several benefits in addition to highly customizable knowledge and skill-building paths. Editing and creating newly scoped lessons are significantly more efficient when other content is not referenced or impacted, and disseminating a timely or urgent message is more expeditious when pointedly scoped.

A **Cyber Snippet** is stand-alone cybersecurity video topic with embedded knowledge-building activities. Each Snippet interactive lesson can be mapped to workforce frameworks, agency competency requirements, or other attribute tags to customize curriculum and use case scenarios for on-demand skill building.

Fortifying knowledge building, the learner can acquire practical experience through lab exercises. **Lab exercises** guide users through hands-on lessons applying cyber tools and techniques. The labs provide opportunity for skill building by performing simulated on-the-job tasks within a sandbox environment. **Cybersecurity challenges** take lab exercises to the next level. Operators rehearse and affirm skill sets by solving hands-on cyber challenges. The ability to demonstrate prowess in finding solutions that strengthen the security posture of a network is a powerful means to improve and gauge mission readiness.

The ability to evaluate and inventory the strengths of a workforce is crucial to aid resource allocation and identify competency gap areas and proficiency development needs, among other mission-readiness goals. Culminating the skill and experience-building projects is the ability to assess the technical acumen of an individual. An evaluator tool that provides feedback offering a data-driven mechanism to determine an individual's fitness for a given task is an evolving initiative.

Our workforce development strategies are designed to be easily distributed and work with most learning management environments. CMR leverages open-source technologies to offer hands-on skill and evaluation capabilities as well as mission-readiness exercise ranges with the Foundry and Crucible projects. For additional information on these initiatives or to discuss your specific mission-readiness needs, contact CMR-Info@sei.cmu.edu

# Interactive Short–Form Videos

## A Resource–Efficient Tool for Workforce Enrichment

### Cultivating a Skilled Workforce

*"Workers will need to continually learn, but many want small, specific bursts of information tied to immediate job demands, available at a time of their choosing."* [1]

### Microlearning Drives Learning Retention and Engagement


Hands-on activities and gamification can result in greater knowledge retention, as active learners retained **93.5%** of information, compared to only **79%** for passive learners after one month [2]

### Distraction Dilemma


Brief, engaging visual lessons offered on-demand accommodate learning for today's workforce

People prefer instructional, informational videos that last 3–6 minutes. [3]

**90%** of information transmitted to the brain is visual. [4]

Visuals are processed **60,000× faster** by the brain than text. [5]

**60 SECONDS OF VIDEO**

**IS EQUIVALENT TO**

*1,800,000* words

6

CC

Video captions *increase understanding* by **56%**

7

### Interactivity Improves Performance

Embedded knowledge checks into video:

- **Higher** test scores
- **More** likely to take notes
- **Less** test **anxiety**

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### Existing Video Library Stats

- ☑ Wide breadth of cybersecurity–related topics
- ☑ 2250+ stand-alone topic videos
- ☑ 440+ hours of content, average 9 minutes
- ☑ Variety of formats
- ☑ Transcribed for closed captioning
- ☑ Massive question bank
- ☑ Customizable curriculum builds


1 *Top Class* (wbtsystems.com/learning-hub/blogs/microlearning-education)
2 *Bridge* (getbridge.com/blog/learning-analytics/10-stats-about-learning-retention-youll-want-forget)
3 *Techsmith* (techsmith.com/blog/video-statistics)
4 *Sh!ft* (shiftelearning.com/blog/bid/350326/studies-confirm-the-power-of-visuals-in-elearning)
5 *Sh!ft* (shiftelearning.com/blog/bid/350326/studies-confirm-the-power-of-visuals-in-elearning)
6 *LinkedIn* (linkedin.com/pulse/did-you-know-60-seconds-video-equivalent-18-million-words-david-cole)
7 10 Facts and Stats About Learning Retention *Bridge* (getbridge.com)
8 The impact of short videos on student performance in an online-flipped college engineering course *Humanities and Social Sciences Communications* (nature.com)


## About the CERT Division

The CERT® Division of Carnegie Mellon University's Software Engineering Institute conducts valued, relevant, and trusted evidence-based research that fortifies the cyber ecosystem and protects national security and prosperity.

## Contact Us


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