

# Cost Benefit Analysis Method (CBAM)

Analyze economic tradeoffs to make better decisions for your organization's system architectures.

## HOW CAN YOU ACCOUNT FOR ECONOMIC CONSIDERATIONS WHEN DESIGNING OR MODIFYING A SYSTEM ARCHITECTURE?

The answer is to use an analysis approach that weighs potential benefits with real development costs, risks, and schedule implications.

Creating and maintaining systems involve making multiple business-critical architecture design decisions. System architects typically focus on the technical tradeoffs of their architectural designs. However, when developing or maintaining large, complex systems, the biggest tradeoffs are related to economics.

Organizations need to know how to invest their resources to maximize their gains, meet their schedules, and minimize their risks. And that is exactly what the CBAM enables you to do.

Because the resources for building and maintaining a system are finite, you must choose among architectural options with different costs, amounts and types of resources, features, and inherent risk or uncertainty. The CBAM enables you to explore the effects of these options using economic software models that account for all of these factors.

### The Challenges

Organizations tend to consider costs only in terms of building a system, and they fail to consider the costs associated with maintaining and upgrading it. This limited view of costs makes it difficult to understand the tradeoffs the organization may need to make as it decides how to develop, upgrade, or maintain a system.

When designing the architecture for a new system or revising the design of existing architectures, the economics of system development must be considered. However, not all system architects are familiar with how to do such an analysis.

To analyze and choose among multiple design options, it is challenging to accurately represent the system in a way that characterizes its proposed designs, quality attributes, and features as well as its benefits and costs. In addition, there are the uncertainties and risks that must be factored into such a representation.

### The CBAM Process

The CBAM guides you through the process of identifying the costs and benefits of architectural decisions that result in system qualities. Then you can consider the information you compiled and choose from multiple proposed architecture options.

For example, you could decide whether to use redundant hardware, checkpointing, or some other method to address concerns about the system's reliability. Or you could choose to invest the organization's resources in some other quality attribute, such as higher performance.

The CBAM process consists of the following steps:

1. Choose scenarios and architectural strategies.
2. Assess quality attribute benefits.
3. Quantify the benefits of architectural strategies.
4. Quantify the costs and schedule implications of the architectural strategies.
5. Calculate the desirability of each option.
6. Make architectural design decisions.

Through this process, CBAM experts from the Software Engineering Institute (SEI) guide you through determining a set of architectural strategies that address your highest priority scenarios. These strategies represent the optimal set of architectural investments. They are optimal based on considerations of benefit, cost, and schedule, within the constraints of the uncertainty of these judgments and your willingness to withstand the risk implied by the uncertainty.

### **Benefits**

The benefits that an architectural decision may bring to an organization are as important—or perhaps more important—than the costs.

The CBAM enables you to make informed decisions about software requirements and software investments based on an analysis of the economic and architectural implications of those decisions.

### **Get Started**

If you are interested in arranging an SEI team to help you conduct a CBAM or if you have technical questions about it, contact us by calling 888.201.4479 or sending email to [info@sei.cmu.edu](mailto:info@sei.cmu.edu).

### **Software Architecture Training**

The SEI offers software architecture courses and certificate and certification programs that are based on extensive SEI and community experience in architecting software-intensive systems.

More than 20,000 people from more than 1,800 organizations have attended courses in the SEI Software Architecture Curriculum, and more than 2,500 people have earned software architecture-related certificates.

Visit [www.sei.cmu.edu/education-outreach/courses/](http://www.sei.cmu.edu/education-outreach/courses/) to see the complete set of architecture-related offerings and register for upcoming courses.

### **SEI Expertise in Software Architecture**

For more than two decades, the SEI has been instrumental in creating and developing the field of software engineering known as *software architecture*.

A system's software architecture is the conceptual glue that holds every phase of a project together for all of its stakeholders. It is the depiction of a system that aids in understanding how the system will behave.

Software architecture serves as the blueprint for both the system and the project developing it, defining the work assignments that must be completed. The architecture is also the primary carrier of system qualities such as performance, modifiability, and security, none of which can be achieved without a unifying architectural vision.

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## **About the SEI**

The Software Engineering Institute is a federally funded research and development center (FFRDC) that works with defense and government organizations, industry, and academia to advance the state of the art in software engineering and cybersecurity to benefit public interest. Part of Carnegie Mellon University, the SEI is a national resource in pioneering emerging technologies, cybersecurity, software acquisition, and software lifecycle assurance.

## **Contact Us**

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