**Operations Research**

Operations research (OR) is an analytical method of problem-solving and decision-making that is useful in the management of organizations. In operations research, problems are broken down into basic components and then solved in defined steps by mathematical analysis.

The process of operations research can be broadly broken down into the following steps:

1. Identifying a problem that needs to be solved.
2. Constructing a model around the problem that resembles the real world and variables.
3. Using the model to derive solutions to the problem.
4. Testing each solution on the model and analyzing its success.
5. Implementing the solution to the actual problem.

Disciplines that are similar to, or overlap with, operations research include [statistical analysis](https://whatis.techtarget.com/definition/statistical-analysis), management science, [game theory](https://whatis.techtarget.com/definition/game-theory), optimization theory, [artificial intelligence](https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence) and network analysis. All of these techniques have the goal of solving complex problems and improving quantitative decisions.

The concept of operations research arose during World War II by military planners. After the war, the techniques used in their operations research were applied to addressing problems in business, the government and society.

**Characteristics of operations research**

There are three primary characteristics of all operations research efforts:

1. Optimization- The purpose of operations research is to achieve the best performance under the given circumstances. Optimization also involves comparing and narrowing down potential options.
2. Simulation- This involves building models or replications in order to try out and test solutions before applying them.
3. [Probability](https://whatis.techtarget.com/definition/probability) and statistics- This includes using mathematical algorithms and data to uncover helpful insights and risks, make reliable predictions and test possible solutions.

**Importance of operations research**

The field of operations research provides a more powerful approach to decision making than ordinary software and [data analytics](https://searchdatamanagement.techtarget.com/definition/data-analytics) tools. Employing operations research professionals can help companies achieve more complete datasets, consider all available options, predict all possible outcomes and estimate risk. Additionally, operations research can be tailored to specific business processes or use cases to determine which techniques are most appropriate to solve the problem.

**Uses of operations research**

Operations research can be applied to a variety of use cases, including:

* Scheduling and [time management](https://whatis.techtarget.com/definition/time-management).
* Urban and agricultural planning.
* Enterprise resource planning ([ERP](https://searcherp.techtarget.com/definition/ERP-enterprise-resource-planning)) and supply chain management ([SCM](https://searcherp.techtarget.com/definition/supply-chain-management-SCM)).
* [Inventory management](https://searcherp.techtarget.com/definition/supply-chain-management-SCM).
* Network optimization and engineering.
* [Packet](https://searchnetworking.techtarget.com/definition/packet) routing optimization.
* [Risk management](https://searchcompliance.techtarget.com/definition/risk-management).

Other definition:

**Operations Research**

Operations research aims to provide a framework to model complex decision-making problems that arise in engineering, business and analytics, and the mathematical sciences, and investigates methods for analyzing and solving them.

The most common solution techniques include mathematical optimization, simulation, queuing theory, Markov decision processes, and data analysis, all of which use mathematical models to describe the system.

**Optimization**

Optimization aims to find the minimum (or maximum) value of an objective function subject to constraints that represent user preferences and/or limitations imposed by the nature of the question at hand. Research in optimization involves the analysis of such mathematical problems and the design of efficient algorithms for solving them.

It is therefore no surprise that optimization, while integral to operations research, has become an indispensable tool in other areas such as statistics, machine learning, computer vision, and computational biology, just to name a few.

Optimization technologies are shining examples of how deep mathematical techniques help to provide concrete computational tools for solving a diverse suite of problems.