Free/Open-Source Operational Research Tools for PBOR Volunteers

To ensure all volunteers can contribute effectively regardless of budget constraints, we have compiled a list of free and open-source software options for Operational Research tasks.

If you require a specific paid tool, please submit a request to the PBOR Manager who will attempt to negotiate access via pro bono licenses or short-term agreements.

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1. Optimisation, Programming & Solvers

This category includes tools for defining and solving Linear Programming (LP), Mixed-Integer Programming (MIP), and other complex combinatorial optimisation problems.

Tool Name	Type	Key Features & Notes
Google OR-Tools	Code Library (Python, C++, Java, C#)	For tackling problems in vehicle routing, flows, constraint programming, and linear optimisation.
GNU Linear Programming Kit (GLPK)	Solver / Library	For solving large-scale linear and mixed-integer programming problems.
CMPL	Modeling Language	An algebraic modeling language often used in conjunction with solvers like GLPK to define large-scale optimisation problems in a clear, mathematical structure.

Tool Name	Type	Key Features & Notes
HiGHS	Solver / Library (C++, Python, others)	An open-source solver for LP, MIP, and Convex Quadratic Programming (QP).
OpenSolver Excel Add-in	GUI Excel Add-in (requires Excel)	Brings optimisation solving directly into Microsoft Excel. Ideal for building and testing smaller models without writing code.
PuLP (Python)	Modeling Package	A Python-based modeling language specifically designed for linear and integer programming.
SCIP	Solver / Framework	One of the fastest non-commercial solvers for Mixed Integer Programming (MIP) and Mixed Integer Nonlinear Programming (MINLP). Suitable for advanced non-linear optimisation tasks.

2. Simulation & Agent-Based Modeling (ABM)

Tools for modeling dynamic systems, discrete-event processes, and understanding how system changes affect outcomes over time.

Tool Name	Type	Key Features & Notes
JaamSim	GUI Desktop Software	A Discrete-Event Simulation tool featuring a drag-and-drop graphical user interface (GUI) and interactive 3D graphics.
NetLogo	Desktop Software	For simulating decentralised systems and complex social interactions.
Insight Maker	Web-Based	For system mapping and causal loop diagramming.

Tool Name	Type	Key Features & Notes
Watchmaker Framework	Code Library (Java/Kotlin)	For developing complex Agent-Based Models and evolutionary algorithms in code.
OpenModelica	Desktop Software (Modelica language)	For modeling, simulating, and optimising complex dynamic systems (e.g. chemical, thermal, or mechanical processes).

3. Data Analysis, Statistics & Visualisation

Essential tools for cleaning data, running statistical tests, and generating clear reports and interactive dashboards.

Tool Name	Type	Key Features & Notes
Google Sheets	Spreadsheet (Web)	For basic data entry, calculation, pivot tables, and simple modeling.
LibreOffice Calc	Spreadsheet (Desktop)	A desktop spreadsheet alternative to Microsoft Excel.
R / RStudio Environment	Code-Based Environment (requires R language)	For statistical computing and graphics via packages like tidyverse, ggplot2, and shiny.
GNU Octave	Numerical Computing	For linear algebra and numerical OR methods, compatible with many MATLAB scripts.
Gretl	GUI Statistical Tool	For time series, regression, and forecasting models.
JASP and Jamovi	GUI Statistical Tools	Provides a familiar spreadsheet interface for common statistical tests (t-tests, ANOVA, regression, factor analysis). No coding required.

Tool Name	Type	Key Features & Notes
PSPP	GUI Statistical Tool	Designed for statistical analysis of sampled data. Ideal for volunteers familiar with SPSS workflows.
OpenRefine	GUI Data Preparation	For cleaning, transforming, and reconciling data against external data sources (e.g. standardising text entries).
Orange	GUI	For quickly exploring data relationships and building predictive models.
Gephi	Desktop Software	For visualising and exploring complex networks and graph data structures (e.g. social networks, supply chain connections).
Neo4J	Database	For storing and querying complex relational data, which is common in routing and network optimisation problems.
Looker Studio (formerly Google Data Studio)	Web-Based Visualisation Tool	For transforming raw data into insightful, customisable reports and interactive dashboards.
Datawrapper	Web-Based Tool	For creating publication-ready charts and maps, optimised for embedding and mobile responsiveness.
RAWGraphs	Web-Based Tool	For creating unique, custom, and non-standard chart types from tabular data.

4. GIS & Geospatial

Essential tools for projects involving facility location, territory design, routing with spatial constraints, and mapping.

Tool Name	Type	Key Features & Notes
QGIS (Quantum GIS)	GUI Desktop Software	For any project involving location, mapping, or spatial analysis.
GRASS GIS	Desktop Software / Library	For advanced spatial data management and analysis, often used alongside QGIS for complex raster and vector processing.
PostGIS (PostgreSQL Extension)	Database Extension	For large-scale location-based OR.
GDAL (Geospatial Data Abstraction Library)	Code Library	For command-line processing of spatial data in scripting workflows.
Open Door Logistics Studio	Desktop Software	For complex Vehicle Routing Problems (VRP) and logistics optimisation, offering strong dedicated features beyond general optimisation solvers.
Google My Maps	Web-Based Tool	For quickly creating and sharing simple custom maps with markers and routes.

If you know any tools/software that would be a good addition to this list then let us know, and best of luck with your PBOR project!