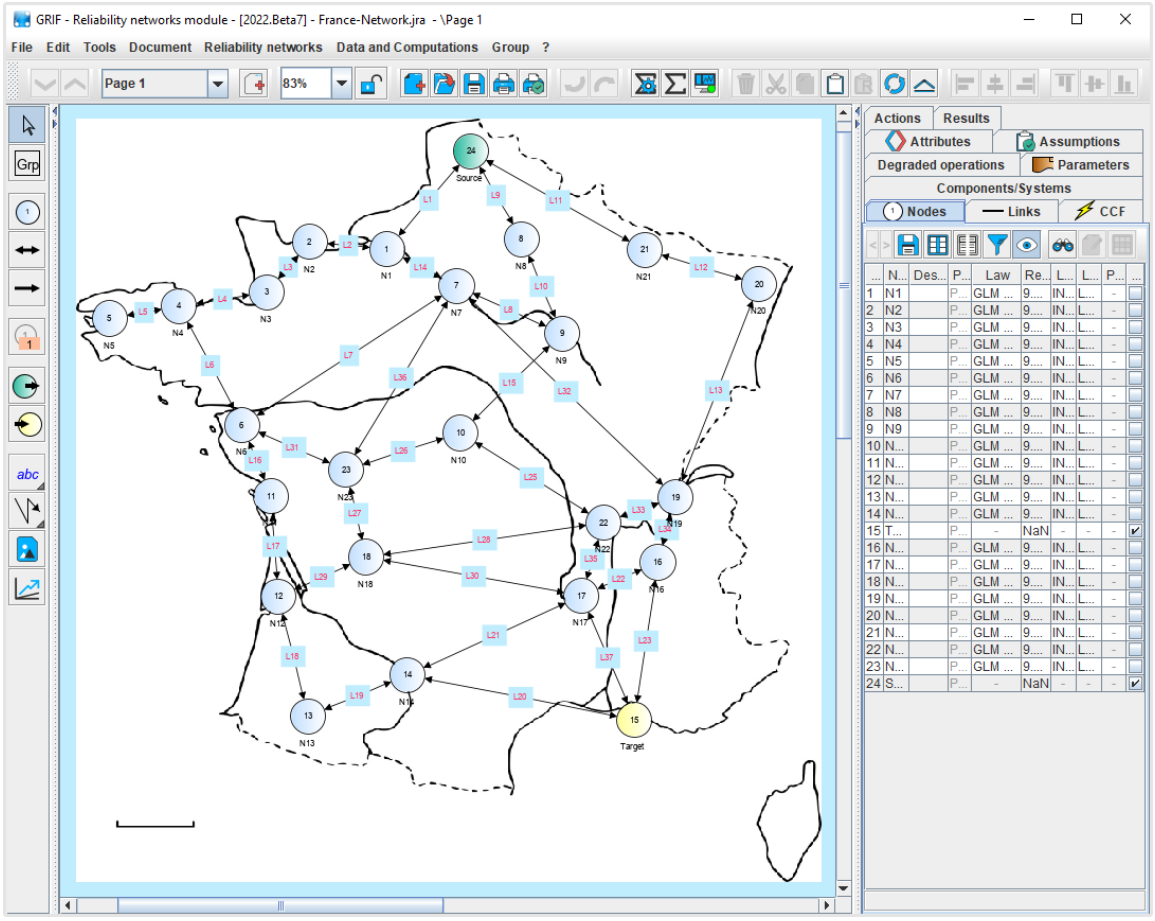
GRIF | Reseda module

Technical sheet

To evaluate all sorts of networks using Reliability Network modelling

GRIF (GRaphical Interface for reliability Forecasting), a technology of TotalEnergies since the 80s, includes 3 packages and 12 modules allowing the user to choose the most appropriate modelling technique for the resolution of the studied system. Reseda module is one of the seven modules belonging to Boolean package.

Reseda is used to model systems based on reliability networks that are made up of nodes and links. This module is suited to any kind of network: electrical, radio, fluid, IT, etc. The aim is to evaluate network failure, assuming failure is the loss of all paths between the input and the output. Reseda uses **ALBIZIA**, the Binary Decision Diagram (BDD) computation engine developed by TotalEnergies, that is able to perform **accurate analytical calculations** and to provide rapidly a very large amount of information on the studied system.



Modelling and computations:

You can easily create a network via an **intuitive graphical interface**. After nodes and links have been created, users can define their failure distribution choosing among more than 20 probability distributions. Links can be directional or bi-directional according to system specifications, and as in all the modules of the Boolean package, Common Cause Failures can be considered.

The "Attribute" feature (a custom property system) can be used to add any required information to each object in the document, either for a more precise description or for traceability. "AND" logic nodes and "M out of N" nodes are also available for modelling specific systems in which the output of one node can be obtained provided there are sufficient inputs.

GRIF
GRaphical Interface for reliability Forecasting
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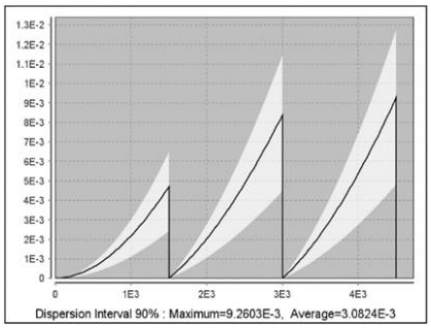
Hardware requirement: Intel Core i3 or faster, 4 GB of free RAM, 1 GB of free space, no internet connection needed. **Software requirements**: Windows 10 or Linux or MacOS X with Java 11. **Licenses**: standalone with USB dongle or Floating licenses with Sentinel server. Installable, laptop.

ALBIZIA, developed by TotalEnergies, provides many results for analytical computations:

- **Unavailability**: Q(t), U(t) or PFD(t), **Availability**: A(t), **Reliability**: R(t), **Unreliability**: F(t).
- **Frequency**: W(t), UFI(t) or PFH(t); and Failure rate: λeq(t), λv(t) or CFI(t).
- **Usual mean values**: MTTF, MTBF, MUT, MDT, number of failures.
- **Minimal cut-sets** (probability and frequency of cut-sets).
- **Reliability allocation.**
- **Many importance factors (Birnbaum MIF, Critical CIF, Vesely, DIF**…) that will help users to find system weaknesses and improve on them.

Specificities and strengths:



- **Factoring in uncertainties:** To reflect real conditions as much as possible (and ensure compliance with certain standards), parameter-related uncertainties can be factored in. For example, a failure rate can be qualified as following a Uniform, Normal or Log-normal law. **A Monte-Carlo simulation** is performed in addition to the BDD computation in order to obtain mean values. Finally, a quantile computation is run to provide a dispersion interval on each result. It can be a 60, 70, 80, 85, 90, 95 or 99% interval (centred or not).
  N.B. it is a requirement of the IEC standard 61511.

- **User-friendliness:** It is easy to add a picture of the network to the background to help network creation. In addition to an editing window for each object, GRIF comprises data-tables that make it easier to control the quality of input data and help users to make modifications (find/replace, suffixes, prefixes).

  GRIF has plugins for entering input data, obtained either from in-house feedback from the field, or from standards, or from commercial sources. Users will save time in finding accurate input data.

Reseda is suitable with all modules of GRIF Boolean package:

All reliability networks performed can be used in the Bool module which combines the features of all modules of the package.

- In the same document, to run computations using event trees (ETree), fault trees (Tree), reliability block diagrams (BFiab), safety instrumented systems (SIL), reliability networks (Reseda), or Bow-Tie / LOPA tables (Risk).
- Models can be linked; a link makes it possible to define any object (Event, Block, Barrier, Network node, etc.) using any model: Fault-Tree, Block-Diagram, SIS, Event-Tree; etc.
- Users in different departments of a company can work on the models they are used to and can then link their models. For example, an engineer can create a network comprising 30 nodes, each node representing an equipment item whose failure can be defined through one fault-tree. The fault-trees can also share gates and basic events in order to handle dependencies between nodes.

Using data and results:

- Possibility of automating calculations (batch runs) and drawing variations for sensitivity analysis.
- Results are stored in the document and can be exported in a variety of formats (csv, XML, Excel, etc.).
- Results can be viewed as line graphs, pie charts or histograms.
- Vectorial printing in PDF format generates high quality pictures but the files are small enough to be sent by e-mail even if the document contains hundreds of pages.
- External files (PDF certificates, system pictures, etc.) can be included in the document and be part of the full report.
- Interaction with the operating system: possibility of copying/pasting to or from word processing software, spreadsheets, or presentation tools.

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Trial version available on
grif.totalenergies.com