

# QuARS Express - User Manual

(version 0.1)

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## abstract

The QuARS Express (Quality Analyzer of Requirements Specifications - Express edition) is a tool that makes it easier to extract structured information and metrics for detecting linguistic inaccuracies and defects in software requirements expressed in Natural language.

In the following is presented the user manual.

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# Introduction

The [QuARS Express](#) (**Q**uality **A**nalyzer for **R**equirement **S**pecifications) is an automatic tool that support the analysis of requirements documents written in Natural Language.

The functionalities provided by [QuARS Express](#) are:

- 1. Defects Identification
- 3. Metrics derivation
- 3. HTML output orgagnized by means of metadata items

- **1. Defects identification**

[QuARS Express](#) performs a linguistic analysis of a requirement document in plain text format and points out defects belonging to the following categories:

- - **Ambiguity**: defects belonging to this category are pointed out when are detected sentences:
  - a. containing terms inherently vague, optional parts or weak verbs,
  - b. expressing personal opinions or feelings,
  - c. having the subject or object generically expressed,
- - **Specification completion**: defects belonging to this category are pointed out when sentences containing generic unspecified objects are detected
- - **Understandability**: defects belonging to this category are pointed out when sentences with multiple subject or main verb are detected

- **2. Statistics derivation**

[QuARS Express](#) calculates defect rates during the analysis of a requirements document. The available defect rates are:

- - **Defect Rate**: the number of sentences found in the document with at least an error (defective sentences) **divided by** the number of the analyzed sentences (e.g. all the requirements found in the document)
- - **Analysis Defect Rate**: the number of sentences with at least an error of the kind of the analysis related item (e.g. "*Optionality, Subjectivity, Vagueness, Weakness, Implicity, Multiplicity, Underspecification*") **divided by** the number of defective sentences found in the document.
- - **Error Defect Rate**: the number of related analysis item (e.g. "*Optionality, Subjectivity, Vagueness, Weakness, Implicity, Multiplicity Underspecification*") errors **divided by** the total number of errors found in the document.

They are all calculated on the whole document and on each subset identified by the metadata items.

- **3. HTML output**

[QuARS Express](#) procuces as output several HTML pages showing the defective sentences with their categorized defects and the calculated defect rates according to a synptical view of all the sentences found in the document and to the sentences subsets identified by means of the metadata items valuuues.

The [QuARS Express](#)'s key components are special text files called Dictionaries.

Two types of defect-related Dictionary exist: the Lexycal and the Syntactic dictionaries. These dictionaries contain the terms able to reveal a defect according to what stated in 1.

# QuARS Express License

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# Installing QuARS Express

[QuARS Express](#) comes as a unique self-extracting executable file with all is needed packed inside. To install [QuARS Express](#) (version 0.6b) starting from the **QuARSxps\_setup.exe** file please follow these simple steps:

- **1.** Navigate your file system to where you downloaded the self-extracting executable file **QuARSxps\_setup.exe**.
- **2.** Double clicking on the file **QuARSxps\_setup.exe** a new directory named QuARSxps will be created in the same place.
- **3.** If you please, you can now delete the **QuARSxps\_setup.exe** file.
- **4.** Come inside the new **QuARSxps** directory: [QuARS Express](#) environment is already prepared to start analyzing requirements files.
- **5.** If you prefer you may move the directory **QuARSxps** where you prefer onto your Hard Disk: [QuARS Express](#) will work anyway.

## Uninstalling QuARS Express

During [QuARS Express](#) installation process there are no added keys to your system registry nor common files or DDLs saved somewhere, so the uninstallation process is very trivial:

- **To Uninstall** <\$ QuARS> simply locate where you installed <\$ QuARS> and remove the installation "*QuARSxps*" directory.


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## System Requirements

In the following are described the minimum system requirements requested by [QuARS Express](#) to work correctly.

- **Operating Systems**
  - Windows 95
  - Windows 98
  - Windows 98SE
  - Windows ME
  - Windows NT 4.0
  - Windows 2000 (Recommended)
  - Windows XP
  -
- **Minimum Hardware**
  - Pentium 233 MHz (Recommended: Pentium 500MHz or greater)
  - 64 MB RAM (Recommended: 128 MB RAM or greater)
  - 50 MB minimum hard drive free space  
(the needed space for the output report may vary in function of the number of defective sentences found)
  -
- **Recommended Screen Resolution: 1024x768**  
Best View: 1152x864

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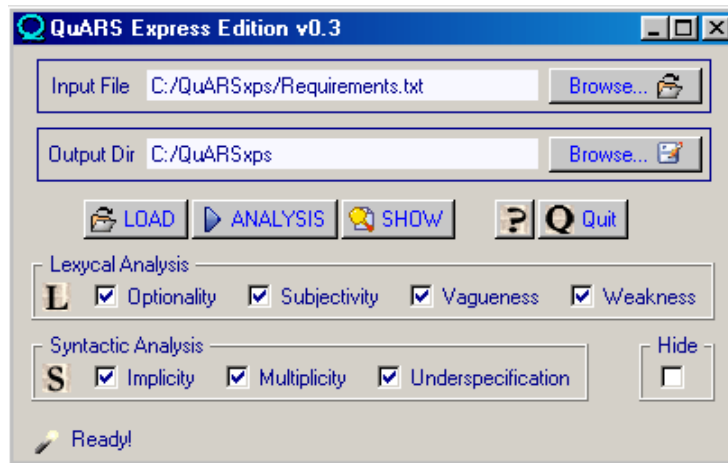
 **Note:** At this moment [QuARS Express](#) runs only on Microsoft Windows systems.

# QuARS Express: GUI Overview

## QuARS GUI overview

The [QuARS Express](#)'s GUI is very *user-friendly* and simple to be used.

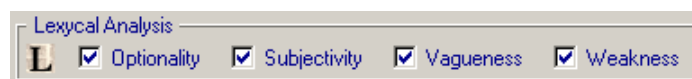
In the following the GUI functionalities are briefly described



- **Input File:** the file to be analyzed can be loaded pushing the **Browse...** button in the **Input File** area: the name of the input file will be shown in the **Input File** entry field. Alternatively you can Drag & Drop a file over the **Input File** area



- **Output Directory:** the [QuARS Express](#) output Analysis Report will be saved in the chosen directory. At start the installation dir is shown by default. You can change this destination by pushing the **Browse...** button in the **Output Dir** area: the name of the new destination folder will be shown in the **Output Dir** entry field. Alternatively you can Drag & Drop the icon of the chosen folder (or a within file) over the **Output Dir** area.
- **Lexical Analysis:** the four kind of Lexical analysis (Optionality, Subjectivity, Vagueness, Weakness) that [QuARS Express](#) is able to perform can be chosen via this four checkbox.



- **Syntactic Analysis:** the three kind of Syntactic analysis (Implicity, Multiplicity, Underspecification) that [QuARS Express](#) is able to perform can be chosen via this three checkbox.



- **Control Buttons** through control buttons the [QuARS Express](#) analysis activity can be controlled.
  - **LOAD**: loads the file to analyze
  - **ANALYSIS**: launches the analysis
  - **SHOW**: shows in the system default browser the html [QuARS Express](#) report
  - **?**: launches [QuARS Express](#) help system
  - **QUIT**: quits [QuARS Express](#)



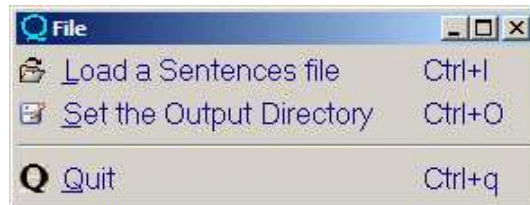
## Menu Reference

This menu reference describes each menu item in the [QuARS Express](#) main window menu. You can even refer to the bird-eye summary table [here](#).

- **File**
  - [Load a Sentences File](#)
  - [Set the Output Directory](#)
  - [Quit](#)
- **Analysis**
  - [Enable/Disable All Lexical Analyses](#)
  - [Enable/Disable Optionality Lexical Analysis](#)
  - [Enable/Disable Subjectivity Lexical Analysis](#)
  - [Enable/Disable Vagueness Lexical Analysis](#)
  - [Enable/Disable Weakness Lexical Analysis](#)
  - [Enable/Disable All Syntactic Analyses](#)
  - [Enable/Disable Implicity Syntactic Analysis](#)
  - [Enable/Disable Multiplicity Syntactic Analysis](#)
  - [Enable/Disable Underspecification Syntactic Analysis](#)
  - [Hide/Show Empty Kind of Analysis in the Report](#)
- **Logs**
  - [Build Only Synoptic Report](#)
  - [Open Latest Session Synoptic Report](#)
  - [Clear Session](#)
- **Options**
  - [Font Settings](#)
  - [Default Font](#)
  - [Stay on Top](#)
  - [View Menu](#)
  - [Hide Menu](#)
  - [System Information](#)
- **? (Help)**
  - [QuARS Express Help: Topics](#)
  - [QuARS Express Help: Introduction](#)
  - [QuARS Express Help: Getting Started](#)

- [QuARS Help: How To](#)
- [QuARS Express Help-on-Help](#)
- [QuARS Express License](#)
- [About](#)
- [Splashscreen](#)

## File



### Load Sentences File

Displays the *Open File* dialog where you can select a file from your local disk file system. At this moment the supported File Type is plain text only.

### Set Output Directory

Displays the *Dir Choosing* dialog to set where on your local file system you prefer the final report have to be saved.

### Quit

Closes [QuARS Express](#) window and exits [QuARS Express](#) completely.

## Analysis



### Enable/Disable All Lexical Analyses

Enable/Disable the performing of all of the Lexical analyses

### **Enable/Disable Optionality Lexical Analysis**

Enable/Disable the performing of the Optionality Lexical analysis

### **Enable/Disable Subjectivity Lexical Analysis**

Enable/Disable the performing of the Subjectivity Lexical analysis

### **Enable/Disable Vagueness Lexical Analysis**

Enable/Disable the performing of the Vagueness Lexical analysis

### **Enable/Disable Weakness Lexical Analysis**

Enable/Disable the performing of the Weakness Lexical analysis

### **Enable/Disable All Syntactic Analyses**

Enable/Disable the performing of all of the Syntactic analyses

### **Enable/Disable Implicity Syntactic Analysis**

Enable/Disable the performing of the Implicity Syntactic analysis

### **Enable/Disable Multiplicity Syntactic Analysis**

Enable/Disable the performing of the Multiplicity Syntactic analysis

### **Enable/Disable Underspecification Syntactic Analysis**

Enable/Disable the performing of the Underspecification Syntactic analysis

### **Hide/Show Empty Kind of Analysis in the Report**

Hide/Show empty or not performed Kind of Analysis in the Report

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## **Logs**



### **Build Only Synoptic Report**

Since [QuARS Express](#) provides several kinds of Reports with several views on data, this options is for the production of the Synoptic Report only.

### **Open Latest Session Synoptic Report**

All the reports [QuARS Express](#) provides are usually stored in the directory called "REPORTS" (or the one you have chosen via the related menu item). This menu item shows the latest Synoptic Report produced.

## Clear Session

All temp data stored related to the current session are erased. Analysis Reports produced aren't affected by this action.

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## Options



### Font Settings

Pops up the *chooser* allowing to change font type and size for nearly all graphic elements of [QuARS Express](#) graphical interface.

### Default Font

Restores default [QuARS Express](#) Interface font.

### Stay on Top

The [QuARS Express](#) GUI will stay in front of all the other windows.

### View Menu

The [QuARS Express](#) GUI can be visualized without the menu bar.

### Hide Menu

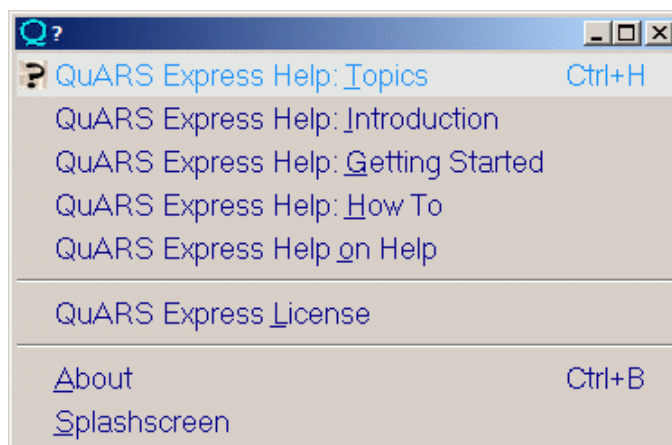
If the [QuARS Express](#) GUI is visualized without the menu bar, this option let the menu bar back visible.

### System Information

[QuARS Express](#) will try to retrieve your System Information exploiting inside system query API.

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## ? (Help)



### **QuARS Express Help Topics**

Pops up the main [QuARS Express](#) on-line help interface showing [QuARS Express](#) Help [topics summary](#).

### **QuARS Express Help: Introduction**

Pops up the [QuARS Express](#) on-line help interface showing [QuARS Express](#) Help [Introduction](#) topic.

### **QuARS Express Help: Getting Started**

Pops up the [QuARS Express](#) on-line help interface showing [QuARS Express](#) Help [Getting Started](#) topic.

### **QuARS Express Help: How To**

Pops up the [QuARS Express](#) on-line help interface showing Help topics related to the [How To's section](#).

### **QuARS Express Help-on-Help**

Pops up the [QuARS Express](#) on-line help interface showing Help about using Help itself.

### **QuARS Express License**

Show the [QuARS Express](#) License.

### **About**

Pops up the [QuARS Express](#) info window.

### **Splashscreen**

Pops up the [QuARS Express](#) starting Splashscreen.

## **Menu Reference Summary**

<i>Menu item</i>	<i>Item entry</i>	<i>Accelerator</i>	<i>Keyb. Shortcut</i>
<a href="#">File</a>	<a href="#">Load a Sentences File</a>	L	Control+l

	<a href="#">Set the Output Directory</a>	S	Control+O
	<a href="#">Quit</a>	Q	Control+q
<b><u>Analysis</u></b>	<a href="#">Enable/Disable All Lexical Analyses</a>	L	Control+L
	<a href="#">Enable/Disable Optionality Lexical Analysis</a>	O	--
	<a href="#">Enable/Disable Subjectivity Lexical Analysis</a>	b	--
	<a href="#">Enable/Disable Vagueness Lexical Analysis</a>	V	--
	<a href="#">Enable/Disable Weakness Lexical Analysis</a>	W	--
	<a href="#">Enable/Disable All Syntactic Analyses</a>	S	Control+S
	<a href="#">Enable/Disable Implicity Syntactic Analysis</a>	I	--
	<a href="#">Enable/Disable Multiplicity Syntactic Analysis</a>	M	--
	<a href="#">Enable/Disable Underspecification Syntactic Analysis</a>	U	--
	<a href="#">Hide/Show Empty Kind of Analysis in the Report</a>	H	Control+H
<b><u>Logs</u></b>	<a href="#">Build Only Synoptic Report</a>	B	--
	<a href="#">Open Latest Session Synoptic Report</a>	O	--
	<a href="#">Clear Session</a>	C	F11
<b><u>Options</u></b>	<a href="#">Font Settings</a>	F	--
	<a href="#">Default Font</a>	D	--
	<a href="#">Stay on Top</a>	S	--
	<a href="#">View Menu</a>	V	--
	<a href="#">Hide Menu</a>	H	--
	<a href="#">System Information</a>	y	--
<b><u>? (Help)</u></b>	<a href="#">QuARS Help: Topics</a>	T	Control+H
	<a href="#">QuARS Help: Introduction</a>	I	--
	<a href="#">QuARS Help: Getting Started</a>	G	--
	<a href="#">QuARS How To</a>	H	--
	<a href="#">QuARS Help: Help-on-Help</a>	o	--
	<a href="#">QuARS License</a>	pippoL	--
	<a href="#">About</a>	A	--
	<a href="#">Splashscreen</a>	S	Control+B

# QuARS Express: Getting Started

## Getting Started

In the following the initial steps for starting up the analysis of textual requirements with [QuARS Express](#) are described. Only the main functions of [QuARS Express](#) are described here.

- **Step 1: LOAD A FILE**

Click the "Load" button and browse the file system to select a [plain text file](#) containing the requirements to be analyzed.

The selected file is displayed in the input frame.

- **Step 2: SELECT THE TYPE OF THE ANALYSIS**

Two types of analysis are available: **Defect Identification** using *Lexical Analysis* ("L" buttons) and **Defect Identification** using *Syntax Analysis* ("S" buttons)

- **L - Lexical Analysis** for defect identification:

This function points out the occurrences of the special defect-revealing terms contained in the dictionaries associated to this type of analysis.

It is possible to modify the content of the dictionaries associated to this function and also to add new dictionaries.

The default set of available lexical analyses is composed of four dictionaries *optionality, subjectivity, vagueness, weakness*

- **S - Syntax Analysis** for defect identification:

This function identifies defective sentences in terms of *implicitness, multiplicity* and *underspecification*.

For doing that the syntactical structure of each sentence in the input requirement document is derived.

It is possible to modify the content of the dictionaries associated to this function but not add new dictionaries.

For an explanation of the meaning of the Indicators see "[Indicators Explanation](#)"

- **Step 3: START ANALYSIS**

Once the requirements document to be analyzed has been loaded and the type of analysis selected, push the Analysis button to start the analysis.

- **Step 4: VIEW REPORT**

Through the **SHOW** button the [QuARS Express](#) Report is visualized.

- *Metrics Calculation*

During the performance of the analysis [QuARS Express](#) calculates some metrics.

The available metrics are:

- **Defect Rate:** the number of sentences found in the document with at least an error (defective sentences) **divided by** the number of the analyzed sentences (e.g. all the requirements found in the document)
- **Analysis Defect Rate:** the number of sentences with at least an error of the kind of the analysis related item (e.g. "*Optionality, Subjectivity, Vagueness, Weakness, Implicitness, Multiplicity, Underspecification*") **divided by** the number of defective sentences found in the document.
- **Error Defect Rate:** the number of related analysis item (e.g. "*Optionality, Subjectivity, Vagueness, Weakness, Implicitness, Multiplicity,*

*Underspecification*") errors **divided by** the total number of errors found in the document.

---

⚠ **QuARS Express** analyses one paragraph at a time, considering a paragraph delimited by the special "end line" char ¶ independently of the number of sentences it contains.

💡 **TIP:** in the case of long paragraphs containing several sentences, it's preferable for a more accurate analysis to break them into single-sentence paragraphs.

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## Linguistic Indicators Explanation

<i>Indicator</i>	<i>Notes</i>
<i>Vagueness</i>	The occurrence of this Indicator is due to the existence of Vagueness-revealing wordings as for example: clear, easy, strong, good, bad, useful, significant, adequate, recent,....
<i>Subjectivity</i>	The occurrence of this Indicator is due to the existence of Subjectivity-revealing wordings as for example: similar, similarly, having in mind, take into account, as [adjective] as possible,...
<i>Optionality</i>	The occurrence of this Indicator is due to the existence of Optionality-revealing words as for example: possibly, eventually, if case, if possible, if appropriate, if needed, ...
<i>Implicitity</i>	The occurrence of this Indicator is determined by the existence of: Implicit Subject or Object: sentences having the subject or object complements expressed by means of: Demonstrative adjective (this, these, that, those) or Pronouns (it, they...) [examples: those <b>shall</b> run in a safe mode - the system shall display it in the main screen] Implicit Determiner: terms having the determiner expressed by a demonstrative adjective (this, these, that, those) or implicit adjective (as for example previous, next, following, last...) or preposition (as for example above, below...) [example: the system shall produce the <b>previous</b> results]
<i>Weakness</i>	The verbs that determine the occurrence of this indicator are the Weak verbs: could, might, may.
<i>Under-specification</i>	This Indicator occurs when words needing to be instantiated are detected. [e.g.: flow instead of data flow, control flow - access instead of write access, remote access, authorized access - testing instead of functional testing, structural testing, unit testing, etc.]
<i>Multiplicity</i>	This indicator occurs when a multiple sentences is found. A multiple sentence has more than one subject [e.g. <b>the mean time to remove a faulty board</b> and <b>the time to restart</b> shall be less than 30 minutes] or more than one main verb. [e.g.: the mean time needed to <b>remove</b> a faulty board and <b>restore</b> service shall be less than 30 minutes]

## References

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May 31-June 2 2000.

# How To Convert an input file in the suitable file format

If the format of the input file is not plain text, it has to be converted.


In the following the procedure to be followed for the most common commercial text formats:

- **MS Word** (.doc)
  - **Export the entire file**
    - Select from the menubar "*File*" --> "*Save as*"
    - Select "*text file (.txt)*" as saving file format
    - Select where saving the file
    - Click the "*Save*" button
  - **Export an excerpt of the file**
    - Select the text of interest
    - Copy the selected text
    - Past the copied text in a plain text file
- **Adobe Acrobat** (.pdf):
  - **Export the entire file**
    - Select from the menubar "*File*" --> "*Save as Text*"
    - Select where saving the file
    - Click the "*Save*" button
  - **Export an excerpt of the file**
    - Select the "*Select Text*" tool button in the *Adobe Acrobat Reader* buttonbox
    - Select the text of interest
    - Copy the selected text
    - Past the copied text in a plain text file
    - Deselect the "*Select Text*" tool button to come back to the normal *Acrobat Reader* view
- **HTML** (.htm, .html):
  - **Export the entire file**
    - Select from the menubar "*File*" --> "*Save as*"
    - Select "*text file (.txt)*" as saving file format
    - Select where saving the file
    - Click the "*Save*" button
  - **Export an excerpt of the file**
    - Select the text of interest
    - Copy the selected text
    - Past the copied text in a plain text file

The file is now in the suitable format for being analyzed by QuARS.

It has be noticed that the editorial formatting (bullets, tables, pictures,) will be lost in the new plain text file°.

---

 °Note: The consequences of that can be relevant.

In particular, it can be difficult to maintain the alignment between the original input file and the new version.

## About QuARS Express



**QuARS Express**  
Quality Analyzer for Requirement  
Specifications  
Version 0.5a (build 01.20111010)  
design and Development by:  
[Giuseppe Lami](#) [Gianluca Trentanni](#)



home: <http://quars.isti.cnr.it>  
info: [info-quars@isti.cnr.it](mailto:info-quars@isti.cnr.it)  
support: [support-quars@isti.cnr.it](mailto:support-quars@isti.cnr.it)

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<http://fmt.isti.cnr.it>  
[Stefania.Gnesi@isti.cnr.it](mailto:Stefania.Gnesi@isti.cnr.it)



**System and Software Evaluation Center**  
<http://www.isti.cnr.it/ResearchUnits/Centers/sse-center/>  
[ssec@isti.cnr.it](mailto:ssec@isti.cnr.it)



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- [QuARS Express: GUI Overview](#)
- [References](#)
- [System Requirements](#)
- [Uninstalling QuARS Express](#)