

# Crypto Wizard

## User Guide

Version 2026.1.1



You can get help with the Crypto Wizard from the data service:

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## 1. Application Information

### 1.1 Introduction

The Crypto Wizard is an alternative to the available commercial or open source encryption tools with the aim of securing the exchange of sensitive data with Solventum Health Information Systems using established encryption methods. It is said to be easier to use in commissioning and use than the available alternatives.

The Crypto Wizard is made available free of charge to customers and interested parties of Solventum Health Information Systems for the above purposes.

The Crypto Wizard includes 3 essential features:

#### **Preparation of the original data (reduce/clean and pseudonymize):**

The Crypto Wizard modifies the original data set (data according to § 21 KHEntgG, eQS data according to § 136 SGB V as well as SpiGes data) to automatically ensure the requirement of pseudonymization and to automatically ensure the requirement of data economy. You can find more information on this in [the "Reducing and pseudonymizing data protection-relevant content"](#).

#### **Encrypting the data (sending data to Solventum)**

The Crypto Wizard makes it possible to encrypt files that are to be delivered to Solventum afterwards. Please find more information on this in the chapter ["Preparing data for sending to Solventum"](#).

#### **Decrypting data (receiving data from Solventum)**

In addition, result deliveries from Solventum can be deciphered. To do this, the user creates his own asymmetric GPG key pair. The public key (file extension ".pub") is uploaded to the Benchmark Portal. For more information, please refer to the chapter ["Obtaining Results from Solventum"](#).

## 1.2 Release Notes

### Version 2026.1.1

- New folder for archiving case number mapping files in the default output folder
- Crypto Wizard is now available in more languages (English and French)

### Version 2026.1.0

- New user interface in Solventum design
- File and folder names adapted to Solventum design (Note: existing configuration and output folders will also be renamed to "Crypto Wizard Configuration" or "Crypto Wizard Edition")
- Fixed a bug where folder names for § 136 data and SpiGes data were not created correctly
- Implemented the ability to define a different path for the configuration folder

### Version 2026.0.0

- Reduction and pseudonymization of § 21 data, § 136 data and SpiGes data of the 2026 specification implemented
- Improving the processing of § 136 data
- Fixed a bug where folder names were not created correctly
- Path to version query has been changed to new Solventum domain

### Version 2025.1.1

- Problems with reading incorrect entries within SpiGes records have been fixed
- Installation Folder Optimization

### Version 2025.1.0

- Pseudonymization and cleansing of SpiGes records (Switzerland) implemented
- Record Selection for Record Encryption Revised
- Update of the Java Runtime Environment (JRE) to OpenJDK Temurin-21.0.6+7 LTS

### Version 2025.0.0

- Reduction and pseudonymization of § 21 data of the 2025 specification implemented
- Cleaning of § 136 data of the 2025 specification implemented
- Generation of the personal GPG key pair now as RSA key with 4096 bit length

### Version 2024.1.0

- Implemented a function for location mapping when processing § 136 data; more information can be found in the ["Location Mapping" section](#)
- New data set specification for § 21 data implemented

### Version 2024.0.1

- Fixed issues with retrieving version information from server 3mhisdataservices.com (due to a new CA in the server certificate)

### Version 2024.0.0

- Cleaning of § 136 data of the 2024 specification implemented
- Reduction and pseudonymization of § 21 data remains unchanged for 2024
- Log files are now stored in the "3M CryptoWizard Configuration" configuration folder in the personal document folder ("My Documents" or "Documents") instead of in the "Log" subfolder in the CryptoWizard program folder as before

Version 2023.0.1

- Change of the designation from "§ 137" or "P137" to "§ 136" or "P136" in the user interface and in folder/file names of the output
- Bug fix for the determination of IK and data year and corresponding naming of folder/file names in the output for § 136 data
- § 21-Location mapping: extended by the field "Location number-place of treatment"
- Batch Mode: Parameter "P137" changed to "P136"

Version 2023.0.0

- Cleaning of § 136 data of the 2023 specification implemented
- Java Runtime Environment updated to OpenJDK 17 JRE
- implemented a function for location mapping when processing § 21 data;  
You can find more information about this in the chapter ["Location mapping"](#)

Version 2022.0.0

- Cleaning of § 136 data of the 2022 specification implemented
- Implemented batch functionality to process and encrypt multiple records without a user interface

Version 2021.0.0

- Cleaning of § 136 data of the 2021 specification implemented

Version 2020.1.2

- Fixed a bug when starting CryptoWizard, which occurred when there was no internet connection and prevented normal use

Version 2020.1.1

- Improved performance and stability when reducing and pseudonymizing § 21 data
- Stability in the cleansing of § 136 data improved
- Transparency of the processing process improved through detailed information on the scope and status of the processing

Version 2020.0.0

- Reduction and pseudonymization of § 21 data according to 2020 data set description implemented
- Cleaning of § 136 data of the 2020 specification implemented
- Function to notify the user when a newer version of CryptoWizard is available for download
- The function for encrypting "other" record formats has been revised, so that each selected file is encrypted to a separate data delivery (GPG file). For more information, see the [section "Preparing Other Datasets"](#).
- Improved stability when generating key pairs

Version 2019.0.2

- Improved management of configuration files
- Improved stability in key generation and decryption
- Minor improvements to the user interface and log files

Version 2019.0.1

- Cleaning of § 136 data of the 2019 specification implemented
- Improvements in the validation of § 21 and § 136 data deliveries

Version 3.1.3

- Fixed a bug in the layout of the mapping file (§ 21 data), where incorrect values for the location and the year of discharge were stored
- Fixed a bug with the reduction of § 21 data, where IK fields and occupancy days may not be reduced as intended
- Minor improvements in the validation of § 21 and § 136 data deliveries

#### Version 3.1.2

- Consideration of the new fields for intensive care in the CASE and FAB files of the § 21 data set for delivery in 2019
- Minor improvements in the validation of § 21 and § 136 data deliveries

#### Version 3.1.1

- Improving stability in encryption and decryption
- Fixed the generation of invalid characters when cleaning XML files (§ 136 data) with character encodings that deviate from the XML character set (UTF-8)

#### Version 3.1

- Addition of the automatic function "Remove PID content" for § 136 data
- Fixed bug in reducing ICD files (§ 21 data) with UTF-8 character encodings

#### Version 3.0

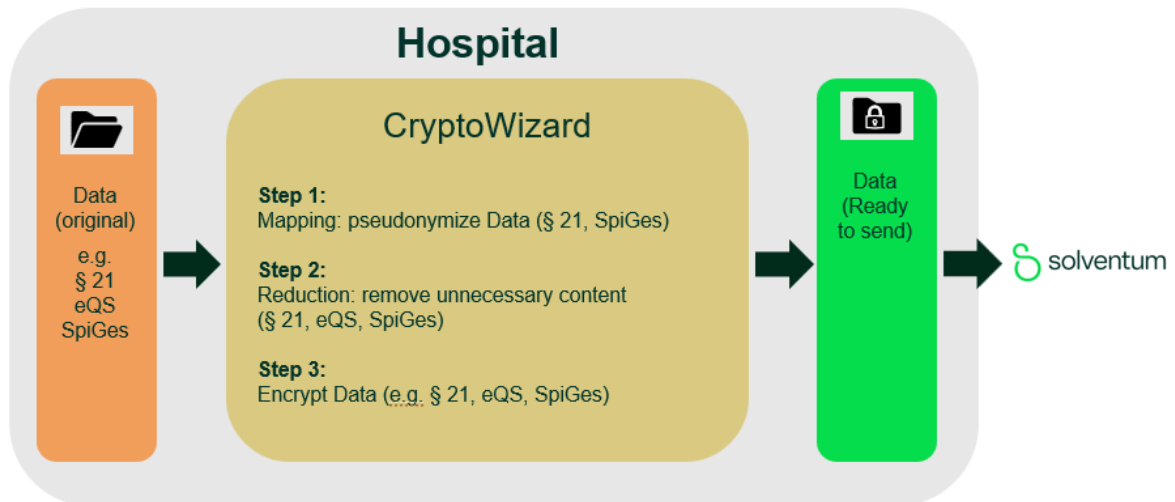
- Addition of the automatic "pseudonymization" function for § 21 data
- Addition of the automatic "Reduce" function for § 21 data
- Optimized storage of the result files

### **1.3 System Requirements**

- Operating System: Windows 10, Windows 11
- Administrator permissions not required (no installation)
- Full access to folders for personal documents ("My Documents", "My Documents", "Documents" library, etc.)
- Executability of Java applications (the required Java Runtime Environment OpenJDK 21 JRE is included)
- Executability of GnuPG (GPG 2.4 is included)
- Ability to unzip ZIP archives

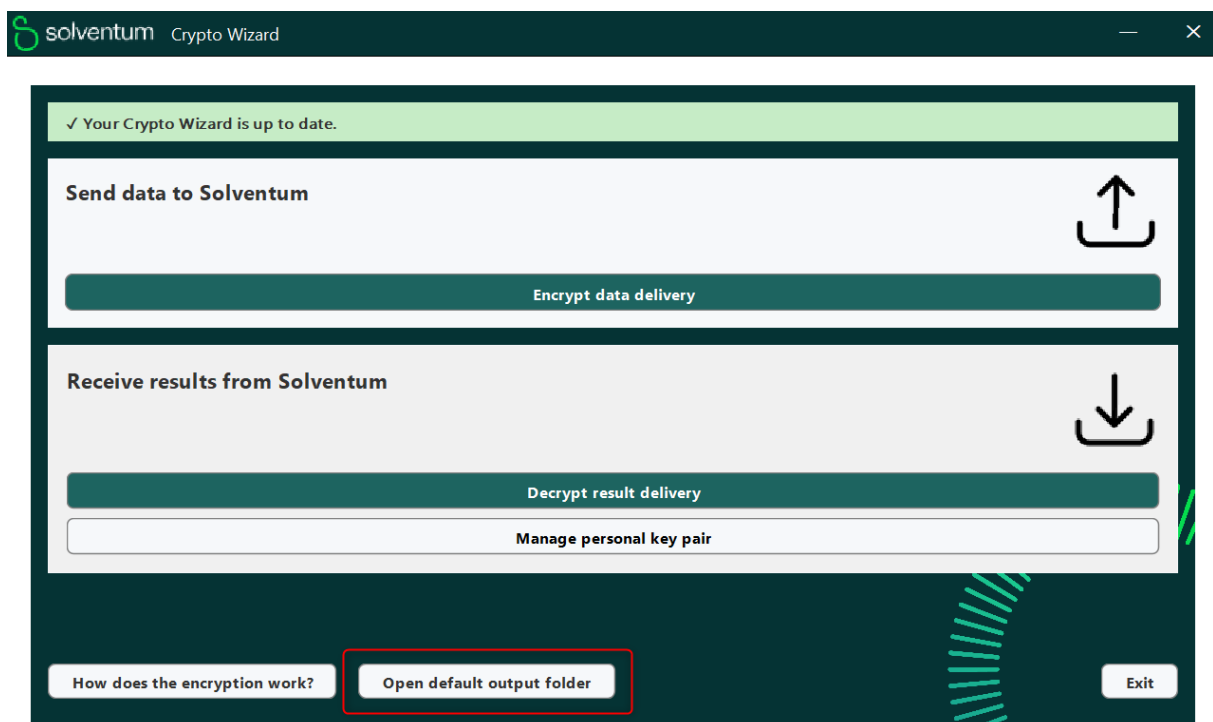
## 2. Reduction and pseudonymization of data protection-relevant content

The Crypto Wizard has been specifically developed to ensure a data protection-compliant transmission of routine hospital data in the context of commissioned data processing. The principle: the original data (depending on the data set) is pseudonymised with the Crypto Wizard before being transferred to Solventum, reduced and then encrypted. The encrypted result file can then be transferred to Solventum.



### 2.1 Pseudonymizing data

When preparing the § 21 and SpiGes data, the Crypto Wizard automatically maps the case numbers. In this case, the original case number is exchanged for a pseudonym. At the same time, a mapping file is generated during this process, which remains in the hospital and later enables a back translation from the pseudonym to the original case number. For each pseudonymization performed by the Crypto Wizard, the mapping files are also stored in a standard output folder of the Crypto Wizard.





Please note the following note:

**Please always upload a § 21 data record with original (hospital-internal) case numbers into the Crypto Wizard. Please **do not** use any other pseudonymization function beforehand (e.g. via the export interface or another pseudonymization tool). Otherwise, a return translation to the original case number is not guaranteed. The same applies to the SpiGes data set.**

## 2.2 Reduce data (§ 21 data)

In this step, the Crypto Wizard removes all contents of the § 21 data record that are not required for the calculation of results. As a matter of principle, the tool only takes into account the § 21 files "CASE", "FAB", "ICD", "OPS" and "ENTGELTE" in all standardised versions and current versions. Other files are not taken into account and are not encrypted.

Within the files, the contents of certain data fields are either completely removed or reduced or changed to such an extent that no conclusions can be drawn about the original content. The following table gives you an overview of the changes:

All fields not listed here remain unchanged. Fields that are not part of a § 21 record specification are removed entirely.

| File § 21 | Data field                               | Operation in normal operation                                         | Operation in Use for Performance Analysis mode                        |
|-----------|------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------|
| CASE      | KH internal license plate                | Replacement of the original case number with Pseudonym                | Replacement of the original case number with Pseudonym                |
| CASE      | Insured ID                               | Content is removed                                                    | Content is removed                                                    |
| CASE      | Contract License Plate 64b Model Project | Content is removed                                                    | Content is removed                                                    |
| CASE      | IK-der-Krankenkasse                      | Content is reduced (transfer of the first two digits, then "0000000") | Content is reduced (transfer of the first two digits, then "0000000") |
| CASE      | Month of birth                           | Content is removed                                                    | Content is removed                                                    |
| CASE      | Zip Code                                 | Content is removed                                                    | Content is removed                                                    |
| CASE      | Pick-up weight                           | Content is changed (value is rounded in increments of 25)             | Content is changed (value is rounded in increments of 25)             |
| CASE      | Patient number                           | Replacement of the original patient number with a pseudonym           | Replacement of the original patient number with a pseudonym           |
| CASE      | Start of treatment-pre-inpatient         | Content is removed                                                    | Content is removed                                                    |
| CASE      | Treatment days - pre-inpatient           | Content is removed                                                    | Content is removed                                                    |
| CASE      | End-of-treatment-post-inpatient          | Content is removed                                                    | Content is removed                                                    |
| CASE      | Treatment days-post-inpatient            | Content is removed                                                    | Content is removed                                                    |
| CASE      | IK laying hospital                       | Content is removed                                                    | Content is removed                                                    |
| CASE      | Occupancy days in other pay range        | Content is removed                                                    | Content is removed                                                    |

|      |                                                                                                                    |                                                        |                                                                          |
|------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------|
| CASE | Fields that are not defined in the § 21 record description (for example, additional fields in the § 21Plus record) | Content is removed                                     | Content is removed                                                       |
| FAB  | KH internal license plate                                                                                          | Replacement of the original case number with Pseudonym | Replacement of the original case number with Pseudonym                   |
| FAB  | Fields that are not defined in the § 21 record description (for example, additional fields in the § 21Plus record) | Content is removed                                     | Content with specialist department information/stations will be retained |
| ICD  | KH internal license plate                                                                                          | Replacement of the original case number with Pseudonym | Replacement of the original case number with Pseudonym                   |

| File § 21 | Data field                                                                                                      | Operation in normal operation                                                | Operation in Use for Performance Analysis mode                               |
|-----------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| ICD       | Diagnostic confidence                                                                                           | Content is removed                                                           | Content is removed                                                           |
| ICD       | Fields that are not in the § 21 data record description (e.g. additional fields in the § 21Plus data record)    | Content is removed                                                           | Content is removed                                                           |
| OPS       | KH internal license plate                                                                                       | Replacement of the original case number with Pseudonym                       | Replacement of the original case number with Pseudonym                       |
| OPS       | Fields that are not defined in the § 21 record description (e.g. additional fields in the § 21Plus data record) | Content is removed                                                           | Content is removed                                                           |
| Fees      | KH internal license plate                                                                                       | Replacement of the original case number with Pseudonym                       | Replacement of the original case number with Pseudonym                       |
| Fees      | IK health insurance                                                                                             | content is reduced (transfer of the first two digits, then follow "0000000") | content is reduced (transfer of the first two digits, then follow "0000000") |
| Fees      | Fee type                                                                                                        | Deleted starting with 4                                                      | remains                                                                      |
| Fees      | Fee amount                                                                                                      | set to 0                                                                     | remains                                                                      |
| Fees      | Billing of                                                                                                      | Content is removed                                                           | Content is removed                                                           |
| Fees      | Billing-up                                                                                                      | Content is removed                                                           | Content is removed                                                           |
| Fees      | Day of Treatment                                                                                                | Content is removed                                                           | Content is removed                                                           |
| Fees      | Fields that are not in the § 21 data record description (e.g. additional fields in the § 21Plus data record)    | Content is removed                                                           | Content is removed                                                           |

### 2.3 Reduce data (§ 136-Data/eQS)

If you want to prepare data from external quality assurance in accordance with § 136 SGB V (eQS data) for submission to the data service, the Crypto Wizard removes all patient-identifying features (PID info) from the files for data protection reasons. All additional fields, i.e. fields that are not intended as export fields in the IQTiG specification, will also be emptied. For processing, you can prepare XML as well as CSV or text files with the Crypto Wizard.

**Please note: the IQTiG revises the specifications of the eQS data every year. Therefore, please check whether you are using the latest version of the Crypto Wizard before preparing the data.**

### 2.4 Reduce Data (SpiGes)

In this step, the Crypto Wizard removes all contents of the SpiGes data record that are not required for the calculation of results and may not be delivered to Solventum due to the principle of data economy or for data protection reasons.

The tool only takes into account the SpiGes XML data file. This contains diagnoses, treatments, date of onset, age and other case-related information relevant to the quality evaluations. The SpiGes XML identifier file with the AHV numbers is not taken into account and is not encrypted.

Within the SpiGes XML data file taken into account, the contents of the data fields (variables) are left unchanged, completely removed or changed to such an extent that no conclusions can be drawn about the original case.

**The following list gives you an overview of the field values left unchanged by the Crypto Wizard:**

"episode\_id", "episode\_beginn", "episode\_ende", "episode\_art", "burnr\_episode",  
 "grund\_wiedereintritt", "wiedereintritt\_aufenthalt", "ent\_id", "uid", "alter\_U1", "chlz", "burnr", "tariff",  
 "aufwand\_imc", "aufenthalt\_imc", "nems", "art\_score", "schwere\_score", "ventilation",  
 "austritt\_behandlung", "austritt\_aufenthalt", "resignation decision", "exit date", "main service point",  
 "admin\_urlaub", "aufenthalt\_ips", "einw\_instanz", "type of entry", "eintritt\_aufenthalt", "Date of Entry",  
 "Age", "Gender", "SPLG", "Vital Status", "diagnose\_id", "diagnose\_poa", "diagnose\_zusatz",  
 "diagnose\_seitigkeit", "diagnose\_kode", "behandlung\_id", "behandlung\_auswaerts",  
 "behandlung\_seitigkeit", "behandlung\_chop", "behandlung\_beginn", "behandlung\_bur"

**The following field values are transformed (rounded up or down):**

"Absorption weight", "birth weight"

**The following field value is pseudonymised:**

"fall\_id"

All fields not listed here will be completely emptied.

### 3. Run Crypto Wizard

#### 3.1 Preparation

Download the Crypto Wizard using the link you received from Solventum. Save the ZIP archive in a folder that insists on Full Control, such as: Your personal documents folder or desktop.

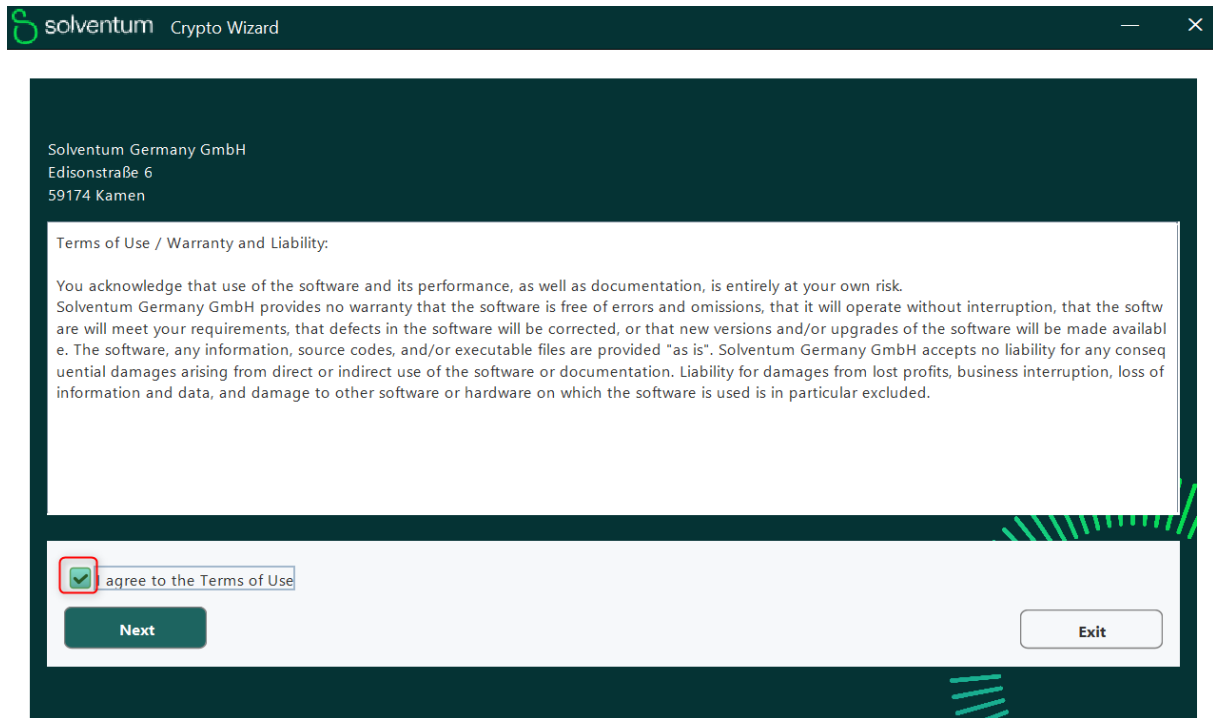
No installation of the Crypto Wizard is required. **The downloaded ZIP archive (SolventumCryptoWizard.zip) only needs to be completely unzipped before starting.** All the resources needed to execute it are included.

Unzip the ZIP archive completely into a subfolder with the help of a suitable tool or with Windows tools by right-clicking on the ZIP archive and using the command "Extract all..." .

| Name                    | Status | Änderungsdatum   | Typ                | Größe     |
|-------------------------|--------|------------------|--------------------|-----------|
| config                  | ✓      | 20.03.2026 15:29 | Dateiordner        |           |
| doc                     | ✓      | 20.03.2026 15:29 | Dateiordner        |           |
| GnuPG                   | ✓      | 20.03.2026 15:29 | Dateiordner        |           |
| jre                     | ✓      | 20.03.2026 15:29 | Dateiordner        |           |
| misc                    | ✓      | 20.03.2026 15:29 | Dateiordner        |           |
| BatchBeispiel.bat       | ✓      | 04.03.2026 14:12 | Windows-Batchda... | 1 KB      |
| <b>CryptoWizard.exe</b> | ✓      | 18.03.2026 13:46 | Anwendung          | 539 KB    |
| CryptoWizard.jar        | ✓      | 19.03.2026 17:29 | JAR-Datei          | 18.969 KB |
| CryptoWizardBatch.exe   | ✓      | 18.03.2026 13:46 | Anwendung          | 496 KB    |
| CryptoWizardBatch.jar   | ✓      | 18.03.2026 13:39 | JAR-Datei          | 18.361 KB |
| jmap2.dll               | ✓      | 20.09.2024 11:53 | Anwendungserwei... | 376 KB    |

Start the application file "CryptoWizard.exe" contained in the subfolder by double-clicking.

### 3.2 Entrance window

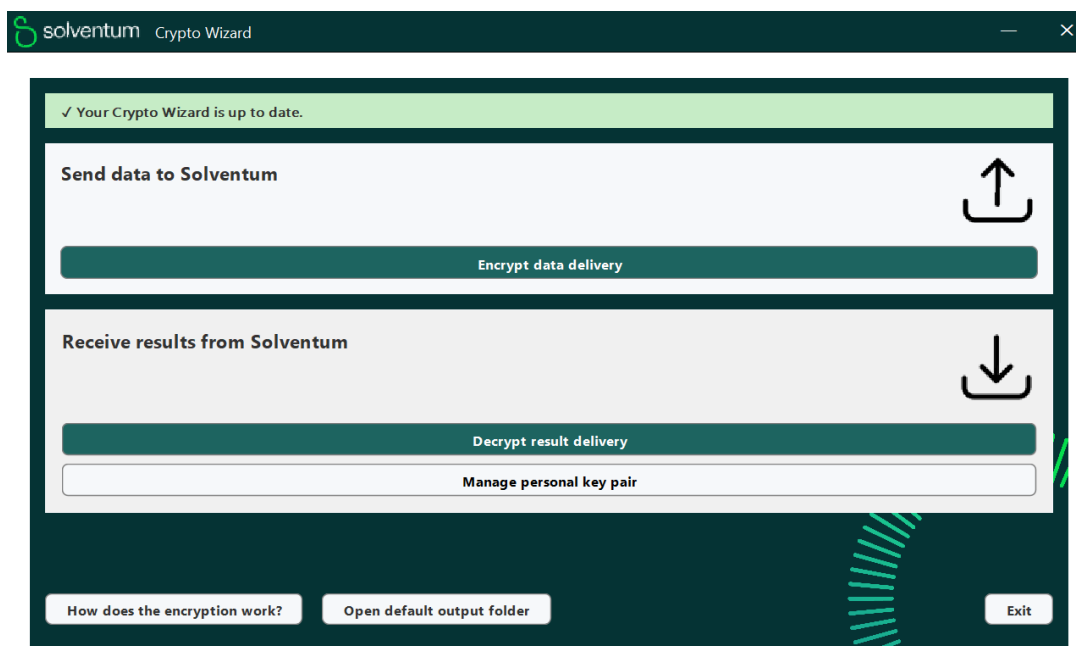


The Crypto Wizard entrance window shows the terms of use. To go to the next page, you need to agree to them and click on **Next**.

If you want to exit the Crypto Wizard, click on **Exit**.

### 3.3 Main Menu

In the main menu, you can select all the functionalities of the Crypto Wizard. Which function is relevant for you at the moment results from the division into the 2 categories "Send data to Solventum" and "Receive results from Solventum".



If a newer version of the Crypto Wizard is available for download, you will receive a corresponding notice above the main menu. In this case, you can directly click on the link that appears to download the new version.

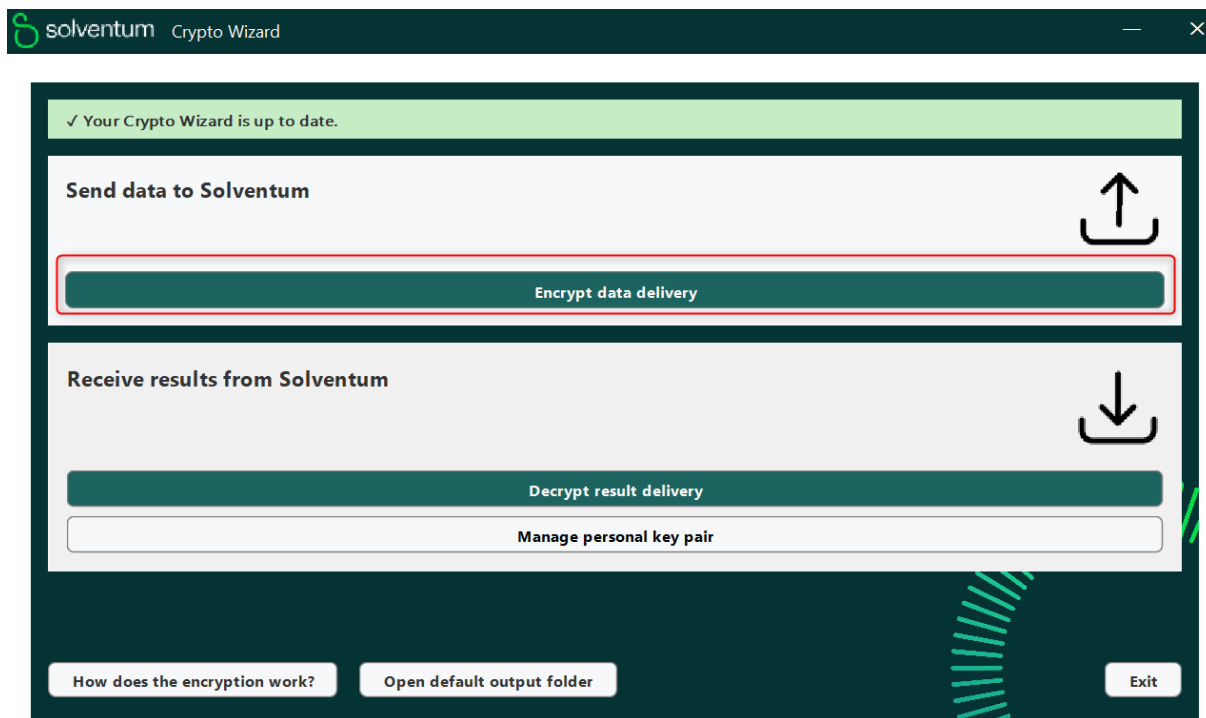
However, if the version you're using is the latest, you'll also see that above the main menu:

✓ Your Crypto Wizard is up to date.

#### 4. Preparing data for sending to Solventum

Under the item "Send data to Solventum", the files are processed and encrypted with the help of the public key of Solventum in order to be able to upload them to the Benchmark Portal. The correct key of the Solventum data service is already stored in the Crypto Wizard.

Select the item "Encrypt data delivery".



In the following view, first select the record type. You can choose "§ 21 Data", "§ 136 Data", "SpiGes Data" or "Other Record Formats".

"Other data record formats" includes all file formats that do not belong to the § 21 data, § 136/eQS data and SpiGes data (e.g. special case data formats).

## 4.1 § 21 - Preparing data

The screenshot shows the 'Crypto Wizard' window with a dark green header. The main area has a light blue background. At the top, it says 'Please select which type of dataset you want to encrypt:'. Below this is a dropdown menu with the following options: '\$ 21 data (incl. pseudonymization)', 'Please make a selection...', '\$ 21 data (incl. pseudonymization)', '\$ 136 data (incl. PID cleaning)', 'SpiGes data (incl. pseudonymization)', and 'Other data formats'. The first option is selected. To the right of the dropdown is a '+ Browse...' button. Below the dropdown is a checkbox labeled 'Use for performance analyses (all information on charges and wards is retained)'. At the bottom of this section is a large grey button labeled 'Pseudonymize & Encrypt'. Below this is a 'Note:' section with the text: 'You can select one or more folders or already compressed files (extension .zip, .7z or .rar) each containing a complete § 21 dataset.' At the bottom right is a 'Back to main menu' button.

The screenshot shows the 'Crypto Wizard' window with a dark green header. The main area has a light blue background. At the top, it says 'Please select which type of dataset you want to encrypt:'. Below this is a dropdown menu with the following options: '\$ 21 data (incl. pseudonymization)', 'Please make a selection...', '\$ 21 data (incl. pseudonymization)', '\$ 136 data (incl. PID cleaning)', 'SpiGes data (incl. pseudonymization)', and 'Other data formats'. The first option is selected. To the right of the dropdown is a '+ Browse...' button. Below the dropdown is a text input field with the placeholder text 'Please select one or more folders each containing a dataset to be encrypted:'. Below the input field is a checkbox labeled 'Save to default output folder'. Below that is a checkbox labeled 'Use for performance analyses (all information on charges and wards is retained)'. At the bottom of this section is a large grey button labeled 'Pseudonymize & Encrypt'. Below this is a 'Note:' section with the text: 'You can select one or more folders or already compressed files (extension .zip, .7z or .rar) each containing a complete § 21 dataset.' At the bottom right is a 'Back to main menu' button.

First, select the record type "§ 21 Data".

In the case of § 21 data, please make sure that the case numbers in the files have **not** already undergone another pseudonymization function (e.g. when exporting via the HIS interface or another pseudonymization tool).

To select one or more record(s), please click

**+ Browse...**

In the following dialog, please select **folders** with a complete § 21 data record each. Multiple folders can be selected by holding the Ctrl key and clicking on individual folders. Alternatively, ZIP archive files can also be selected here, each of which must contain a complete § 21 data record.

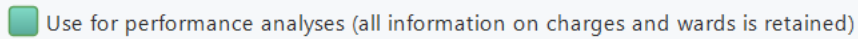


The output folders are then normally stored in the same location where the input folders are stored. Alternatively, you can use the



by ticking the box. The output folders are then placed in the "Crypto Wizard Output" folder in your personal documents folder. Where exactly this folder can be found on your system is shown in a tooltip. To do this, hold the mouse pointer over the checkbox a little longer.

The option



please select only if you want to send the data for use in performance analysis.

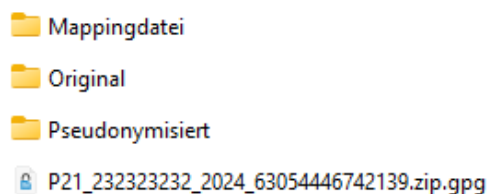
To start preparing the data, click

**Pseudonymize & Encrypt**

Please note that large § 21 records (or multiple records selected for processing at the same time) can be expected to take long runtimes, as changes have to be made in several million rows. In addition, if the input and/or output data is stored on a network drive, the runtime is extended accordingly because the data must be loaded over the network.

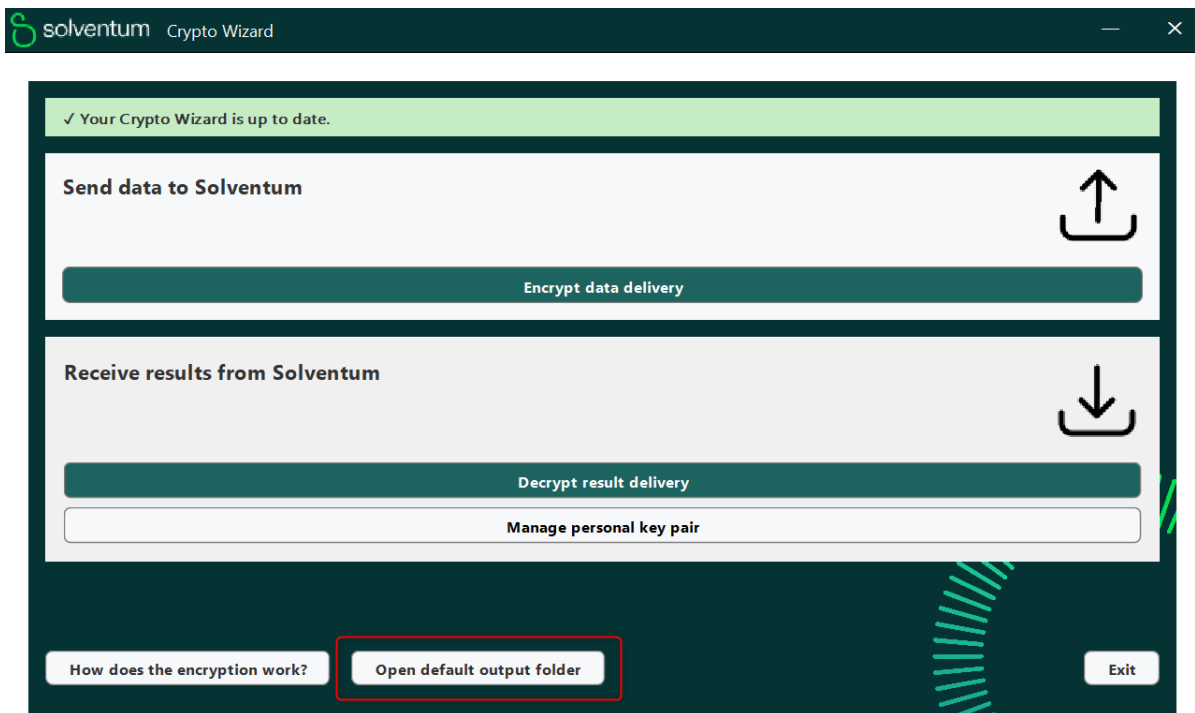
**Guideline: 5 minutes running time / 20,000 cases.**

After processing is complete, the Crypto Wizard creates an output folder (named with "P21\_", institution identifier, data year, name of the selected original folder) and the following content in the target folder:



In the folder "Mapping File" you will find the mapping file (named with "Mappingdatei\_", institution flag, data year, creation date and time).

In addition, mapping files are stored in the default output folder of the Crypto Wizard.



This file can be used to establish a direct reference between the original case number and the pseudonym used in the data set. **Please never send this file to Solventum.** You will need this file later to be able to relate the case-related results you receive from Solventum to the original case number. **Therefore, please keep this file in a safe location.**

In the "Original" folder you will find the original data record as a ZIP archive. You can use this file to understand exactly which data basis was used for data preparation at a later date.

In the folder "Pseudonymized" you will find the created data record (pseudonymized and reduced, see chapter 2) as a ZIP archive. You can use this file to understand the result of the data preparation.

In addition to these three folders, you will also find the fully encrypted GPG file (named with "P21\_", institution identifier, data year and a numerical code).

This file, which contains the pseudonymized data set, is encrypted with the Solventum data service key and can be uploaded in this form to the Benchmark Portal. Please do not change the file name of the GPG file, as it is used for a check function. A GPG file with a changed file name may not be able to be uploaded to the Benchmark Portal.

**Benchmark Portal:** <https://benchmarkportal.his.solventum.de>

## 4.2 § 136-/eQS Data Processing

The screenshot shows the 'Crypto Wizard' window from Solventum. At the top, it says 'Please select which type of dataset you want to encrypt:' with a dropdown menu currently set to '§ 136 data (incl. PID cleaning)'. Below this, it says 'Please select one or more folders each containing a dataset to be encrypted:' followed by an empty text box and a '+ Browse...' button. There is a checked checkbox labeled 'Save to default output folder' and a large 'Clean & Encrypt' button. A 'Note' section at the bottom provides instructions: 'You can select one or more folders or already compressed files (extension .zip, .7z or .rar) each containing any number of § 136 export files. Please use only exports for a maximum of one IK and one evaluation year per selected folder or compressed file. We recommend placing the export files with all cases of a year plus carry-overs from the previous year with a shared IK in one folder (including subfolders if necessary) and selecting it.' A 'Back to main menu' button is in the bottom right corner.

First, select the record type "§ 136 Data".

To select one or more file(s), please click  .

In the following dialog, please select **folders** with eQS data. Multiple folders can be selected by holding the Ctrl key and clicking on individual folders. Alternatively, ZIP archive files can also be selected here. **Please note that per selected folder or compressed file, only exports for a maximum of one institution code (IK) and one evaluation year may be included.**

**We also recommend that you store all relevant export files with all transactions of a year + overlying files from the previous year with a common IK in a folder (possibly in subfolders) and select it. Then you will get a single encrypted file per hospital as a result and only need to upload that one.**

The output folders are then normally stored in the same location where the input folders are stored. Alternatively, you can use the

A checkbox with a green checkmark and the text 'Save to default output folder'.

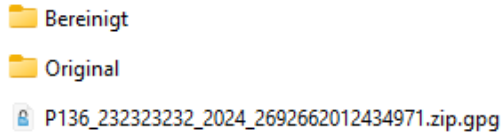
by ticking the box. The output folders are then placed in the "Crypto Wizard Output" folder in your personal documents folder. Where exactly this folder can be found on your system is shown in a tooltip. To do this, hold the mouse pointer over the checkbox a little longer.

To start preparing the data, click

### Clean & Encrypt

Please note that with large/many § 136 files (or several data sets selected for processing at the same time), long runtimes are to be expected. In addition, if the input and/or output data is stored on a network drive, the runtime is extended accordingly because the data must be loaded over the network.

After the processing is complete, the Crypto Wizard creates an output folder (named with "P136\_", institution identifier, data year, name of the selected original folder) in the destination folder with the following content:



A compressed ZIP file is stored in the "Cleaned" folder, in which the reduced or cleaned data records (original without PID info) are located.

In the "Original" folder, the original or untreated data is stored as a compressed ZIP archive.

In addition to these two folders, you will also find the fully encrypted GPG file (named with "P136\_", institution code, data year and a numerical code). This file, which contains the cleaned eQS data, is encrypted with the Solventum data service key and can be uploaded in this form to the Benchmark Portal.

Please change the file name of the ZIP.GPG file because it is used for a check function. A GPG file with a changed file name may not be able to be uploaded to the Benchmark Portal.

## 4.3 Preparing SpiGes data

The screenshot shows the 'Crypto Wizard' window from Solventum. The title bar includes the Solventum logo and the text 'Crypto Wizard'. The main content area has a light blue background and contains the following elements:

- A dropdown menu with the text 'Please select which type of dataset you want to encrypt:' and the selected option 'SpiGes data (incl. pseudonymization)'.
- A text input field with the placeholder text 'Please select one or more folders each containing a dataset to be encrypted:' and a '+ Browse...' button to its right.
- A checkbox labeled 'Save to default output folder' which is currently checked.
- A large blue button labeled 'Clean & Encrypt'.
- A 'Note:' section with the text: 'You can select one or more folders or already compressed files (extension .zip, .7z or .rar) each containing a SpiGes data file.'
- A 'Back to main menu' button in the bottom right corner.

First, select the record type "SpiGes Data".

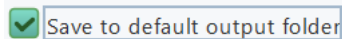
**Please make sure that the Fall\_id contained in SpiGes data have **not** already undergone another pseudonymization function.**

To select one or more datasets, please click on

**+ Browse...**

In the following dialog, please select **folders** with one record each (contains only one SpiGes XML data file each). Multiple folders can be selected by holding the Ctrl key and clicking on individual folders. Alternatively, ZIP archive files can also be selected here, each of which must contain a SpiGes data record. **Please note that each SpiGes data set only contains data from one hospital ID and one data year. However, data from multiple locations per data set is possible.**

The output folders are then normally stored in the same location where the input folders are stored. Alternatively, you can use the



by ticking the box. The output folders are then placed in the "Crypto Wizard Output" folder in your personal documents folder. Where exactly this folder can be found on your system is shown in a tooltip. To do this, hold the mouse pointer over the checkbox a little longer.

To start preparing the data, click

**Clean & Encrypt**

Please note that very large SpiGes data sets (or several data sets selected for processing at the same time) can be expected to have long runtimes, as numerous changes have to be made in a very large XML structure. In addition, if the input and/or output data is stored on a network drive, the runtime is extended accordingly because the data must be loaded over the network.

**Guideline: 5 minutes running time / 20,000 cases.**

After the processing is complete, the Crypto Wizard creates an output folder (named with "SpiGes\_", Spital\_ID, data year, name of the selected original folder) and the following content in the target folder:

 Bereinigt

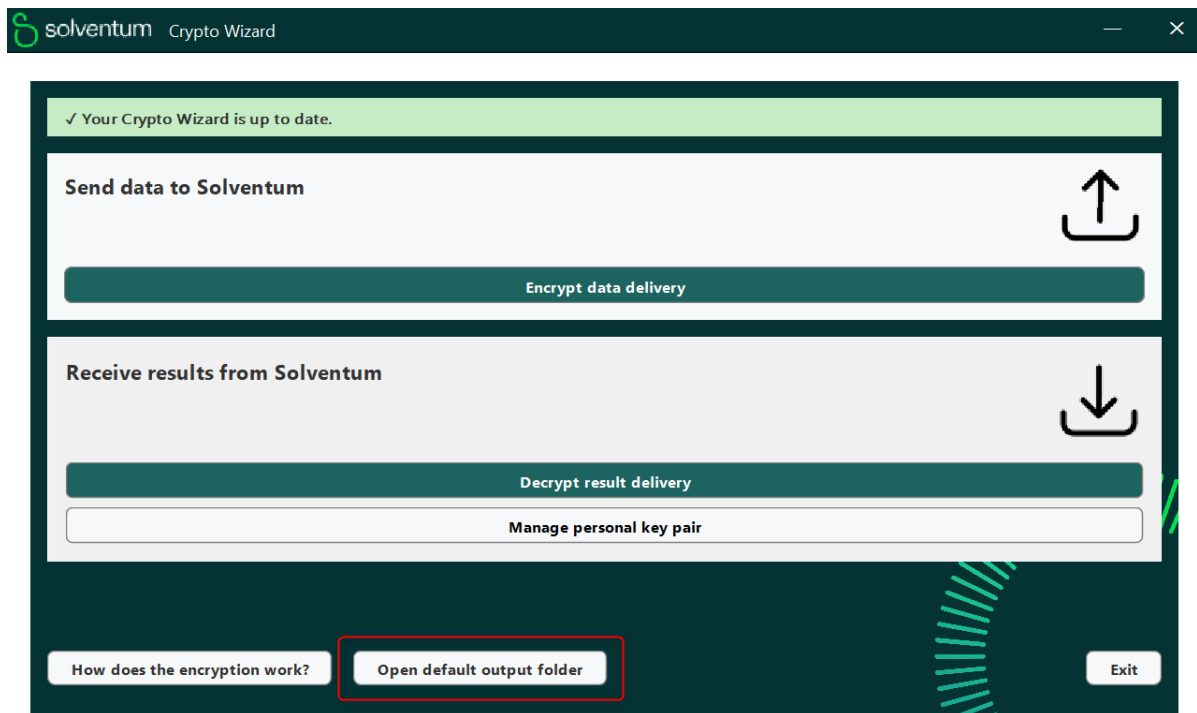
 Mappingdatei

 Original

 SpiGes\_12345678\_2024\_326518200332305633300191.zip.gpg

In the "Mapping File" folder, you will find the mapping file (named "Mappingdatei\_", Spital\_ID, data year, creation date and time).

In addition, mapping files are stored in the default output folder of the Crypto Wizard.



This file can be used to establish a direct reference between the original Fall\_id and the pseudonym used in the data set. **Please never send this file to Solventum.** You will need this file later to be able to relate the case-related results you receive from Solventum to the original case number. **Therefore, please keep this file in a safe location.**

In the "Original" folder you will find the original data record as a ZIP archive. You can use this file to understand exactly which data basis was used for data preparation at a later date.

In the folder "Pseudonymized" you will find the generated data record (pseudonymized and reduced) as a ZIP archive. You can use this file to understand the result of the data preparation.

In addition to these three folders, you will also find the fully encrypted GPG file (named with "SpiGes\_", Spital\_ID, data year and a numerical code).

This file, which contains the pseudonymized data set, is encrypted with the Solventum data service key and can be uploaded in this form to the Benchmark Portal. Please do not change the file name of the GPG file, as it is used for a check function. A GPG file with a changed file name may not be able to be uploaded to the Benchmark Portal.

**Benchmark Portal:** <https://benchmarkportal.his.solventum.de>

## 4.4 Prepare other data sets

Select the "Other Record Formats" record type.

"Other data set formats" includes all data that does not belong to the § 21, § 136 or SpiGes data (e.g. special formats). If you are not sure which function is the right one for your data transmission, please call us. We are happy to support you with encryption.

Please select which type of dataset you want to encrypt:

Other data formats

Please select the file(s) you want to encrypt:

+ Browse...

☒ Save to default output folder

Encrypt

**Note:**  
 You can select one or more files. An encrypted .pgp file is created for each selected file.  
 If multiple files should be part of a single data delivery, please create an archive (extension .zip, .7z or .rar) with the relevant content beforehand and select it for encryption.

Back to main menu

To select one or more data sets or data deliveries for encryption, please click

+ Browse...

In the following dialog, please select all files that are to be encrypted into a separate delivery (several files can be selected by holding the Ctrl key and clicking on individual files). The files must all be stored in the same folder, otherwise multiple selection is not possible.

If the data records or data deliveries to be encrypted each consist of more than one file, they must be combined into a ZIP archive file in advance in order to receive only one GPG file per data record or data delivery at the end of the encryption process.

The output folders are placed in the same location where the input files are stored. Alternatively, you can use the

☒ Save to default output folder

by ticking the box. The output folders are then placed in the "Crypto Wizard Output" folder in your personal documents folder. Where exactly this folder can be found on your system is shown in a tooltip. To do this, hold the mouse pointer over the checkbox a little longer.

To start encrypting the data, click

Encrypt

After the encryption is complete, the Crypto Wizard creates an output folder (named with the name and file extension of the input file) in the destination folder and the following content:

 Original  
 Datensatz1.csv.zip.gpg

In the "Original" folder you will find the original data record as a ZIP archive. You can use this file to understand exactly which data basis was used for encryption at a later date.

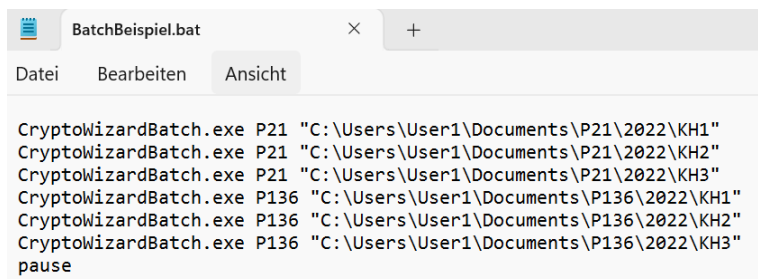
In addition, you will also find the fully encrypted GPG file in the output folder (named like the input file with the additional file extensions ".zip.gpg"). This file is encrypted with the Solventum data service key and can be uploaded in this form to the Benchmark Portal.

**Benchmark Portal:** <https://benchmarkportal.his.solventum.de>



## 4.5 Batch Mode

Users who want to encrypt records from many clinics for delivery to Solventum can use batch mode in addition to selecting multiple folders for encryption via the user interface. For this purpose, a batch file must be maintained in advance. An example of the structure of the batch file can be found in the figure. The "BatchBeispiel.bat" file is also included in the Crypto Wizard program folder.



```

CryptoWizardBatch.exe P21 "C:\Users\User1\Documents\P21\2022\KH1"
CryptoWizardBatch.exe P21 "C:\Users\User1\Documents\P21\2022\KH2"
CryptoWizardBatch.exe P21 "C:\Users\User1\Documents\P21\2022\KH3"
CryptoWizardBatch.exe P136 "C:\Users\User1\Documents\P136\2022\KH1"
CryptoWizardBatch.exe P136 "C:\Users\User1\Documents\P136\2022\KH2"
CryptoWizardBatch.exe P136 "C:\Users\User1\Documents\P136\2022\KH3"
pause

```

Two parameters must be passed to the "CryptoWizardBatch.exe":

1. Type of record to be encrypted: [P21|P136]
2. Folder (full path) in which the record to be encrypted is stored. This should be enclosed in quotation marks if there are spaces in the path.

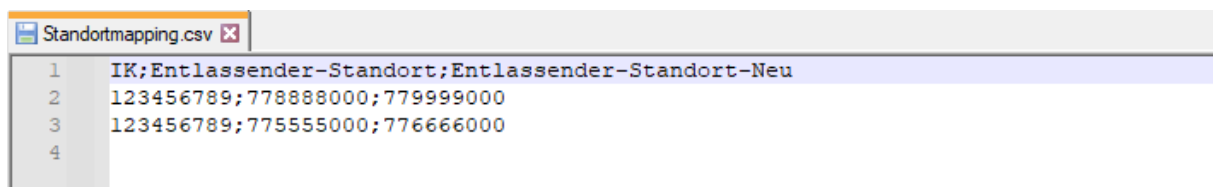
The output folder is stored in the same folder as the input folder, according to the standard procedure for encryption via the user interface.

## 4.6 Location mapping

A location mapping function has been implemented for the processing of data according to § 21 or § 136. This enables the replacement of location identifiers in the entire data set, as well as in the case number mapping file generated during § 21 pseudonymization.

This functionality is usually used after a corresponding agreement with the Solventum Data Service. You may receive a mapping file specially prepared for your data. Please only use these for location mapping, otherwise your data may be assigned to incorrect locations.

The mapping file "Standortmapping.csv" is automatically used by the Crypto Wizard as soon as it is located in the configuration folder "Crypto Wizard Configuration" in your personal document folder (usually "My Documents" or "Documents").



```

1 IK;Entlassender-Standort;Entlassender-Standort-Neu
2 123456789;778888000;779999000
3 123456789;775555000;776666000
4

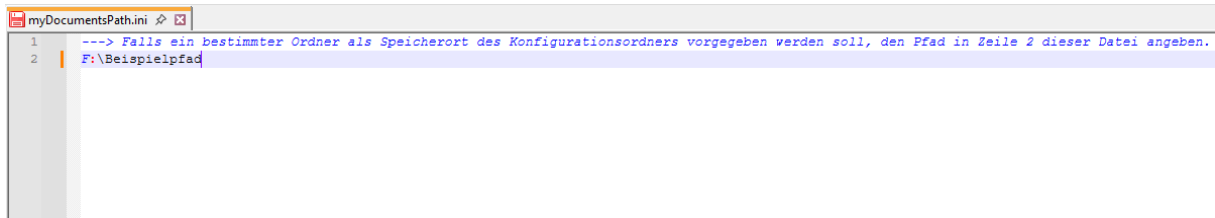
```

If usable entries for mapping your locations are found, the Crypto Wizard will display this during the processing of your data or output corresponding information in the log file.

#### 4.7 Customize Configuration Folder

In some configurations, the user-dependent document folders (usually "My Documents" or "Documents") in the Windows system are not defined or cannot be used as a location for the configuration folder "Crypto Wizard Configuration". For such cases, the path to the configuration folder that the Crypto Wizard should use can be adjusted.

To do this, the desired path must be stored in the 2nd line of the file "myDocumentsPath.ini":

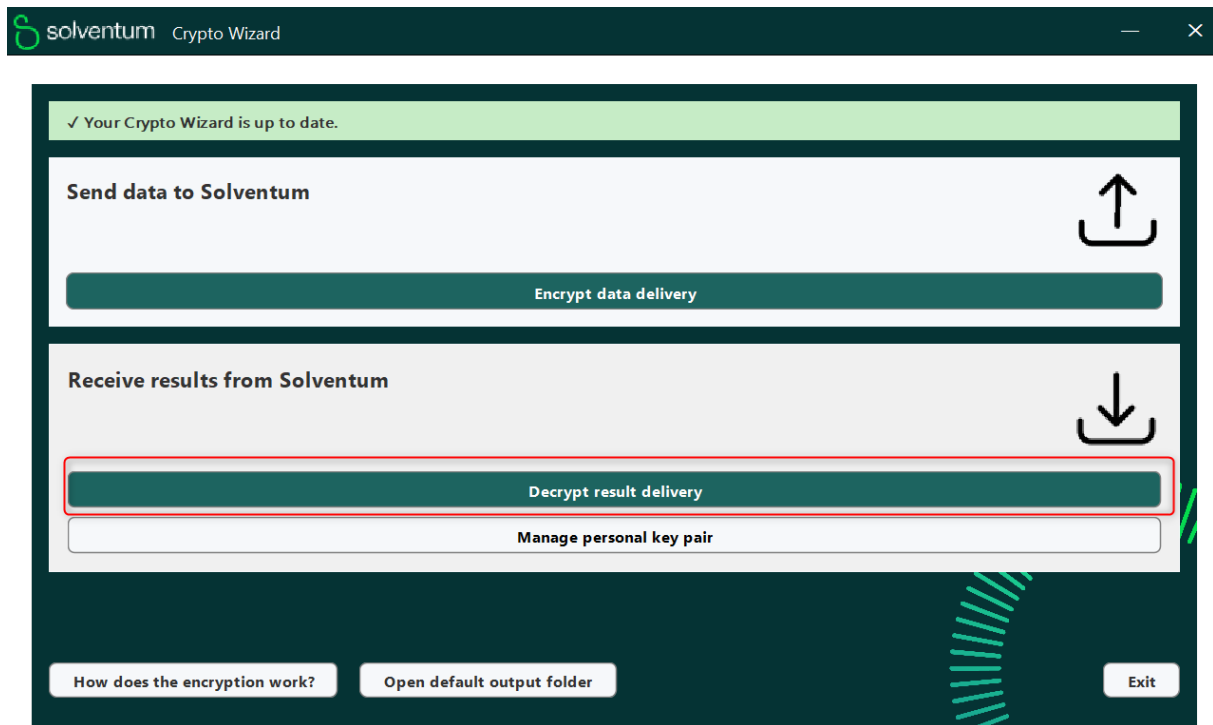


```
1  ---> Falls ein bestimmter Ordner als Speicherort des Konfigurationsordners vorgegeben werden soll, den Pfad in Zeile 2 dieser Datei angeben.
2  F:\Beispielpfad
```

You can find this file already prepared in the "config" subfolder in the Crypto Wizard program folder.

## 5. Get results from Solventum

Under this point, you can decipher the result deliveries. In advance, it is necessary to create your own GPG asymmetric key pair. The public key is uploaded to the Benchmark Portal, as described below.



When starting the Crypto Wizard for the first time, the item "Decrypt result delivery" appears deactivated, as you first have to create a personal key pair and upload the public part to the Benchmark Portal to use this function.

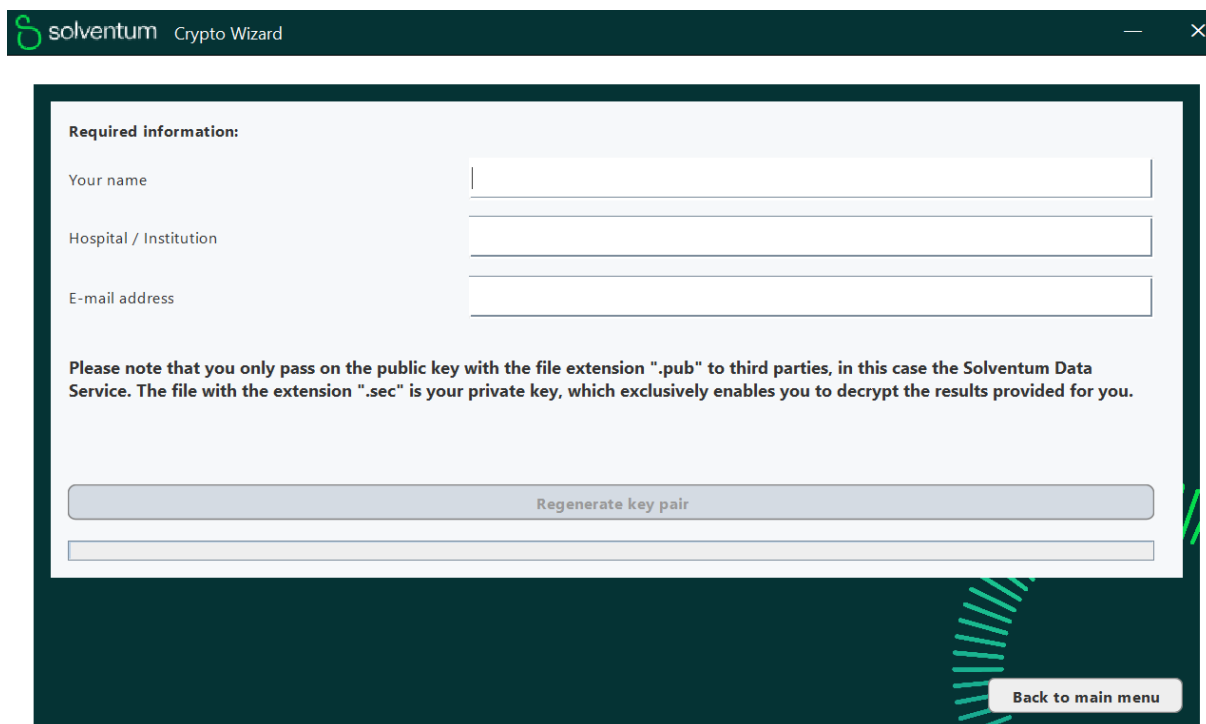
**ATTENTION!** As long as the Crypto Wizard performs the decryption of files, there is no need to recreate a key pair.

### 5.1 Create a personal key pair

To generate the key pair, please click on



In the following window, please enter your name, the name of your hospital or provider and your e-mail address.



**Required information:**

Your name

Hospital / Institution

E-mail address

Please note that you only pass on the public key with the file extension ".pub" to third parties, in this case the Solventum Data Service. The file with the extension ".sec" is your private key, which exclusively enables you to decrypt the results provided for you.

Please confirm the following button to generate the key pair.

**Regenerate key pair**

Please note that you only pass on the public key with the file extension ".pub" to other people, in this case to the Solventum data service. The file with the extension ".sec" is your private key, which only enables you to decrypt the results provided to you.

After the key is generated, the hint text is replaced by the hint listed in the following figure. The name of the key is displayed and, at the bottom of the window, the folder path in which your personal key pair is stored. The folder (named "Crypto Wizard Configuration") was created by the Crypto Wizard in your personal documents folder (usually "My Documents" or "Documents").

**ATTENTION! Please do not move or delete the contents of this folder under any circumstances, as the Crypto Wizard must access the private key every time a file is decrypted.**

**Required information:**

Your name

Hospital / Institution

E-mail address

The key pair was generated successfully. The public key "██████████" was also placed on the desktop. Please upload it to the Solventum Benchmark Portal. Log in there with your username and password. Then click on "Your Profile" in the menu bar and then on "Your public key".

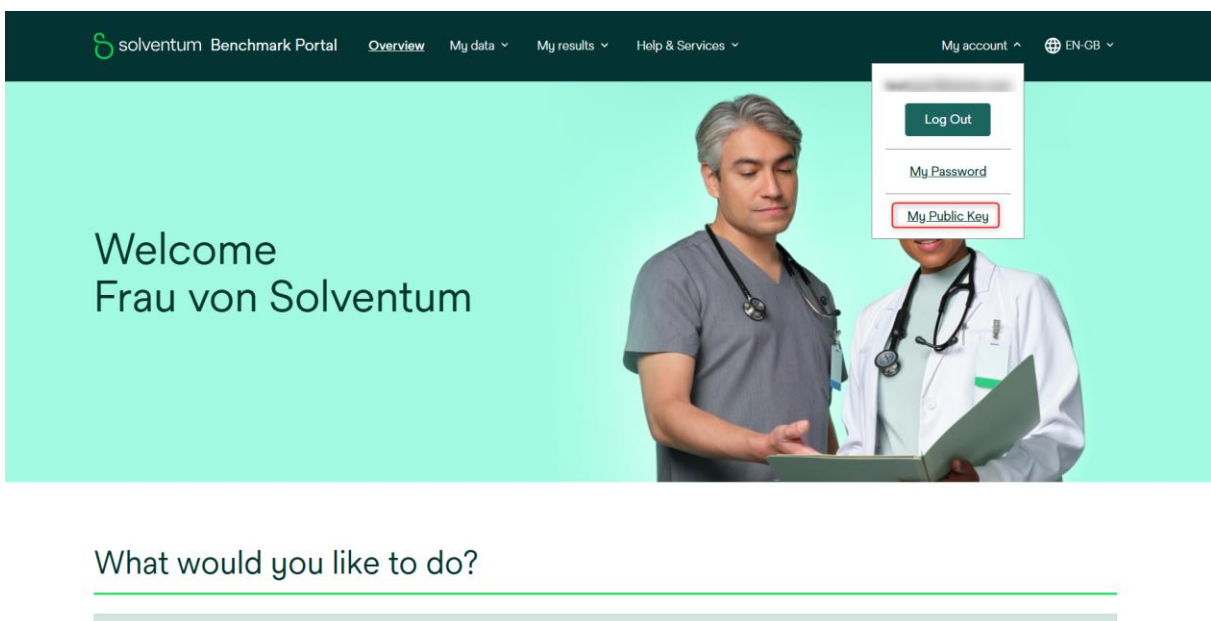
A copy of the public key is also stored on your Windows desktop. Please upload it to the Benchmark Portal as described below.

To exit the window, click **Back to main menu**.

## 5.2 Uploading the public key

**Benchmark Portal:** <https://benchmarkportal.his.solventum.de>

Log in there with your username and password, then click on "My Account" in the menu bar and then on "My Public Key".



Outdated? Upload a new public key here:

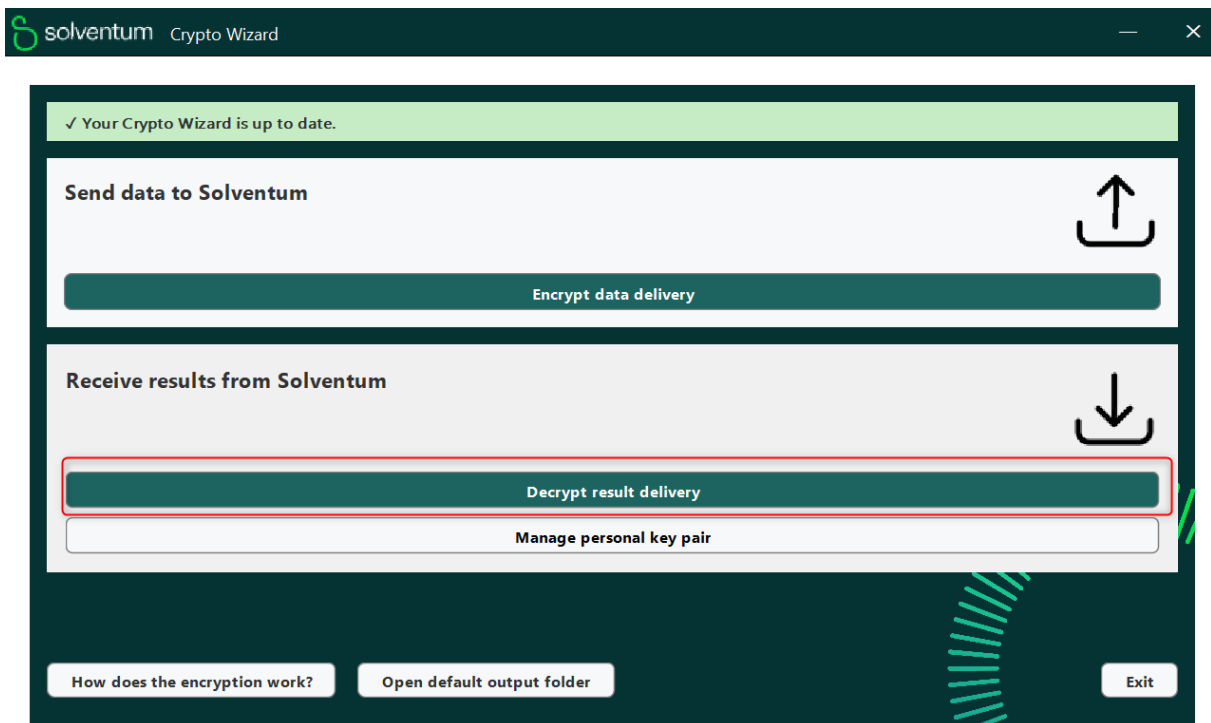
**File selection**  
Drag and drop the PUB file here or click to select a file

Upload selected key file

To upload the public key, please click in the "File Selection" field or drag and drop the key with the extension ".pub" into the field. Next, click on "Upload selected key file".

### 5.3 Deciphering the results of the Solventum data service

Under this point, you can decrypt the result delivery encrypted by Solventum with your public key. This means that this is only possible after you have created a personal key pair, uploaded the public part to the Benchmark Portal and then requested an encrypted download package with evaluation results.



To decrypt files obtained from Solventum, click "Decrypt result delivery".

If the above button is inactive, then no personal key pair has yet been created within your Windows account. Read more about this in the chapter ["Creating a personal key pair"](#).

Please select the file(s) you received from Solventum to decrypt them:

**Browse...**

☒ Decompress archive(s) after decryption

**Decrypt**

**Note:**  
You can select one or more file(s) (extension .gpg) for decryption.

**Back to main menu**

To select one or more files, please click on **+ Browse...** and please select the file(s) you received from Solventum. This is usually recognizable by the file extension ".gpg" (several files can be selected by holding the Ctrl key and clicking on each individual file).

Next, click

**Decrypt**

The decrypted file(s) will then be placed in the source folder.

If the option ☒ Decompress archive(s) after decryption is activated, the ZIP archive files created during the decryption will then be unzipped so that you can access the contents directly.

## Appendix

### Encryption methods

With the Crypto Wizard, we have implemented the recommendations of the German Federal Office for Information Security (BSI).

We use hybrid encryption according to the OpenPGP standard using the software "GNU Privacy Guard" (GnuPG):

1. Message encryption with symmetric algorithm AES-256
2. Session key encryption using asymmetric algorithms:
  - a. Transfer to Solventum → asymmetric encryption with 2048-bit RSA key
  - b. Transfer to user → asymmetric encryption with 4096-bit RSA key

### Other License Terms

The encryption and decryption is carried out using the software "GNU Privacy Guard" (GnuPG) from the Free Software Foundation Inc., which is licensed under the GNU GENERAL PUBLIC LICENSE.



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