# Functional Documentation - Forecast Accuracy

## 1.0 Overview

### Business Context and Application Overview

**Forecast accuracy refers to the degree to which the predictions or forecasts of demand for products or services align with the actual demand observed in the marketplace. It is a critical performance measure used to evaluate the effectiveness of demand forecasting processes and to assess how well Solvay is able to anticipate and meet customer demand. High forecast accuracy is essential for efficient operations, optimized inventory management, and customer satisfaction. The KPI Forecast Accuracy (FA) evaluates the ability to get visibility on customer's demand.**

**As an input of S&OP process, reliable forecasts constitute the major way to improve the customer satisfaction via an optimised planning of operations.**

**In the query, the Forecast Accuracy can be calculated from different forecast sources:**

- **Final Forecast (by default in the report)**
- **Sales Team Forecast (optional)**
- **Statistical Forecast (optional)**
- **Demand Review Forecast (optional)**

### Application User Profile

*General role/Viewer role:*

- Supply Chain Managers
- Demand Manager
- Sales Team

*Approver role:*

**Target Users:**

- Supply Chain Managers
- Demand Manager
- Sales Team

| VERSION | DATE | MODIFIED BY | DESCRIPTION |
|---|---|---|---|
| 0.01 | 26.10.2023 | Karen Oppong | Initial draft |
| | | | |
| | | | |

### Application Type

| | |
|---|---|
| Data Product Type | ☐ Dashboard<br>☑ Report<br>☐ Advanced analytics<br>☐ AI<br>☐ Others <specify which one> |
| Technologies | ☑ BW<br>☐ Tableau<br>☐ Qliksense<br>☐ Talend<br>☐ Dataiku<br>☐ Others <specify which one> |
| Data Sources<br>*Note: list of all applications and various environment* | ☐ SAP PF1 (Production environment)<br>☑ SAP WP1<br>☐ SAP PI1<br>☐ BW (versions)<br>☐ iCare CRM<br>☐ CORE CRM<br>☐ Others <specify the name of the source> |

## 2.0 Business Process

*xxxxx*

# 3.0 Application Feature Overview

The below Information describes the existing Workbooks and their respective BW queries.

| Reports | Definition | Prompts | BW Workbook Query | Query Technical Name |
|---|---|---|---|---|
| **BW - DP - Forecast Accuracy (Core Query)** | This report is a performance metric used to evaluate the effectiveness of demand forecasting processes and assess how well Solvay anticipates and meets customer demand. | | BW - DP - Forecast Accuracy (Core Query) | BW_QRY_MVDYN11_0005 |

- Final Forecast (by default in the report)
  - xxx
- Sales Team Forecast (optional)
  - xxx
- Statistical Forecast (optional)
  - xxx
- Demand Review Forecast (optional)
  - xxxx

# 4.0 Functional Specification

## 4.1 How does Forecast Accuracy work?

Forecast accuracy in demand planning within the supply chain is a critical aspect of ensuring that a business can meet customer demand efficiently and cost-effectively. Here's how forecast accuracy works within the supply chain:

1. Data Collection: The process begins with the collection of historical data related to demand for products or services. This data includes sales figures, order history, customer behavior, market trends, and any other relevant information that can impact demand.
2. Forecasting Models: Demand planners use various forecasting models and methodologies to analyze historical data and make predictions about future demand. These models can be statistical, mathematical, or based on machine learning algorithms. The choice of model depends on the nature of the product, the available data, and the forecasting horizon.
3. Data Preprocessing: Before applying forecasting models, data preprocessing may be necessary to clean, transform, and prepare the data. This ensures that the data is accurate and suitable for analysis.
4. Model Selection: The most appropriate forecasting model is selected based on the specific characteristics of the product, such as seasonality, trend, and demand variability. The selected model should provide the best fit for the data.
5. Forecast Generation: Using the chosen forecasting model, demand planners generate forecasts for future demand over a specific time horizon. These forecasts are typically in the form of numerical predictions, such as monthly or weekly demand quantities.
6. Accuracy Metrics: Forecast accuracy is assessed using various accuracy metrics, such as Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE), or Root Mean Squared Error (RMSE). These metrics compare the forecasts with the actual demand, quantifying the level of error.
7. Feedback and Continuous Improvement: Based on the accuracy metrics, organizations receive feedback on the performance of their forecasts. This feedback is crucial for identifying areas where forecasts need improvement and for refining forecasting models and processes.
8. Inventory Management: Accurate demand forecasts are used to manage inventory levels effectively. Businesses aim to prevent overstock situations (holding excess inventory) and stockout situations (insufficient inventory to meet demand) by aligning inventory levels with forecasts.
9. Production and Procurement Planning: Manufacturers and suppliers rely on demand forecasts to plan production schedules and procure raw materials. The accuracy of forecasts influences resource allocation and production planning decisions.
10. Distribution and Logistics: Accurate demand forecasts help optimize distribution and logistics operations. Businesses can plan transportation, warehousing, and distribution routes to meet demand efficiently.
11. Customer Service: High forecast accuracy is essential for ensuring that customer orders are fulfilled on time and with the right quantity of products. This contributes to high levels of customer satisfaction.
12. Strategic Decision-Making: Forecast accuracy plays a role in strategic decision-making, as it influences product development, marketing, pricing, and resource allocation decisions.
13. Cost Management: Reducing forecast errors can lead to cost savings. Accurate forecasts minimize the need for costly expedited shipping, excessive safety stock, and production overruns.
14. Risk Management: Understanding the limitations of forecasts and the potential impact of forecast errors allows organizations to develop risk management strategies to mitigate supply chain disruptions.

## 4.1.1. Basic level and aggregation

The forecast Accuracy is calculated at 2 levels, based on Gross History (GH) from last month :

- at detailed level : Material, Distribution Channel, Ship-to

- at aggregated level : at the level required by the user (dynamic calculation at displayed level)

| FA Type | BW Core Query | Dashboard |
|---|---|---|
| FA ("Simple") | blocked URL | blocked URL |
| Aggregated FA | blocked URL | blocked URL |
| Weighted FA | blocked URL | blocked URL |

## 4.1.2. Time frame and snapshots

### Snapshots :

Every 6th of each month, a snapshot is taken for each month in the future up to 6 months. This will allow to calculate FA for periods M-1, M-2, M-3, M-4, M-5 and M-6

The forecast Accuracy is calculated at 2 levels, based on Gross History (GH) from last month :

- at detailed level : material, Distribution Channel, Ship-to and weighted
- at aggregated level : at the level required by the user (dynamic calculation at displayed level)
- Snapshots : Every 6th of each month, a snapshot is taken for each month in the future up to 6 months.This will allow to calculate FA for periods M-1, M-2, M-3, M-4, and M-5.

### Example

For June, the FA M is the picture taken the 6th of July for the month of June (to capture the changes made on June). M-1 will the the picture taken the 6th of June for June (to capture the changes made on May). M-2 the picture taken the 6th of May for June (to capture the changes made on April).

| | | REFERENCE MONTH | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SNAPSHOT day | | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV |
| 6th | MAY | M-1 | M-2 | M-3 | M-4 | M-5 | M-6 | |
| 6th | JUNE | M | M-1 | M-2 | M-3 | M-4 | M-5 | M-6 |
| 6th | JULY | | M | M-1 | M-2 | M-3 | M-4 | M-5 |
| 6th | AUG | | | M | M-1 | M-2 | M-3 | M-4 |
| 6th | SEPT | | | | M | M-1 | M-2 | M-3 |
| 6th | OCT | | | | | M | M-1 | M-2 |
| 6th | NOV | | | | | | M | M-1 |

## 4.1.3. Formula and calculation

Example

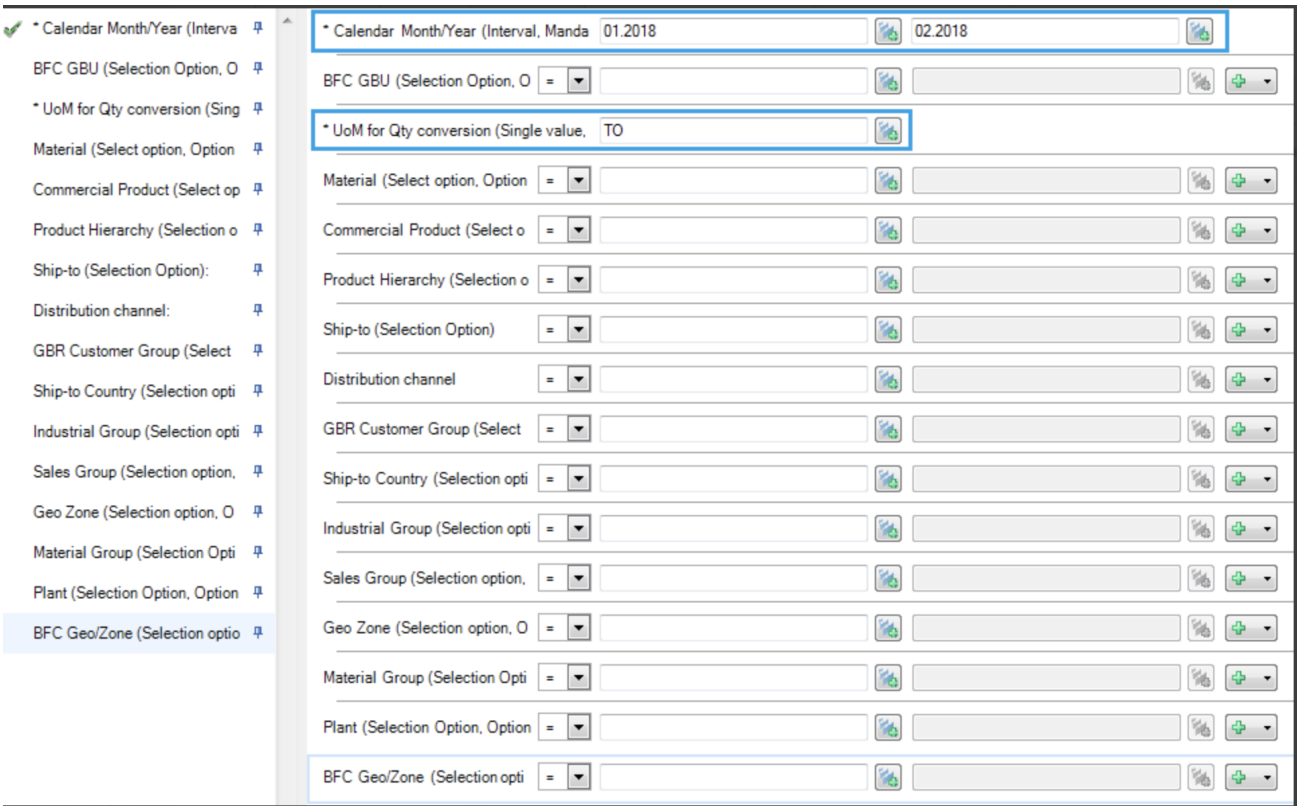
**FA = Max (0; 1 - Σ ABS(FF - GH) X 100)** **FA Aggr. = Max (0; 1 - ABS(FF - GH) X 100)**
**GH** **GH**

| At detailed level (DFU level 1) | | | | | | |
|---|---|---|---|---|---|---|
| Material | DC | Ship-to | Gross History (M-1) | Final Forecast (M-1) | /Δ M-1/ | FA & FA aggr. |
| A | B | X | 21 | 15 | 6 | **71%** |
| A | B | Y | 4 | 10 | 6 | **0%** |
| A | C | Z | 1 | 1 | 0 | **100%** |

| Aggregated level | | | | | | |
|---|---|---|---|---|---|---|
| Product Group | Gross History (M-1) | Final Forecast (M-1) | Σ/Δ M-1/ | FA | /Δ M-1/ | FA Aggr. |
| A | 26 | 26 | 12 | **54%** | 0 | **100%** |

## 4.1.4. Variables and selection screen

1. Calendar Year/Month is mandatory (MM.YYYY) as well as UoM for Qty conversion
2. Other prompts are optional




## 4.1.5. Key Figures

Key figures in the report are quantities mandatory to calculate the Forecast Accuracy (FA) :

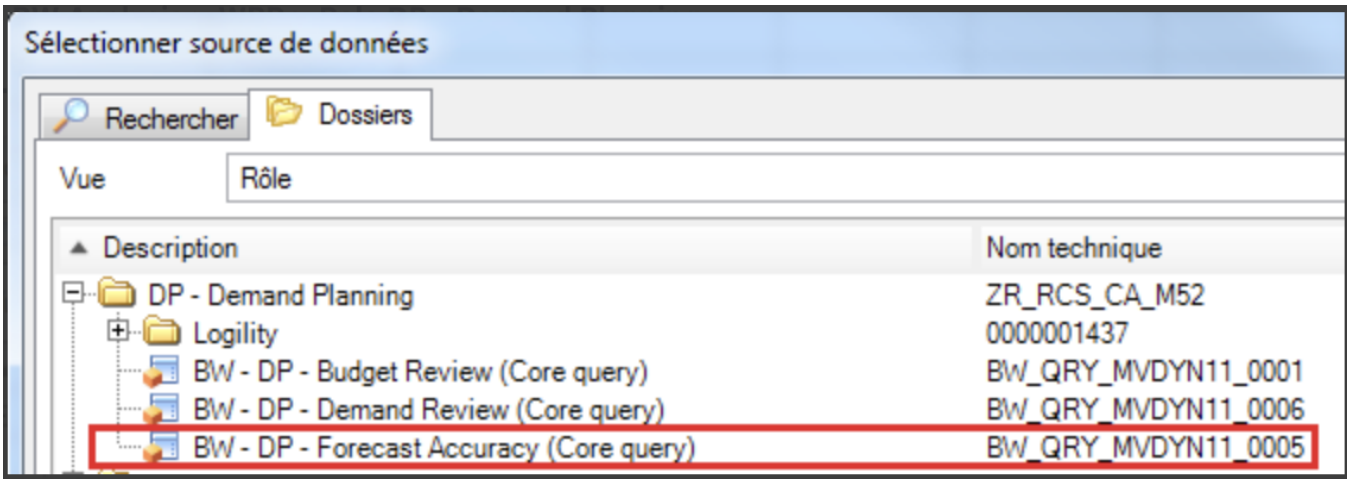
The FA is calculated and displayed by default in the query based on Final Forecast

Other FA can be shown as optional based on other Forecast "sources"

## 4.1.6. Access to the query

To access the query, follow the process below

Go to BW Analysis > WBP > Role DP - Demand Planning




| | | | | | Calendar Year/Month | JAN 2018 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | GH / Gross History | FF / Final Forecast M1 | FA FF M1 | FA aggr. FF M1 | Relative Error FF M1 |
| Material | | Ship-to | | Distribution Channel | | TO | TO | | | |
| 13998 | SD NATURELLE *GRIV | 308965 | ZAMIL GROUP TRADE & SERVICES CO LTD | SD | SD | 0 | 0 | 0 | 0 | 0 |
| 15366 | SD TGT FROIDE *R | 402877 | CORNING PHARMACEUTICAL GLASS S.P.A | SD | SD | 44 | 35 | 80 | 80 | -20 |
| | | 404036 | COLOROBBIA ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 408865 | FORMEC BIFFI SPA | SD | SD | 0 | 60 | 0 | 0 | 0 |
| | | 455945 | VETROPACK ITALIA S.R.L. | SD | SD | 0 | 1 | 0 | 0 | 0 |
| | | 456909 | COLOROBBIA ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| 16236 | SD TGT 250/1000 *RB | 117702 | UNILEVER FRANCE HOME | SD | SD | 552 | 514 | 93 | 93 | -7 |
| | | 554643 | DALLI-DE KLOK B.V. | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 600104 | FRIKE POWDER AG | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 604742 | FRIKE CHEMICALS AG | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 1105199 | SAINT-GOBAIN GLASS | SD | SD | 0 | 0 | 0 | 0 | 0 |
| 16654 | CASO TEC FLAKES *R | 116654 | EUROTAB OPERATIONS | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 152542 | SANOFI CHIMIE | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 152627 | SANOFI CHIMIE | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 420983 | PROMAIN SRL | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 450115 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 451950 | AUTOSTRADA VALDOSTANA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 452898 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 452910 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 452916 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 452920 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 453362 | AUTOCAMIONABILE DELLA CISA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 454591 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 455164 | AUTOSTRADE PER L'ITALIA SPA | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 459317 | ELETTROCHIMICA VALLE STAFFORA SRL | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 460224 | AUTOSTRADA DEI FIORI S.p.A. | SD | SD | 0 | 0 | 0 | 0 | 0 |
| | | 603988 | AMT FUER BETRIEB NATIONALSTRASSEN | SD | SD | 24 | 45 | 14 | 14 | 86 |

## 4.2 Process Detail

### 4.2.1. Report/Process Definition

| | |
|---|---|
| **BW Server** | WBP |
| **Application** | DP - Demand Planning |
| **Query Name** | BW - DP - Forecast Accuracy (Core Query) |
| **Query Technical Name** | BW_QRY_MVDYN11_0005 |
| **Core/Specific Scope** | Core |
| **Specific Reason** | |
| ***Provider Name*** | MVDYN11 - DYN - Reporting |
| **Usage type** | Direct execution in Analysis |
| **Expected users** | Supply Chain Managers, Demand Manager, Sales Team |

### 4.2.2. Naming convention by System (Reporting layer and Dynasys vs. APO)

| | Reporting | | Forecasting system (Source)* | | |
|---|---|---|---|---|---|
| | BW Core Query | Global SC Dashboard | Dynasys | APO (WP1) | APO (PF1) |
| Forecast type | GH / Gross History | Actual Sales | GH / Gross History | Demand History | History |
| | FF / Final Forecast | Final Forecast | FF / Final Forecast | PreSOIP Plan | Consensus Forecast |
| | STATF / Statistical Forecast | n/a | STATF / Statistical Forecast | Statistical Forecast | System Forecast |
| | STF / Sales Team Forecast | n/a | STF / Sales Team Forecast | Sales Team Forecast | AM forecast |
| | DRF / Demand Review Forecast | n/a | DRF / Demand Review Forecast | PreSOIP Plan | Shifted Forecast |

> ***Dynasys***
>
> ***EP**: Order book in Requested departure date (we call it "Demand history ETD", it's the pure demand, the source is the Sales order in SAP).*
>
> ***Aroma/Silica/TS/Novecare**: Order book in Requested delivery date (we call it "Demand history ETA", it's the pure demand, the source is the Sales order in SAP).*
>
> ***SA&D**: Shipped history in departure date (source is Delivery, taking the Act GI date in SAP)*
>
> *For **Peroxides**, it depends on the zone :*
>
> *Perox except NA: Order book in Requested delivery date (we call it "Demand history ETA", it's the pure demand, the source is the Sales order in SAP).*
>
> *Perox NA: Shipped history in departure date*
>
> ~~***APO***~~
>
> *For **Special Chem**, forecasts are managed in ETD.*

| Time period | BW Core Query | Global SC Dashboard | DynaSys | *Forecast for :* | *Forecast input in DynaSys as of* | *Captured (from Dynasys to BW) on:* |
|---|---|---|---|---|---|---|
| | M | n/a | M | *March 2019* | *March, 31rst 2019 except for TS : April, 6th* | *6th of April 2019 (irrelevant)* |
| | **M-1** | **M-1** | M-1 | *March 2019* | *February, 28th 2019 except for TS : March, 6th* | *6th of March 2019* |
| | **M-2** | **M-2** | M-2 | *March 2019* | *January ,31rst 2019 except for TS : February, 6th* | *6th of February 2019* |
| | **M-3** | **M-3** | M-3 | *March 2019* | *December, 31rst 2019 except for TS : January, 6th* | *6th of January 2019* |
| | **M-4** | **M-4** | M-4 | *March 2019* | *November,30th 2018 except for TS : December, 6th* | *6th of December 2018* |
| | **M-5** | **M-5** | M-5 | *March 2019* | *October,31rst 2018 except for TS : November, 6th* | *6th of November 2018* |

### 4.2.. Key Figures

#### Key figures in the report are quantities mandatory to calculate the Forecast Accuracy (FA) :

The FA is calculated and displayed by default in the query based on Final Forecast

Other FA can be shown as optional based on other Forecast "sources"

# 5.0 Non-functional Descriptions

*Please populate the relevant section and delete those that are not applicable.*

## 5.1 Usability

*Usability is about the ease with which a User can learn to start using the solution and the ease with which they can use the system. In addition to ease of learning and ease of use, usability also includes areas such as ease of recall, error avoidance and handling, accessibility among others e.g., 99% of metadata entry Users who have use the Maintenance Dashboard should be able to change filters, extract etc., when required. Maintenance data will be centrally stored in the Google Cloud platform, which will be available to other applications e.g., and Dashboards if needed.*

## 5.2 Regulatory Compliance

*Software systems must comply with legal and regulatory e.g., GDPR requirements, this can change depending on country, organisation industry and / or region. The software systems must be secure from unauthorized access. The Maintenance Dashboard will comply with Solvay's regulations and compliance e.g., access only granted to authorized Users.*

## 5.3 Security

*Security refers to essential aspects that assure a solution and its components will be protected against unauthorized access or malware attacks. Important considerations related to security aspects of a system are User authentication, User authorization or User access privileges, data theft, malware attacks, data encryption, and maintaining audit trails, e.g., only Users with administrator access shall be able to create new accounts and assign data access privileges to the new accounts e.g.,*

- *All data will be encrypted in the dashboard*
- *Only authorised Users / Administrative Users will be able to access data.*
- *Maintenance data will be split between either SCO or ECO, and Users will only have authority to one Entity data.*

## 5.4 Performance

*Performance defines how fast a software system or a particular section of it responds to certain User actions under a certain workload. In most cases, this metric explains how long a User must wait before the target operation happens e.g., the page renders, a transaction is processed, etc., given the overall number of Users now. Performance requirements may describe background processes invisible to Users, e.g., backup and speed of data transfers.*

## 5.5 Reliability

*Reliability is the ability of a solution or its component to perform its required functions without failure under predefined conditions for a specified time / period. Reliability can possibly be specified in terms of average time system runs before failure occurs, percentage of operations completed successfully within a time / period, maximum acceptable failure probability, or number of failures within a period. Reliability aspects are in reference to (but not limited to) evaluation of the system to be considered as reliable, classification of reliability defining failures vs. regular failures, and the impact of failure on business operations. The Maintenance Dashboard will display data from the previous refresh of data.*

## 5.6 Scalability

*Scalability refers to the degree to which a solution can evolve to handle increased amounts of work. The increased amount of work could be in terms of the user base, transactions, data, network traffic, or other factors e.g., the system should be able to handle an additional load of a maximum of 5,000 Users every month for the next 6 months without any noticeable performance impacts.*

## 5.7 Compatibility

*Interoperability is the degree to which the solution is compatible with other components. It is a measure of how effectively the system interoperates with other software systems and how easily it integrates with external hardware devices.*

*Interoperability aspects to be discussed during elicitation are in reference to (but not limited to) software systems to be interfaced with along with data / messages to be exchanged and any standard data formats, hardware components to be integrated with, and any standard communication protocols to be followed e.g., Order Management system will push the order file into a secured file transfer protocol server from where it will be loaded into the system through a daily job. To guarantee between Google Cloud platform and SAP BW Queries e.g., BW_QRY_MVPMOR01_0002, Solvay has introduced a new tool called Xtract (Xtract).*

## 5.8 Availability

*Availability is the degree to which the solution is operable and accessible when required. It is a measure of time during which the system is fully operational e.g., available for use and sometimes included as a Service Level Agreement (SLA) considering its criticality to the business, e.g., the system shall be at least 99% available on weekdays between 09:00 to 18:30 Central European Time (CET).*

## 5.9 Refresh of the Data

*Frequency, data, and time of the data refresh in the data product.*