QUANTIFICATION ANALYTICS TOOL

User Manual

USAID
FROM THE AMERICAN PEOPLE

PEPFAR
U.S. President's Emergency Plan for AIDS Relief

PMI | U.S. PRESIDENT'S MALARIA INITIATIVE
USAID
FROM THE AMERICAN PEOPLE
CDC

Document details:

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1 (Mar 15, 2021) GHSC-PSM FASP	Restructured document so all realm & app admin functions are moved to annex, formatting changes, editing for clarity
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GHSC-PSM	o Replaced Commit/Load language with Upload/Download throughout the manual
	o Section 3.B – Added clarification to the redownload pop-up notification
	o Section 3.C – Updated functionality on merging forecast during upload process
	o Section 3.D – Replaced 'Rejected' language with 'Needs Revision'
	o Section 4.A.1 – Added Road transport as a shipping modality; updated the ability for Program Admins to add/remove/edit Procurement Agents to their program
	o Section 4.A.4 – Added Road transport as a shipping modality
	o Section 4.A.6 – Updated to include tagging multiple programs to a single budget
	o Section 4.B.1 – Updated to include multi-select PUs to enter consumption data
	o Section 4.B.2 - Updated to include the ability to enter multi-select PUs to enter inventory/adjustment data & other new functionalities
	o Section 4.B.3 – Updated to include various changes (i.e. multi-select PUs, road transport, blank freight cost, etc.) to the shipment data entry functionality
	o Section 4.C.3 – Added new functionality of rounding residuals when importing forecasted consumption to the supply planning module
	o Section 5.A – Updated to include the combined shipment rows, the ability to view actual consumption in graph, & AMC calculation to have decimals
	o Section 5.C, 5.C.1, & 5.C.2 – Updated to include the combined shipment rows & streamlined shipment pop-up
	o Section 5.E – Updated expiry logic to 'best case scenario'
	o Section 5.G – Updated to include various changes to the Supply Plan Report (i.e. including order no., multi-select PUs, forecasted consumption in graph, etc.)
	o Section 6.D.1 & 6.D.3 – Includes new Forecast Error Report & functionalities
	o Section 6.E.6 – Includes updates to Budget Report
	o Section 6.F.1 – Added details on the 'Total Cost of Expiry' in Expiry Report
	o Section 6.F.3 – Includes new Inventory Turns Report & functionalities
	o Section 8.A.3 – Added clarification on r-squared calculation
	o Section 8.B.1, 8.B.1.a, 8.B.1.b – Includes changes to forecasting trees, such as: duplicate across trees, expand/collapse tree, branch templates, discrete/continuous icons, auto-calculate button, PU validation flag
	o Section 8.B.1.e – Remove multi-month dispensing functionality
	o Section 8.B.2 – Includes annual forecasting quantities to modeling validation
	o Section 8.B.4.a & 8.B.4.b – Added branch template functionality & various updates to tree templates
	o Annex 1 – Added information on variable settings & data restrictions, and updated user/access roles functionality
	o Annex 2 – Updated business rules and calculations for unmet demand, expiry logic, total cost of expiry, & inventory turns
	o Annex 3 & 4 – Updated the ability for Program Admins to add/remove/edit Procurement Agents to their program

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Acronyms

AMC	Average Monthly Consumption (see Important QAT Concepts and Terms)
ARIMA	Auto Regressive Integrated Moving Average
ARTMIS	Automated Requisition Tracking Management Information System
ARU	Alternate Reporting Unit (see Important QAT Concepts and Terms)
ERP	Enterprise Resource Planning
EU	Equivalency Unit
FASP	Forecasting and Supply Planning
FEFO	First Expiry, First Out
FP/RH	Family Planning and Reproductive health
GFPVAN	Global Family Planning Visibility and Analytics Network
GHSC-PSM	Global Health Supply Chain – Procurement and Supply Management program
GLN	Global Location Number
GTIN	Global Trade Item Number
MSE	Mean Squared Error
MAPE	Mean Absolute Percentage Error
MNCH	Maternal, Newborn and Child Health
MOH	Ministry of Health
MOQ	Minimum Order Quantity (see Important QAT Concepts and Terms)
MOS	Months of Stock (see Important QAT Concepts and Terms)
PEPFAR	President's Emergency Plan for AIDS Relief
PMI	U.S. President's Malaria Initiative
PWA	Progressive Web Application
QAT	Quantification Analytics Tool
RMSE	Root Mean Squared Error
RO	Requisition Order
SKU	Stock Keeping Unit
SOH	Stock on Hand
STG	Standard Treatment Guidelines
TES	Triple Exponential Smoothing (Holt-Winters)
USAID	United States Agency for International Development
WAPE	Weighted Absolute Percentage Error

Overview

A. Introduction

The Global Health Supply Chain – Procurement and Supply Management (GHSC-PSM) program is an official project of the United States Agency for International Development (USAID), implemented by Chemonics International and its consortium members. The purpose of GHSC-PSM is to ensure uninterrupted supplies of health commodities in support of US Government-funded public health initiatives around the world.

The Forecasting and Supply Planning (FASP) tool modernization initiative was supported with funding from the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), the U.S. President's Malaria Initiative (PMI), USAID's family planning and reproductive health (FP/RH) program, and USAID's maternal and child health (MCH) program, which share the cost of the project.

Previous USAID-funded projects, including the Supply Chain Management Systems (SCMS) and DELIVER developed and implemented the previous suite of FASP tools used in the global health domain. These tools performed their specific functions well and achieved their main objectives. The tools, however, were designed separately, were inconsistent in terms of the user interfaces, and required manual manipulation for data exchange.

The primary objectives of this initiative were to build the next generation FASP tools on a scalable and modular platform that is operating-system agnostic; a tool that is web-based with significant offline capabilities; designed to allow for seamless data exchange and sharing across key stakeholders and public health systems, as well as have a user-centric interface for overall usability and automates supply chain functions for end-to-end data visibility and evidence-based decision-making that extends across global and national supply chains and encourages coordination with all stakeholders.

B. Forecasting vs. Supply Planning

A forecast is an estimate/prediction of the quantities of products to be consumed/utilized by clients or consumers over a future period of time. Supply planning is the component of supply chain management involved with determining how to best fulfill the requirements created from the demand plan. The objective is to balance supply and demand in a manner that achieves the service delivery and financial objectives of the health program.

C. What is QAT and What Can It Do for You?

The Quantification Analytics Tool (QAT) is a modernized solution for country-led forecasting and supply planning. QAT leverages new technologies to enhance and modernize the functionality offered by the incumbent PipeLine and Quantimed tools by providing flexible forecasting tree structures, advanced extrapolation methodologies, scenario planning and updated planning logic. It also streamlines forecasting supply planning activities. Furthermore, the QAT enables offline functioning that helps users log their data even when there is no network coverage. QAT is changing the paradigm of legacy forecasting and planning solutions by leveraging master data management to drive standardization and increase visibility across all programs.

This new tool seeks to enable users to do multi-method forecasting, compare outputs, quickly transfer the forecast to the supply plan module to optimize commodity procurement and delivery schedules, monitor the stock status of products and share data with external platforms and key stakeholders.

QAT supports forecasting, monitoring, and procurement planning functions, as explained below:

QAT forecasting functions include:
- Forecasts based on multiple types of data.
- Advanced extrapolation methodologies, including moving averages, semi averages, linear regression, Holt-Winters, and Auto Regressive Integrated Moving Averages (ARIMA).
- Forecasting tree development that allows flexibility for multiple applications.
- Visual comparison of multiple forecast outputs to drive stakeholder consensus and selection of final output.

QAT monitoring functions include:
- Monitoring stock balances, in terms of quantities and months of stocks on hand in the entire program.
- Comparing stock balances to maximum and minimum stock parameters and identifying stock outs, balances below minimum or above maximum.
- Automating the identification of problems such as additional procurements needed.

Procurement planning functions include:
- Calculation of shortfalls/surpluses and quantities needed to maintain the program's optimum stock levels.
- Automated calculation and tracking of pending actions, based on lead times such as shipments to plan, order, ship, and receive.
- Calculation of estimated shipment and freight costs.
- Tracking estimated budget expenditures.
- Comparison of alternative procurement scenarios and analysis.

D. **Who Should Use QAT?**

It is increasingly necessary that local program managers be empowered to do their own forecasting, monitoring, and procurement planning; they must also take charge of coordinating the activities of donors and local suppliers, as well as those of their own logistics management staff. While program managers and decision makers will be the primary users of QAT, the system can provide information to host country policy makers, country directors, procurers, and donors.

Who	Purpose
Supply Planners / Program Managers	Managing procurements from multiple funding sources (with different budgets), multiple procurement agents (with different catalogs, and lead times) and consumption and inventory data coming from different levels of the supply chain. QAT will help decrease the risk of stock imbalances by providing increased visibility into procurement planning, and stock status monitoring in the near- and long-term.
Forecast/Demand Planners	Estimating the demand with different methodologies (consumption, demographic, morbidity, services) using flexible and easy-to-use templates, advanced extrapolation methods, and built-in validations. Guide conversations, build assumptions, compare methodologies, and select final commodity forecasts using QAT's built-in visualizations to
Host-country policy makers / country directors	Use QAT to visually compare available forecasts, as well as highlight any stock imbalances and the implications of different decisions, such as new program targets, budgetary constraints, and procurement policies.
Procurers and donors	QAT highlights the current supply status and future procurement requirements

E. **Important QAT Concepts and Terms**

E1. **Cross-cutting terms**

Terms	Definitions
Forecasting Unit	The base unit that will be used for a specified forecasting period (e.g. one tablet, one condom, one milliliter).
Master Data (Sync)	Master data is a cleaned/standardized set of data that is shared and used across a system. Many data points in QAT are standardized – for example, in the Global Health Realm, product lists, shipment statuses, data sources, etc are shared. Users can request updates and additions to this master data though a ticketing mechanism. QAT will sync master when a user logs in online or if the user chooses to manually sync. Note that for the full forecast or supply plan data, users must download the data to their local computer and upload it to the server when done. See Section 3 Managing Programs and Versions for more.
Planning Unit	The product to be planned for in QAT. It is a product with a full description up to the primary packaging (e.g. bottle of 30 tablets, 10x10 blister pack, etc.)
Programs	A program arises similar in structure to a PipeLine "supply plans database" in the supply planning module, or a Quantimed dataset in the forecasting module. Each program consists of only one country, one or more technical area(s), one region (national level, central level, etc.), and one organization (MOH, PEPFAR-only, PMI-only).
Realm	QAT is subdivided into realms, each one governed by their own master data (inclusive of product catalog, funder names, procurement agent names, etc.). QAT has started with the Global Health Realm, but future realms could be set up for other fields such as education supply chains, agriculture supply chains, etc.
Region	QAT users can capture data at sub-national levels by structuring their programs with regions. The regions are defined at the program level. If a program administrator does not have subnational-level data or prefers to enter aggregated values, the user may keep the region as "national" or "central." To define sub-national levels, both forecast/actual consumption and inventory/adjustments must be entered at each level, which the application would then aggregate to a national total.
Technical Area	In QAT, technical area is synonymous with commodity groups (i.e. ARV, Family Planning, Malaria, etc.) and are used to build a QAT program.
Tickets	When a program user notices an issue with QAT (i.e. bug, system error) or would like to update/add master data, user role/access, or a program, they may submit a ticket. This ticket will be resolved by a realm or application administrator and changes made accordingly.
User Roles	These are dedicated assignments to users that allow for different levels of access to data and functional areas within QAT.

E2. **Supply Planning Terms**

Terms	Definitions
Alternate Reporting Unit (ARU)	The product and the unit that the country's data (consumption or stock) is reported in. This could be the same as the planning unit or may be different. QAT users can define an alternate reporting unit and a conversion factor (multiplier) to

	the planning unit. (E.g., The planning unit is one bottle of 30 tablets; inventory reported in a box of 20 bottles (alternate reporting unit) = 100; multiplier is 20. Therefore, inventory reported is converted to planning units = 20 x 100 = 2,000 bottles of 30 tablets.) See Section 4.A3 Alternate Reporting Unit for more.
Average Monthly Consumption (AMC)	A dynamic value (could be different month to month) that determines the average quantity a product is used over a selected period of time. For QAT, the default AMC will be an average of the past three (3) months of consumption, the current month, and two (2) months into the future. If there is missing monthly consumption data within the calculated time period, it will be treated as "null," not as zero. QAT program administrators have the ability to change the AMC time period to a maximum of 12 months into the past and 12 months into the future. $$Average\ Monthly\ Consumption\ (AMC) = \left(\frac{Consumption\ in\ No.\ of\ MONTHS\ IN\ PAST\ +\ Consumption\ in\ No.\ of\ MONTHS\ IN\ FUTURE}{Number\ of\ Months} \right)$$
Data Source	A data source is the location where data that is being entered into QAT originates from. Data sources should be applied for transactional records (Consumption, Inventory, Adjustments and Shipments) by QAT users. The selection of data sources for each transactional record will depend on which Data Source Type that record is for.
Enterprise resource planning (ERP)	The software is designed to interface with different procurement management (ie Enterprise Resource Planning) systems from the various procurement agents. Initially, QAT will have an interface with ARTMIS that will enable import of USAID product information along with shipment data directly into QAT, reducing workload on planners to update shipment delivery dates, quantities, and statuses. In the future, PSM will work to engage other procurement agents to interface with their systems, thus enabling importation of shipment data from them.
Funding Source	Funding Source is any financial institution or other entity providing funding or facilities for the program. Every shipment should be assigned a funding source.
Lead Times	Lead times for QAT shipments have been mapped to the supply planning statuses and are inputted per product by the QAT program administrator. There are six different lead time calculations: - Planned to Submitted: time from when a shipment is planned (need identified) until it is entered into the procurement agent's system. - Submitted to Approved: time from when the shipment is entered into the procurement agent's system until it is approved for procurement. - Approved to Shipped: time from when the shipment is officially approved for procurement until it is shipped by the supplier. - Shipped to Arrived (sea) and Shipped to Arrived (air): time from when the shipment has left the supplier's location until it arrives at the port of entry. - Arrived to Received: time from when the shipment arrives at port of entry and is in the customs clearance process until it arrives at the final destination and is ready to distribute.
Minimum & Maximum Stock Levels	The minimum stock level (in months) is determined per planning unit and is set at the program level. QAT program administrators can adjust as desired. $$Min\ MoS = AMC \times Max\ of\ (\ Min\ Months\ of\ Stock\ ,\ Min\ MoS\ Guardrail\ )$$ The maximum stock levels (in months) are dynamically calculated based on the minimum stock level plus the reorder interval.

	$Max\,MoS\,=\,Min\,Of\,\{\,[\,Max\,(\,MIN\,Months\,of\,Stock\,,\,Min\,MoS\,Guardrail\,)\,+\,REORDER\,FREQUENCY\,]\,,\,Max\,MoS\,Guardrail$
Minimum Order Quantity (MOQ)	Minimum number of units a product must be ordered in.
Months of Stock	This measure is conceptually the same as in PipeLine. However, due to the new AMC calculation methodology, results may vary from those seen in PipeLine. $Months\,Of\,Stock = \left(\dfrac{Ending\,Balance}{AMC} \right)$
Plan by MOS	For products that are consumed in high quantities, planning by Months of Stock (MOS) is more appropriate. For these products, we expect: • Minimal expiries • Shipments mostly replacing consumption rather than expired product • Minimum and maximum months of Stock (MOS) rather than a minimum or maximum quantity to be the appropriate method to plan for the product. Therefore, QAT offers the option to "Plan by MOS" See Section 4.A2 Planning Units for how to update this parameter and Section 5.A Supply Planning: An Overview for more information on the supply planning implications.
Plan by Quantity	Some products are consumed in low quantities, for emergency purposes with high expiries, such as calcium gluconate for pre-eclampsia, severe malaria treatment in the malaria elimination context, anti-venom treatment for rare bites or fire extinguishers. For these high expiry, low consumption products, we expect: • high inventory compared to consumption • high amount of expiries • shipments replacing both consumption (small percentage) and expired product (large percentage) • A minimum quantity of stock (e.g. e.g. 2 units per facility * 2,000 facilities = 4,000 min) rather than a minimum months of stock Therefore, QAT offers the option to "Plan by Quantity" See Section 4.A2 Planning Units for how to update this parameter and Section 5.A Supply Planning: An Overview for more information on the supply planning implications.
Reorder Interval	A user-input number of months between shipments. QAT program administrators can adjust (default = 1 month) as desired. The reorder interval is used to calculate the maximum stock parameter. • For Plan by MOS, Min MOS + Reorder Interval = Max MOS. • For Plan by Quantity, Min Quantity + Reorder Interval * AMC = Max Quantity. See Section 4.A2 Planning Units for how to update this parameter.
Shipment Statuses	Within QAT, there are a total of nine supply planning statuses that have been identified through the shipment's lifecycle. These nine statuses are: Suggested: shipments "suggested" by QAT as an early warning to avoid going below minimum stock levels. These are not actual shipments and as such, do not affect stock projections. Only when a suggested shipment is accepted and the status change to planned, will it be counted towards your stock projections. • **Planned**: could be manually entered or suggested shipments accepted by the QAT user and are included in stock projections. Must have an assigned procurement agent and funding source (which could be TBD).

	• **Submitted**: shipments that have been placed in a procurement management system (i.e. ARTMIS, WAMBO) and have a designated order number (i.e. RO number). This was previously known as 'ordered' in PipeLine • **Approved**: shipments that have been approved by the procurement agent/funder. • **Shipped**: orders that have been shipped by the supplier. • **Arrived**: shipments that have arrived at the port of entry and are in the customs clearance process. • **Received**: shipments that have been received at destination and ready to distribute. • **Cancelled**: shipment was placed in a procurement management system, but later cancelled due to various reasons. These do not count towards projected inventory balances. • **On-hold**: shipment in QAT that has been placed in the procurement management system but is waiting for decision-maker action. These do count towards projected inventory balances.
Unmet Demand	QAT avoids negative stock balance and will only allow a program's stock on hand (SOH) to be equal to or greater than zero. However, in order to capture the difference between the forecast and what was projected to be consumed up to the stock out, QAT will place that quantity in a separate row as unmet demand. This will be useful to inform what the theoretical real consumption would have been, had there not been a stock out (while avoiding negative SOH and the need for manual positive adjustments).
Volumetrics	In QAT, programs users will be able to define volumes, and thus be able to estimate the volumetrics of orders.

E3. **Forecasting Terms**

Terms	Definitions
Consumption-based forecast	A prediction of future demand based on historical actual consumption data, using linear and non-linear extrapolation methodologies. (Section 8.A Consumption Forecasts for more)
Tree Forecast	Flexible forecasting structures used to convert different types of data (demographics, morbidity, services) into commodities for the purpose of extrapolating or interpolating into the future in the forecasting module. (Section 8.B Tree Forecasts for more)
Tree Template	Pre-defined forecasting trees that can be downloaded and customized to each user's context in the forecasting module. (Section 8.B4.a Tree Templates for more)
Usage Template	Pre-defined rates of use of specific products that can be applied across trees and programs in the forecasting module. (Section 8.B4.c Usage Templates for more)
Continuous and Discrete usage	When defining a product's usage rate on a forecasting tree, the user can choose whether it is continuous use (i.e., unending) or discrete use. If discrete, the user must specify the period of time the product is used for, or can also specify if the product is for single use, thus no period is required.

Getting Started

F. System Requirements

The QAT is primarily expected to be accessed via laptops and desktops with standard operating systems such as MS Windows, Linux/Ubuntu, and iOS. The recommended web browser is Google Chrome, but Chromium, Edge, Mozilla Firefox or Safari may be utilized.

It is also suggested that each user of QAT have enough space on their C:drive to allow for storing browser cache data successfully. The amount of space needed depends on the size of the QAT program that is being downloaded and how many apps are currently running and utilizing browser data. Temporary storage is shared among all web apps running in the browser. This shared pool can be up to 1/3 of the of available disk space. Each app can then have up to 20% of the shared pool. For example, if the total available C:drive space is 60 GB, the shared pool is 20 GB; thus, QAT can potentially utilize up to 4 GB. This is calculated from 20% (up to 4 GB) of 1/3 (up to 20 GB) of the available C:drive space (60 GB).

G. Levels of Hierarchy in QAT

The QAT system has **three levels of hierarchy** for conducting operations. The hierarchy levels are as follows:

Application Masters → Realm-level Masters → Program-level Masters

- **Application** Masters is the top-most data hierarchy level in QAT. Application master data applies to all the Realms and Programs within QAT. Most of it is only accessible to Application Admins, though a few of the Application functions are available to Realm Admins such as adding and updating users and assigning roles to users. Application Admins can select the specific application-wide master data they want to add or update.
- **Realm** Level Masters covers all the master data for that Realm which apply to its forecasting and supply planning programs. The Realm Admin will be able to view, create and edit this master data. Programs, Technical Areas, Planning Units, Procurement Agents, and Tree Templates are a few examples of realm master data that the Realm Admin can add and maintain. A lot of the realm level masters are accessible for viewing to Program Admins; however, they do not have the ability to add/update this data.
- **Program** Level Masters is the third level of hierarchy in QAT. While program admins cannot add programs, they can update the program information (e.g., lead times, freight costs, etc.) within their assigned program(s). Program Admin and Program Users can also add and update the program's data, such as consumption adjustments, extrapolation, and managing trees (in forecasting); and consumption, inventory, shipments (in supply planning).

For more on functionality for Application- and Realm-level administrators, please see Annex 1: Application & Realm Administrator Manual.

Programs are a combination of Country, Technical Area (1 or more), Organization and Region. For example, **FASPonia**–ARV-MOH-National, is a supply planning program under the Global Health Realm for the management and planning of **antiretrovirals** for the ministry of health of the fictional country FASPonia, and the consumption and inventory data is captured at a national level (region).

H. **User Roles and Permissions**

Users can be assigned one of many roles available in QAT that define what level of data users have access to and how they interact with that data, according to the following hierarchy:

Application-level data → Realm-level data → Program-level data

Users will have access to one or more levels of data as per the roles and permissions assigned to them. Roles are defined centrally at the Application or Realm Level. A role can have multiple permissions assigned to it. These permissions define what actions a user is entitled to. (NOTE: Roles can be assigned to only those users that are registered in QAT).

The vast majority of QAT users – in-country health program managers and officers - will interact with the application at the **program level**; thus, this manual will focus mainly on tasks and functions that apply to this group. The Program Admin and Program User roles are usually configured to have access to one or multiple program(s) within a geographic jurisdiction i.e., a Program Admin can only manage assigned program(s) in their country, but not a realm.

A **Realm** Admin manages master data and can have access to all programs within that realm.
At the **Application** level, there is an Application Administrator role. This role has exclusive access to create application-wide data structures, including adding languages, roles, creating realms, updating static and dynamic labels, among other business functions.

Please refer to Annex 4: Business Functions for a table with the full list of QAT business functions available per user role.

I. **How to Log into QAT and Install the Progressive Web Application (PWA)**

How to log in to QAT for the first time (**online**)

1. If you do not have a user profile, please contact the realm administrator to create a new user account and corresponding role on your behalf.
2. Once the account is created, the new user receives an email to "Reset Password".
3. The "Reset Password" link will redirect the user to the QAT website to create the new password. Once complete, click "Submit".
    a. **Note**: the "Reset Password" link will be valid for 24 hours and can be used only once. If needed, the user can generate the link again to reset the password by clicking "Forgot Password" on the login screen.
4. Afterwards, the user will be redirected to the sign in screen. Using the User ID email and the created password, log in to QAT.

Note: The password must: be at least six characters long, start with a letter, not be the same as your username or your last password, and must include at least one special character, one number, and one uppercase letter.

Installing the QAT Progressive Web Application

Progressive web applications (PWA) are standalone browsers that bring an app-like look and feel and are installed on the Desktop. Users can only install the QAT PWA through Google Chrome and Edge. The PWA can be used in online or offline mode.

1. Go to https://www.quantificationanalytics.org/
2. Click on the add button in the address bar.
3. Click "install" when the small pop-up appears.
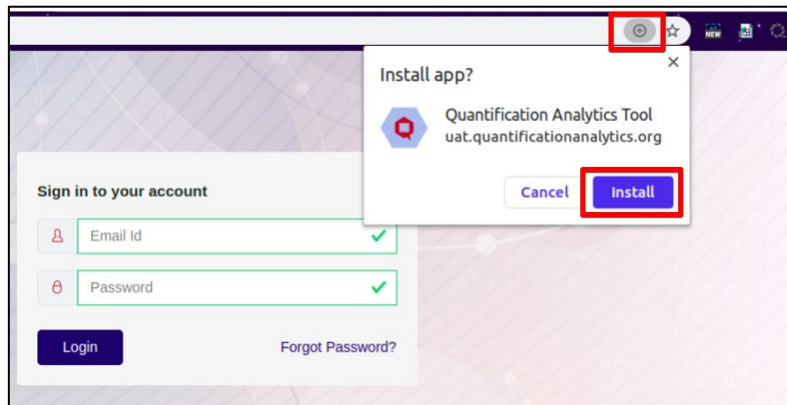
Figure 1: Installing QAT PWA

4. An icon will appear on your Desktop as a standalone application. Users can directly open from the desktop or type **chrome://apps/** in the browser.

Figure 2: QAT PWA Icons

Note: Users can utilize the PWA and browser versions concurrently; however, when making changes in one, a refresh is needed in the other so changes are made effective (see When and How to Conduct an Application Refresh).

Steps to Install PWA When the Install Button is Not Available
1. In your Chrome browser, navigate to https://www.quantificationanalytics.org/
2. Click on the three vertical dots on the top righthand corner of the browser
3. Select "More Tools".
4. Click on "Create Shortcut"
5. A QAT icon will be displayed on your desktop.
6. Click on the "QAT" icon to open PWA of QAT application.

Figure 3: Install PWA alternate method
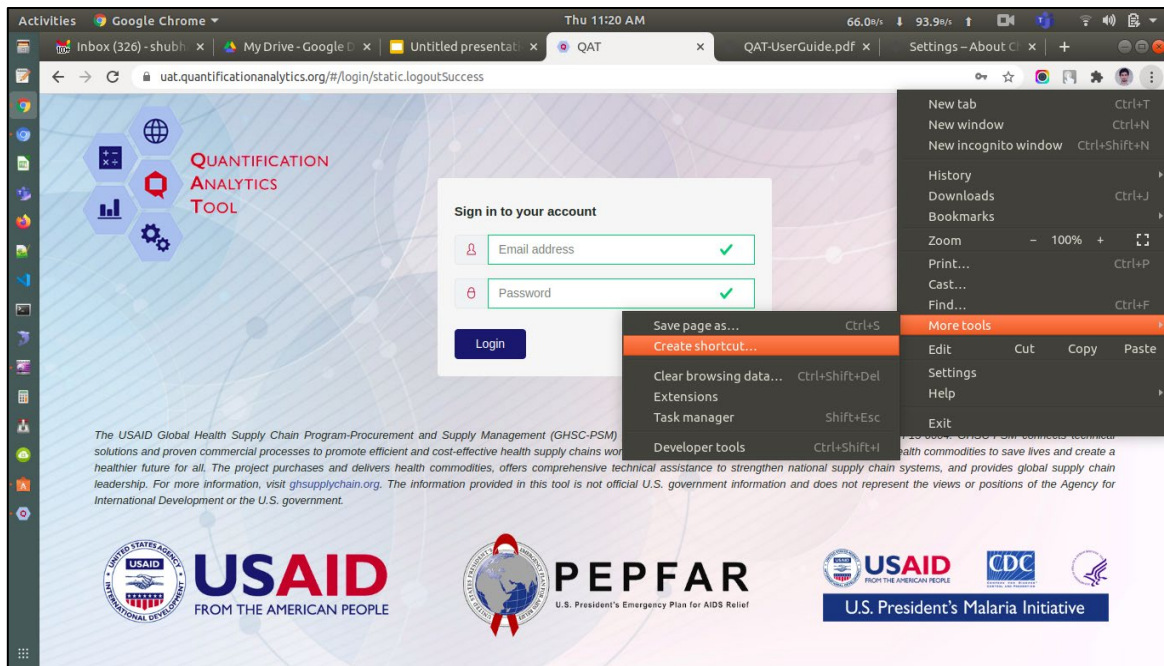
J. **How to Log into QAT for Existing Users**

Login

1. To log in, type the URL https://www.quantificationanalytics.org/ in the browser bar and press enter, or open the PWA from your desktop.
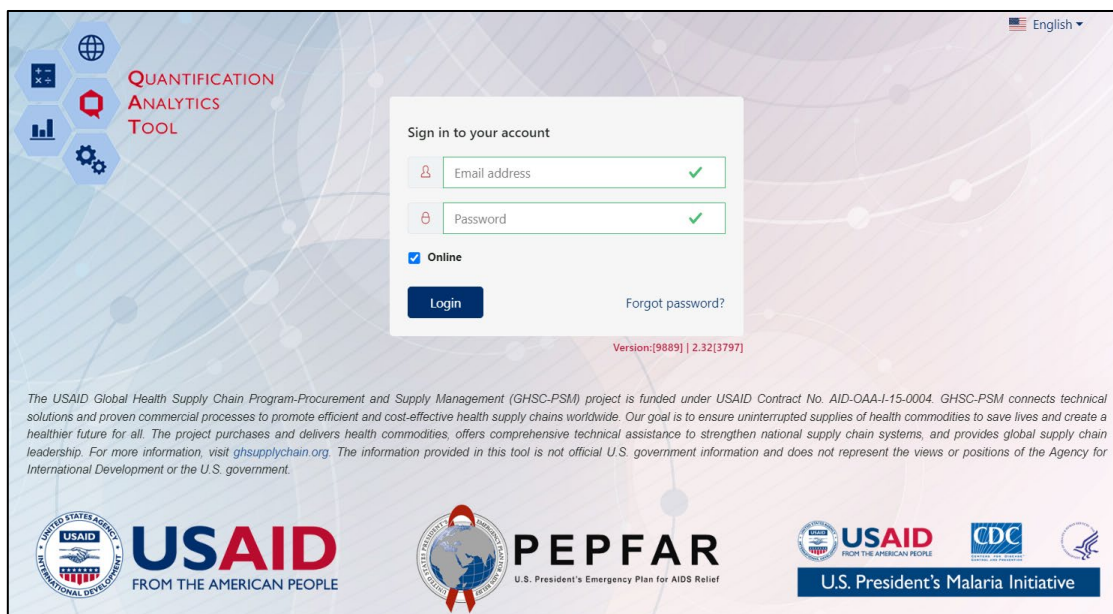2. A login screen will be displayed.

Figure 4: Log-in Screen

   a. Type the username and password in the required fields.
   b. Click on the "Login" button.

1. Note: A user can choose to login "online" or "offline" using the checkbox above the "Login" button. For more information on working in QAT offline, see Section F. Working Offline.
2. When logging in using "online" mode – QAT will undergo master data sync. If you see a message about a "more recent server version" – see Figure 36 in Section 3.B for more information..

Logging out
1. Go to the top right corner of the screen.
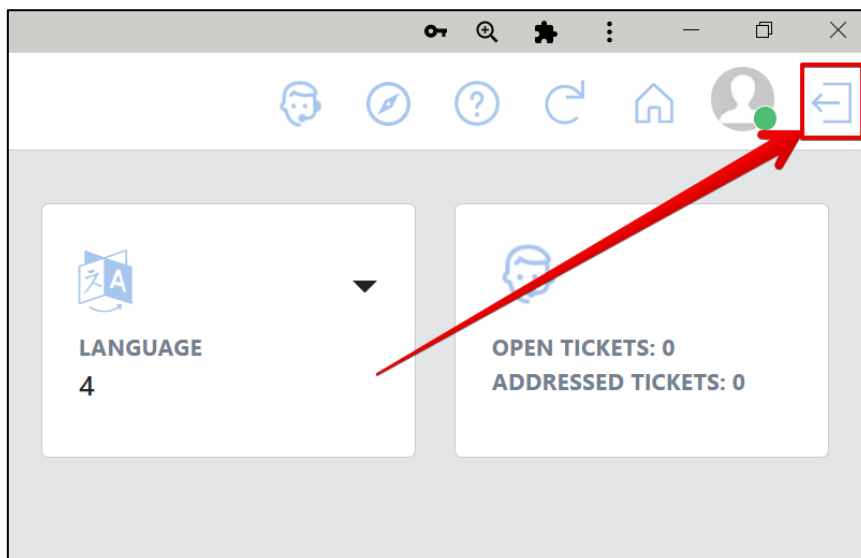2. Click on the logout button icon to the right of the profile icon.

Figure 5: Logout Icon

3. A pop up will appear asking "Are you sure you want to log out?" – click "yes" to log out

Change Password
1. Within QAT, click the Profile icon on the top right corner of the screen.
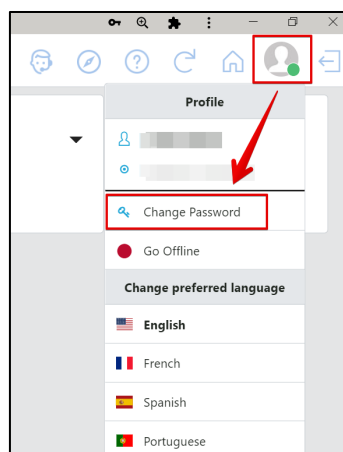2. Click "Change Password".

Figure 6: Profile Icon

3. Once on the 'Change Password' screen, enter your old password followed by the desired new password.
4. The new password must meet the following criteria:
   - Password must be at least 6 characters
   - Password should not contain the word 'password'
   - Password must contain at least 1 special character
   - Password must contain at least 1 number
   - Password must contain at least 1 uppercase letter
   - Password must start with a letter
   - New Password should not be the same as your username
   - New password should not be the same as your last password
5. Confirm the new password by typing it again.
6. Click "Submit".

If user forgets their password
1. A user that has forgotten their password, can click on the "Forgot Password?" link to reset it.
2. Type the email address the user is registered in QAT with and click "Submit".

Figure 7: Forgot Password Screen

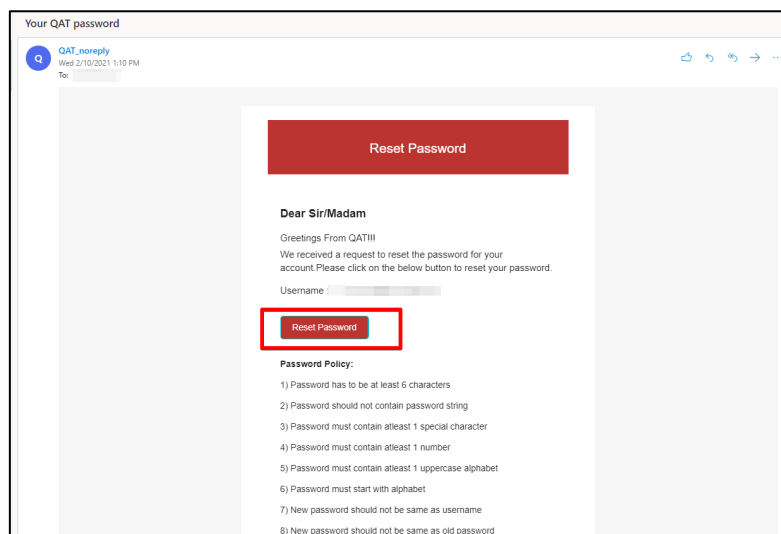3. The user will get a link via email to reset their password.

Figure 8: Reset Password Email

4. The "Reset Password" link will redirect you to QAT, where you will input your new password. Once complete, click "Submit".
5. After clicking "Submit" the user will be redirected to the login screen. Using the User ID email and the newly created password, log in to QAT.

Note: A QAT user password will be valid for up to one year from the date it is created/updated.

K. **Working Offline**

QAT is a hybrid tool and can be operated in both the online and offline mode. There are two ways to force the offline mode of QAT: on the login page before logging into QAT or under the profile settings after logging into QAT. It may be useful to switch to the offline mode of QAT when internet bandwidth is low.
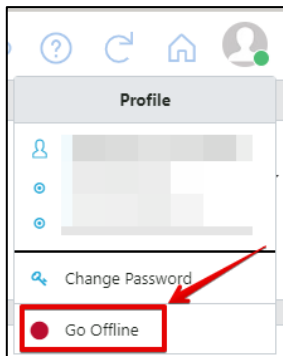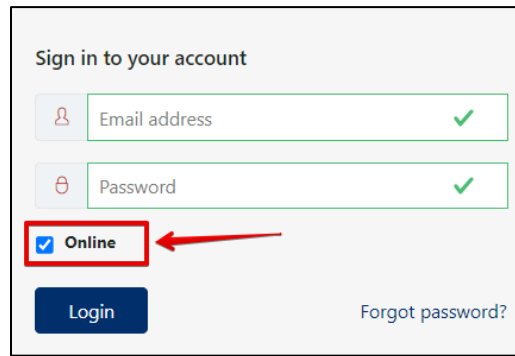

Figure 9: Offline Button on Profile Page

Figure 10: Offline Button on Login Page

The Profile icon on the top right corner shows a green-colored circle when working in online mode. When the user switches to offline mode the color changes to red, as shown on the screenshot below.
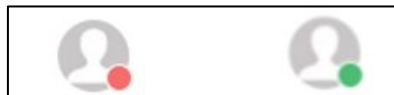

Figure 11: Offline vs. Online Icons

The below table details *some* of the key functionalities that can be done in QAT offline as well as *some* of the functionalities that must be done online:

What can a user do Offline?*	What must a user do Online?
Import/Export supply plans/forecasts	Reset password
View master data	Sync master data
Build Trees/Scenarios	Update program info, planning units, version settings, or budgets
Enter/update supply plan transactional data, and manually enter/adjust consumption data	Import forecast data to/from the Supply Planning Module to/from the Forecasting Module
Extrapolate using moving averages or semi-averages	Extrapolate using linear regression, triple-exponential smoothing (TES), or ARIMA methods
Supply/Scenario plan	Create tickets
View QAT Problem List	Download/Upload supply plans/forecasts
View <u>program</u> reports & forecast outputs	View <u>global</u> reports

*Note: Even when online, functions in the "offline" column require that that a program is downloaded- see Section 3 for more information
Table 2: Online vs. Offline Capabilities

L. **QAT Version Updates**

The QAT phase 1 (supply planning module) was deployed in Production/LIVE on 02-Dec-2020 as V1.0. After go-live, there will be incremental maintenance releases that will have incremental decimal numbers (e.g. release 1.1, release 1.2 and so on).

There will also be whole number release updates that will happen when one or more of the following occur:
1. Deployment of future QAT phases such as the forecasting module.
2. One or more large change requests that drastically alters the way QAT works.

M. **Troubleshooting**

When a user comes across a potential system issue with QAT, they should attempt to troubleshoot the issue by trying the solutions outlined in this section, in the order they are described (ie try H1 first, and if that does not work, then attempt H2, and then H3). If none of these steps resolve the issue, the user should submit a helpdesk ticket to report the bug (see section on 'Reporting a Bug').

M1. **When and How to Conduct an Application Refresh**

The QAT development team deploys incremental software releases to address the bugs and changes needed for the application. QAT prompt users to do so on the log-in screen after each release (see Figure 12). To conduct an application refresh, users should press "Ctrl" + "Shift" + "R" at the same time on their keyboard.
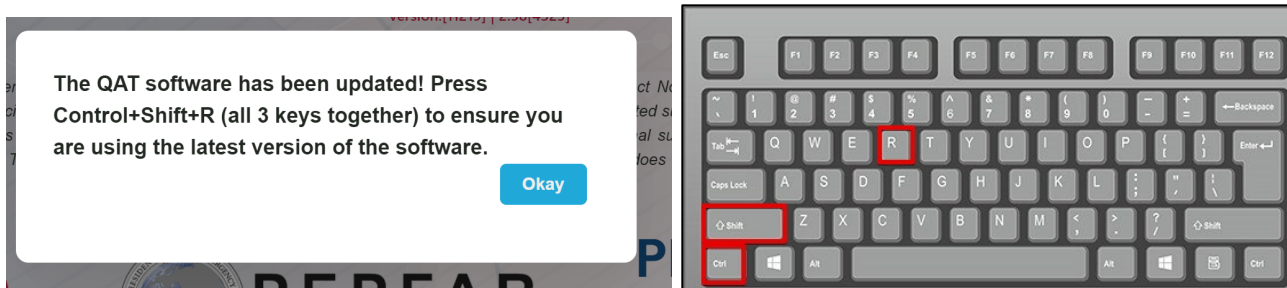

Figure 12: Hold Ctrl + Shift + R (all 3 keys) to conduct an Application Refresh

The application refresh can also be used to help troubleshoot any issues experienced while using QAT. After holding all 3 keys, the software should reload automatically. Note that the application refresh is different than simply refreshing the browser ("Ctrl" + "R").

M2. **When and How to Conduct a Full Master Data Sync (MDS)**

If an application refresh ("Ctrl" + "Shift" + "R") does not solve your software issue, you can try conducting a "Full Master Data Sync." To do so, please ensure you have a stable internet connection, and then click on the "Full Master Data Sync" link at the bottom of the application (see Figure 13). This solution is likely to work if you are experiencing master data issues that may be the result of unstable internet that disturbed the regular Master Data Sync (MDS) described in Section 2.J Navigation and Menu Bar.

- In a **regular MDS,** only incremental changes are synced between the server and your local computer based on the last time a MDS was completed.
- In a **full MDS**, the entire master data is loaded irrespective of the last time QAT was synced, as if this is the first time you are loading master data. Therefore, this will take longer than a normal MDS.
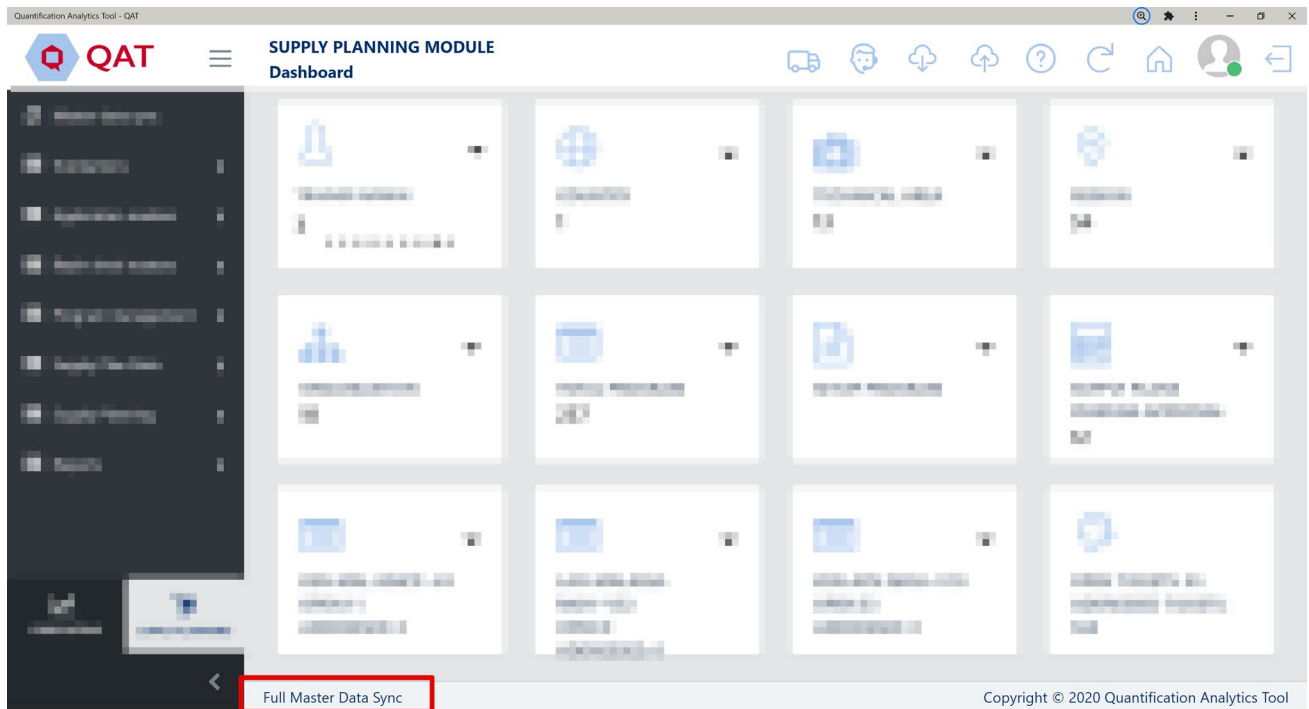
Figure 13: Click "Full Master Data Sync"

M3. **When and How to Clear Site Data**

If refreshing QAT (Ctrl + Shift + R) and a Full Master Data Sync do not resolve the issue, the user should attempt to clear site data in order to troubleshoot the issue. Follow the below steps in order to clear site data on your QAT:

Warning: Clearing site data on QAT clears all local data on the PWA and Web Browser, including any changes that you have made since you last uploaded. Ensure you have uploaded any unsaved programs before clearing site data.

1.   Click on "Ctrl"+"Shift"+"I" keys at the same time on your keyboard.
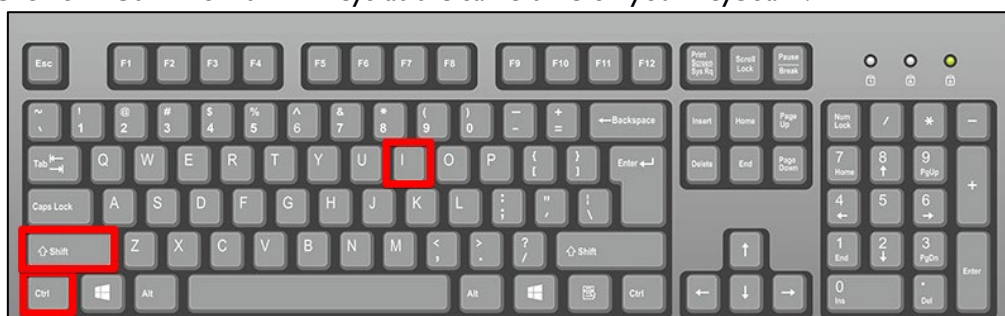

Figure 14: Ctrl + Shift + I

2.   Go to "Application".
3.   On the left-hand side of the screen, click where it says "Storage".
4.   Once on the "Storage" screen, select "Clear site data." This will clear any data that was not uploaded.
5.   Log in again to QAT and re-download any programs you need. (Clearing site data erases all programs from your local machine so you will need to re-download those programs.)
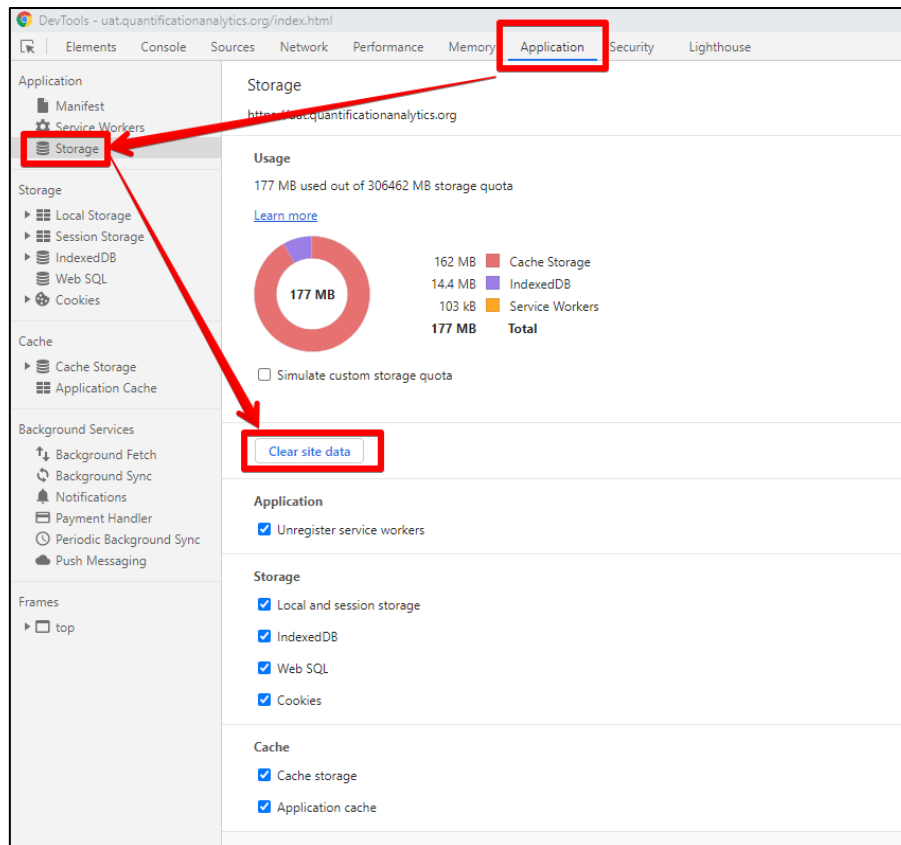
Figure 15: Clear Site Data

M4. **Troubleshooting Network Errors**

Users may see the following error message when logging in or while using QAT:

> "Network error. Please check your internet connection or contact your organizational IT department to ensure api.quantificationanalytics.org/# and www.quantificationanalytics.org/# are whitelisted for firewall access."

This message appears for two reasons: 1) Unstable internet, or 2) Restricted internet.

Unstable Internet: Use another internet with a stable or faster connection, or try again later.

Restricted Internet: QAT can be accessed by most private internet connections, but sometimes organizational IT systems have stricter security control, and thus they are flagging QAT as a potential threat. In this case, users have two options:

1. Use another internet connection without restrictions, or
2. Enable firewall access by whitelisting the below two site URLs. User may need to contact their organizational IT staff for assistance

- api.quantificationanalytics.org/#
- www.quantificationanalytics.org/#

N. **QAT Helpdesk and Tickets**

N1. **Tickets for Adding/Updating Users and Master Data**

When a user needs to either add or update a user or master data for any reason, they may do so by taking out a helpdesk ticket. Before requesting any additions or changes to the master data in QAT, the user should first check the realm-level master data (Realm Level Masters >> Product) and the Program Catalog Report to make sure the information does not already exist. For more information on how to access and use master data, please see Program Management and Realm Masters. For information on how to access the Program Catalog, please see Program Catalog. To access the QAT Helpdesk:

1. Click on the QAT Helpdesk icon in the top right screen of QAT
2. Four options will appear for taking out a ticket: Add/Update User, Add/Update Master Data, Change Request, and Report a Bug. See below sections on Change Requests and Report a Bug.
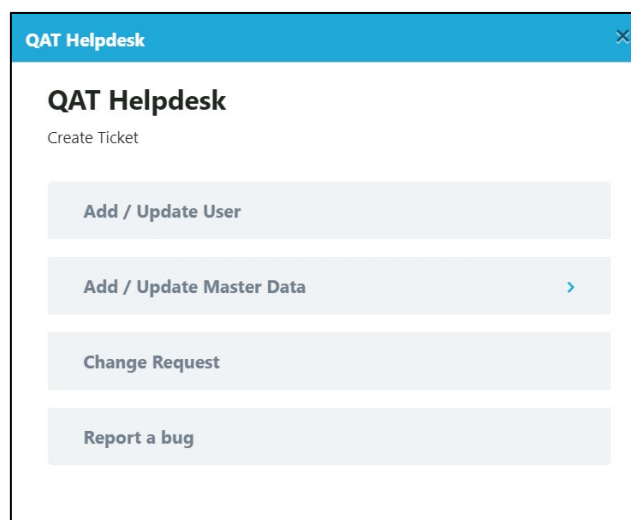

Figure 16: QAT Helpdesk Icon

Figure 17: QAT Helpdesk Menu

3. Choose to Add/Update User or Add/Update Master data. Either option will take you to different screens for more information.
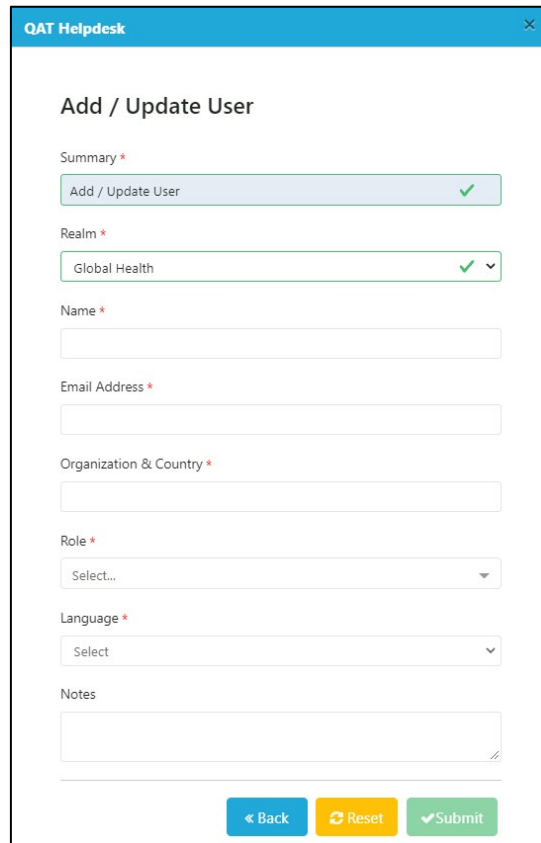4. Enter the information required in the form and click "Submit."
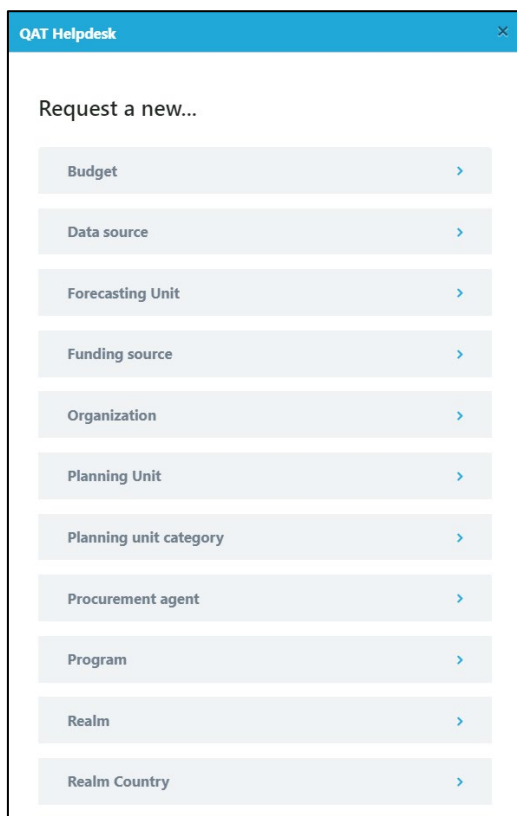
Figure 18: Add/Update User Screen
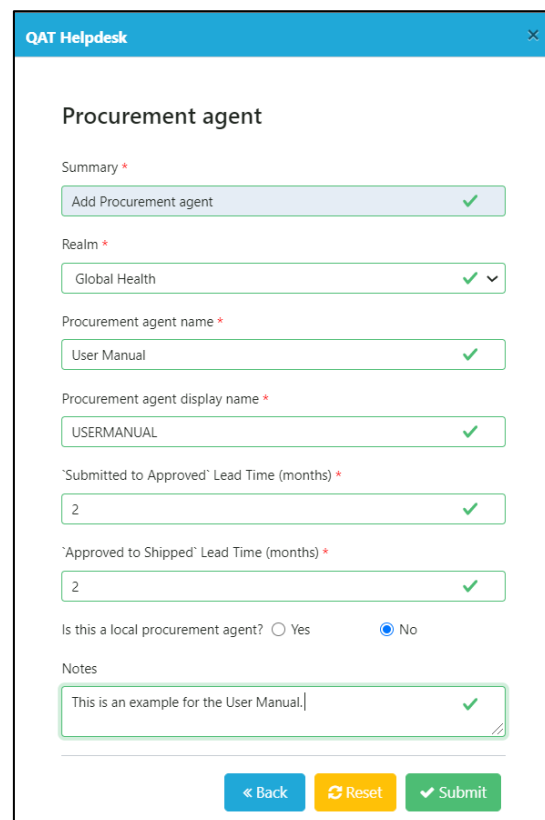

Figure 19: Add Master Data Screen

Figure 20: Add Procurement Agent Master Data Screen

After submitting a ticket, the user will be assigned a Ticket Code number (ex: QAT-570). The user will also receive an email notification and the number of "Open Tickets" on the user's home page dashboard will increase. This ticket number corresponds to the ticket number stored in the JIRA software management tool. For more information on managing tickets and the JIRA software management tool, please see Managing Tickets.

N2. **Requesting a Change**

When a user has an idea for a new feature, functionality, or design element that would make QAT a better application for all users, such as a new report, removing an unnecessary column, etc., they may request a change through the QAT Helpdesk. All change request tickets will require a detailed description and screenshots. Once the technical team receives a user's change request ticket, it will be reviewed for feasibility and usefulness to all QAT users. If the change request is accepted, it will not be made available in QAT immediately, but will placed in a queue based on realm business priority, criticality, and LOE requirements. To request a change in QAT:

1. Click on the QAT Helpdesk icon in the top right screen of QAT

Figure 21: QAT Helpdesk Icon

2. Click on "Request a Change" from the QAT Helpdesk menu options.
3. Complete the form by filling out the required information and click "Submit,"

Figure 22: Change Request Ticket

4. After submitting a ticket, the user will be assigned a Ticket Code number (ex: QAT-570). The user will also receive an email notification and the number of "Open Tickets" on the user's home page dashboard will increase. This ticket number corresponds to the ticket number stored in the JIRA software management tool. For more information on managing tickets and the JIRA software management tool, please see Managing Tickets.

N3. **Reporting a Bug**

When a user comes across a potential system issue with QAT, they should attempt to troubleshoot it through an application refresh and/or clearing site data. If neither of these steps resolve the issue, the user should submit a helpdesk ticket to report the bug.

The bug ticket will be addressed by the development team per the business priority, criticality and available 'capacity' via the incremental releases. The steps to raise a ticket in QAT is shown below:

1. Once logged into QAT, go to the top right corner of the screen, and click on the Helpdesk icon.
2. Once the QAT Helpdesk screen appears, click on "Report a bug".
3. Enter a summary of the bug as well as a description of the bug. Please be descriptive and provide as much detail as possible (*e.g., what program/version/functionality you were working on, steps you took to obtain the bug, etc*).
4. Upload a screenshot of the bug by clicking the "Browse" button and pulling a saved screenshot file from your computer.
   a. **Note**: *If you want to upload multiple files, place the multiple screenshots in a folder on your computer and zip it before browsing in QAT. Then, upload the zipped folder.*
5. Click on the "Submit" button to raise the ticket.

Figure 23: Report a Bug

N4. **Managing Tickets**

For enhanced visibility, QAT will give users the option to manage and check the status of their tickets, whether they are adding/editing a user or master data, requesting a change, or reporting a bug. When a user submits a ticket, they will be assigned a Ticket Code number (ex: QAT-570). The user will also receive an email notification and the number of "Open Tickets" on the user's home page dashboard will increase. This ticket number corresponds to the ticket number stored in the JIRA software management tool.
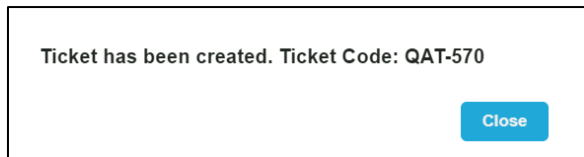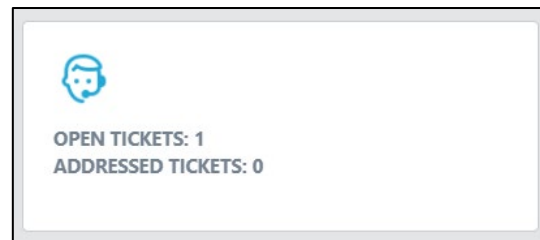
Figure 24: Helpdesk Ticket Code Number

Figure 25: Number of Tickets on User Dashboard

From the email notification, users may click on "View Requests" to see the status of their ticket. Users may also add additional comments and screenshots to their request, if desired. **Users will always receive an email notification once the ticket has been completed.**

Note: In order to fully access the ticket via the JIRA software management software, users must create an account with a username and password in JIRA. Creating an account in JIRA is **optional.** JIRA is an outside software management tool that can be accessed through the link provided in the email or directly through https://qathelpdesk.atlassian.net/servicedesk/customer/portals.
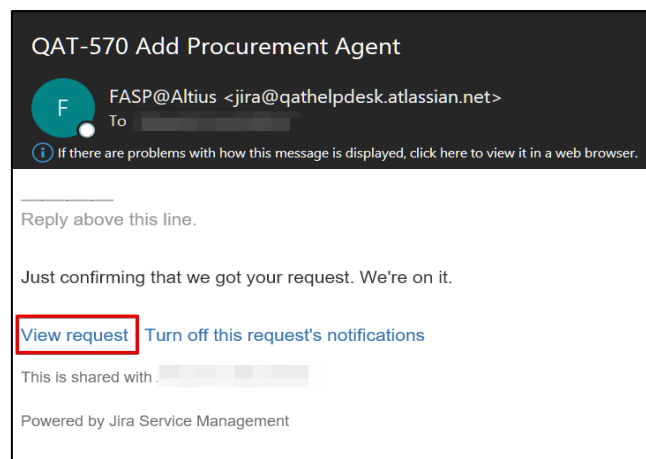

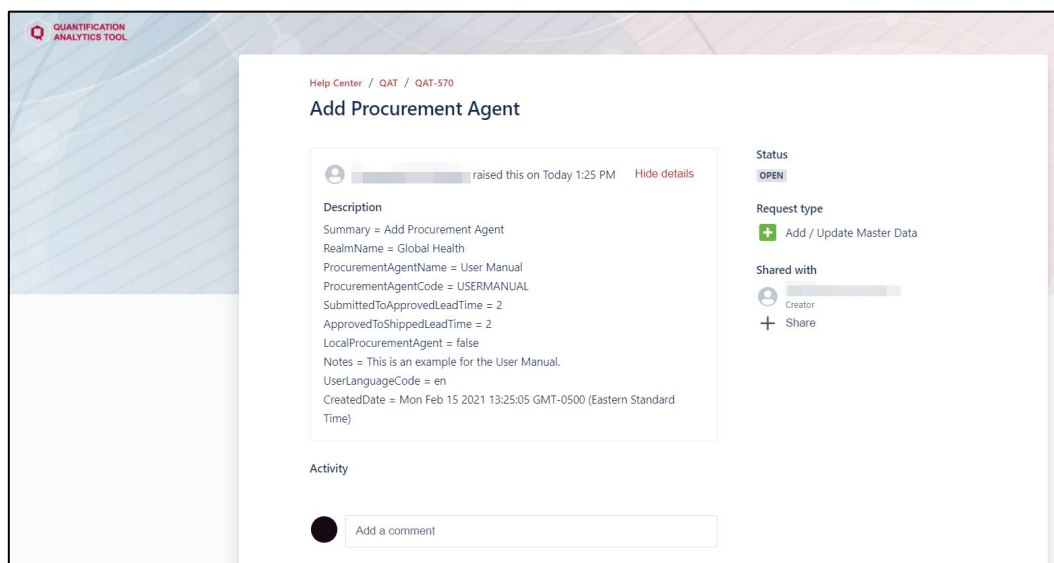*Figure 26: Email Notification for QAT Ticket*

Figure 27: JIRA Ticket Management

O. **Navigation and Menu Bar**

Basic Navigation

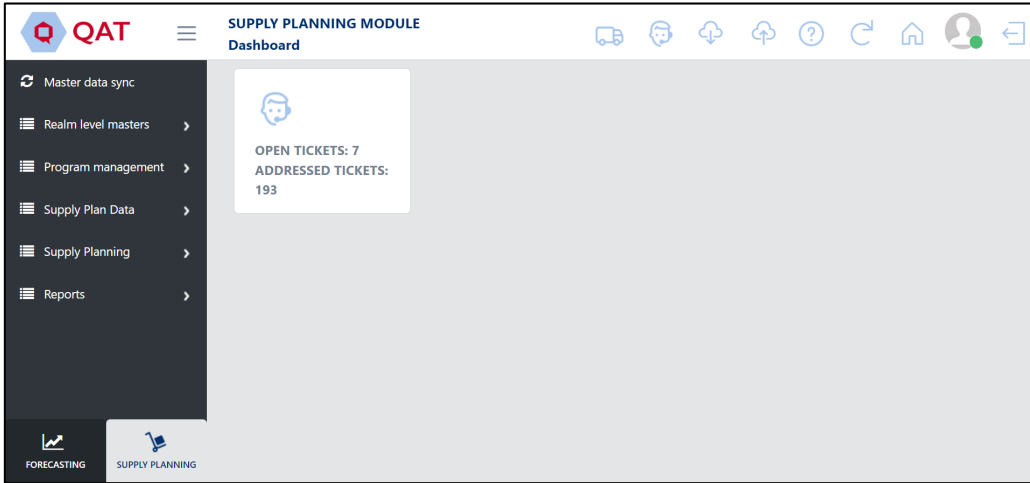Once logged into QAT, the below screen will appear:

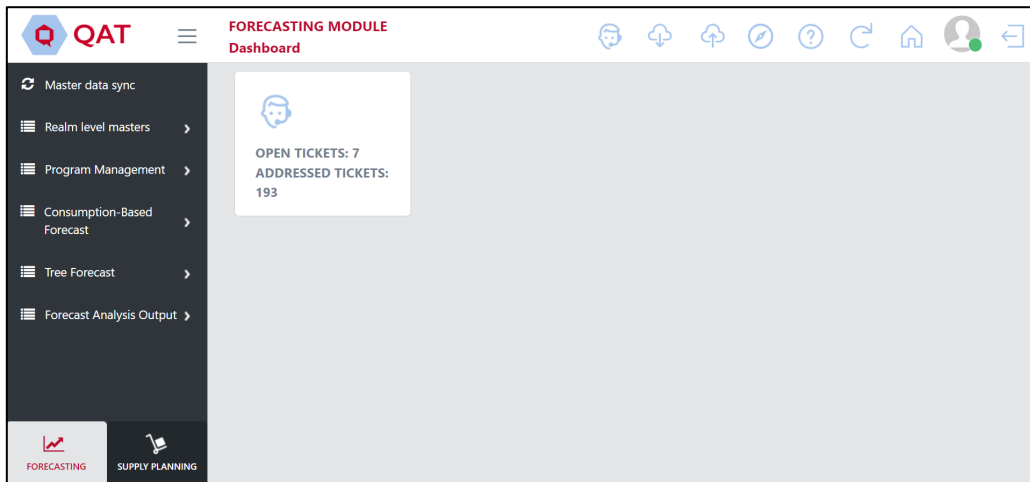*Figure 28: Supply Planning Module Home Screen*

Figure 29: Forecasting Module Home Screen

In the main area of the home page will be an application dashboard. Ability to see the Forecasting vs. Supply Planning Module, the number of tiles, and types of tiles will depend on the access according to the role assigned to the user. Users will see one tile for program they've downloaded (i.e. When in the forecasting module, users will see one tile for every forecasting program they've loaded. When in the supply planning module, users will see one tile for every supply planning program they've loaded.) For information on other tiles within the dashboard, refer to Application Dashboard.

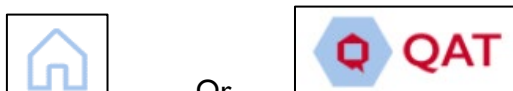| Screenshot	Explanation
Forecasting Tiles	This tile displays the program name and version, and the forecast period (in this example, Jul 2023 to Jun 2026). Clicking on the down arrow will allow you to 1) Delete the program, 2) Proceed to the Version Settings for the program, 3) Proceed to the list of Forecasting Trees, or

	4) Proceed to the Consumption Data Entry & Adjustment screen.
Supply Planning Tiles 	This tile displays the program name and version, and its **number of open** and **addressed problems** (those within the QAT Problem List. In this example, there are 9 open and 0 addressed problems). Clicking the on down arrow will allow you to 1) Delete the program, 2) Recalculate the number of problems, 3) Proceed to the QAT Problem List screen.
Helpdesk Tickets
OPEN TICKETS: 55 ADDRESSED TICKETS: 568	This tile displays the **number of helpdesk tickets** the user reported that are **open** and **addressed**. (in this example, the user has 55 open tickets and 568 addressed tickets).

In addition to the application dashboard, the screen consists of the top ribbon and a menu sidebar on the left-hand side. All the functions available in the ribbon and sidebar will be accessible to the user throughout the tool no matter which screen they are viewing.

To return to the Dashboard screen, the user can either click the home icon in the top ribbon or the QAT logo in the top left corner of the screen.

          Or

Top Ribbon for Supply Planning Module

Top Ribbon for Forecasting Module

Screenshot	Function
	Logs user out of QAT.
	The profile icon is green when working online and red while working offline. When the user click on the icon, they are able to: • View the username and associated role(s) assigned to them • Change their preferred language • Change their password • Go offline/online
	Returns user to the dashboard/home screen.
	Downloads the QAT user manual to the user's computer. The file can be found in the **Downloads** folder on the user's computer.
	Refreshes the current page a user is working on.
	Informs the user when a program stored on the local server has non-uploaded changes and should upload that program to the server. If the icon is blue, there are no programs non-uploaded. If the icon is red, there is at least 1 program that should be uploaded to the server.
	Informs the user when there is a newer version on the server for of one of their locally downloaded programs. If the icon is blue, the user has the most up to date version of all downloaded programs. If the icon is red, there is at least 1 program that is outdated compared to the server.
	Opens up the QAT Helpdesk where users can create tickets to add/update master data, propose change requests and report a bug. For more information on the helpdesk, refer to QAT Helpdesk and Tickets.
	Directs the user to the ERP Shipment Notification page. This page will inform users if there are any important updates that need to be reviewed for a linked ERP shipment. For more information on these notifications and which will be flagged, refer to ERP Shipment Linking. *Note: this icon is only available in the QAT Supply Planning Module.*
	Opens a Show Guidance webpage on an Introduction to QAT Forecasting. This document provides a high-level overview on the QAT forecasting process flow. *Note: This icon is only available in the QAT Forecasting Module.*

Table 3: Top Ribbon Functions

Sidebar Menu:

The sidebar menu is where the user can navigate to the different screens within QAT. The options available in the sidebar will vary based on the access according to the role assigned to the user. Within the sidebar there are menu items. Clicking into one of those items will expand to show a list of sub menu items. As the user selects different items from the menu, the respective data will be displayed in QAT.

Within the sidebar menu, you will find the following menu items:
• **Supply Planning Module**

- o **Master Data Sync** - Clicking on this button will sync the updated master data to your local version. This function is done automatically when logging into QAT, but this button provides the user to do so without logging out and logging back in.
- o **Application Masters** (only available to Application and Realm Admins) – view/add/edit application-level data.
- o **Realm Level Masters** – view/add/edit realm level data.
- o **Program Management** – view/add/edit program level data. Download/Upload/Delete/Import/Export programs. Conduct supply plan reviews.
- o **Supply Plan Data** – Add/Edit supply plan data.
- o **Supply Planning** – View/edit supply plan. Scenario Plan.
- o **Reports** – View Reports. Edit QAT Problem List.
- **Forecasting Module**
  - o **Master Data Sync** - Clicking on this button will sync the updated master data to your local version. This function is done automatically when logging into QAT, but this button provides the user to do so without logging out and logging back in.
  - o **Application Masters** (only available to Application and Realm Admins) – view/add/edit application-level data.
  - o **Realm Level Masters** – view/add/edit realm level data.
  - o **Program Management** – view/add/edit program level data. Download/Upload/Delete/Import/Export programs.
  - o **Consumption-Based Forecasts –** Import/add/adjust and extrapolate consumption data.
  - o **Tree Forecasts –** Build and manage forecast tree. View modeling and product validations.
  - o **Forecast Analysis Outputs –** Compare & select final forecasts. View other output reports.

Screenshot	Function
≡	Completely collapses the sidebar menu to create more space on the screen. Clicking the icon once will make the menu disappear. Clicking it again will make it re-appear.
<	Minimizes the sidebar menu while not making it completely disappear. Creates some more space on the screen.
>	Shown when sidebar menu is minimized. Click to expand and show the full sidebar menu. Also used to expand and show sub menu items under menu items.
∨	Shown when sub menu items are displayed. Click to collapse sub menu items.
FORECASTING SUPPLY PLANNING	Buttons that allow users to toggle between the Forecasting and Supply Planning Module in QAT, if their user access allows.

Table 4: Sidebar Menu Icons

Buttons Found Throughout QAT

The following buttons are frequently found on the different QAT screens:

Buttons	Action

✓ Submit	Submits and makes changes.
✗ Cancel	Cancels the unsubmitted changes.
↻ Reset	Reverts unsubmitted data back to previous format.
➕	Adds a new record to the database.
✓ Update	Updates records.
Search	Helps users to search the desired information. Searches all fields in the table displayed.
Clear	Allows a user to clear search fields.
*	Indicates mandatory data entry fields.
Show Formulae	Displays explanations/definitions and formulas on commonly used terms in the specified window/report.
Show Guidance	Provides high-level guidance on how to best use the current page.
📄 CSV 📄	Exports report PDF, CSV or Word (options depend on the screen).

P. **Changing Language**

Table 5: Commonly Used Buttons

To ensure that QAT is adaptable to users around the world, the application displays text in four different languages: English, French, Portuguese, and Spanish. Users are encouraged to submit tickets if they would like to see a particular label translation improved. [Note: Translations for application labels can be edited only by **application admins**. Instructions on how to do so can be found in the translation section.

There are two ways to change the language displayed for the user:
1. **Login Screen:**
On the top right corner of the login screen, there is a drop-down menu from which users can select their preferred language ahead of logging in. This will not only change the text once you are logged in to QAT but it will also change the text displayed on the login screen.
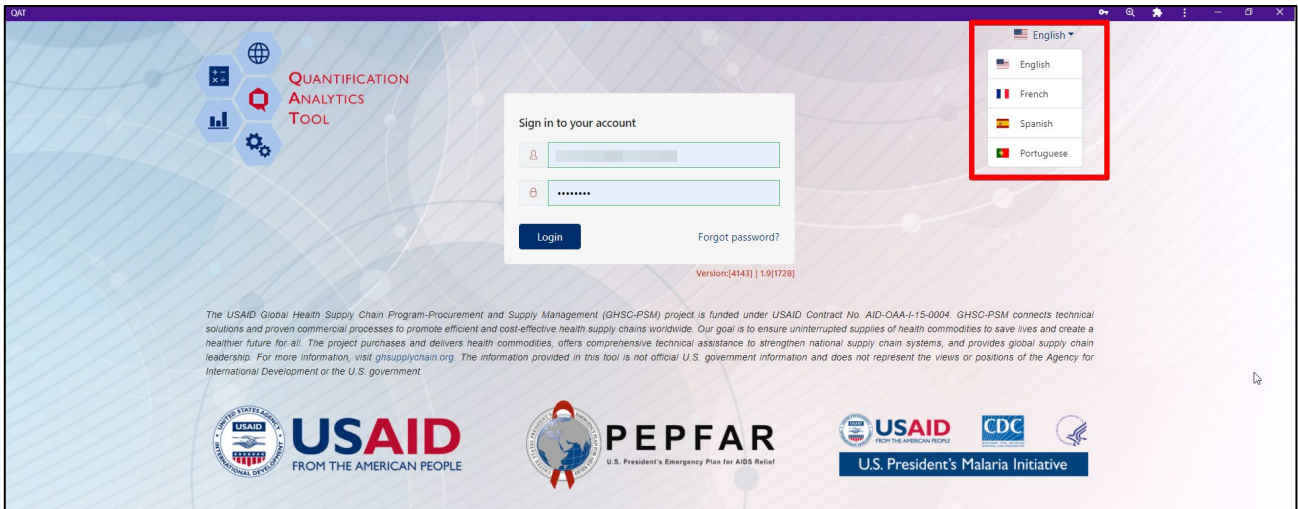
Figure 30: Login Screen Language Change

2. Within QAT:

Once logged into QAT, the user may change the display language by clicking on the user profile icon on the top right corner of the screen, selecting the preferred language and then the tool will automatically update it's text/labels.
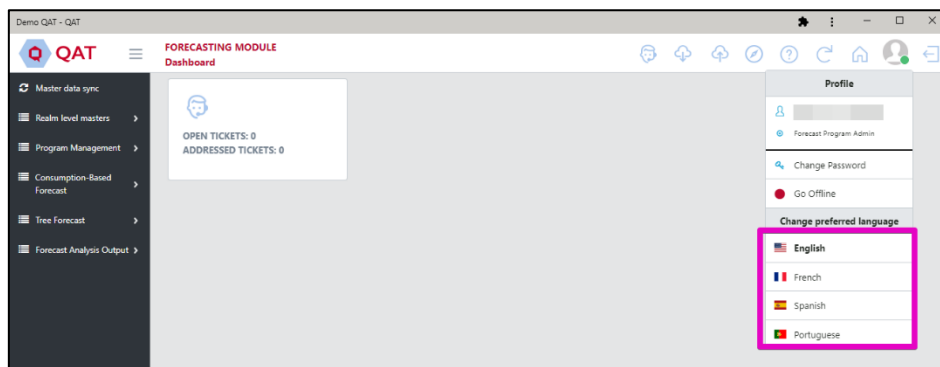

Figure 31: In Tool Language Change

Managing Programs and Versions

Q. Working with Program Data

	Online	Offline
Data from others	Download	Import
Data from users	Upload	Export

Table 6 - Working with Program Data

Program data can be downloaded, uploaded, imported, and exported in QAT.

- Note that forecasting programs are entirely different from supply planning programs. Ensure you are in the correct module before downloading, uploading, importing or exporting.
- Users must **Download** program data to begin supply planning or forecasting and need to **Upload** their data back to the server to share their work with others.
- Uploading can be as "draft" or as "final". Uploading a supply plan program as "final" initiates the supply plan review process. The status of supply plan versions can be viewed in the **Supply Plan Version & Review** screen – this is the only function described in this section that is available to report viewers. Uploading a forecast program as "final" allows users to import that forecast directly into the supply plan module. See QAT Forecast Import for further instructions on how to import a forecast into a supply plan.
- When no internet is available, the **Export** feature allows users to share their data with other users via external devices such as a pen drive/flash drive, who can then use the **Import** data function to open that file on their computer.
- These functions can be accessed from the left menu bar under **Program Management.**
- Additionally, Download & Upload can be accessed from the top menu bar (see Figure 32)
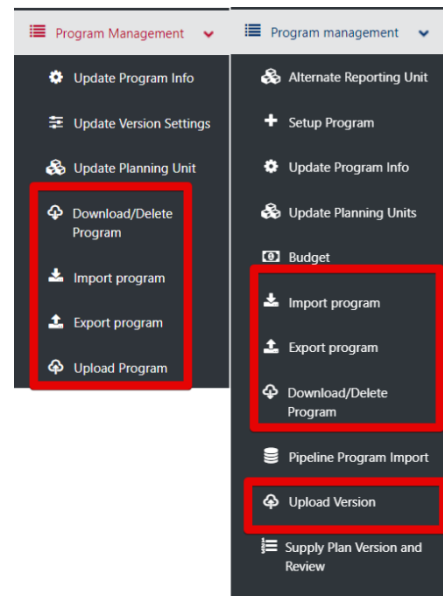

Figure 32 Menu Bar

R. Download/Delete

- Who? This function is available for **Application/Realm/Program Admins, Program Users and Supply Plan Reviewers.** Not available or needed for **Report Viewers**

- When? The user must be online to download a program.

- Why? Users should download a program if they want to enter or update data, or actively forecast or supply plan (instead of just viewing reports). Users may download a program when they notice that their local version is not the latest (i.e. when download icon is red ⟳ instead of the usual blue ⟳). Downloading programs enable the user to work offline. However, note that programs must be downloaded to complete the following functions, even if the user is online:
    - Supply Planning:

- Enter/update data (consumption, inventory/adjustments, shipments). For example, if the user is working on "Consumption Details", he/she must select a program from the given list. The list will show data only for those "Programs" which have been downloaded in the local index database.
        - Supply/scenario plan
        - View QAT Problem List
        - In reports, viewing the data on the local computer (as opposed to on the server)
    o Forecasting:
        - Enter/update data (enter/import actual consumption, add/edit forecast trees, extrapolate, etc)
        - In validation or forecast analysis reports, viewing the data on the local computer (as opposed to on the server)

- What happens when a user downloads a program? When the user downloads a Program, it gets stored in his/her local index database in the JSON format.

- How to download a Program:

1. Determine whether you would like to export from the forecasting or the supply planning module, and navigate to the correct module (See Section 2.J Navigation and Menu Bar). If you only have access to one module, you can ignore this step.

2. Go to "Program Management" > "Download/Delete Program." (Alternatively, access this screen by clicking the ⬇ icon in the top right bar in QAT). The screen will display the Program Data as shown in the below figure.
    - Red text indicates that the program downloaded is not the latest version. Green text indicates that the program downloaded is the latest version. Black text indicates the program is not downloaded.
    - Click on the yellow dot to expand (+) or collapse (-) the tree view shown above.
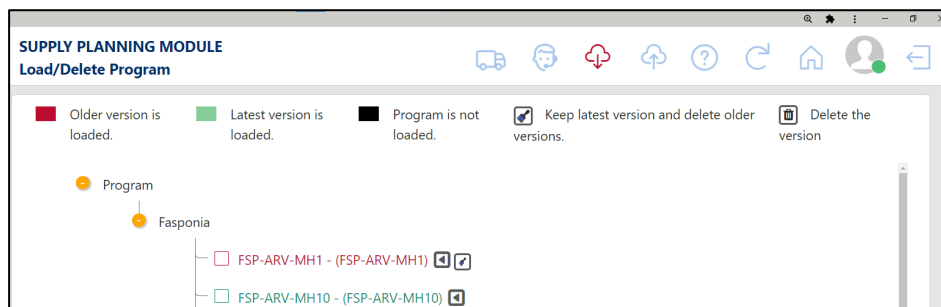

Figure 33 Load Program Screen

3. To Download
    a. Select the checkbox next to the program you want to download. By default, QAT will download the latest version of the selected program.
    b. *(optional)* Click on the triangle button next to the program to see all version of the program. The five latest versions will be displayed. Click "see more" to view older versions. Use the checkbox to select which specific version(s) you would like to download.
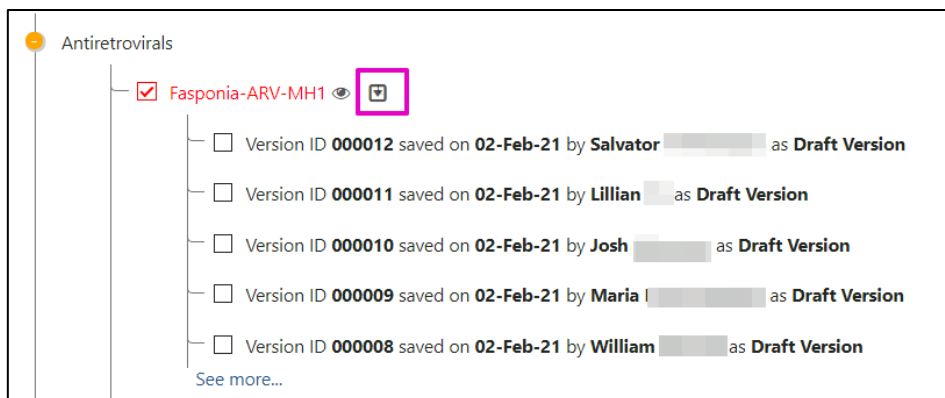
Figure 34: Version Tree – how to expand

    c.   Click on the "**Download**" button to download the program to your system.

  4. To Delete or Clean up:

    a.   Click on the triangle button next to the program to see all version of the program.

    b.   Select the trashcan icon 🗑 next to the version of the program you want to delete. If you have multiple versions, you also have the option of clicking the clean up icon ☑ to delete all versions except the latest local version.
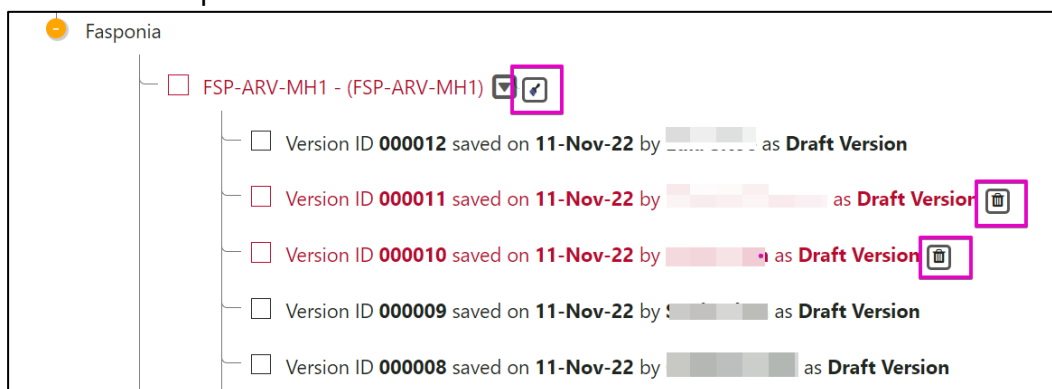

Figure 35: Download Screen Version Tree –clean up and delete icons

Note: If you download an older version, or if another user uploads a later version on the server after you download, you will see a message like the below in Figure 36 any time master data sync happens (upon logging in, upon downloading new program, or if manually requested by user).

- If you select "OK", the latest server version will be downloaded and your local version will be permanently deleted. Please only select "OK" if you are okay with discarding your changes or if you have not made any changes.
- If you select "cancel", no action will be taken and you will remain with your local version.
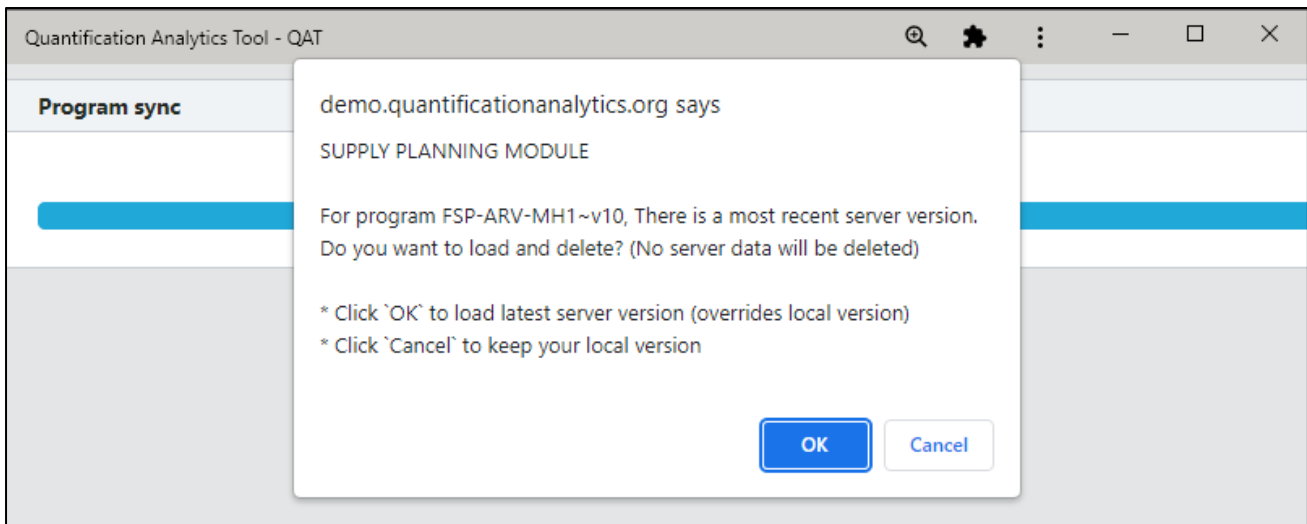
Figure 36: "More recent server" warning on user login

S. **Upload**

- Who?
    - **Supply Planning:** Application/Realm/Program Admins, and Program Users. Not available or needed for Report Viewers
    - **Forecasting:** Application/Realm/Program Admins and Program Users. Not available or needed for Forecast Viewers

- Why?
    - **Uploading as draft:**
        - **Supply Plans/Forecasts:** Share the local version of program data with the server and other users (uploading as draft)
    - **Uploading as final:**
        - **Supply Planning:** Indicate to all users that the supply plan has been fully updated, and also to initiate the supply plan review process
        - **Forecasting:** Allow final forecasts to be importable into the supply plan

- What happens when a user uploads a program? When the user uploads a Program, it becomes the latest version on the server and is available for all other users to download or view

- When? The user must be online to upload a program

Supply Plan Module - How to Upload a Program:

1. Ensure you are in the Supply Plan Module
    a. Go to "Program Management" > "Upload Version."
    b. Or, Click the ☁ icon in the top right bar in QAT

2. Use **Program** dropdown to select the appropriate program, if it is not already selected (only downloaded programs will be visible)

3. Select a **Version Type** using the dropdown:
   a. **Draft Version**: Indicates the supply plan is a work in progress. Use this to share a supply plan with others, but not ready to be submitted into the supply plan review process.
   b. **Final Version**: Indicates that the supply plan has reached a final status, and is being submitted to the supply plan review process. Note that QAT will not allow the user to upload as final with any "Open" issues in the QAT Problem List. Please use the QAT problem list (see Closing and Addressing Problems) to mark any open issue as "Addressed" with an explanatory note, or move issue to "in compliance" via data entry first.
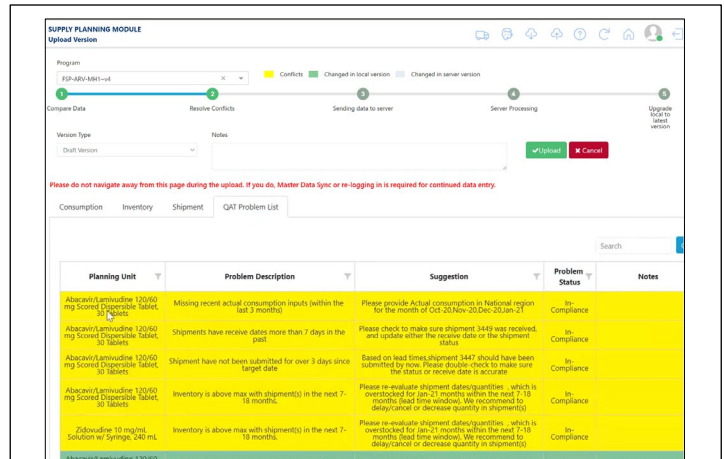

Figure 37 *Upload Version*

	DRAFT	FINAL
Must be online to upload local version to server	✓	✓
Data sent to linked ERP system(s)	✗	✓
'Open' issues allowed on QAT Problem List	✓	✗
Supply Plan Reviewer will be informed	✗	✓

Figure 38 Uploading Supply Plan as Draft vs Final

4. In **Notes**, type any overall notes about this version, such as summarizing the major changes made the supply plan and the reasoning behind those changes.

5. In the 4 tabs – Consumption, Inventory, Shipment, QAT Problem list – QAT will display a detailed comparison of supply plan details between the "Local version" and the "Server version." Review each tab for any highlighted records. Yellow records require your action before you can upload the supply plan

   Legend Explanation:
   - Green: represents changes that have been made in the local version; by uploading your program, these changes will save to the online server as a new version.
   - Light blue: represents changes made by another user that has already been uploaded to the live/online version – because this is a data point that you did not edit, the server version will persist for this/these records.
   - Yellow: represents a conflict in data between the local version and the server version for the same data cell. You must resolve all yellow conflicts before the Upload button appears. To resolve a conflict, right click on the relevant row, and select "Resolve Conflict." In the pop-up screen, choose whether to keep the local version of the data or the server version of the data. (see Figure 32)

Figure 39 Resolving Conflict while uploading supply plan

6. After reviewing all updates and resolving all conflicts, click the "Upload" button. QAT will provide a confirmation message.
7. **(For final)** Supply planners and supply plan reviewers will receive an email notification confirmation that their supply plan has been uploaded as final.
8. **(For final)** Supply planners, program admins and supply plan reviewers, realm admins, program users, data viewers and supply plan viewers will receive an email notification when their supply plan is rejected. They can also check the status of their supply plan review in the Supply Plan Version and Review Report.

Forecasting Module – How to Upload a Program:

1. Ensure you are in the Forecasting Module
    a. Go to "Program Management" > "Upload Version."

b. Or, Click the ☁ or ☁ icon in the top right bar in QAT

2. Use **Program** dropdown to select the appropriate program, if it is not already selected (only downloaded programs will be visible)

3. Select a **Version Type** using the dropdown:

    a. **Draft Version**: Indicates the forecast is a work in progress. Use this to share a forecast with others.

    b. **Final Version**: Indicates that the forecast has reached a final status and can be imported into the supply plan. Note that QAT will not allow the user to upload as final if no there are no changes between the latest server version and the version being uploaded.

4. In **Notes**, type any overall notes about this version, such as summarizing the major changes made in the forecast and the reasoning behind those changes.

9. In the 5 tabs – Version Settings, Planning Unit, Consumption, Tree, Selected Forecast – QAT will display a detailed comparison of details between the "Local version" and the "Server version." Review each tab for any highlighted records. Yellow records require your action before you can upload your version
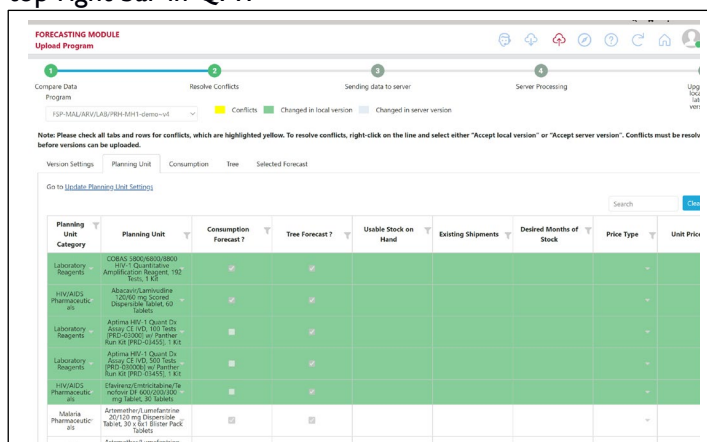

Figure 40 Upload Version

	DRAFT	FINAL
Must be online to upload local version to server	✓	✓
Forecasted consumption can be imported into the supply planning module	✗	✓

Figure 41 Uploading Forecast as Draft vs Final

Legend Explanation:

● Green: represents changes that have been made in the local version; by uploading your program, these changes will save to the online server as a new version.

● Light blue: represents changes made by another user that has already been uploaded to the live/online version – because this is a data point that you did not edit, the server version will persist for this/these records.

● Yellow: represents a conflict in data between the local version and the server version for the same data cell. You must resolve all yellow conflicts before the Upload button appears. To resolve a conflict, right click on the relevant row, and select "Resolve Conflict." In the pop-up screen, choose whether to keep the local version of the data or the server version of the data. (see Figure 42 Resolving Conflict while uploading forecast)

Figure 42 Resolving Conflict while uploading forecast

5. After reviewing the table and confirming the selected forecasts, click the 'Upload' button. This will open up a separate pop up window ("Forecast Validation"). The **Forecast Validation** screen provides users the ability to double check their work and anything they might have missed when creating and selecting the forecast(s). The user has the option to view the different validations for only the <u>selected</u> forecasts for each planning unit, or to view the validations for <u>all</u> forecasts in the program. To change this setting, check/uncheck the box in the top of the screen. For ease of access, the validations that are in blue font are linked to the page in QAT where the validation is being flagged. For example, if a forecast is not selected for one of the planning units, clicking on the planning unit in the validation page will direct you to the Compare and Select screen where you can select a forecast.

    a. **Section 1** flags any active planning units that do not have a selected forecast.
    b. **Section 2** looks at all active planning units that use consumption-based forecasting. 2a will flag if any of the consumption forecasts are missing actual consumption values (gap). 2b will flag any planning units that do not have at least 24 months of consumption data. If the checkbox at the top is selected, then only the planning units with a selected consumption forecast will be flagged. Planning units with a selected tree forecast will not be flagged in this section.
    c. **Section 3** looks at all active planning units that use tree forecasting. Planning units with a selected consumption forecast will not be flagged in this section. 3a flags any planning units that do not appear on any tree. 3b flags any tree branches that are missing a planning unit. 3c flags any tree nodes where the parent's child nodes don't add up to exactly 100%. In section 3c, clicking on the + icon will expand a table with details on which nodes and % are being flagged.
    d. **Section 4** compiles all of the notes across the different screens in the forecasting module. 4a will display notes from the Data Entry & Adjustment screen. 4b will display notes from the 'Manage Tree' screen. These notes include both tree specific notes and scenario specific notes. 4c will display notes from the 'Manage Tree' screen, specifically the notes in each node.

Forecast Validation

☑ **Include only Selected Forecasts**

FSP-ARV-MH1-MWI~v18 (local)
Forecast Period: Jun-2022 to May-2024

1. No Forecast Selected: (Compare & Select, Forecast Summary)
  • Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL - National

2. Consumption Forecast: (Data Entry & Adjustment, Extrapolation)
a. Months missing actual consumption values (gap):
        No months missing actual consumption values (gap)

b. Planning units that do not have at least 24 months of actual consumption values:
        No planning units have less than 24 months of consumption data

3. Tree Forecast(s): (Manage Tree)
a. Planning unit that does not appear on any tree:
  • Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL - National

b. Branches missing Planning Unit:
        No branches missing planning units

c. Nodes with children that don't add up to 100%:
Part 1. Simple ARV Forecast / Default ✚

Part 2 - Full Adult ARV Forecast / Default ✚

Part 3 - Full Adult ARV Forecast -MMD Transition / Default ✚

4. Notes:
a. Consumption:

        No Consumption notes found

b. Tree Scenarios:

Tree	Scenario	Tree Notes	Scenario Notes
Part 2 - Full Adult ARV Forecast	Static Scenario	Adult 1L only and 2L	
Part 2 - Full Adult ARV Forecast	Dynamic Scenario	Adult 1L only and 2L	
Part 3 - Full Adult ARV Forecast - MMD Transition	Dynamic Scenario	Adult 1L only and 2L	

Figure 43: Forecast Validation

6. After reviewing all validations and resolving ay issues, click the "Okay" button to upload. QAT will provide a confirmation message.

T. **Supply Plan Version and Review (Supply Plan Module Only)**

- <u>Who?</u> This function is available for **Application/Realm/Program Admins, Program Users, Supply Plan Reviewers, and Reports Viewers**

- <u>When?</u> The user must be online. Supply Plan Reviewers will receive an email from QAT whenever a supply plan is uploaded as final (i.e. ready for review).

- <u>Why?</u> This function allows users to **review the supply plan review status of supply plans.**
    o **Supply planners** (program admins & users) can check on the status of their review
    o **Supply plan reviewers** can view the review queue
    o **Report viewers** can check on the status of supply plan reviews

- <u>How?</u>

1. Go to "Program Management" > "Supply Plan Version and Review" and the below screen will be displayed. Select the Report Period, Country, Program, Version Type, and Status. In this table, users can see the status of all supply plans and any version comments. Users can also use the search, filter and sort options (see Navigation and Menu Bar) to find specific programs.

Program	Version	Version Type	Date Version Uploaded	Version Uploaded by User	Supply Plan Approved?	Reviewer	Date Approved/Rejected	Version Comments
Fasponia-ARV-MH10	2	Final Version	24-Nov-20	Alexandra Mccollister	Pending Approval			Nov 2020 Training Test

Figure 44: Supply Plan Versions and Review

2. Click any row in the table to open the details for that supply plan.
   ***For Supply Plan Reviewers* ONLY** –
   a. Use the first tab "Supply Planning" to review the stock status and data elements of any given planning unit
   b. Use the second tab "QAT Problem List" to review any issues within the supply plan.
      i. Use the "Reviewed" column and check the checkbox in each row as you review them. All issues other than "in compliance" or "resolved" must be checked as "reviewed" in order for you to approve or reject the plan.
      ii. Use the "Enter Reviewer Notes" column to note any feedback for the supply planner.
      iii. Update the "Problem Status" as needed – Leave issues as "Addressed" if you want the supply planner to review them again in the next review cycle (the issue will become "open" in the next version). Mark issues as "Resolved" if they don't need to be reviewed again even in future review cycles. Mark issues as "Open" if you want to communicate to the reviewer that they need to update their comments.
      iv. If there is a problem that should be addressed by the supply planner, but is not automatically flagged by the QAT Problem List, the reviewer can add a manual problem by clicking the "+" symbol in the top right of the screen.
         1. Manual problems must have an associated planning unit, criticality, description, and suggestion. These problems will be added as a separate row in the QAT Problem List for supply planners to address.
   c. After reviewing, change the status of the Supply Plan to Approved or Needs Revision, provide notes (mandatory), and click "Update"

Figure 45: Supply Plan Version and Review (second screen)

3. The user that submitted the supply plan for review will be notified by email when their submission is either Approved or Needs Revision. Rules for supply plan review email notifications are as follows:
    a. Notification of **uploaded** final supply plan
        i.   Sent to: All supply plan reviewers with access to that program.
        ii. Cc'd: User who uploaded the version
        iii. Bcc'd: All program admins with access to that program.
    b. Notification of **Needs Revision** supply plan:
        i.   Sent to: The user who uploaded the supply plan.
        ii. Cc'd: Reviewer who requested revisions to the version
        iii. Bcc'd: All reviewers with access to that program as well as admins with access to that program.
    c. Notification of **approved** supply plan:
        i.   Sent to: The user who uploaded the plan.
        ii. Cc'd: All users who have access to that program except for app admins and reports viewer.

U. **Export**

*   Who? This function is available for **Application/Realm/Program Admins, Program Users and Supply Plan Reviewers.** This function is not available or needed for **Report Viewers.**

*   Why? The "Export Program" function is used when the user wants to export the program to his/her local machine. By using the Export function, Program data can be shared with others offline. For example, user A can export a program and save that file on a USB drive to share with user B, who is offline.

*   What? The program data file will be exported in the zip format. The zip file contains all the data for that version of the program. Users can choose to export in encrypted or unencrypted format. This file can subsequently be shared with others to import into QAT, or, if unencrypted, analyzed outside of QAT.

Program

Select...

☑ Do you want to encrypt
data?

✔Submit ↻ Reset ✖ Cancel

Figure 46: Export Program Screen

- How to export a program:
  1. Determine whether you would like to export from the forecasting or the supply planning module, and navigate to the correct module (See Section 2.J Navigation and Menu Bar). If you only have access to one module, you can ignore this step.
  2. Go to "Program Management" > "Export Program"
  3. Select the program to be exported using the dropdown. Programs must be first downloaded before exporting is available. (See Section 3.B Download/Delete Program).
  4. Determine whether or not you need an unencrypted version.
     o For importing back into QAT, leave the "Do you want to encrypt" checkbox checked
     o For analyzing data outside of QAT, uncheck the "Do you want to encrypt" checkbox
  5. Click on the "Submit" button to save the changes.
  6. A browse window will pop up. Select the folder you want to save the exported file in. Then click "Save."
  7. The .zip file will now be saved in the selected folder.
  8. Share the .zip file with others as needed.

V. **Import**

- Who? This function is available for **Application/Realm/Program Admins, Program Users and Supply Plan Reviewers.** Not available or needed for **Report Viewers**

- Why? The "Import Program" function is used when the user is working on the program in offline mode and wants to open a program that has been exported into a .zip file
  o **Note**: The program data file must be saved in the zip format). For example, user B can (while offline) import a program that user A exported and saved to an external device

- When? This function can be used when offline or online.

File Input (must be .zip format)

Choose File   Browse

✔Submit ↻ Reset ✖ Cancel

Figure 47: Import Program Screen

- How to import a program:
  1. Determine whether you would like to export from the forecasting or the supply planning module, and navigate to the correct module (See Section 2.J Navigation and Menu Bar). If you only have access to one module, you can ignore this step.

2. Go to "Program Management" > "Import Program"
3. Click "Browse". Choose the required file that needs to be imported. The selected file must be in the zip format. The zip file may have multiple programs.
4. Select the required program to import.
5. Click on the "Submit" button to import the program into the local machine.

W. **Version Comparison**

Purpose: Enable users to view and compare 2 different versions of the same forecast program. In this screen, users will select a forecast program to view and from there select 2 versions of that program to compare. The user can select both local and server versions as well as draft and final versions. If the version has a * next to it, this indicates that the version is final. Once the user has selected all of the dropdowns, a table will appear comparing the two forecast versions. For each planning unit and region combination, the table will display the selected forecast, forecast quantity, and notes for each of the 2 forecast versions. This screen is only for viewing purposes and no changes can be made to the selected forecasts in this screen.

Figure 48: Version Comparison

Using this screen:

1. First, select from the output filters from the dropdowns. This screen only compares 1 program at a time, but allows the user to compare multiple versions of that program. The user has the ability to compare any combination of final and draft versions as well as local and server versions. If the version has a * next to it, this indicates that the version is final. The version notes and forecast period will appear greyed out as these are non-editable fields. To update these fields, go to 'Update Version Settings'.

2. Once all dropdowns are selected, a table will appear with data across for both forecast versions that were selected. For each planning unit and region combination, the table will show the selected forecast, total forecast quantity for the forecast period, and any forecast notes for that selected forecast. Each side of the table represents 1 of the 2 forecast versions selected. The top row of the table shows which version the side is showing data for.

3. This screen can be exported in both PDF and CSV format by clicking the icons in the top right of the page.

Supply Planning Module: Program Data

As previously defined on [Important QAT Concepts and Terms](#), a program is similar in structure to a PipeLine supply plan database. Each program consists of only one country, one or more technical area(s), one region (national level, central level, etc.), and one organization (MOH, PEPFAR-only, PMI-only). Every program within a realm is governed by the same standardized master data, such as product catalog, procurement agents, funding sources, data sources, etc.

Program data management sits on the third tier of the QAT system hierarchy and is generally done by users with the roles **program admin and program user** (for more information on the user roles, please see [Annex 3: User Role Matrix](#)). Program-level master data managed by these users include budgets and alternate reporting units.

A user can "Download" or "Delete" programs from their local machine. Programs can also be "Imported" to the local machine or "Exported" from the local machine to share with other users if there are connectivity issues.
Program admins and users can manipulate two big categories of data within their programs: Program data and Transactional data (the "big 3" – consumption, inventory, shipments).

	Data Category	Details
Background Data	**Program Info**	Program Manager, Freight %, Lead Times
	Product Info	Planning units – min, reorder interval, alternate reporting units
	Budget	Funding source, amounts, beginning and ending dates, etc.
Transactional Data ("Big 3") for each product	**Consumption**	Forecasted consumption And actual consumption, as it becomes available
	Stock	Inventory counts & Adjustments
	Shipments	Quantities, receive date, status, procurement agent, funder & associated budget (if available) batch #s & expiry dates

Table 7: Program level data

X. Background Data

Note: All background data must be updated while a user is online. It is recommended that users click "master data sync" after making any background data updates so it is reflected throughout the tool.

XI. Program Information

Program managers in QAT can define their general program parameters, by selecting from a list of dropdowns that contain realm-level master data for each the fields. These general parameters for the supply planning module include program name, program manager, default freight percentages for air, sea, & road

freight, lead times by shipment status, and notes. General parameters for the forecasting module include program name, program manager, and notes. **Program users** will be able to list/view all the programs they have access to, while only **Program Admins** are able to update any of the program's general parameters.

Update program information:
1. Click on "Program Management" and then select "Update Program Info"
2. Click on the program that needs to be updated

Figure 49: Update Program Info – Supply Planning Module

Figure 50: Update Program Info – Forecasting Module

3. Update fields as desired, and click "Submit"

Note: QAT only allows Realm-level Admin or App-level Admins to update the fields which are in gray in the Update Program Info screen. If a user requires these fields to be updated, they can take out a ticket with the QAT HelpDesk system.
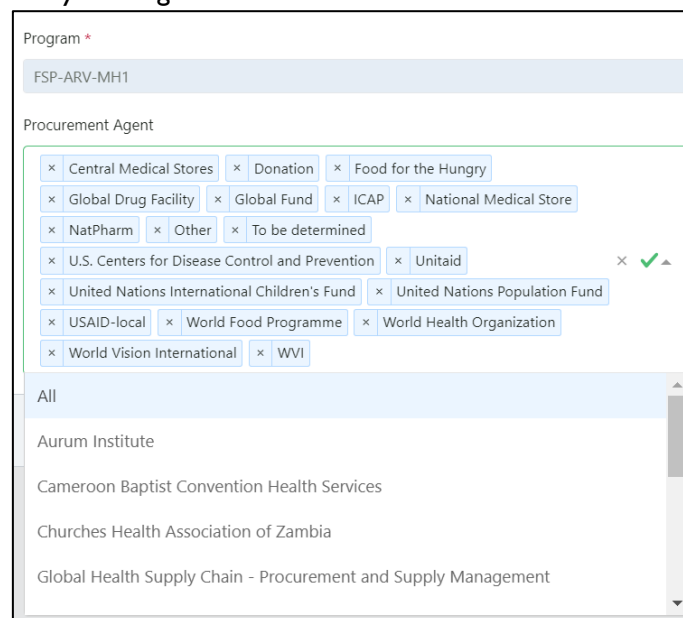
Mapping Procurement Agents to a Program

Program Admins can add/remove procurement agents that already exist in QAT to their program. This will in turn, add/remove the procurement agents to the dropdown fields in the Shipment Data entry screens. If a user would like to add a procurement agent to their program that does not exist in QAT, they can take out a ticket with the QAT HelpDesk system.

1. Click on "Program Management" and then select "Update Program Info"
2. Right click on the desired program and click "Map Procurement Agent"

Program Code	Country
FSP-ARV-MH1	Fasponia
	Map Procurement Agent
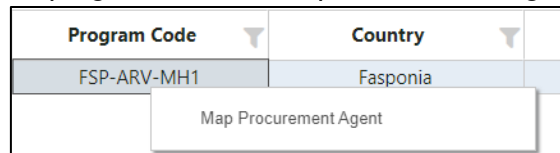
3. Choose which procurement agents to add by selecting one(s) available in the dropdown, or remove procurement agents by clicking on the "x" next to their name.

Program *

FSP-ARV-MH1

Procurement Agent

× Central Medical Stores   × Donation   × Food for the Hungry
× Global Drug Facility   × Global Fund   × ICAP   × National Medical Store
× NatPharm   × Other   × To be determined
× U.S. Centers for Disease Control and Prevention   × Unitaid   × ✓ ▲
× United Nations International Children's Fund   × United Nations Population Fund
× USAID-local   × World Food Programme   × World Health Organization
× World Vision International   × WVI

All

Aurum Institute

Cameroon Baptist Convention Health Services

Churches Health Association of Zambia

Global Health Supply Chain - Procurement and Supply Management

4. Click "Update" to save changes to the program.

X2. **Planning Units**

The planning unit is the product used in QAT as the basis for planning procurements, and displaying consumption, inventory, and adjustments. A planning unit name is usually inclusive of a full description up to the primary packaging; thus, its nomenclature closely follows the pack size in which dispensing happens, i.e., one bottle of 30 tablets, blister of 10x10 capsules, etc. Note: Consumption and inventory are entered into QAT using Alternate Reporting Units (see A3 Alternate Reporting Unit for more).

The QAT planning unit catalog is considered of realm-level master data, meaning any additions / edits / subtractions from that catalog are managed at the realm level and apply to all programs within that realm. Every program must have at least one planning unit that **Program Admins** can select from the realm-level catalog to add to their programs or deactivate from their programs. Program Admins can also update any parameter related to a particular planning unit, including the reorder frequency, minimum months of stock, average monthly consumption calculation, local procurement agent lead time, shelf life, and price (see Important QAT Concepts and Terms and Updating Program Lead Times for further information on these

cocncepts). Planning units can be deactivated from the program if no longer in use, allowing the program manager to keep all the legacy data.

Figure 51: Parameters to update per planning unit. See

Update planning units within a program:

1. Ensure that you are working in 'online' mode. Select "Program Management" and then "Update Planning Units".
2. Select the program to display the planning units currently managed.
3. Double-click on the cell (parameter) that needs updating.
4. Click "Submit" to save the changes.

Add planning units to a program:

1. Ensure that you are working in 'online' mode. Select "Program Management" and then "Update Planning Units".
2. Select the program to display the planning units currently managed.
3. Click on the blue "Add row" button on the bottom right of the screen and a new row will appear at the top of the table.
   a. Alternatively, right-click on any row in the table and select "Insert new row before" or "Insert new row after".
4. Double-click the planning unit cell to display the list of planning units that can be selected for the program.
5. Complete all the cells (parameters) in that row.
6. Click "Submit" to save the changes.

Note: A user must also add the associated Alternate Reporting Unit (ARU) for the new planning unit to appear in the transactional data entry screens and in the supply plan.

Figure 52: Adding planning units to the program

If a required planning unit is not available in the dropdown, and thus on the QAT catalog, please raise a ticket through the QAT Helpdesk so that it can be created for the entire realm. See more on ticketing in section QAT Helpdesk and Tickets.

Add/edit procurement agent-specific prices to planning units within a program:

QAT users can enter procurement agent-specific prices for each planning unit in their programs, in addition to the program's default (catalog) prices or realm-level procurement agent catalog prices – for example, a user may want to enter the UNDP price for malaria rapid diagnostic test (mRDT) in the program FASPonia-Malaria, if UNDP's catalog is not available at the realm level.

Rules:
- The program/procurement agent-specific price will take precedence over the default and realm-level catalog prices, when entering new shipments.
- If a new shipment is assigned a procurement agent for which a procurement agent price has not been defined in a program, QAT will use the default price for that program.
- Procurement agent prices that are set at the realm-catalog level don't need to be entered for a program.
- Program/Procurement-agent prices only affect new planned shipment created after defining those prices. Legacy shipment planning unit prices need to be edited manually.

To enter procurement agent-specific prices in a program:
1. Select "Program Management" and then "Update Planning Units".
2. Select the program to display the planning units currently managed.
3. Right-click on the row of the planning unit to add the procurement agent price for and click on "Add Program/Procurement Agent Prices" to show a new screen.

Figure 53. Accessing the Program/Procurement Agent Prices screen

4. Select the procurement agent from the dropdown list; enter the price per planning unit (ensure the price corresponds to the planning unit pack size).
5. To add prices for multiple procurement agents, click on "Add Row".

Figure 54. Adding Program/Procurement Agent Prices for a planning unit

6. Click "Submit" to save the changes.
7. Click on Master Data Sync after making changes (applies to any item under Program Management).

X3. **Alternate Reporting Units**

An alternate reporting unit (ARU) is the product and unit that the country's data (consumption, inventory & adjustments) is reported in and it could the same description as the planning unit, forecasting unit, procurement unit, or in an altogether different packaging description. The ARU is defined within a particular country and requires entering a conversion factor from the ARU to the planning unit it is associated with (could be 1). Of all the product masters, the ARU is the only one program admins manage, because they are country specific. **Application, Realm, and Program Admins** can add/edit ARU for a country and program. Alternate reporting units are useful when:

*   Data sources report data in different units (e.g. pieces vs packs)
*   There's another common name in country (e.g. brand name)

To see the list of all alternate reporting units in one country:
1. Select "Program Management" and then "Alternate Reporting Unit".
2. Select the program from the dropdown.

To add alternate reporting units to a country:
1. Select "Program Management" and then "Alternate Reporting Unit".
2. Select the program from the dropdown.
3. Click on the "Add Row" button at the bottom right corner of the screen, or right-click on any row to add another.
4. Enter the details in the newly created row and click on "Submit".

Planning Unit *	Alternate Reporting Unit *	SKU Code *	Unit *	Conversion Factor (Alterna... Reporting to Planning) *
Lamivudine/Tenofovir DF 300/300 mg Tablet, 30 Tablets	Lamivudine/Tenofovir DF 300/300 mg Tablet, 30 Tablets	FP-ARV-103442	Bottle	1
Lamivudine/Tenofovir DF 300/300 mg Tablet, 30 Tablets	Lamivudine/Tenofovir DF 300/300 mg Tablet, 30 Tablet Bottle - box of 25 bottles	FP-ARV-103442-2	Bottle	25

Figure 55: ARUs

*Note that for each planning unit added to a program, QAT will automatically create an Alternate Reporting Unit with a 1:1 conversion factor. QAT will use the Planning Unit description as the Alternate Reporting Unit description.

X4. **Default Lead Times**

QAT uses six shipment statuses to track the progression of a shipment from planning to product receipt. Each of those steps in the order lifecycle has an associated lead time that is used to estimate when the next action should happen at each step. Lead times are expressed in months and can be partial months or even zero. When defined at the program level, these lead times are the default for all shipments created by the program, except when they are defined at the procurement agent level (realm-specific).

Figure 56: QAT shipment statuses

There is a different lead time logic depending on whether the procurement is tagged as international or local.

- For international procurement: **Program Admins** manage lead times that are program/country-specific (e.g., planning time, shipment times, custom clearance times, quarantine periods, etc.), while **Realm Admins** manage lead times that are specific to each procurement agent (more on this in the table below).
- For local procurements: the entire lead time ('planned to received') is determined by what's entered at the program level, per planning unit. Ideally in local procurement, all steps would be much shorter than for international.

Lead time (from – to)	Definition	Configuration
Planned to submitted	Number of months from identifying procurement need to placing an order with a procurement agent	Always set at the program level by Program Admins
Submitted to approved	Number of months between order placement and approval of order. This lead time can be defined for each procurement agent.	Default set at the program level by Program Admins. However, overwritten by realm-level procurement agent setting, if procurement agent is assigned to a shipment.
Approved to shipped	Number of months between order approval and dispatch from the procurement agent/supplier. This lead time can be defined for each procurement agent.	Default set at the program level by Program Admins. However, overwritten by realm-level procurement agent setting, if procurement agent is assigned to a shipment.
Shipped to arrived by air	Transit time via air between order dispatch until arrival at port of entry -in number of months.	Always set at the program level by Program Admins
Shipped to arrived by sea	Transit time via ocean between order dispatch via air until arrival at port of entry -in number of months.	Always set at the program level by Program Admins
Shipped to arrived by road	Transit time via road between order dispatch via road until arrival at requested point of delivery –in number of months	Always set at the program level by Program Admins
Arrived to received	Number of months from arrival at port of entry until reception into the	Always set at the program level by Program Admins

	warehouse.	

Table 8: Lead times by shipment stage - definitions

Two steps – from 'submitted to approved' and from 'approved to shipped'- are initially defined at program level, but as soon as procurement agent is chosen, this changes to the procurement agent lead times if those are defined for that procurement agent at the realm level.

Enter/update the default lead times at the program level:

1. Go to "Program Management" and then click on "Update Program Info" (see Updating Program Information).
2. Scroll down to the second half of the page where all the lead time fields are.
3. Enter the default program lead times per step.
4. Click "Update" to save the changes.

Enter/update the default local procurement agent lead times:

1. Go to "Program Management" and then click on "Update Planning Units" (see Updating Planning Units)
2. Select the program from the dropdown on the top left.
3. Enter the default program lead time for local procurement.
4. Click "Submit" to save the changes.

Planning Unit Category*	Planning unit*	Plan By *ⓘ	Reorder Interval In Months *ⓘ	Min Month Of Stock ⓘ	Min Quantity ⓘ	Months in future for AMC (including current month) *ⓘ	Months in the past for AMC *ⓘ	Local Procurement Lead Time (months) *ⓘ	Distribution Lead Time (months) ⓘ	Shelf Life (months) *ⓘ
HIV/AIDS Pharmaceuticals	Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets | 1073	MOS	5	8		3	3	1.50		36
HIV/AIDS Pharmaceuticals	Dolutegravir 50 mg Tablet, 30 Tablets | 2724	MOS	5	8		3	3	1.50		36

Figure 57: Entering local procurement agent lead times

X5. **Budgets**

A budget represents an amount (estimated or actual) of capital for a set period that is to be spent on buying commodities for the program.

Go to "Program Management" and then "Budget" to view a list of all budgets for your program(s).

A budget can be tagged to one program or multiple programs. For example, if FSP-Lab-A has budget x, FSP-Lab-B can also link its program to budget x. If a program is delinked from a budget, the user will be forced to un-tag all shipments from that budget before uploading the version to the server. Any program admin that has access to a program can edit a budget that is associated with the program; however, he/she will only be able to add/remove programs that they have access to.

To add or remove programs from a budget, click into the budget and then select or de-select from the first dropdown.
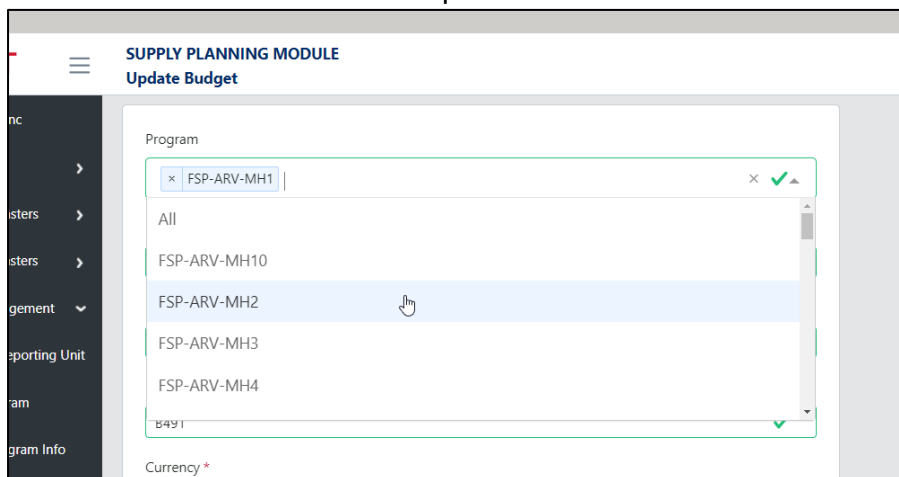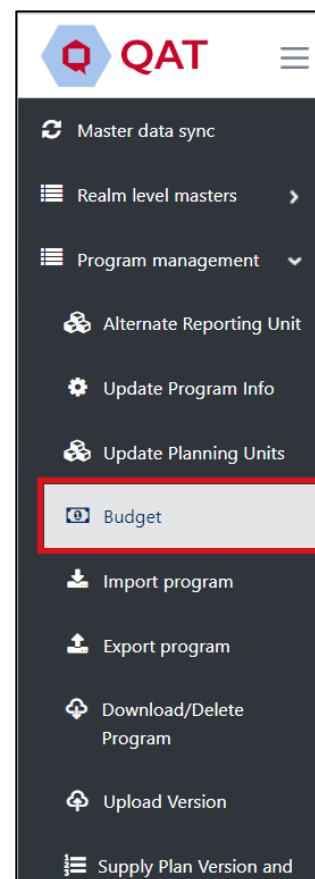
Figure 58: Multiple Program ®

If a budget is highlighted in red, it indicates that the budget has either passed the 'End Date' and/or the 'Used Amount' has exceeded the 'Budget Amount'.

Add a Budget

1. In the "Budget" screen, go to the top right corner and click on the blue "+" icon.
2. A new screen titled "Add Budget" will appear.
3. Enter the required details.
4. Click the "Submit" button.
   a. ***Note:*** *A Program cannot have multiple budgets with the same Funding Source and Budget Display Name. An error message will pop up if this is the case.*

Update a Budget

1. Go to the Budget screen.
2. Left click on the budget that you want to update.
3. A new screen will appear titled "Update Budget

4. Update the details of the selected budget as appropriate.
5. Click "Submit" to save the changes.

Figure 59: Budget Screen

Figure 60: Update Budget

Y. **Transactional Supply Plan Data**

There are 3 main data requirements when creating or updating a supply plan: consumption, inventory, and shipments. The section below will define each of the data elements and how to add/update those elements in QAT.

1. **Consumption**: Stock dispensed by the program to clients.
    a. **Actual Consumption**: The reported quantity of a product dispensed to clients in a given time period for a specific program at a specific supply chain level or combination of levels.
    b. **Forecasted Consumption**: The quantity predicted to be consumed by clients in a given time period which has been agreed upon by the program.
2. **Inventory**: The quantity on hand of usable product at a specific supply chain level or combination of levels, on a specific date, for a specific product.

a. **Stock count**: A check of how much stock a program has at a particular time in a specific supply chain level or combination of levels.

b. **Stock adjustments**: Positive or negative modifications to usable inventory quantities for a specific date, categorized by reason for the adjustment, if possible (e.g. damage, expiry, quarantine, transfer to another implementing partner, etc.). Rebalancing transfers between locations in the same supply chain are excluded.

3. **Shipments**: The quantity of funded or planned orders that will ship in current or future month or has shipped in a previous month or that has been received. Expressed in individual shipments, have a shipment number, and expected receipt date.

٢١. Consumption Data

Add Consumption Data:

1. From the menu sidebar, go to "Supply Plan Data" and click "Consumption Data".

2. Once the "Consumption Data" screen appears, select the desired filters using the drop-down menus at the top.

3. The screen will display all current data for the selected period, planning unit(s), and other filters selected in step 2.

4. To add a new consumption record, right click on any cell and select "Add new consumption" OR select the blue "+ Add row" at the bottom.

5. Enter the required information and click "Submit".
   a. Any cell that is greyed out (e.g. Quantity (PU) indicates that it is a QAT generated cell and cannot be manually entered/edited.
      i. Reminder that [Alternate Reporting Unit](#) (ARU) is the product and the unit that the country's data is reported in. This could be the same as the planning unit or may be different. QAT users can define an alternate reporting unit and a conversion factor (multiplier) to the planning unit.
   b. Any cell that is highlighted yellow indicates that it is a required field and has not yet been entered by the user.

> **Notes on Consumption Data:**
> - For each month and each region, user may enter <u>one</u> forecasted consumption record, and <u>one</u> actual consumption record.
> - Users may <u>not</u> enter actual consumption for months in the future
> - Users may <u>not</u> edit forecasted consumption more than nine (9) months in the past and may <u>not</u> edit actual consumption more than nine (9) months in the past.

QAT Planning Unit *	Consumption Month *	Region *	Consumption Type *	Data Source *	Alternate Reporting Unit (ARU) *	Quantity (ARU) *	Conversion Factor (Alternate Reporting to Planning)	Quantity (PU)	Number of Days Stocked Out
Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	May-2023	National	Forecast	Quantimed	Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	42,209	1.0000	42,209.00	0
F-100 Therapeutic Milk Powder, 400 g, 1 can	Jun-2023	National	Forecast	Quantimed	F-100 Therapeutic Milk Powder, 400 g, 1 can	41,778	1.0000	41,778.00	0
Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	Jun-2023	National	Forecast	Quantimed	Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	41,840	1.0000	41,840.00	0
F-100 Therapeutic Milk Powder, 400 g, 1 can	Jul-2023	National	Forecast	Quantimed	F-100 Therapeutic Milk Powder, 400 g, 1 can	41,784	1.0000	41,784.00	0
Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	Jul-2023	National	Forecast	Quantimed	Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	41,471	1.0000	41,471.00	0
		National						0.00	

Figure 61: Add Consumption Data

Update consumption data:

1. From the menu sidebar, go to "Supply Plan Data" and click "Consumption Data".
2. Once the "Consumption Data" screen appears, select the desired filters using the drop-down menus at the top.
3. The screen will display all current data for the report period, planning unit(s) and other filters selected in step 2.
4. To update existing consumption data, the user must double-click on the cell(s). A user can update as many cells for as many rows as they need to before saving as long as it is for the same dropdown filters selected in step 2.
   a. **Note:** Users may <u>not</u> edit forecasted consumption more than nine (9) months in the past and may <u>not edit</u> actual consumption more than nine (9) months in the past. The non-editable data is identified by greyed out rows.
5. Once a consumption record has been saved in QAT, it cannot be deleted. Therefore, if a user wants to remove that record from the supply plan, he/she must de-activate it by checking the blue check box in the far-right column or it can be repurposed for a different month's data.
6. Once the update(s) have been made, click "Submit".

Add/update batch details:

Adding batch information to consumption records can only be applied to actual consumption.

1. Right click on the "Actual Consumption" row and click "Show Batch Information".
2. A pop-up screen of the batch details for that actual consumption record will appear.
3. The user can edit the existing batch number and/or quantity by double clicking on the cell.
4. The user can also add a new batch(es) by right-clicking and selecting "Add New Batch" or by clicking on the "+Add Row" button".
5. The total quantity of the batches must equal the quantity of that actual consumption record.
   a. If the batch quantity/batch quantities are less than the actual consumption quantity, QAT will create a batch, using FEFO to calculate the difference.
   b. If the batch quantity/batch quantities are greater than the actual consumption quantity, QAT will have a validation error and not let the user submit.
6. Click "Submit".

Batch Number	Expiry Date	Quantity (ARU)
FEFO		1,806

+ Add Row   ✖ Cancel

Figure 62: Batch Details

Y2. **Inventory Data**

Add Inventory/Adjustment Data:

1. From the menu sidebar, go to "Supply Plan Data" and click "Inventory Data".
2. Once the "Inventory Data" screen appears, select the desired filters using the drop-down menus at the top.
   a. If the user is entering inventory data, select "Inventory" in the Inventory Type drop-down. If the user is entering adjustment data, select "Adjustment".
3. The screen will display all current data for the selected period, planning unit(s) and other filters selected in step 2.
4. To add a new inventory/adjustment record, right click on any cell and select "Add New Inventory Count"/ "Add new adjustments" OR select the blue "+ Add row" at the bottom.
5. Enter the required information.
   a. Any cell that is greyed out (e.g., Conversion Factor) indicates that it is a QAT generated cell and cannot be manually entered/edited.
   b. Any cell that is highlighted yellow indicates that it is a required field and has not yet been entered by the user.
   c. If entering an adjustment, a note in the "Notes" field is required. Notes for inventory records are optional.
6. Click "Submit".

> **Notes on Inventory Data:**
> - For each month, data source, and region, users may enter <u>one</u> inventory record but may enter <u>multiple</u> adjustments.
> - Users can <u>not</u> enter inventory for months in the future
> - Users may <u>not</u> edit inventory or adjustment records more than nine (9) months in the past.

QAT Planning Unit *	Invento... Date *	Region *	Data Source *	Alternate Reporting Unit (ARU) *	Inventory Type	Quantity (ARU) *	Conversion Factor (Alternate Reporting to Planning)	Quantity (Planning Unit)	
F-100 Therapeutic Milk Powder, 400 g, 1 can	Mar-2023	National	SDP & Warehouse Inventory	F-100 Therapeutic Milk Powder, 400 g, 1 can	Inventory	495,863	1.0000	495,863.00	
Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sachet	Mar-2023	National	SDP & Warehouse Inventory	Ready-to Use Supplementary Food (RUSF) 100 gm Paste, 1 Sach	Inventory	177,206	1.0000	177,206.00	

Show Batch Information

Add New Inventory Count

15 ▾ Showing page 1 of 1 entries   1

+ Add Row   **✓ Submit**   **✗ Cancel**

Figure 63: Add Inventory

Update Inventory/Adjustment Data:

1. From the menu sidebar, go to "Supply Plan Data" and click "Inventory Data".
2. Once the "Inventory Data" screen appears, select the desired filters using the drop-down menus at the top.
   a. If the user is updating inventory data, select "Inventory" in the Inventory Type drop-down. If the user is updating adjustment data, select "Adjustment".
3. The screen will display all current data for the report period, planning unit(s) and other filters selected in step 2.
4. To update existing inventory/adjustment data, the user must double click on the cell(s). A user can update as many cells for as many rows as they need to before saving as long as it is for the same dropdown filters selected in step 2. A user also cannot update adjustment <u>and</u> inventory data at the same time without first saving.

     a. **Note:** Users may <u>not</u> edit adjustment or inventory records more than nine (9) months in the past. The non-editable data is identified by greyed out rows.

7. Once an inventory record has been saved in QAT, it cannot be deleted. Therefore, if a user wants to remove that record from the supply plan, he/she must de-activate it by checking the blue check box in the far-right column or it can be repurposed for a different month's data.

5. Once the update(s) have been made, click "Submit".

Add/Update Batch Details

1. Right click on the Inventory/Adjustment row and click "Show Batch Information".
2. A pop-up screen of the batch details for that record will appear.
3. The user can edit the existing batch number and/or quantity by double clicking on the cell.
4. The user can also add a new batch(es) by right-clicking and selecting "Add New Batch" or by clicking on the "+Add Row" button".
5. The total quantity of the batches must equal the quantity of that inventory/adjustment record.
   a. If the batch quantity/batch quantities are less than the inventory/adjustment quantity, QAT will create a batch, using FEFO/Best Case Scenario logic to calculate the difference (for more information on this calculation, please see Annex 2: Business Rules).
   b. If the batch quantity/batch quantities are greater than the inventory/adjustment quantity, QAT will have a validation error and not let the user submit.
   c. *Note: there is no user override for auto-adjustments, only manual adjustments.*
6. Click "Submit".

Inventory Date *	Region *	Data Source *	Alternate Reporting Unit (ARU) *	Inventory Type *	Quantity (ARU) *	Conversion Factor (Alternate Reporting to Planning)	Quantity (Planning Unit)	
Mar-2023	National	SDP & Warehouse Inventory	F-100 Therapeutic Milk Powder, 400 g, 1 can	Inventory	495,863	1.0000	495,863.00	

Batch Number	Expiry Date	Quantity (ARU)
FEFO		495,863

Figure 64: Batch Details

Υ3. Shipment Data

Add Shipment Data:

1. From the menu sidebar, go to "Supply Plan Data" and click "Shipment Data".
2. Once the "Shipment Data" screen appears, select the desired filters using the drop-down menus at the top.
3. The screen will display all current data for the report period, planning unit(s) and other filters selected in step 2.
4. To add a new shipment record, right click on any cell and select "Add new shipment" OR select the blue "+ Add row" at the bottom.
5. Enter the required information.
   a. Any cell that is greyed out (e.g. Planning Unit Cost) indicates that it is a QAT generated cell and cannot be manually entered/edited.
   b. Any cell that is highlighted yellow indicates that it is a required field and has not yet been entered by the user.
   c. Certain cells will not be available to enter data into until other cells have been filled in. For example, "Budget" cannot be selected until the user has selected a "Funding Source".

      d. "QAT Shipment ID" will display as blank or '0' until the program is uploaded.

      e. Shipments cannot be marked as 'Received' if the Receive Date is in the future.

      f. In the shipment data screen, the user may select the desired currency from a drop-down list by clicking in the appropriate cell in the currency column. Based on the currency selected, the user will get the catalog price.

            i. That price can be changed during data entry/updating.

            ii. Freight cost is based on shipment mode but can also be modified manually.

      g. If a shipment row is in red text, this means that the shipment is identified as an "Emergency Shipment". QAT will automatically mark the shipment as an emergency shipment if the receive date falls inside the predefined lead time, meaning the shipment will most likely need to be expedited. *Note: QAT will only auto-flag the emergency shipment when the shipment is first created, but QAT will stop auto-flagging after first time the shipment row is submitted.*

      h. If a shipment is highlighted in grey, this means that the shipment is not included in the ending balance of the supply plan. Shipments can be excluded by either changing the status of the shipment to "Cancelled" OR by de-activating the shipment using the blue check box on the far left.

6. Click "Submit".

Update Shipment Data:

1. From the menu sidebar, go to "Supply Plan Data" and click "Shipment Data".
2. Once the "Shipment Data" screen appears, select the desired filters using the drop-down menus at the top.
3. The screen will display all current data for the report period, planning unit(s) and other filters selected in step 2.
4. To update existing shipment data, the user must double click on the cell(s). A user can update as many cells for as many rows as they need to before saving as long as it is for the same dropdown filters selected in step 2 (i.e. you cannot edit shipments for a product and then edit shipments for a different product without first saving).
5. If one of the following elements is changed (quantity, ARU, shipment mode, and planning unit cost), the freight cost field will become empty and highlighted yellow, and the user will be forced to enter a figure. This is done to ensure that the user is re-considering the freight cost based on the updated shipment information. The user can enter a formula into the cell to calculate the freight cost by typing an '=' first. This formula will go away upon saving the changes, but the figure will remain.
6. Unlike consumption data, a user can delete a shipment record even after it has been saved to the program, although the shipment must be in the 'Planned' status. To do so, right-click on the desired shipment and select 'Delete Row'.
7. Once the update(s) have been made, click "Submit".

Add/Update Batch Details

Adding batch information to shipment records can be applied to shipments in any status other than "suggested shipments". Once a shipment is created, QAT will auto-generate a batch. The user has the ability to edit that batch and/or add new batches to that shipment.

1. Right click on the shipment row and click "Show Batch Information".
2. A pop-up screen of the batch details for that shipment will appear.
3. The user can edit the existing batch number, expiry date and quantity by double clicking on the cell.
4. The user can also add a new batch(es) by right-clicking and selecting "Add New Batch" or by clicking on the "+Add Row" button".

5. The total quantity of the batches must equal the quantity of that shipment. At the bottom of the pop-up screen will display the total quantity for the shipment as well as the total quantity assigned to the batch(es). This is to let the user know if the batch quantity is over, under, or the same as the shipment quantity.
6. Click "Save Batch Information".
7. **Note:** When a shipment status is changed to "Received," the batch details will automatically pop-up for users to edit or confirm the current batch information.

The column to the far right labeled "Auto Generated" will let the user know if that batch was auto generated by QAT or manually entered by the user. If any of the 3 fields of the batch (batch number, expiry date, quantity) are changed, the checkbox for the auto generated field will become unchecked. If the expiry date and/or quantity are changed but not the batch number, the batch number automatically changes to swap out 'QAT' for 'MAN' and the cell gets highlighted with a red triangle indicating to the user that it should be changed. If the user doesn't know the real batch number, QAT will allow the batch to still be saved without changing the number.

Figure 65: Shipment Batch Details

Strategic Order Calculator:

For specific planning unit and procurement agent combinations, a **strategic order calculator** may appear for the user when entering the quantity of a shipment. The purpose of the calculator is to advise users on the appropriate order quantity for a shipment based on one or more of the following elements: a) Minimum Order Quantity (MOQ); b) Container load; c) Euro 1 pallet; d) Euro 2 Pallet. The calculator will help users plan shipments to maximize efficiency with delivery logistics (e.g. utilizing a full container instead of 20% of the container). Strategic products are defined at the realm level by an application or realm admin. For more information on how to define strategic products, see the section on adding planning units for procurement agents.

1. To view the Quantity Calculator for a strategic product, double click on the cell under the "Order Quantity" column and the "Quantity Calculator" screen will appear. *Note: If the product is a non-strategic product, the user can directly modify the order quantity in the cell after double-clicking and there will not be a pop-up.*
2. The original quantity of the shipment will appear in the "Manual Order Quantity" cell.
3. If you don't want to use the strategic calculator and want to use the original "Manual Order Quantity", select "None" in the drop-down for "Packaging Based On" and click "Save Shipment Quantity".
4. If you want to use the strategic calculator:
   a. Select how you wish to use the calculator by choosing an option from the "Packaging Based On" drop-down as well as the "Rounding Option" drop-down.
   b. Depending on your selections in step 4a, the quantity in "Final Order Quantity" cell will show you QAT's calculated shipment quantity. The bottom table summarizes the key information around the different packaging modes.

c. After confirming you are happy with the Final Order Quantity, click "Save Shipment Quantity".

Figure 66: Strategic Order Calculator

View Shipment Dates:

Estimated for each status can be seen, and actual dates can be manually entered, in the Shipment screen. This will allow the user to identify if the shipment is on schedule or behind/ahead based on the lead times. The user can also use this screen to compare the actual dates with the estimated dates of that shipment and use that information to update lead times that may not be accurate.

1. From the menu sidebar, go to "Supply Plan Data" and click "Shipment Data".
2. Once the "Shipment Data" screen appears, select the desired filters using the drop-down menus at the top.
3. The screen will display all current data for the report period, planning unit and other filters selected in step 2.
4. Right-click on the shipment you wish to view the dates for and select "Show shipment dates". A pop-up screen labeled "Shipment Dates" will appear.
5. The row labeled "Estimated" of the "Shipment Dates" screen will show a date for each status of the shipment based on the lead times entered for the program as well as the estimated receive date. Only the estimated receive date can be edited by the user.
   a. If a user changes the estimated receive date, the other estimated dates will also change based on the program's lead times.
6. The row labeled "Actual" will allow the user to enter the actual date that each status occurred for that shipment. If a cell is greyed out in this row, it means that the shipment has not yet reached that status and a date cannot be entered.
7. If the user makes a change to the estimated receive date or one of the actual dates, click "Save shipment dates".

Figure 67: Show Shipment Dates

ϒ4. **ERP Shipment Linking**

The ERP shipment linking functionality allows supply planners to link select shipments (currently GHSC-PSM) with the corresponding procurement agent's ERP system (currently ARTMIS). Once a shipment is linked in the supply plan, all the order details (status, receive date, costs, quantity, batches, etc.) will match what is in the ERP and the user will no longer need to manually update the shipment. If the packaging of the product in the ERP does not match the packaging of the planning unit in QAT, the user will have the ability to correct this through a conversion factor attribute in QAT. The user will be able to de-link the shipment if they want to manually track instead. The shipment details for these linked shipments will appear throughout QAT (Shipment Data Entry, Supply Planning, Reports, etc.). The user will be alerted if there are any key changes made in the ERP such as an order being cancelled or a product SKU changing. Users will only be able to tag shipments that are past funding source approval in ERP.

When managing ERP shipment linking, users will select either the 'Link ERP Shipments' or 'ERP Shipment Notifications' menu options. Within the 'Link ERP Shipments' screen there are 3 sub-screens:

> **1) Not Linked (QAT)** – Use this screen to link QAT shipments with ERP orders for the first time. Users will see a list of QAT shipments, and when a user clicks on a single QAT shipment, they can choose which ERP orders that QAT shipment should be linked with.
> **2) Linked** – Users will see a list of currently linked shipments and they can update the conversion factor or notes of already linked shipments, add ERP lines to already linked QAT shipments, or de-link ERP lines from QAT shipment.
> **3) Not Linked (ERP)** – Use this screen to link ERP orders to QAT for the first time. Users will see a list of ERP shipments, and when a user clicks on a single ERP shipment, they can then choose which QAT shipment that ERP shipment should be linked with. For any orders that are in the ERP that are not already in QAT, you can create a new QAT shipment in this screen.
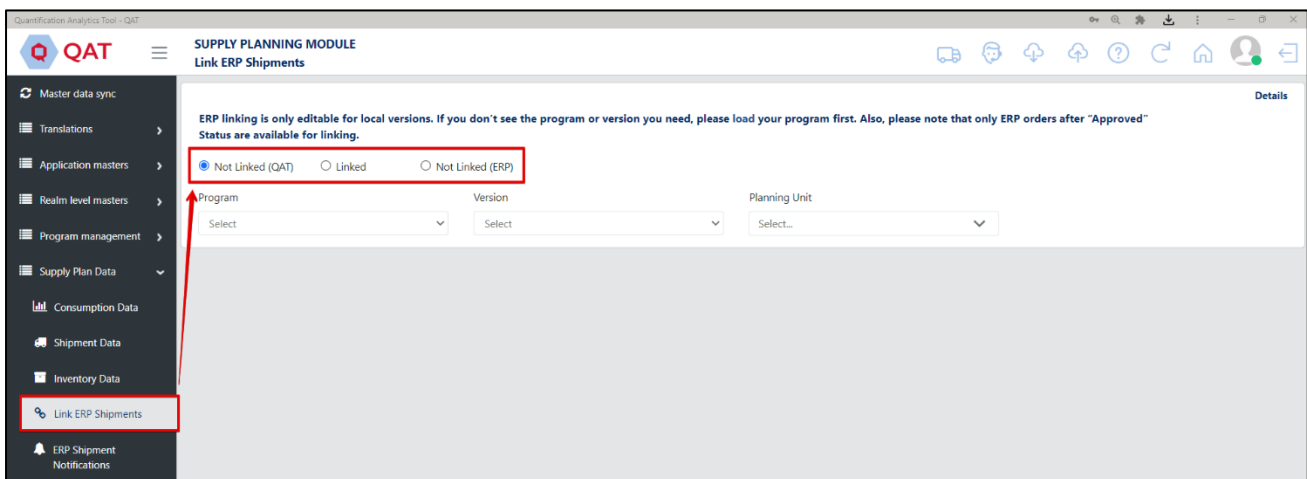

Figure 68: ERP Linking Screens

Rules for ERP Shipment Linking
Below are the rules for ERP shipment linking. The details button in the top right corner of the 'Link ERP Shipments' screen will summarize these rules.

1. ERP linking is only editable for downloaded local versions. The ERP linking screens will show server versions, but that data is read only. To save the linking changes, the user must upload that version.
2. Currently, QAT shipments can only be linked if the procurement agent is GHSC-PSM.
3. QAT shipments cannot be linked if they are in the status of planned, cancelled or suggested.

4. Inactive QAT shipments cannot be linked.
5. QAT shipments in the 'received' status can only be linked if the receive date falls within the last 6 months.
6. ERP orders can only be linked if they are past the funding source approval status (e.g. USAID approved).
7. ERP orders in the 'delivered' status can only be linked if the delivery date falls within the last 6 months.
8. ERP receive date uses the logic: 1) Actual Delivery Date 2) Estimated Delivery Date 3) Agreed Delivery Date 4) Requested Delivery Date. Therefore, if #1 is not available QAT will use #2. If #2 is not available QAT will use #3 and if #3 is not available QAT will use #4.

Not Linked (QAT)

This screen is used by supply planners to link QAT shipments with ERP orders. Below are the steps on how to link a QAT shipment with one or multiple ERP orders:

1. Select the radio button at the top labeled 'Not Linked (QAT)'.
2. Select the program and planning unit(s) you want to choose the QAT shipment from. Once selected, a list of QAT shipments will appear. ERP linking can only be done on local versions, however, linked shipments can be viewed on server versions.
3. Left click on a single QAT shipment. A pop-up window will appear called 'Search ERP-linked shipments'. This window will allow the user to choose which ERP orders that QAT shipment should be linked with.
   a. The top half of the window will show the QAT shipment details. This information is non-editable.
   b. The middle half of the window will show 2 dropdowns that will allow the use to filter the list of ERP orders to link the QAT shipment with.
   c. The bottom half of the window will list all ERP shipments based on the dropdowns in the middle section. This is where the user will link 1 or more orders as well as provide the Alternate Reporting Unit (ARU) and note(optional). The ARU will automatically populate the conversion factor.
      i. To change/add a conversion factor, the user can do so in the 'Alternate Reporting Unit' screen.
4. In the middle section, the user can filter the ERP shipments by selecting the ERP planning unit, the RO/Order No. or both. QAT will pre-fill the RO/Order No. dropdown once this window appears by selecting the Proc Agent Order No. from the QAT shipment.
5. To link an ERP shipment, the user will check the box in the far-left column that says 'Link?'. Once the user does this, they will be required to enter the ARU.
   a. If a user wants to link multiple ERP lines to the same QAT shipment, he/she should check the box for multiple rows.
   b. If a user wants to link multiple QAT shipments to 1 or multiple ERP lines, he/she should check the box at the top that says 'Show all shipments for _____' and then select each of the QAT shipments to link.
6. The conversion factor is useful when the QAT planning unit and ERP product are different (pack of 10 chocolate bars vs. pack of 100 chocolate bars). The conversion factor is used to calculate what the converted QAT shipment quantity is. The converted QAT shipment quantity is the order quantity that will be used in your supply plan for the linked shipment.

$$\{(ERP\ Shipment\ Quantity) \times (Conversion\ Factor) = (Converted\ QAT\ Shipment\ Quantity)\}$$

7. If there is a note in the QAT shipment, this will carry over to each of the ERP orders when you link. In this pop-up window, the user can edit or delete that note.
8. The bottom of the window will show what the original QAT quantity order is and what the new converted QAT quantity will be.

Search ERP-linked shipments

QAT Shipment: ☐ Show all shipments for Abacavir/Lamivudine 600/300 mg Tablet, 30 Tablets

Select shipment id	QAT Shipment ID	Procurement Agent	Proc Agent Order No.	Alternate Reporting Unit (ARU)	Receive Date	Status	ARU Qty	Conversion (ARU to PU)	Qty (PU)	Notes
☑	76158	GHSC-PSM	RO10137111_1	Abacavir/Lamivudine 600/300 mg Tab, 30 Tabs	11-AUG-22	Received	43,000	1.00	43,000	Documents in process July 2022; not updated in ARTMIS RR 11968

Enterprise Resource Planning (ERP) Shipment

ERP Planning Unit

Search By RO/Order No.
RO10137111

Link?	Order #	Planning Unit	Receive Date	Status	Batch #	Expiry Date	ARU*	Qty	Conver... Factor (ERP to QAT PU)*	Conver... Qty	No
☑	RO10137111 - 2 | PO10021362 - 1 | WWWE556378004727	Abacavir/Lamivudine 600/300 mg Tablet, 30 Tablets	11-AUG-22	Delivered	3152930	30-APR-25	Abacavir/Lamivudine 600/300 mg Tab, 30 Tabs	21,605	1.00	21,605	
☑	RO10137111 - 2 | PO10021362 - 1 | WWWE556378004727	Abacavir/Lamivudine 600/300 mg Tablet, 30 Tablets	11-AUG-22	Delivered	3152931	30-APR-25	Abacavir/Lamivudine 600/300 mg Tab, 30 Tabs	21,395	1.00	21,395	

15 ▾ Showing page 1 of 1 entries   1

Original QAT Quantity : 43,000 / Quantity after linking : 43,000   ✔Link Shipment   ✘ Cancel

Figure 69: ERP Converted Quantity

9. Lastly, click 'Link Shipment'.

Not Linked (ERP)

This screen is used by supply planners to link ERP orders to QAT for the first time. For any orders that are in the ERP that are not already in QAT, you can create a new QAT shipment in this screen. Below are the steps on how to link an ERP order with a QAT shipment:

1. Select the radio button at the top labeled 'Not Linked (ERP)'.
2. Select the country AND planning unit category or planning unit you want to choose the ERP order from. Once selected, a list of ERP orders will appear.
    a. **Note: This list is showing ERP data whereas the Not Linked (QAT) screen shows QAT data.**
3. Left click on a single ERP order. A pop-up window will appear called 'Search ERP-linked shipments'. This window will allow the user to link 1 or more ERP orders with a pre-existing or new QAT shipment.
    a. The top half of the window will show the QAT shipment details. This area will allow the user to either select a pre-existing QAT shipment or create a new one. Steps 4 and 5 will detail how to do so.
    b. The middle half of the window will show 2 dropdowns that will allow the use to filter the list of ERP orders to link the QAT shipment with.
    c. The bottom half of the window will list all ERP shipments based on the dropdowns in the middle section. This is where the user will link 1 or more orders as well as provide the

conversion factor and note. This section is pre-populated based on the ERP order number that was selected on the previous screen.

4. To select an existing QAT shipment, click on the 'Select Existing Shipment' button in the top section.
   a. Select the program that you want to search the QAT shipment(s) from. The dropdown will be filtered to show only the country that was selected in step 2.
   b. Next, either search the list of QAT shipments by planning unit (default) or by QAT shipment ID. If you want to search by QAT shipment ID, you will need to check the box that is labeled 'Filter by QAT shipment id?'. To go back to searching by planning unit, you will uncheck the box.
   c. Once you find the desired QAT shipment, select the button in the far-left column labeled 'Select shipment id'.

5. To create a new QAT shipment, click on the 'Create New Shipment' button in the top section.
   a. The user will need to fill in 4 dropdowns (Program, Planning Unit, Funding Source, Budget) to provide required information for creating the shipment. The rest of the shipment details will come from the ERP order that is selected in step 7.
      i. The program dropdown is filtered to show only the country that was selected in step 2.
      ii. The budget dropdown is filtered based on the selection in the funding source dropdown.
      iii. If there is no applicable budget, the user will need to leave the screen and add a budget in master data. If the user adds a budget, he/she must master data sync before seeing that option appear in this screen.

6. In the middle section, QAT will pre-fill the RO/Order No. dropdown once this window appears based on the selected ERP order made in step 3.

7. To link an ERP shipment, the user will check the box in the far-left column that says 'Link?'. Once the user does this, they will be required to enter the ARU.
   a. If a user wants to link multiple ERP lines to the same QAT shipment, he/she should check the box for multiple rows.
   b. If a user wants to link multiple QAT shipments to 1 or multiple ERP lines, he/she should check the box at the top that says 'Show all shipments for _____' and then select each of the QAT shipments to link.

8. The conversion factor is useful when the QAT planning unit and ERP product are different (pack of 10 chocolate bars vs. pack of 100 chocolate bars). The conversion factor is used to calculate what the converted QAT shipment quantity is. The converted QAT shipment quantity is the order quantity that will be used in your supply plan for the linked shipment.

$$\{(ERP\ Shipment\ Quantity) \times (Conversion\ Factor) = (Converted\ QAT\ Shipment\ Quantity)\}$$

9. The user can add a note to the shipment by editing the far-right column labeled 'Notes'.

10. The bottom of the window will show what the original QAT quantity order is and what the new converted QAT quantity will be.
11. Lastly, click 'Link Shipment'.

Figure 70: Create New Shipment

Linked Screen

This screen is used by supply planners to view the list of currently linked ERP shipments and update the Alternate Report Unit (ARU) or notes, add ERP orders to already linked QAT shipments, or de-link ERP lines from the QAT shipment.

1. Select the radio button at the top labeled 'Linked'.
2. Select the program and planning unit(s) you want to see the list of linked shipments for. Once selected, a list of shipments will appear. The information in these shipments is being pulled in from the ERP.
3. To make any of the updates listed in step 2, left click on a single shipment.
   a. To edit ARU and/or notes, double-click on the cell and type or select from dropdown.
   b. To de-link an ERP order, uncheck the box in the 'Link?' column.
   c. To add an ERP order, check the box for that order under 'Link?' column. The user can clear the search dropdowns in the middle section to look up a differe planning unit or order number and the originally linked orders will remain linked.
4. Users will have the ability to also view order history details from the ERP. To do so, from the original 'Linked' screen, right-click on a single shipment and click 'View ERP Order History'. A pop-up window will appear labeled 'ERP Order History'. This screen will show any details that have changed over time in the ERP order. Each row indicates that one or more of the columns has changed. The furthest column on the right labeled 'Data Received On' is when the record was received by QAT.
   a. To view batch details, click on the 👁 icon.
   b. **Note:** Certain fields from the ERP are not captured on this screen so there may be some instances where 1 or more rows have the same details. This means that a column in the backend was changed.

Once you have linked QAT shipments with ERP orders, the data will reflect in your supply plan without having to master data sync. The newly linked ERP data will reflect in the local reports, supply planning screen as well as the shipment data entry screen. The user **does** need to upload a version to the server in order for other users to see these changes.

To view the ERP-linked shipments in the shipment data entry screen, the user must select 'ERP-linked shipments' from the Shipment Type dropdown. The user can either display only this option or combine it with the manual shipments to show all shipments. The ERP-linked shipments will be greyed out to indicate that they are non-editable.

Figure 71: View ERP Shipments in Data Entry

In the supply planning screen, ERP-linked shipments will have a link icon in the top left of the cell. The user can click into a specific shipment to view the details but those cells will also be greyed out to indicate that they are non-editable. The user can still right click on the shipment details,however, to view the shipment dates and batch information.

Figure 72: View ERP Shipments in Supply Plan

ERP Shipment Notifications

The purpose of the 'ERP Shipment Notifications' screen is to alert supply planners of any key changes made to ERP linked shipments, such as an order being cancelled or a product SKU changing. Supply planners will be encouraged to 'address' each of the notifications to confirm that they are aware of the change and the implications made on the supply plan. For product changes, the user will re-confirm the conversion factor, whether it changes or not.

At the top of the screen, there is a [icon] icon. This icon will display a red number indicating how many non-addressed notifications are in the ERP shipment notifications screen. If there is no red number, that means there are none.

To get to the 'ERP Shipment Notifications' screen, either click on the truck icon at the top of QAT or select 'ERP Shipment Notifications' under 'Supply Plan Data' in the left sidebar menu.

To view the notifications, the user will need to select from the 3 dropdowns (Program, Planning Unit, Addressed). The user also has the option to select directly from the table above the dropdowns. When a user left clicks on a row in the table, the 3 dropdowns will atomically populate based on the program that user selected. The planning unit dropdown will populate to all planning units and the addressed dropdown will select 'Not Addressed'.

Program name	Notification Count
Benin PRH/Condoms	2
Burundi Malaria	2

15 ⌄ Showing 1 of 1 Pages   1

Program	Planning Unit	Addressed
Select ⌄	Select... ⌄	Not Addressed ⌄

✖ Cancel

Figure 73: ERP Shipment Notifications Filtering

To address a notification, the user must check the box in the 'Addressed?' column and then hit the 'Submit' button. If the user is addressing an ERP Product Change notification, he/she must first enter the conversion factor. The conversion factor field is not editable until the addressed box is checked.

Just like in the 'Linked' screen, the user can view ERP order history. To do so, right-click on the notification row and click 'View ERP Order History'. Refer to the Linked Screen section for more information.

Z. Importing Data for Supply Planning

Z1. Supply Plan Data Excel Import Templates

Consumption, Inventory and Shipment data can be entered through QAT's data entry screens, through the Supply Planning screen or through Quantimed Import (forecasted consumption only). QAT also provides users with the ability to input this data directly from Microsoft Excel. This method of data entry is intended for bulk entries that have a lot of data. The steps below will show how to input data from Excel into QAT:

> **Notes on Excel Templates:**
> Each of the four data types (Inventory, Adjustment, Consumption and Shipment) have their own Excel template so it is important that you click on "Download Template" from the proper screen. For inventory and adjustment, make sure the drop-down menu has selected the type of data you want the template for.

1. From the menu sidebar, go to "Supply Plan Data" and click the type of data you want to enter (e.g. "Consumption Data").

2. Once on the data entry screen, go to the top right corner and click "Download Template".
3. A Microsoft Excel file will be downloaded directly to your computer's '**Downloads'** folder.
4. Proceed to your computer's Downloads folder and open the Excel file. The name format should be **ConsumptionDataEntryTemplate.xlsx** with the first portion dependent on the type of data you are entering.
    a. *Each of the four data types (Inventory, Adjustment, Consumption and Shipment) have their own Excel template so it is important that you click on "Download Template" from the proper screen. For inventory and adjustment, make sure the drop-down menu has selected the type of data you want the template for.*
5. Once in the Excel template, click "Enable Editing" at the top if it prompts you to.
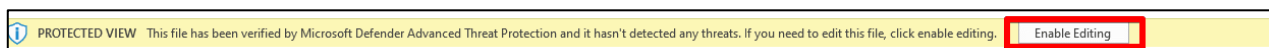

Figure 74: Enable Editing

6. Enter data for all of the required fields.
    a. Any cell highlighted in grey (e.g. Conversion Factor) is non-editable and does not need to be filled in.
    b. Certain fields (e.g. Data Source) will have drop down menus pre-populated from QAT. Therefore, it is important to download a new template if it has been a while since the last time the user used the template.
    c. Certain fields have built in data validations (e.g. letters cannot be entered in cost cells). If the validation is not met, a pop-up error message will appear.
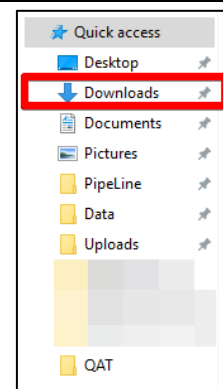
Consumption Month	Region	Consumption Type	Data Source	Alternate Reporting Unit(ARU)	Quantity(ARU)	Conversion Factor(Alternate Reporting to	Quantity(PU)	Number of Days Stocked Out	Notes	Active
2021-02-01	National	Actual	LMIS Reports	Levonorgestrel 0.75 mg Tablet, 2 Tablets	25000			0	TEST	TRUE
2021-03-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	15498			0	TEST	TRUE
2021-04-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	15258			0	TEST	TRUE
2021-05-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	23569			0	TEST	TRUE
2021-06-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	18479			0	TEST	TRUE
2021-07-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	17007			0	TEST	TRUE
2021-08-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	24433			0	TEST	TRUE
2021-09-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	17635			0	TEST	TRUE
2021-10-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	23660			0	TEST	TRUE
2021-11-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	21795			0	TEST	TRUE
2021-12-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	20183			0	TEST	TRUE
2022-01-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	17848			0	TEST	TRUE
2022-02-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	24655			0	TEST	TRUE
2022-03-01	National	Forecast	Demographic Goal	Levonorgestrel 0.75 mg Tablet, 2 Tablets	15746			0	TEST	TRUE

Figure 75: Excel Template

7. Once all the data is entered in the Excel template, re-open QAT window.
8. Go to the Data Entry screen (Consumption, Inventory, Adjustment, Shipment).

9. Click the blue "+Add Row" button at the bottom.
    a. **Note:** You only need to add 1 row in QAT regardless of how many rows there are in the Excel template.
10. In the Excel template, select all data and press Ctrl + C on your keyboard to copy the data.
11. Go to the added row in QAT, left click on the far most left cell in that row and press Ctrl + V on your keyboard to paste the data.
12. QAT will automatically create new rows for the data being imported from Excel.
13. Click "Submit".

Z2. **Quantimed Forecast Import**

Quantimed is a software designed to facilitate the process of determining the quantities of medicines and medical supplies required for a health program. The output of Quantimed is a health programs' forecasted consumption data. That forecasted consumption data can be a key input into QAT user's supply plans. QAT allows users to import Quantimed forecasts into QAT to include in their supply plan.

Step 1: Import Quantimed Data into QAT
1. Go to "Supply Plan Data" on the sidebar menu
2. Selected "Quantimed Import"
3. Import Quantimed Data File
    a. Choose the Quantimed .xml forecast file from your local computer system.
    b. Select the QAT program that you want the Quantimed data to import into.
    c. Click on "Import".
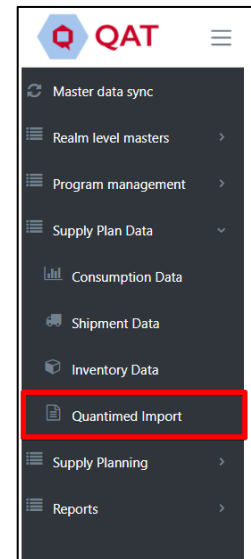
Figure 76: Quantimed File Import

Step 2: Map Planning Units
1. To map a Quantimed product to a QAT planning unit, select the QAT planning unit using the drop-down menu.
2. If you do not want to import a specific Quantimed product, select the "Do Not Import" option for that row.
3. If there is not a QAT planning unit associated with the Quantimed product, the dropdown will show "Planning Unit Not Found". You will either need to manually select a planning unit from the dropdown or go back to the program and add a planning unit for that Quantimed product before proceeding. You cannot click "Next" one or more of the cells says "Planning Unit Not Found".
    a. **Note**: to minimize instances where a planning unit is not found, it is recommended that Quantimed users select products from the GHSC-PSM product catalog .xml file.
4. Once very row has a planning unit selected or says "Do not import", click "Next" at the bottom of the screen.

Figure 77: Map Planning Units

Step 3: Region
1. In this step select the region that you want to import the forecasted consumption data into. If there is only one region, you must select that region to proceed.
2. Then, input the percentage of that consumption data that you want to import into QAT. This percentage must range from 0-100% and will apply to all the planning units previously selected.
3. Click "Next".

Step 4: Consumption Month
1. Select the date range for the Quantimed data that you want to import into QAT.
   a. The period you select is the period of data that you will be able to import and will apply to all planning units previously selected.
2. Click "Next".

Figure 78: Consumption Month Screen

Step 5: Import Data
1. The final step is to confirm the data that will be imported from Quantimed into QAT based on what was entered in steps 1-4.
   a. "Quantimed Forecasted Consumption" is the amount that is being pulled in from Quantimed for the associated product and month-year.
   b. "Converted Quantimed Forecasted Consumption" is the amount that will be pulled into QAT for the associated product and month-year after applying the import percentage and conversion factor.
   c. "Current QAT Forecasted Consumption" is the forecasted consumption amount currently in QAT for that planning unit and month-year. Once you import the Quantimed data, this amount will be overwritten by the "Converted Quantimed Forecasted Consumption" amount.
2. This screen will show all the data that will be imported into QAT. If you do not want to import certain records, click on the checkbox in the 'Import?' column on the far right. This will prevent QAT from importing the Quantimed data and will keep the current QAT forecasted consumption for that planning unit and month-year.

3. Click "Submit" to import the data.

Figure 79: Confirm Data Import Screen

Z3. **QAT Forecast Import**

Purpose: Enable users to import QAT-created forecasts into supply plan programs. Forecasts are only available for importing if 1) they are uploaded as a final version and 2) there is a forecast selected for each planning unit.

Using this screen:

(Step 1)
- Select which forecast program to import from (only final forecasts are available)
- Select which supply plan program to import to. Only local supply plan versions can be used. To download a program, go to the 'Download/Delete Program' screen under 'Program Management'.
  - Select the date range of forecast data to import, which must be within the forecast period.
- In the table that appears, select and map planning units.
  - For every Forecasting Planning Unit, QAT requires a corresponding Supply Plan Planning Unit and conversion factor. QAT automatically maps exact planning unit matches, but users can override both the planning unit mapping and conversion factor.
  - Not all forecast planning units need to be imported, however, all forecast planning units must have a selection in the mapping table. For example, in the below table, even though 2 products are not being imported, you would still need to select 'Do not import'.
  - If a planning unit does not appear in the dropdown, you will need to add this to the supply plan program in the 'Update Planning Units' screen.

Figure 80: Forecast Import Screen

(Step 2)
For each Forecast region, input how much (%) of that region's forecast you will import and which region the forecasted consumption will be imported into. Below are some use cases:

- National forecast to national supply plan

Forecast Region (s)	% of Forecast	Supply Plan Region
National	100	National

- Multi-region forecast to multi-region supply plan

Forecast Region (s)	% of Forecast	Supply Plan Region
North	100	North
East	100	East
South	100	South

- Multi-region forecast to national supply plan –

Forecast Region (s)	% of Forecast	Supply Plan Region
North	100	National
East	100	National
South	100	National

- National forecast to multi-region supply plan – note that the import process needs to be repeated for each supply plan region.

Forecast Region (s)	% of Forecast	Supply Plan Region
National	20	North

Forecast Region (s)	% of Forecast	Supply Plan Region
National	45	South

Forecast Region (s)	% of Forecast	Supply Plan Region
National	35	East

(Step 3)
QAT will list each forecast record to be imported (one row for each planning unit, region and month combination).

- QAT calculates the Forecasted Consumption to be imported as follows:

$$\text{Forecasted Consumption (Forecast Module)} \times \text{\% of Forecast} \times \text{Conversion Factor (Forecast to Supply Plan)} = \text{Rounded* Converted Forecasted Consumption}$$

For example:

- A national forecast that will be split into two regions of 50% each

- The Forecast Planning Unit is in packs of 3, and the Supply Plan Planning Unit is in packs of 1 (Conversion factor = 3)
- The national forecast for Month N was 100 (packs of 3)
- Forecast of 100 x 50% x 3 = 150.00 rounded (packs of 1) will be imported into each region for Month N
- ***Rounding Method:** Because QAT Supply Planning requires whole numbers without decimals, QAT converts forecasted consumption into whole numbers by rounding down and summing the "residuals" over time. Each month, QAT adds last month's residuals total and this month's forecast, before rounding down, and any residual not rounded down is added to a running residual total, called the Cumulative Total. In this way, quantities are not lost through the rounding process.
  - Formulas:
    - **Cumulative Total for Month N** = (Residual for Month N - 1) + Converted Forecast for Month N
    - **Residual for Month N** = How much was lost in the rounding = (Cumulative Total for Month N) – (Rounded Converted Forecast for Month N)
    - **Rounded Converted Forecast for Month N** = Cumulative Total for Month N, rounded down to the nearest whole number
  - For example, a national forecast is projected to consume 0.25 packs of the Forecast Planning Unit per month, for 12 months. The Forecast Planning Unit and the Supply Plan Planning Unit are the same (Conversion factor = 1)
    - In January, the Converted Consumption is 0.25, and since it's the first month, the 0.25 is also the January Cumulative Total. 0.25 is rounded down to a whole number is 0, and the rounded number of 0 is imported into the supply planning module. The January Residual from the rounding is 0.25 – 0 = 0.25.
    - In February, the Converted Consumption is 0.25, added to the January Residual of 0.25 makes the February Cumulative Total 0.25 + 0.25 = 0.5. Then, 0.5 is rounded down to a whole number of 0, which is imported into the supply planning module. The February Residual from the rounding is 0.5 – 0 = 0.5.
    - In March, the Converted Consumption is 0.25, added to the February Residual of 0.5 makes the March Cumulative Total 0.25 + 0.5 = 0.75. Then, 0.75 is rounded down to a whole number of 0, which is imported into the supply planning module. The March Residual from the rounding is 0.75 – 0 = 0.75.
    - In April, the Converted Consumption is 0.25, added to the March Residual of 0.75 makes the April Cumulative Total 0.25 + 0.75 = 1.00. Then, 1.00 is rounded down to a whole number of 1.00, which is imported into the supply planning module. The April Residual from the rounding is 1.00 – 1.00 = 0.
    - From May onwards, the cycle repeats itself.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Converted Forecast *(After conversion factor is applied)*	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Cumulative Total	0.25	0.5	0.75	1	0.25	0.5	0.75	1	0.25	0.5	0.75	1
Residual	0.25	0.5	0.75	0	0.25	0.5	0.75	0	0.25	0.5	0.75	0
Rounded Converted Forecast *(To be imported into Supply Planning Module)*	0	0	0	1	0	0	0	1	0	0	0	1

- If there is an existing forecasted consumption in the supply plan, the 'Current Forecasted Consumption' cell will be highlighted yellow.

- If there is an existing forecasted consumption in the supply plan and the forecasted consumption data the user is trying to import is older than 4 months, the 'Current Forecasted Consumption' cell will be highlighted gray, and will NOT be imported.
- Use the "Import?" column to de-select any forecasts that you do NOT want to import into the supply plan. If checked, the Converted Forecasted Consumption will override the Supply Plan forecast. If unchecked, the current Supply Plan forecast will remain.

| | Data already exists in Supply Plan Program | | Data exists in Supply Plan Program and is past 4 months, so it cannot be imported. | | | | | | |

Note: *Because QAT Supply Planning requires whole numbers without decimals, QAT converts forecasted consumption into whole numbers by rounding down and summing the "residuals" over time. By clicking "Import" QAT will utilize these converted "residual" quantities in the Supply Planning module. For more information and an example on this process, please see the Show Guidance.*

Forecast Planning Unit	Supply Plan Planning Unit	Supply Plan Region	Month	Forecasted Consumption (Forecast Module)	% of Forecast	Conversion Factor (Forecast Planning Unit to Supply Plan)	Rounded Converted Forecasted Consumption (to be imported)	Current Forecasted Consumption (Supply Plan Module)	Import?
Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets	Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets | 1073	National	Dec-22	23,743.63	100.00	1.00	23,743.00	42,801.00	☐
Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets	Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets | 1073	National	Jan-23	23,846.10	100.00	1.00	23,846.00	43,683.00	☑
Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets	Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets | 1073	National	Feb-23	23,875.79	100.00	1.00	23,876.00	43,315.00	☑
Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets	Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets | 1073	National	Mar-23	23,891.84	100.00	1.00	23,892.00	42,946.00	☑
Abacavir/Lamivudine 120/60 mg Scored Dispersible	Abacavir/Lamivudine 120/60 mg Scored Dispersible	National	Apr-23	23,888.89	100.00	1.00	23,889.00	42,577.00	☑

Figure 81:QAT Forecast Import Screen

Supply Planning Module: Supply Planning

AA. Supply Planning: An Overview
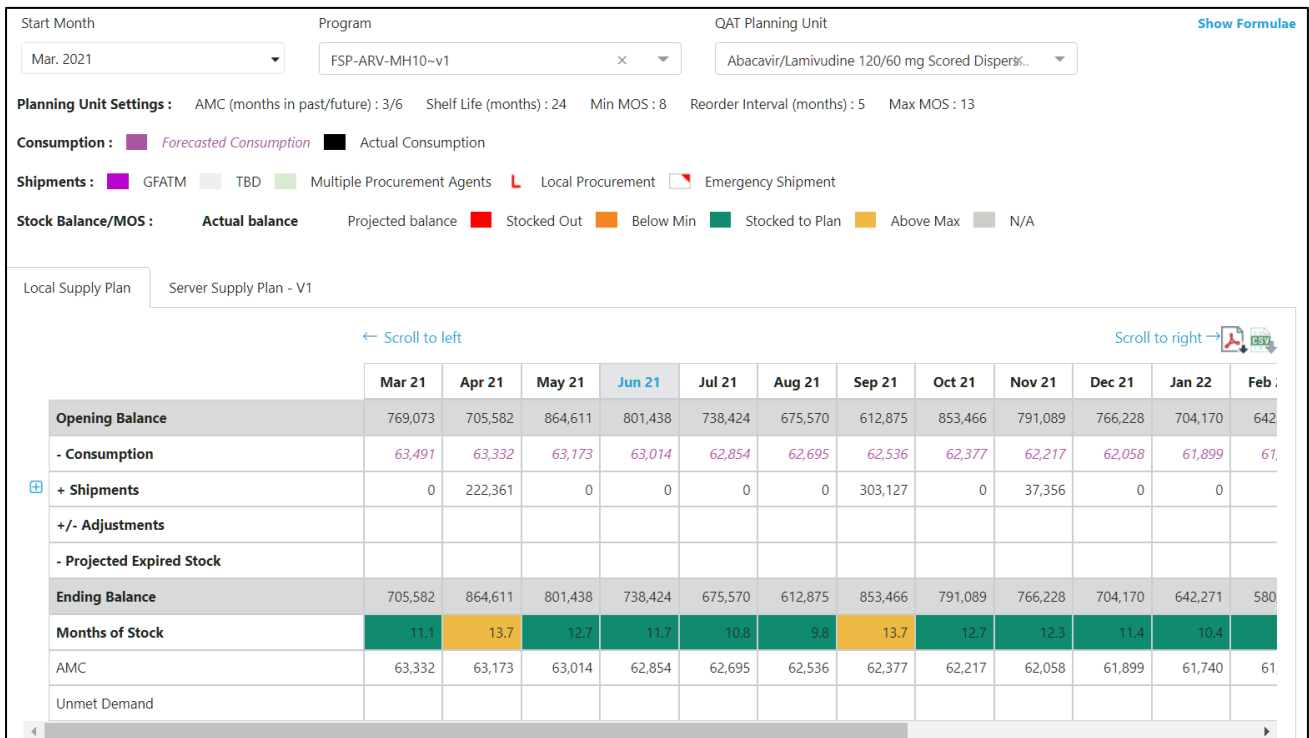
Figure 82: Supply Planning Screen – Plan by MOS
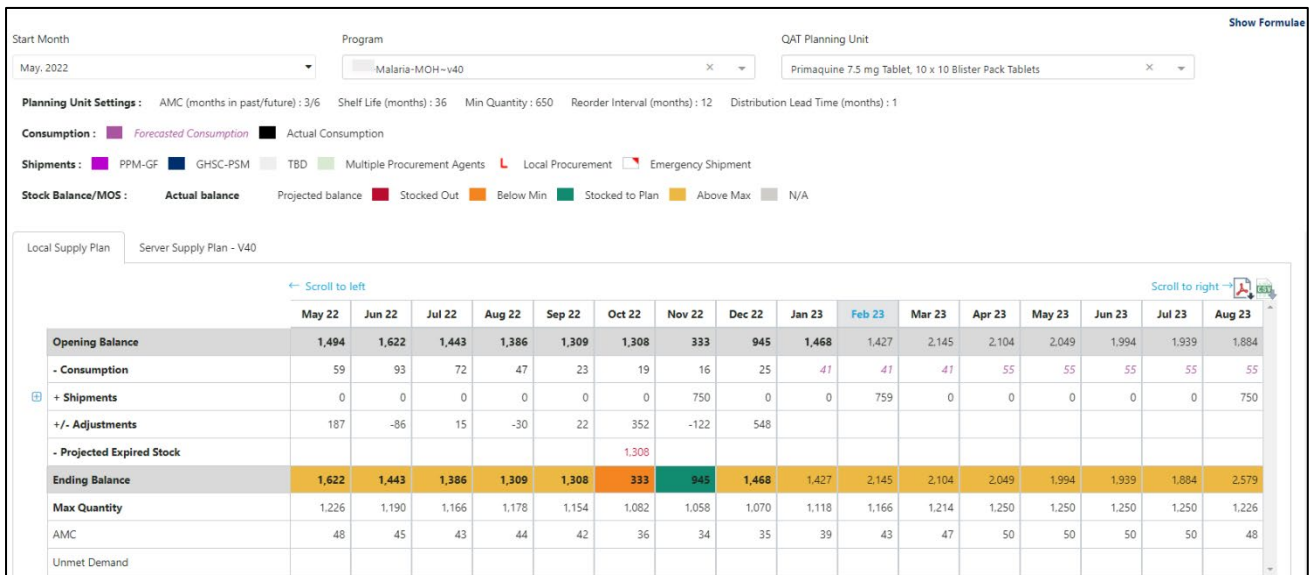
Figure 83: Supply Planning Screen – Plan by Quantity

- <u>What</u>? All major data points (consumption, shipments, inventory) come together on the supply planning screen, and this is where most QAT users will spend the majority of their time. Users can click on many of the cells in the table to directly edit their data. It is recommended to use this screen for active supply planning (including data updates and planning new shipments), but to use the data entry screen when significant data entry is required. Note that some sections vary based on

whether the planning unit is planned by MOS or planned by Quantity (as selected in Updating Planning Units) – differences are noted below.

- <u>Who?</u> **Application/Realm Admins/ Admins**, **Supply Plan Reviewers** and **Program Users** can add/edit the supply plan. Certain "view only" roles can view the supply plan.

- <u>When?</u> The user does not have to be online. However, they must have downloaded a program onto their local computer while online before beginning.

- <u>How?</u>
  Note: other than step 1 being required, the remaining steps are not sequential, but an explanation of the features available in the supply planning screen.
  1. On the left menu bar, go to Supply Planning > "Supply Planning"
     a. Select the desired **Program**. The drop-down list in the supply plan screen will show all the programs that have been downloaded by the user in their local machine. Refer to Download Program for details on how to download a program
     b. Select the desired **QAT Planning Unit**.

  2. The screen displays two Supply Plan tabs: **Local Supply Plan** and **Server Supply Plan - VX.** The "Local Supply Plan" tab is the local version that was selected under "program" and is available to be edited. The "Server Supply Plan" is the latest version available on the server and is only available for viewing (not editable).

  3. By default, the past 3 months and 15 future months from the current date are shown. Use **Scroll to Left/Right** to shows data for 6 months in the past/future

     Click "Show Formulae" at the top right of the screen for explanations on calculations on this screen.

  4. Click on the PDF & CSV icons to export this report, and will include all planning units in the program. In PDF, only the graph for the selected product will be included, but there will be tables for each planning unit.

  5. Understanding the stock balance calculations on the top half of the table:

Figure 84: Ending Stock Balance Calculation

- **Opening Balance** represents the quantity of stock at the beginning of the month. It is equal to the ending balance of the previous month, except the very first month of the program, where the opening balance is zero. It can be an inventory count from the previous month (**bolded**), or a projected calculated value (unbolded).
- **Ending Balance** represents the quantity of stock at the end of the month. It can be an inventory count (**bolded**), or a projected calculated value (unbolded).
- Follow the +/- signs besides each row to understand how the math works from opening balance to ending balance.

6. The bottom half of the table contains more detail to help the user interpret the stock status.

Figure 85 Differences in the Supply Planning Table - Plan by MOS vs Plan by Quantity

- **Average monthly consumption (AMC)** is an average of the consumption over the months indicated by the AMC parameters, which are displayed above the table. To edit these parameters, see Updating Planning Units.

Figure 86 Differences in the Supply Planning Legend- Plan by MOS vs Plan by Quantity

- **Unmet demand.** When the consumption is greater than the available inventory (opening balance) for the month, there is a stock out, so the ending balance will go to 0 and unmet demand is calculated as the absolute value of consumption - available balance. The next month's opening balance would be 0. The unmet demand is calculated per month and is not

carried over between months. The QAT unmet demand functionality is what captures what would have been negative stock in legacy software PipeLine.

- The second row from the bottom
  - o **Planned by MOS: Months of Stock** is calculated as the ending balance of the month divided by the AMC.
  - o **Planned by Quantity:** Max Quantity is calculated as the Minimum Qty + Reorder Frequency x AMC.
- Stock Status Color-coding
  - o **Planned by MOS:** The **"Months of Stock"** row is color-coded based on the stock status using the color coding displayed in the legend. Stock status is determined by comparing the MOS with the min MOS and max MOS.
  - o **Planned by Quantity:** The "**Ending Balance**" row is color-coded based on the stock status using the color coding displayed in the legend. Stock status is determined by comparing the quantity of the "ending balance" with the min quantity (provided by user) and max quantity (calculated).

7. Reading the stock status graph. The dates on this graph follow the table. By default, all graph elements are displayed. Click on any data element in the legend to hide a data element. The Stock Status graph has two axes:
   - The **primary (left) axis is in units**, and depicts shipments, consumption and stock. For Plan by Quantity, there minimum and maximum quantities use the primary axis.
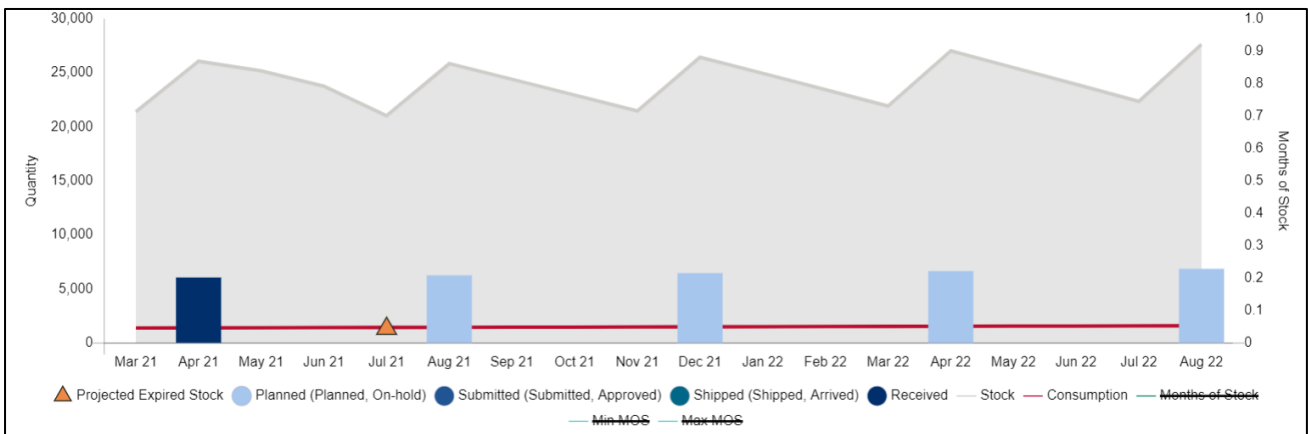
Figure 87 Supply Planning Graph - Primary Axis (Plan by MOS)
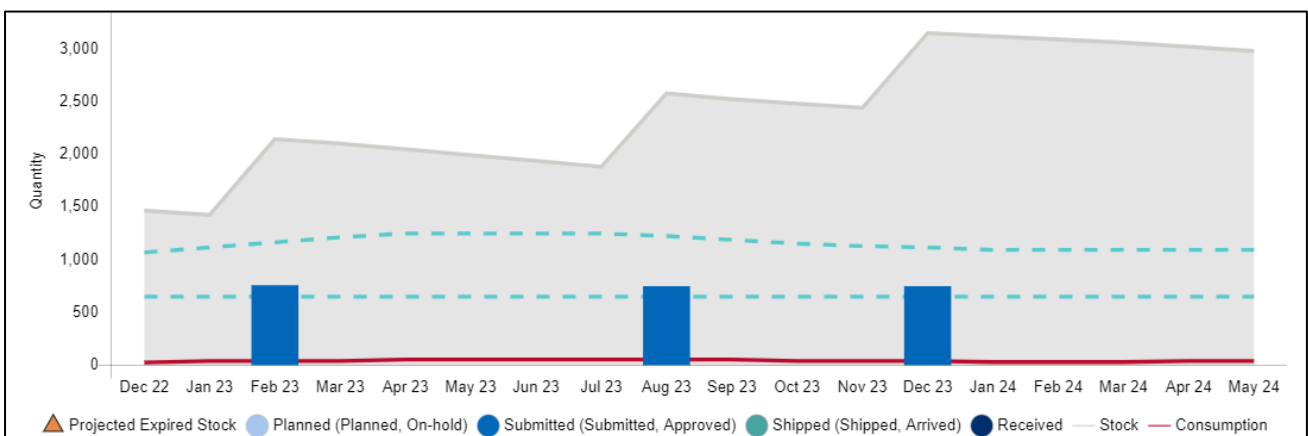
Figure 88 Supply Planning Graph - Primary Axis (Plan by Quantity)

- For plan by MOS, there is a **secondary (right) axis in months**, and depicts minimum month of stock parameter, maximum month of stock parameter, and the actual Months of Stock.

Click on a legend item to hide the data element. Note that hiding shipments/consumption only removes them from the graph and does not impact the underlying data or stock calculations.
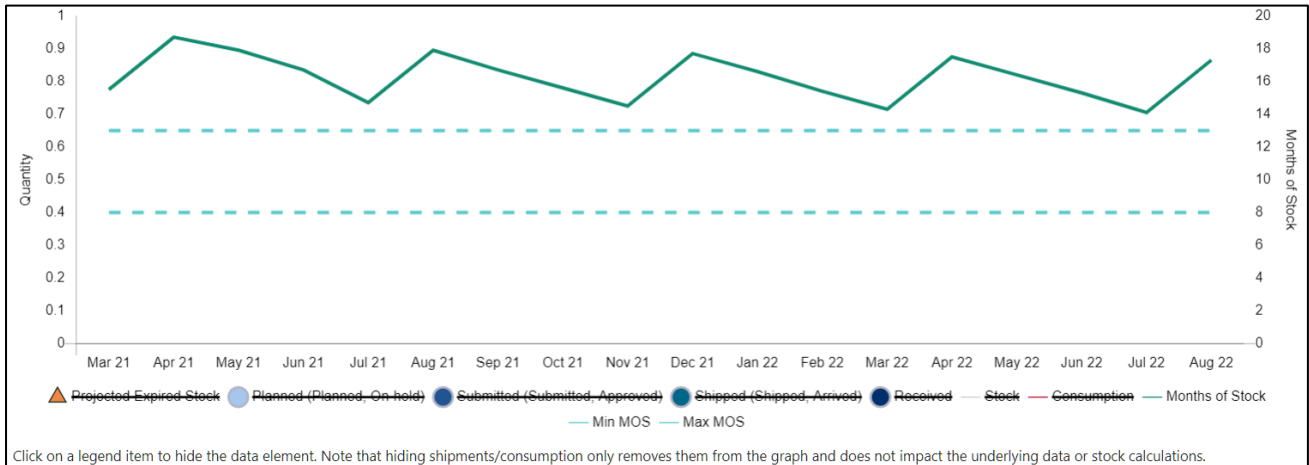
Figure 89 Supply Planning Graph - Secondary Axis (Plan by MOS)

BB. **Supply Planning: Consumption**

In the supply planning table, only one number will show per month for the whole program in the consumption row. As noted in the legend, *forecasted consumption* is indicated by purple italic text, while **actual consumption** is indicated by black non-italicized text.

	Aug 20	Sep 20	Oct 20	Nov 20	Dec 20
Opening Balance	170,653	160,865	151,076	140,763	131,674
- **Consumption**	9,788	9,788	10,313	*9,089*	*9,094*

Forecasted Consumption ▪ Actual Consumption

Logic for Consumption Data Displayed
- For single-region programs, the actual consumption will be displayed when it is available. If actual consumption is not available, the forecasted consumption will display.
- For multi-region programs, QAT will display the greater between Σ(actuals) or Σ(forecast) across regional data. (Note: this logic is being reviewed and may be updated in the future).

To add or edit consumption records

- Click on the month and cell on the Consumption row in the supply planning screen.
- A new window called Consumption Details will pop up. In the table that appears, each row represents a region. Single-region programs will only have one row, while multi-region programs would have multiple rows.
- The total shows the aggregated consumption for all regions.
- Click on the consumption record of any month and region to display further details.

> **Lots of data to add/update? Go to data entry screen!**
>
>
>
> *On the consumption details pop-up, users can directly access the Consumption data entry by clicking the link on the top right corner (see Consumption Data). Left click to open a tab on your browser, right click and select "Open link in new Quantification Analytics Tool window" to open a separate QAT PWA window.*

1. Any records for that month and region will display below.
    - d. To create a new record, right click on the details row and select "Add new consumption" or click the "+ Add Row" button.

    - e. To edit a record, click on any cell and edit consumption details (consumption type, data source, quantity, etc.) Double click to activate any dropdowns. See Consumption Data for additional guidance on consumption data entry.

Consumption Month*	Region*	Consumption Type*	Data Source*	Alternate Reporting Unit (ARU)*	Quantity (ARU)*	Conversion Factor (Alternate Reporting ... Planning)	Quantity (PU)	Number ... Days Stocked Out	Notes	Active
Sep-2020	National	Forecast	None selected	Dolutegravir 50 mg, Tablet, 30 Tablets	37,413	1	37,413	0		☑
Sep-2020	National	Actual	LMIS Reports	Dolutegravir 50 mg, Tablet, 30 Tablets	38,500	1	38,500	2	Test	☑
			LMIS Reports ✓							
			MSD Reports							
			SDP Reports							

+ Add Row   **✓ Submit**   **✗ Cancel**

2. Click "Submit" to save the changes and return to the main supply planning screen, where your changes will be reflected.

CC. **Supply Planning: Shipments**

By default, shipments are only shown as one row in the supply planning screen – this is the aggregate quantity of all shipments (excluding suggested shipments). To show more details, click on the + icon to the left of the "+ Shipments" row to expand and display the sub-rows. You will see five rows split up by order status (one row for suggested shipments which are automatically calculated).

To see a detailed breakdown of all shipments in a month, click on the cell in the corresponding month in the '+Shipments row'. To see the detailed breakdown of all shipments by status, click on the cell in the corresponding month in the individual status row.

ERP (enterprise resource planning): data linked to ERP from procurement agents are non-editable (see ERP Shipment Linking)

For all shipment rows, the colors indicate the procurement agent. If a month has multiple shipments with different procurement agents, the cell will be green. Red triangles on the top right of the cell indicate that a shipment is an emergency. If the shipment is a local procurement, there will be an L icon in the bottom left of the cell. If the shipment is ERP linked, there will be a link icon in the top left of the cell. Shipments can have multiple icons such as a local ERP linked emergency order. The legend appears at the top of the screen.

Shipments : ■ UNFPA ■ GHSC-PSM □ TBD □ Multiple Procurement Agents **L** Local Procurement ◺ Emergency Shipment ∞ ERP-linked shipments

	Jul 23	Aug 23	Sep 23	Oct 23	Nov 23	Dec 23	Jan 24	Feb 24	Mar 24
Opening Balance	529,651	1,141,423	1,003,195	**1,482,967**	1,754,071	1,464,663	1,998,007	1,712,325	1,422,600
- Consumption	138,228	138,228	138,228	*286,296*	*289,408*	*292,139*	*285,682*	*289,725*	*293,665*
⊟ + Shipments	750,000		618,000	557,400		825,483			
QAT Suggested Shipments 📅									924,316
Received	∞ 750,000		618,000						
Shipped (Shipped, Arrived)				557,400					
Submitted (Submitted, Approved)						L 825,483			
Planned (Planned, On-hold)									

Figure 90 Shipments in Supply Planning

The following sections will cover how to update existing shipments and create new shipments within the supply planning screen. See **Shipment Data** for more tips on the shipment data fields, which apply across the Shipment Data Entry screen and the supply planning screen.

> **Lots of data to add/update? Go to data entry screen!**
>
>
>
> *On the shipment details pop-up, users can directly access the shipment data entry by clicking the link on the top right corner (see **Shipment Data**). Left click to open a tab on your browser, right click and select "Open link in new Quantification Analytics Tool window" to open a separate QAT PWA window.*

CC1. **Updating an Existing Shipment**

1. Click on the cell representing the month and shipment to be edited. Clicking on the '+Shipments' row will open up a tab with all shipments for that month regardless of status. Clicking on one of the status rows will open up a tab showing only shipments for that month with that status.

2. The Shipment Details pop-up will appear. Make all desired changes. To update batch or date information, right click on the shipment row. The top of the pop-up allows users to navigate to a different month to make changes to those shipments as well.

3. Click "Submit" to save the changes and return to the main supply planning screen, where changes will be reflected (Note: The Submit button will not appear if all required fields are not filled.)

Updating Shipment Quantity with Recalculate Button

For planned shipments in the future, QAT will suggest a revised shipment quantity as an early warning to avoid going below minimum stock levels. Just like suggested shipments (see Creating a new Shipment), QAT will only provide the recalculate button if the shipment falls in a month that is below min followed by at least two months that also below minimum stock level. The quantity recommended by the recalculate button will follow the same logic as the QAT suggested shipments (see **Rules for Suggested Shipments** below).

Below are the steps to use the recalculate button in the Supply Planning screen:
- Go to a planned shipment in the future where the current month and at least following 2 months are below minimum stock level.
- Left click on the shipment.
- Find the 'Order Quantity' column and right click.
- Click 'Recalculate'. A pop-up message will appear telling you how much quantity QAT is suggesting to add and how much quantity the revised shipment will be.
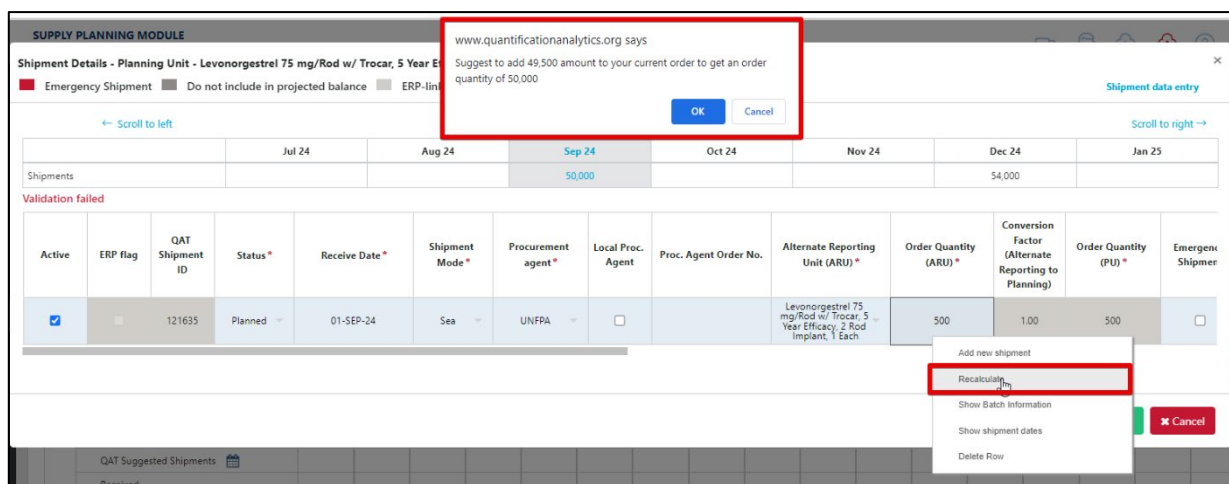
Figure 91: Recalculate Button

- Click 'Ok'. The pop-up will go away, and the revised order quantity will appear in the 'Order Quantity' column.
- Click 'Submit' if you wish to proceed with the revised order quantity.
  a. At any point, the user can override the quantity by double clicking into the cell and typing in a new quantity.
- The revised quantity will now reflect in the supply plan.

CC2. **Creating a New Shipment**

There are two ways to create new shipments – 1) converting a QAT suggested shipment into a planned shipment or 2) manually adding a shipment.

To **Convert a Suggested Shipment** into a planned shipment:
1. Click on the row for Suggested Shipment under the desired month (see Figure: Suggested Shipment)
2. The Shipment Details pop-up will appear. Change the status to the desired status, fill out the required fields, indicated by an asterisk. Double click to activate any dropdowns. Scroll to the right to see all fields. The order quantity will be pre-filled by the suggested order quantity (see Figure: Suggested Shipment).

> **QAT Suggested Shipments**
> QAT suggests a shipment as an early warning to avoid going below minimum stock levels. These are not actual shipment and as such, do not affect stock projections. Only when a suggested shipment is accepted and the status changes, will it be counted towards your stock projections. QAT will automatically mark a suggested shipment as an emergency shipment if it is within the lead time. See **Rules for Suggested Shipments** below.

Figure 92: Suggested Shipment

3. Click "Submit" to save the changes and return to the main supply planning screen, where changes will be reflected (**Note**: The Submit button will not appear if all required fields are not filled)

Rules for Suggested Shipments:

For Plan by MOS:
1. Is the planning unit understocked (MOS<Min) for 3 straight months?
   a. If yes, suggested shipment will bring the current month's stock level to **maximum**.
   b. If no, no suggested shipment.
2. If the planning unit is stocked out, QAT will always suggest a shipment.
   a. If both of the next 2 months are <Min, the suggested shipment will bring the current month's stock level to **maximum.**
   b. If 1 of the next 2 months is >Min, the suggested shipment will bring the current month's stock level to **minimum.**
3. If AMC = 0 or N/A, there will not be a suggested shipment for that month.

For Plan by Quantity:
Where Month N is the month QAT is calculating for, and X = Distribution Lead Time
1. If AMC = 0 or N/A for Month N, no suggested shipment
2. If Month N is stocked out (Ending balance = 0), QAT will always suggest a shipment
   a. If both of next 2 months (N+1, N+2) are < min qty, suggested shipment is the quantity that would bring month N to **maximum qty.**
   b. If one or both of the next 2 months (N+1 or N+2) is > min qty, suggested shipment is the quantity that would bring month N to **minimum qty.**
3. Is product understocked (ending balance < Min qty) for 3 straight months (Month N, N+1, N+2)?
   a. If yes, suggested shipment is the quantity that would bring Month N to **maximum qty.**
   b. If no, no suggested shipment

QAT puts the suggested quantity in Month N-X. In other words, X months before Month N, where X is the distribution lead time.

To Manually Create a New Shipment:

1. Click on the cell representing the month the shipment should be added to. Clicking on the '+Shipments' row will open up a tab with all shipments for that month regardless of status. Clicking on one of the status rows will open up a tab showing only shipments for that month with that status. Either option will work for adding a new shipment.
2. The Shipment Details pop-up will appear. To add a new row, click on the '+ Add Row' button or right click on any row and select 'Add new shipment' Double click to activate any dropdowns. Change to the desired status, quantity, and complete the required fields indicated by an asterisk. Scroll to the right to see all fields.
3. To create multiple new shipments, right click on any row and select "Add new shipment" or click the "+ Add Row" button.

4. Click "Submit" to save the changes and return to the main supply planning screen, where changes will be reflected (Note: The Submit button will not appear if all required fields are not filled.)

DD. **Supply Planning: Inventory/Adjustments**

In the supply planning table, only one number will show per month for the whole program in the **adjustments** row, regardless of how many adjustments are made. Similarly, the **ending balance** will always be one row, regardless of whether the ending balance is projected by QAT or provided by the user as an inventory count.

		Nov 19	Dec 19	Jan 20
Opening Balance		238,590	214,799	226,133
- Consumption		23,791	23,791	*23,617*
+ Shipments		0	0	0
+/- Adjustments			35,125	
- Projected Expired Stock				
Ending Balance		214,799	226,133	202,516

Logic for Adjustments and Ending Balances
- When there are no inventory counts,
  - **Adjustments =** the sum of all manual adjustments (Σ(manual adjustments))
  - **Ending balance =** projected inventory
- Inventory counts always supersedes manual adjustments.
  - For single-region programs, if there is an inventory count, that inventory count will be the ending balance .
  - For multi-region programs where <u>not</u> all regions are reporting, QAT will use whichever is <u>greater</u>, Σ(inventory count) or (projected inventory) as the ending balance
  - For multi-region programs where *all* regions are reporting, QAT will use Σ(inventory count) as the ending balance
- Whenever QAT uses inventory count as the ending balance, auto adjustments are calculated, and manual adjustments not used.

1. To add or edit adjustment or inventory records, click on the month and cell on the adjustments or ending balance rows in the supply planning screen.
   a. A new window called **Adjustments and Inventory Details** will pop up. In the table that appears, each row represents a region. Single-region programs will only have one row, while multi-region programs would have multiple rows.
   b. The total shows the aggregated adjustments and inventory for all regions.
   c. Click on the record of any month and region to display further details

Lots of data to add/update? Go to data entry screen!
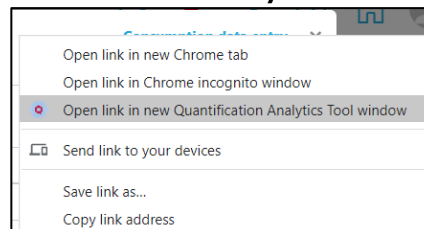
On the Adjustments and Inventory Details pop-up, users can directly access the Adjustments and Inventory data entry by clicking the link on the top right corner (see Inventory Data). Left click to open a tab on your browser, right click and select "Open link in new Quantification Analytics Tool window" to open a separate QAT PWA window.

2. Any records for that month and region will display below.
   a. To add an adjustment or inventory record, click on add row, or right-click on the bottom table and select "Add new adjustment" or "Add new inventory". Enter the required details. For adjustments, users can enter both positive and negative adjustments, in the past and in the future, and notes are required

   b. To edit a record, click on any cell to edit.
3. **Note:** A user can review which batch is affecting their ending balance for a particular month, by clicking on "Final Inventory" in the "Adjustment and Inventory Details" screen pop-up.

Adjustment and Inventory Details															Adjustment and inventory details data entry ✕

← Scroll to left   Scroll to right →

	Feb 21		Mar 21		Apr 21		May 21		Jun 21		Jul 21		Aug 21	
	Adjustment	Inventory	Adjustment	Inventory	Adjustment	Inventory	Adjustment	Inventory	Adjustment	Inventory	Adjustment	Inventory	Adjustment	Inven
National							500							
Total	0	Not all regions have reported inventory.	0	Not all regions have reported inventory.	0	Not all regions have reported inventory.	500	Not all regions have reported inventory.	0	Not all regions have reported inventory.	0	Not all regions have reported inventory.	0	Not a regio have repor inven

Projected Inventory	22,774	21,403	26,068	25,172	23,764	21,031	25,844
Auto adjustment	0	0	0	0	0	0	0
Final Inventory	22,774	21,403	26,068	25,172	23,764	21,031	25,844

Batch Number	Created Date	Expire Date	QAT Generated	Quantity
SH0RT	30-Apr-21	01-Jul-21	No	3,616
QAT002566000061892207Q8P	31-Jul-20	01-Jul-22	Yes	4,435
QAT002566000061892208013C4	31-Aug-20	01-Aug-22	Yes	6,844
QAT00256600006189220901I4U	30-Sep-20	01-Sep-22	Yes	5,714
QAT00256600006189221101K03	30-Nov-20	01-Nov-22	Yes	4,410
L0NG	30-Apr-21	01-Apr-23	No	1,049

Figure 93: Batches Affecting Final Inventory Pop-up

EE. Supply Planning: Project Expired Stock and Batch

Information

In the supply planning screen, QAT users will be able to view the projected expired stock, if any, for each month in their supply plan. They can edit the batches that contribute to the expected expired stock directly in the Supply Planning screen or in the Shipment Data entry screen (see Shipment Data). In the Supply Planning screen, a user edits a batch by:

1. Click on the Projected Expired Stock cell. QAT will have a pop-up window with the Project Expired Batch Details

	May 21	Jun 21	Jul 21	Aug 21
Opening Balance	26,068	25,172	23,764	21,031
- Consumption	1,396	*1,408*	*1,421*	*1,433*
+ Shipments	0	0	0	6,246
+/- Adjustments	500			
- Projected Expired Stock			1,312	

2. Click on the Batch Number. QAT will automatically redirect the user to the shipment from which the batch was generated.

Logic for Batches & Expiries
- Batches start with **shipments.**
  - QAT will automatically generate one batch for each shipment that equals the quantity of the shipment.
  - The expiry date is based on the **shelf life** (Program Admins can update in Update Planning Units) of that planning unit and the **receive date** of the shipment.
  - Users can override the batch number, expiry date, and split shipments into multiple batches.
- QAT will use First Expired, First Out (**FEFO**) logic for **consumption**.
  - QAT assumes that the batch that expires first will be consumed first.
  - Users can override the FEFO logic and instead, choose a specific batch from a dropdown to tag to that actual consumption record.
- QAT uses the **Best-Case Scenario** logic for **adjustments.**
  - QAT assumes that if there is a positive adjustment (manual or automated) it will add it to the batch that is last to expire (one with the longest shelf life). If there is a negative adjustment (manual or automated) it will subtract it from the batch that is the expiring soonest.
  - Users can override the Best-Case Scenario logic and instead, choose a specific batch from a dropdown to tag to that manual adjustment record.
  - Users cannot override the Best-Case Scenario logic for an auto-adjustment record.

Projected Expired Batch Details   ✕

Click on 'Expired Quantity' to display batch ledger

Batch Number	Created Date	Expire Date	QAT Generated	Expired Quantity
SH0RT	30-Apr-21	01-Jul-21	No	1,312
		Total		**1,312**

3. From the shipment screen, a user can edit the Batch Name, Expiry Date, and Shipment Quantity.

In the supply planning screen, QAT users can also view the life of a batch from shipment receipt to expiry, month-by-month by using the batch ledger:

1. Click on the Projected Expired Stock cell. QAT will have a pop-up window with the Project Expired Batch Details.

	May 21	Jun 21	Jul 21	Aug 21
Opening Balance	26,068	25,172	23,764	21,031
- Consumption	1,396	*1,408*	*1,421*	*1,433*
+ Shipments	0	0	0	6,246
+/- Adjustments	500			
- Projected Expired Stock			1,312	

2. Click on the Expired Quantity cell. QAT will automatically open a pop-up screen below with the batch ledger.

Projected Expired Batch Details

Click on 'Expired Quantity' to display batch ledger

Batch Number	Created Date	Expire Date	QAT Generated	Expired Quantity
SH0RT	30-Apr-21	01-Jul-21	No	1,312
Total				1,312

Batch Number : SH0RT
*Auto-Allocated: Consumption or Adjustment as calculated by QAT

Month	Opening Balance	User-Entered Batches			Auto-Allocated* (+/-)	Closing Balance
		Consumption (-)	Adjustment (+/-)	Shipment (+)		
Apr-21	0			5,000	-1,384	3,616
May-21	3,616	1,396	500		0	2,720
Jun-21	2,720				-1,408	1,312
					Expiry	1,312

3. **Note:** unless the user tags a batch to specific actual consumption or adjustment entries (see "Add/Update Batch Details" in Consumption Data and Inventory Data), QAT will default to monthly batch quantities being placed in the "Auto-Allocated" column in the Batch Ledger.

FF. **Scenario Planning**

QAT provides users with predefined scenarios for supply planning. This functionality will allow users to make changes to- and visualize their data in different ways, without necessarily affecting their current supply plan. Users can apply one or more scenarios to their data to see how those changes affect stock projections. The selected scenario(s) can then be applied to a current supply plan, creating a new version.

There are currently six predefined scenarios available to users; more can be programed into QAT depending on the need and use cases. QAT users can request new scenarios through raising a ticket. The need for new scenarios will be managed centrally by the Realm Admin.

Available scenarios:

- **Increase forecasted consumption**: by a user-defined percentage and period. This will apply a percent increase to forecast values for each month of the selected period.
- **Decrease forecasted consumption**: by a user-defined percentage and period. This will apply a percent decrease to forecast values for each month of the selected period.
- **Remove unfunded shipments**: all shipments without an assigned funding source (i.e., funding source = TBD) will be removed from the supply plan and stock projections.
- **Remove all Planned shipments not within the lead time**: all shipments with status "planned" that do not comply with the established lead times (i.e. expected receipt date is sooner than what would be feasible given lead times) will be removed the supply plan and from stock projections.
- **Remove all Submitted shipments not within the lead time**: all shipments with status "submitted" that do not comply with the established lead times will be removed from the supply plan and stock projections.
- **Remove all On Hold Shipments not within the lead time**: all shipments with status "on hold" that do not comply with the established lead times will be removed from the supply plan and stock projections.

- **Re-plan supply plan:** for a user-defined time period, QAT removes planned shipments that are not correctly maintaining stock between MIN/MAX parameters and creates new planned shipments to comply with stock parameters, using suggested shipment logic described in <u>Section 5.C2 Creating a New Shipment</u>.

To access these scenarios:

1. Go to Supply Planning and click on "Scenario Planning".
2. Select a predefined scenario from the dropdown menu and edit the required fields
3. Click Add to view the changes.

	May 20	Jun 20	Jul 20	Aug 20	Sep 20	Oct 20	Nov 20	Dec 20	Jan 21	Feb 21
Opening Balance	1,018,731	953,647	888,722	823,957	759,351	694,904	699,532	635,404	571,435	832,724
- Consumption	65,084	64,925	64,765	64,606	64,447	64,288	64,128	63,969	63,810	63,651
+ Shipments	0	0	0	0	0	68,916	0	0	325,099	0
+/- Adjustments										
- Projected Expired Stock										
Ending Balance	953,647	888,722	823,957	759,351	694,904	699,532	635,404	571,435	832,724	769,073

Figure 94 Scenario Planning Screen

4. The scenario will be shown in the "Scenario List".

Scenario	Start Date	End Date	Percentage
Increase forecasted consumption	Nov-19	Oct-20	3

Figure 95: Scenario Planning Scenario List

5. If the user wishes to apply the scenario to their supply plan, they can click on the "Submit" button. The new supply plan will get stored in the local machine of that user, and the user can store this in the server as a new version via the Upload functionality.
6. If the user does not wish to apply the scenario to their current supply plan, they can click on the "Cancel" button or the "Reset" button, and the changes will not take effect.

GG. **Supply Plan Report**

The purpose of the supply plan report is to allow the user to quickly assess the stock status of a selected planning unit, by graphically comparing the stock projections to dynamic minimum and maximum inventory levels and to be able to see all consumption (both actual and forecast), inventory, and shipping details in one place. The report provides a graphical representation of the supply plan, as well as a tabular view. The report

can be exported in PDF and/or CSV format. Exports can be done for one, multiple, or all planning units at a time.

This Report, different from the others, can be found under the "Supply Planning" menu.
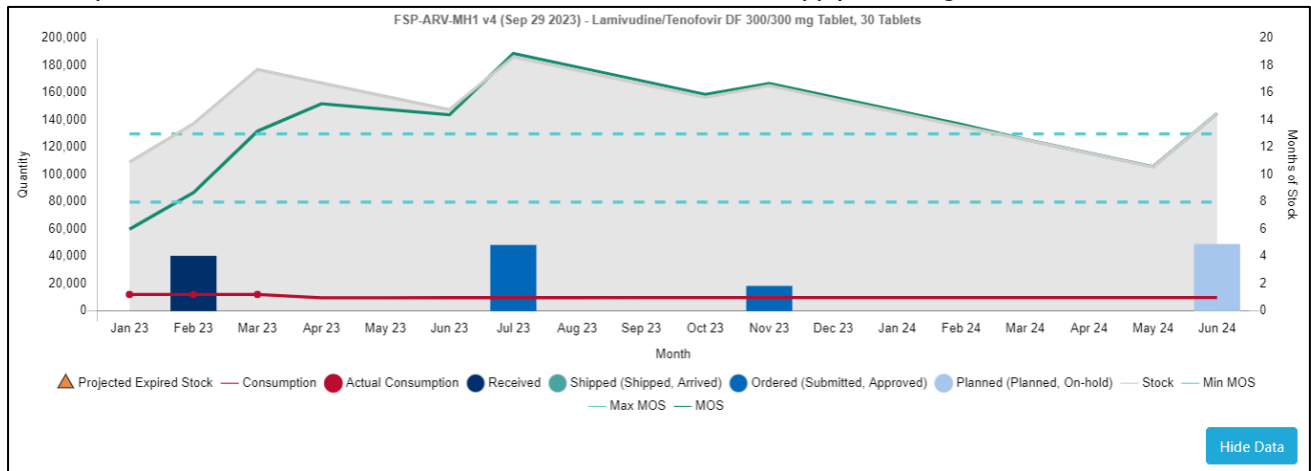
Figure 96: Supply Plan Report Graph View

To view the supply plan report:
1. Go to Supply Planning and click on "Supply Plan Report".
2. Select the Report Period, Program, Version of the program, and desired Planning unit.
3. QAT will display a graphic version of the supply plan.
4. To show the data table click on "Show Data."

AMC (months in past/future) : 3/3   Shelf Life (months) : 36   Min MOS : 8   Reorder Interval (months) : 5   Max MOS : 13

Stocked Out   Below Min   Stocked to Plan   Above Max   N/A

Month	Stock Opening Balance	Consumption Forecasted	Consumption Actual	Shipment Quantity	Shipment Quantity | Funding source | Shipment Status | Procurement Agent | RO - Prime line No | Order No - Prime line No	Adjustment Quantity	Projected Expired Stock	Stock Ending Balance	AMC	MOS	Unmet Demand
Jan 23	121,437	9,773	12,207	0				109,230	18,206	6.0	
Feb 23	109,230	9,786	12,207	40,536	1,512 | GFATM | Received | UNDP | GPH394H010 39,024 | GFATM | Received | UNDP | GPH468H001			137,559	15,807	8.7	
Mar 23	137,559	9,798	12,207	0		51,854		177,206	13,410	13.2	
Apr 23	177,206	9,810		0				167,396	11,015	15.2	
May 23	167,396	9,823		0				157,573	10,622	14.8	
Jun 23	157,573	9,835		0				147,738	10,230	14.4	
Jul 23	147,738	9,847		48,528	48,528 | GFATM | Submitted | UNDP | GPH468H001			186,419	9,841	18.9	
Aug 23	186,419	9,859		0				176,560	9,853	17.9	
Sep 23	176,560	9,872		0				166,688	9,866	16.9	
Oct 23	166,688	9,884		0				156,804	9,878	15.9	
Nov 23	156,804	9,896		18,475	18,475 | GFATM | Submitted | UNDP | 4806			165,383	9,890	16.7	
Dec 23	165,383	9,909		0				155,474	9,902	15.7	

Figure 97: Supply Plan Report Tabular View

5. **Note:**
   a. The report includes the Planning Unit settings of AMC, shelf life, MIN, reorder interval, and MAX.

b. The Shipment Quantity column is the sum of all shipments that have a receive date in the same month for that planning unit.

c. The "Shipment Quantity | Funding Source | Shipment Status | Procurement Agent | RO – Prime lie No | Order No – Prime line No" column allows the user to see the disaggregated shipments that have receive date in the same month, including details of quantity, procurement agent, status, funding source, and order number assigned to that order.

Supply Planning Module: Reports

QAT reports allow the user to extract and view their supply planning data in graphs, tables, and other visual formats. The user will also be able to navigate, sort, filter, and view the data for specific needs. QAT reports produce visualizations and display data in a way that can support decision making.
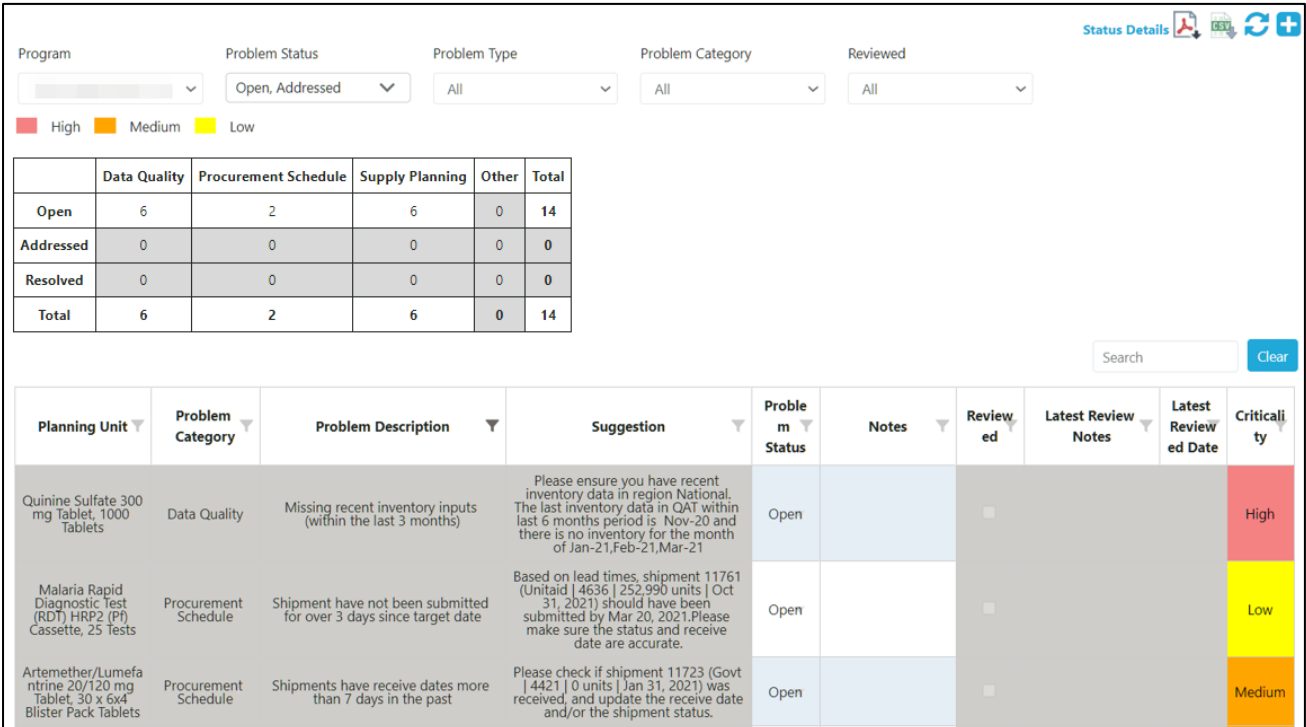
The reports are divided into **Global Reports** and **Program-specific Reports**. Program-specific Reports are shown offline, as well as online. However, the Global Reports are shown only in online mode and are only available to Global Users, such as the Realm Administrator and the Application Administrator.

Note: All QAT reports have the ability to be exported into an Excel CSV file as well as PDF format. Additionally, all graphs allow for the user to hover over a visual for a tool tip with more information.

HH. **QAT Problem List**

Purpose: A Supply Plan Review integrated within QAT that allows for a quality check to easily identify problematic data/issues and correct these before uploading a supply plan to the server as a "Draft" or "Final" version.

- **Accessible to:** Realm Admins, Program Admins, and Program Users
- **Navigation:** Reports → QAT Problem List

Figure 98: QAT Problem List

Note: Only the Problem associated with the programs that have been downloaded by the user in their local machine will appear in the QAT Problem List. For details on how to download specific programs and versions, refer to the Download Program section of the User Manual.

HH1. **QAT Problem List Basics**

Each Problem that is flagged in the QAT Problem List will have a separate line. This will have the associated planning unit, a description of the problem, a suggestion on how to fix the problem, the problem status, user notes, a checkbox for identifying if the problem has been reviewed, the latest reviewer notes (as applicable), the date it was last reviewed and the criticality.

Planning Unit ▼	Problem Category ▼	Problem Description ▼	Suggestion ▼	Problem Status ▼	Notes ▼	Reviewed ▼	Latest Review Notes ▼	Latest Reviewed Date	Criticality

Figure 99: Aspects QAT Problem List

QAT Problems can be subdivided into four main categories: Data Quality, Procurement Schedule, Supply Planning, and Other. They are also assigned to different levels of criticality: Low (yellow), Medium (orange), and High (red). The criticality informs users the extent to which a problem affects the quality of the supply plan. However, regardless of criticality, all problems must be "In-compliance" or "Addressed" in the QAT Problem List to be uploaded as a Final Version. There are five main statuses associated with the individual problems in the QAT Problem List:

1. **In-Compliance** – Issue has been closed through data entry by the user. Status will be automatically changed, and notes are not required.

   Example – A planning unit is missing actual consumption in the last 3 months. A user enters actual consumption data for the last 3 months. QAT automatically marks this as 'in-compliance'.

2. **Resolved** – Issue has been manually marked by reviewer as 'resolved'. The reviewer uses this status if this issue will unlikely be corrected via data entry and also does not require further notes in the future. Only a reviewer can mark an issue as 'resolved'.

   Example – A planning unit gets flagged for not following dynamic forecasting. The user enters a note that this planning unit does not follow dynamic forecasting as it is not a seasonal product. The reviewer marks this as resolved because the explanation will most likely not change in the future.

3. **Addressed** – Issue has been manually marked by either reviewer or user as 'addressed'. The user applies this status when they cannot resolve the issue through data entry. This status must be accompanied by a note. The reviewer uses this status if this issue cannot be resolved in this review period, but will be resolved in the future, most likely in a few periods, rather than before the next review.

   Example – A planning unit being phased out only has 8 months of forecasted consumption in the future instead of 18. This is acceptable as it is a phasing out planning unit, but the user will still need to de-activate the planning unit once it is fully phased out, which is why the issue is marked as 'addressed' instead of 'resolved'.

4. **Open** – This problem has been automatically flagged by QAT, or the problem has been manually marked by the reviewer as 'Open'. The reviewer could use this status when rejecting a supply plan to indicate that the notes are not accepted.

   Example – A user has a planning unit that is missing actual consumption data in the last 3 months. QAT will automatically flag this as 'Open'. If the problem has been 'Addressed' when uploaded and approved, the problem will revert back to the 'Open' status for the next submission.

5. **Reviewed -** The issue has been reviewed by the supply plan reviewer. This field is only editable by the supply plan reviewer.

HH2. **Closing and Addressing Problems**

1. **Closing a problem via data entry**: to change an 'Open' problem to one that is 'In-compliance,' the user will need to complete the suggestion provided in the "Suggestion" column for the specific problem. For example, the suggestion may be to "provide actual consumption" for specific months. Thus, the user will need to:

Planning Unit	Problem Category	Problem Description	Suggestion	Problem Status	Notes	Reviewed	Latest Review Notes	Latest Reviewed Date	Criticality
Primaquine 7.5 mg Tablet, 10 x 10 Blister Pack Tablets	Data Quality	Missing recent actual consumption inputs for months in gaps	Please check your actual consumption input in region National and provide data for month Feb-21	Open					High

Figure 100: Closing a Problem Example

a. Navigate to the Consumption Data Entry screen by either clicking directly on the Problem (which will open a new QAT window) or by clicking on Supply Plan Data → Consumption Data.

b. From the consumption data entry screen, the user will add actual consumption for the requested months. For instructions on how to add consumption, please refer to [Consumption Data](#).

c. Navigate back to the QAT Problem List and click Recalculate to refresh the QAT Problem List to include the most recent addition of actual consumption data. The previously flagged problem should now be "In-compliance" and no longer be flagged by the QAT Problem List.
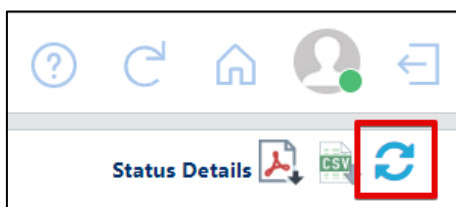
Figure 101: QAT Problem List Recalculate/Refresh

2. **Addressing a problem with a comment**: If a problem that has been flagged in the QAT Problem List cannot be fixed and made 'In-compliance' through data entry as recommended in the "Suggestion" column, a user can provide a comment and manually change the status to 'Addressed.' For example, a planning unit may be overstock/understocked and the suggestion to "re-evaluate supply plan to meet the min/max parameters" is presented. If a user is unable to fix this problem via data entry, they will need to address the problem:

Planning Unit	Problem Category	Problem Description	Suggestion	Problem Status	Notes	Reviewed	Latest Review Notes	Latest Reviewed Date	Criticality
Artesunate 100 mg Suppository, 2 Suppositories	Supply Planning	In the next 1-6 months (May-21 to Oct-21), inventory is * overstocked for 6 month(s) * understocked for 0 month(s). In the next 7-18 months (Nov-21 to Oct-22), inventory is * overstocked for 0 month(s) * understocked for 4 month(s) Note: There are 2 shipment(s) in the next 1-6 months, and there are 2 shipment(s) in the next 7-18 months.	Re-evaluate supply plan to meet the min/max parameters. If overstocked, consider delaying/canceling shipment(s), review future expiries, or donating stock. If understocked, consider planning & ordering, expediting, or increasing shipment quantity.	Open					Medium

Figure 102: Addressing a Problem Example

a. Double-click on the Problem Status dropdown for that problem and choose "Addressed." Users must provide an explanatory note in the Notes column for all problems marked as "Addressed."

Figure 103: Addressing a Problem & Adding a Note

Note: the user can also see in the "Problem Transaction Details" screen by right clicking on the Problem. This area will show the user past notes, reviewers, dates reviewed, etc.

Figure 104: Problem Transaction Right Click

Figure 105: Problem Transaction Details

b. Click "Update." The QAT Problem List will now include the most recent addition of explanatory notes and the status.

HH3. QAT Problem List: Explanation of Problems

- **Missing recent actual consumption inputs (within the last 3 months)**
  If a planning unit is missing recent actual consumption data inputs within the last three months, it will be flagged in the QAT Problem List. If the inputs are filled in for any of these last three months, whether it is one month or all three months, the problem will not be flagged by the system.

- **Any gaps in the last 6 months (actual consumption)**
  QAT checks if a planning unit is missing a month or multiple months of recent actual consumption inputs between two actual consumption entries in the specified 6-month range. This problem is looking for accidental gaps in actual consumption inputs. If there is any gap in actual consumption

data in the past 6 months, the QAT Problem List will flag this as an issue. For example, a user inputs actual consumption for September 2022, December 2022, and January 2023. This will be flagged by the QAT Problem list because there is a gap of missing actual consumption inputs for October 2022 and November 2022.

- **Missing recent inventory inputs (within the last 3 months)**
  If a planning unit is missing recent actual inventory data inputs within the last three months, it will be flagged in the QAT Problem List. If the inputs are filled in for any of these last three months, whether it is one month or all three months, the problem will not be flagged by the system.

- **Supply Plan lacks forecasted consumption within the next 18 months**
  If a planning unit is missing the forecasted consumption inputs for one or more months for a period of 18 months from the current month, QAT will flag it as a problem. QAT will check for gaps to ensure that all of the future 18 months have forecasted consumption values.

  Note: If there is a planning unit that is phasing out, it is recommended that the user puts zero as the forecasted consumption, until it is fully phased out, at which point the planning unit will need to be deactivated.

- **Shipments with received dates in the past**
  QAT will check the receive dates of all shipments to see if any are in the past based on the current date. If the receive date for a shipment is in the past, it will be flagged in the QAT Problem List. For example, there is a planning unit with a receive date of December 31st, 2022. As this date is in the past, QAT will flag it, and the user will need to either change the shipment status to "Received" or change the receive date to one that is in the future.

  Note: there is a fourteen-day buffer time for QAT to recognize that the shipment receive date is in the past and for the problem to be flagged.

- **Shipments that should have been submitted by the target date**
  QAT will check the estimated shipment dates, which are calculated based on the Program's pre-defined lead times, to see if there are any shipments with an estimated "Submitted" date in the past. If the estimated shipment submitted date is in the past, it will be flagged in the QAT Problem List. For example, there is a planning unit with a target submitted date of January 15th, 2023. As this date is in the past, QAT will flag it, and the user will need to either change the shipment status to "Submitted" or change the receive date to one that is further in the future. Changing the receive date to one further in the future, will cause QAT to automatically recalculate the target shipment dates. If it is not possible to change the status or receive date, a user many 'Address' the problem (see Closing and Addressing Problems).

  Note: There is a fourteen-day buffer time for QAT to recognize that the shipment submitted date is in the past and for the problem to be flagged.

- **Dynamic forecasting is not used (for commodity groups Malaria, ARV, VMMC)**
  For any products that belong to the following tracer categories: Malaria, ARV, or VMMC, QAT will check for dynamic forecasting. GHSC-PSM encourages forecasting with dynamic monthly values, in order to show that factors, such as seasonality, program scale-up, or campaigns have been taken into account. If a planning unit from one of these three commodity groups has four consecutive months with static consumption, it will be flagged in the QAT Problem List.

- **Supply Plan does not follow minimum/maximum parameters**
  If a planning unit is overstocked, understocked or stocked out at any point during the next 18 months, it will be flagged in the QAT Problem List. QAT will count the number of months the planning unit is **overstocked and understocked**, by subdividing it in two different time windows: those months within lead time (1-6 months) and those within the planning window (7-18 months). The QAT Problem List will also denote the number of shipments being received in the next 1-6 months and the next 7-18 months. **Stock-outs** will be flagged as a separate problem in the QAT Problem List. QAT will directly state which months are stocked out in the subdivided time periods of 1-6 months and 7-18 months. The QAT Problem List will also denote the number of shipments being received in the next 1-6 months and the next 7-18 months.

  Plan by MOS: Overstocked is defined by MOS > Maximum MOS. Understocked is defined by MOS < Minimum MOS. *See below for an example of a problem and the accompanying supply plan graph:*

  > **Flagged in Feb 2021**
  > *In the next 1-6 months (Mar 21 - Aug 21), inventory is…*
  > **understocked** *for 2 month(s)*
  > **overstocked** *for 1 month(s)*
  > *In the next 7-18 months (Sep 21 - Aug 22), inventory is…*
  > **understocked** *for 0 month(s)*
  > **overstocked** *for 3 month(s)*
  >
  > **Note:** *There are 2 shipment(s) in the next 1-6 months, and there are 3 shipment(s) in the next 7-18 months.*
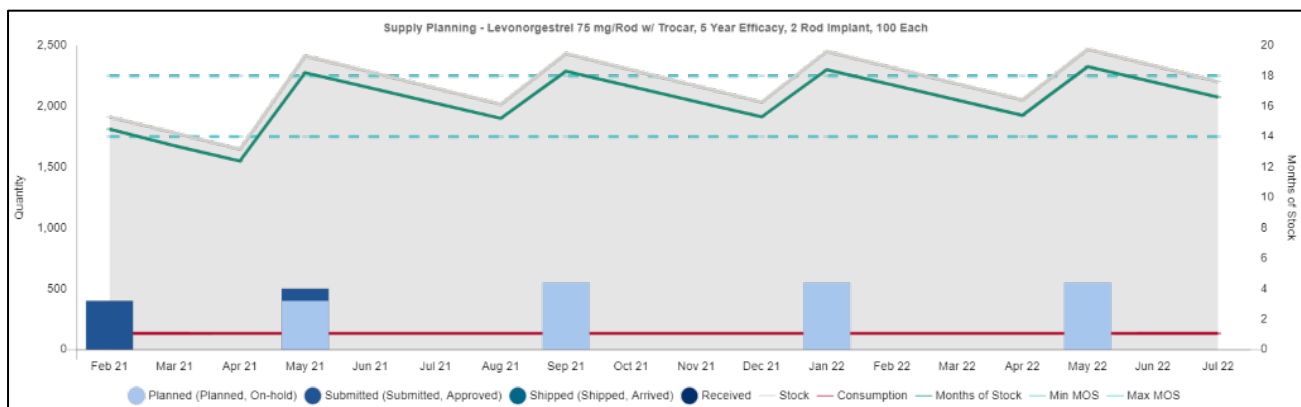
Figure 106: Supply Plan does not follow min/max MOS parameter example

  Note: *If the MOS value for a given month is "N/A", then all such instances are excluded while calculating the overstocked, understocked or stocked out problems.*

- **Plan by Quantity Example**: Overstocked is defined by Ending Balance Quantity > Maximum Quantity. Understocked is defined by Ending Balance Quantity < Minimum Quantity. Note that QAT will only flag the overstock if this overstock occurs more than distribution lead time in a row (e.g. if lead time is 2 months, then QAT flags if there is an overstock more than 2 months in a row - but won't flag the problem if the overstock every other month). *See below for an example of a problem and the accompanying supply plan graph:*

<div style="border:1px solid black; padding:10px;">

<u>Flagged in Feb 2021</u> (Distribution lead time is 1 month)

In the next 1-6 months (Mar-23 to Aug-23), inventory is…
* over the max stock qty + distribution lead time for 1 month(s)

* under the min stock qty for 0 month(s).

In the next 7-18 months (Sep-23 to Aug-24), inventory is…
* over the max stock qty + distribution lead time for 6 month(s)
* under the min stock qty for 0 month(s)

</div>
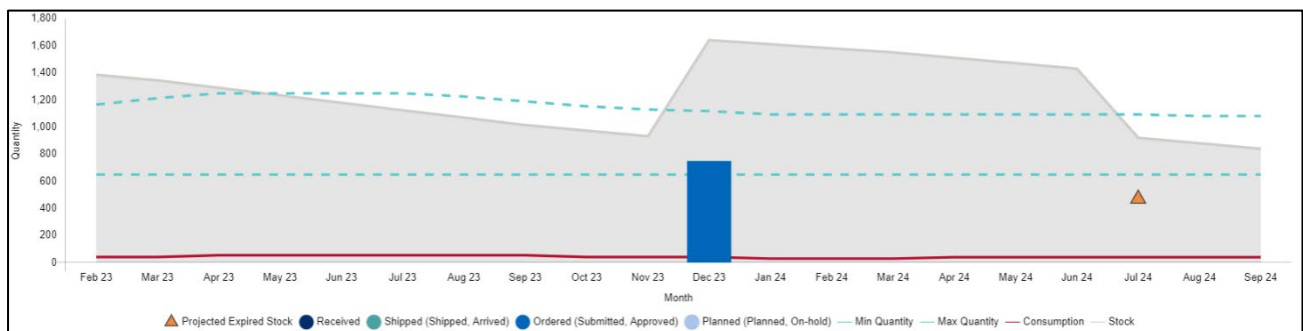
Figure 107: Supply Plan does not follow min/max quantity parameter example

- **Other – Manual**
  These are specific questions or clarifications manually entered by the supply plan reviewer that are not automatically flagged by QAT. These problems could be items that supply plan reviewer wants addressed that quarter before finalizing or a reminder for the next quarterly submission. The problem description, suggestion, and the criticality are determined by the supply plan reviewer.

II. Program Catalog

Purpose: to view a standardized list of all the planning units and forecasting units in your QAT program and their corresponding attributes.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Program Catalog
- **Notes:** A user may select all Planning Unit Categories and Tracer Categories, or they may choose a specific category for viewing. If a user would like to add a planning unit that does not appear in the Program Catalog Report, please refer to Tickets for Adding/Updating Users and Master Data.

Figure 108: Program Catalog Report

JJ. **Stock Status Reports**

JJ1. **Stock Status Over Time**

Purpose: to compare one or more products and their inventory-levels across a period time

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Stock Status → Stock Status Over Time
- **Notes:** The Planning Unit can be single, multi-select, or select all. The "Select All " option may not be advantageous if the program has many planning units, as the graph will not be able to decern the individual lines on the graph. We suggest choosing less than ten products at once. Specifically, this report can be useful to compare categories.
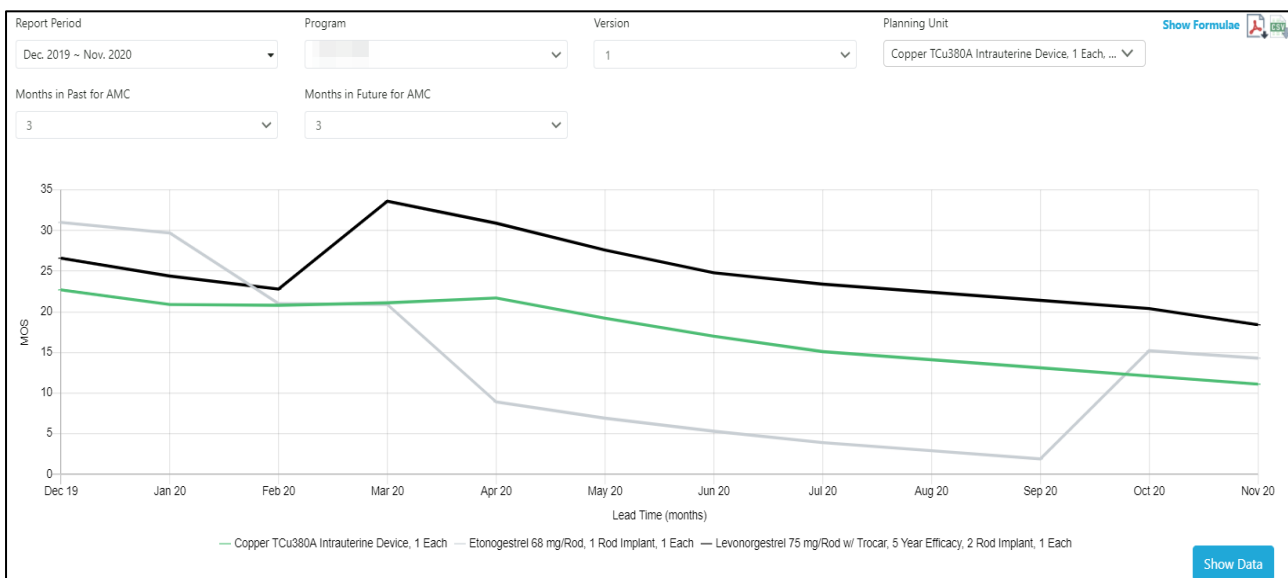
Figure 109: Stock Status Over Time Report

JJ2. **Stock Status Matrix**

Purpose: to provide a quick snapshot of the months of stock across time in an easy-to-read table format.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers and Program Users
- **Navigation:** Reports → Stock Status → Stock Status Matrix

- **Notes:**
  - One row is shown for every planning unit & year combination, based on what's selected in the top filters.
  - QAT will display the MOS or quantity for each planning unit based on whether the product is planned by quantity or MOS, as selected in the Update Planning Units screen (see Section 4.A2).
  - Colors corresponds to the stock levels during that particular month:
    - Red – Stocked Out
    - Orange – Under Stocked
    - Green – Stocked to Plan
    - Yellow – Over Stocked
    - Grey – N/A (QAT is unable to calculate the value due to missing data)
  - Although the CSVs does not export the conditionally formatted colors, the PDF contains the colors and users may copy and paste the table to keep all the colors and formatting.

Figure 110: Stock Status Snapshot Report

JJ3. **Stock Status Snapshot**

Purpose: to give a high-level view of a program's stock status across planning units at a single point in time (one month).

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Stock Status → Stock Status Snapshot
- **Notes:**
  - The various color corresponds to the stock levels during that particular month:
    - Red – Stocked Out
    - Orange – Under Stocked
    - Green – Stocked to Plan
    - Yellow – Over Stocked
    - Grey – N/A (QAT is unable to calculate the value due to missing data)

  - Although the PDF and CSV do not export the conditionally formatted colors, users may copy and paste the table to keep all the colors and formatting.

Figure 111: Stock Status Snapshot Report

JJ4. **Stock Status Snapshot (Global)**

Purpose: to give a high-level view of a program's stock status across planning units at a single point in time (one month) for multiple programs.

- **Accessible to:** Realm Admins and Report Viewers
- **Navigation:** Reports → Stock Status → Stock Status Snapshot (Global)
- **Notes:**
    - The various color corresponds to the stock levels during that particular month:
        - Red – Stocked Out
        - Orange – Under Stocked
        - Green – Stocked to Plan
        - Yellow – Over Stocked
    - Although the PDF and CSV do not export the conditionally formatted colors, users may copy and paste the table to keep all the colors and formatting.
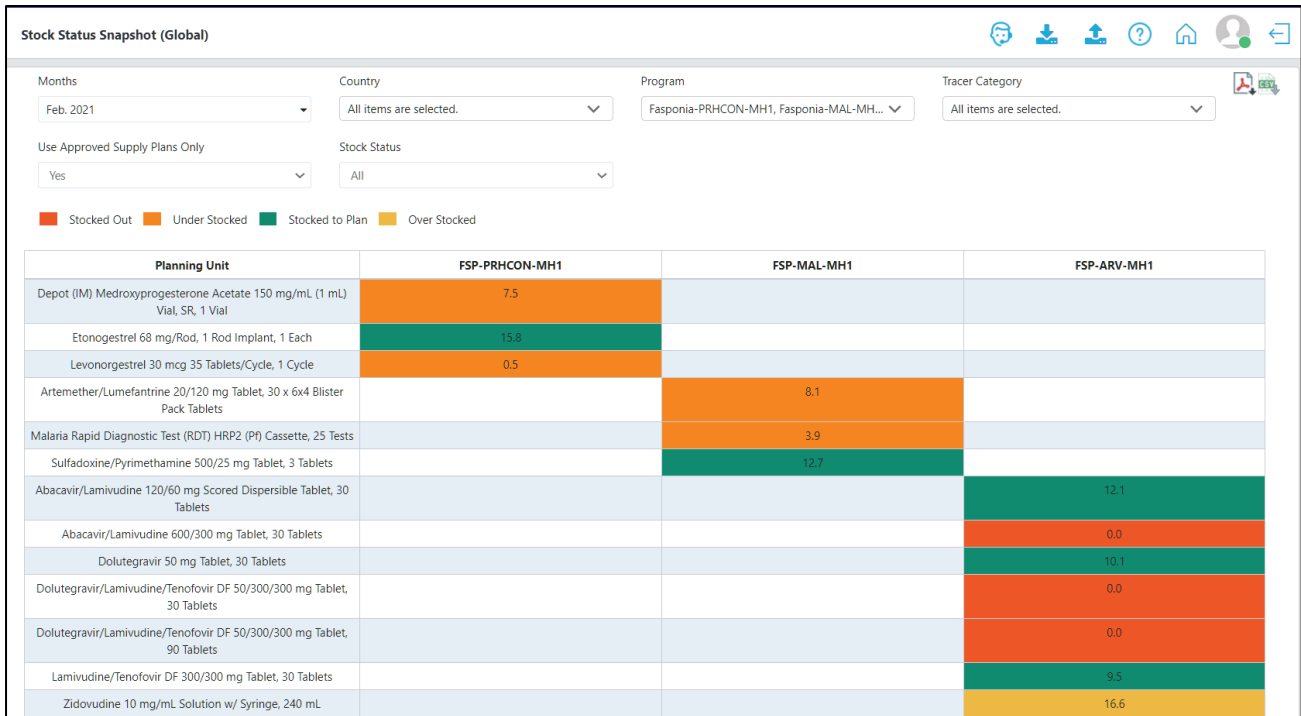
Figure 112: Stock Status Snapshot (Global) Report

KK. Consumption Reports

KK1. Consumption (Global)

Purpose: to visually show the consumption of a planning unit or multiple planning units across countries.

- **Accessible to:** Realm Admins and Report Viewers
- **Navigation:** Reports → Consumption → Consumption (Global)
- **Notes:**
  - The various colors stacked in the horizontal bars represent different countries. Users can determine which country by referencing the graph legend.
  - The x-axis corresponds to the consumption quantity (in millions) for each country.
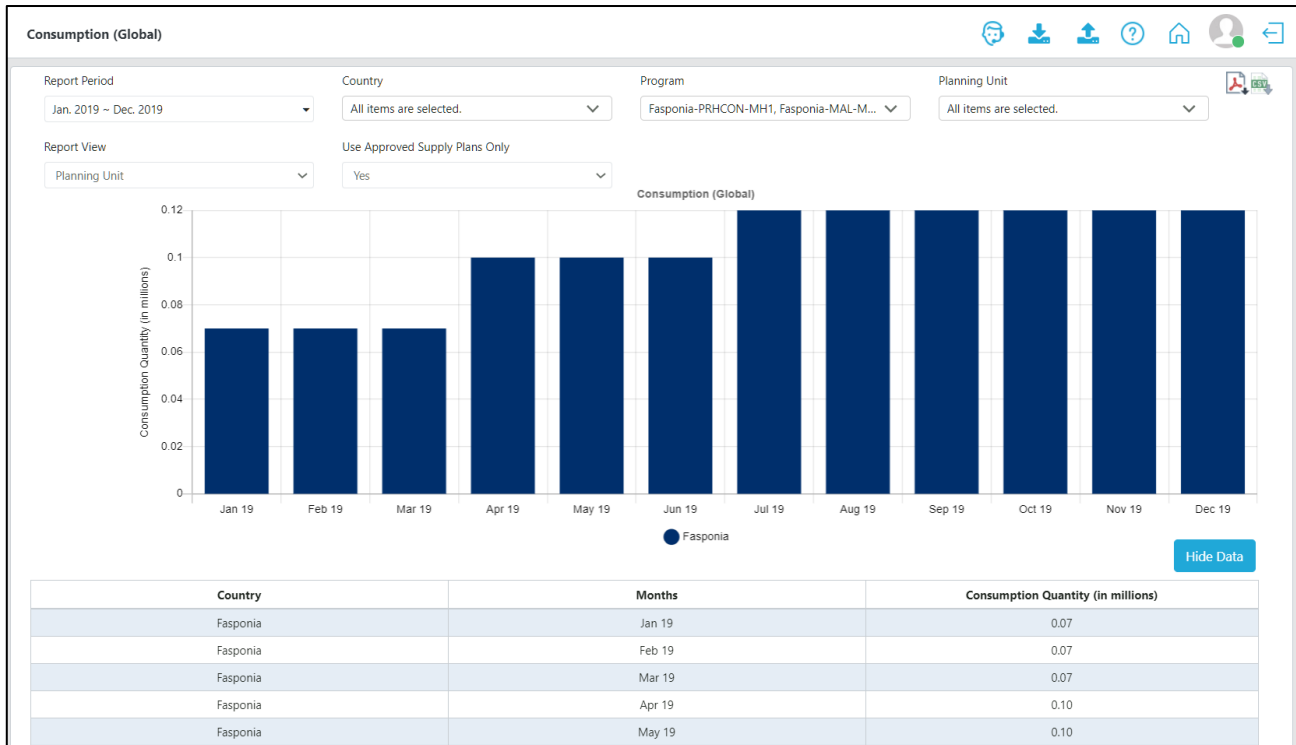
Figure 113: Consumption (Global) Report

KK2. Forecast Error (Monthly)

Purpose: to visually show forecast accuracy using the weighted average percent error (WAPE) method, over time, while viewing the forecasted consumption against the actual consumption.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Consumption → Forecast Error (Monthly)

Figure 114: Forecast Error (Monthly) Report

- **Notes:**
    o In the graph, the red vertical bars represent the actual consumption, the blue vertical bars represents the forecasted consumption, and the yellow line (which uses the right axis), represents the forecast error (see Figure 114).
    o The Report View can be viewed in multiple ways:

- **Forecasting unit.** A user may want to choose forecasting unit when comparing in base units, such as with medicines that have different bottle sizes (planning units) sharing the same forecasting unit (e.g. the antiretroviral TLD30 vs TLD90 - See Figure 116.)
        - **Equivalency Unit:** A user may want to choose forecasting unit when comparing products with different forecasting units, but some programmatic link (e.g. malaria treatments AL 6x1 vs 6x2 – see Figure 117.)
        - **"Show consumption adjusted for stock out?":** If this checkbox is checked, QAT uses the adjusted actual consumption instead of the actual consumption. QAT calculates the total days in the month based on the calendar.
    o Missing Data:
    o If data is missing for either forecasted or actual consumption, there will be a missing segment of the line or a missing bar in the graph
    o If there is missing data for actual or forecasted consumption, it will not be possible to calculate the forecast error and the user may see a gap in the line graph
    o **Formula:** Forecast Error uses the Weighted Average Percent Error (WAPE) formula. The example below uses the time windows of 6 months.
        - **Time Window:** For non-seasonal products with predictable consumption pattern, use a short time window, but consider using a longer time window for those products with a more variable consumption or those with seasonality (use a time window at least long enough to consider the entire season).
        - For more details on the logic QAT uses to calculate this report, see the "Show Formulae" in the tool.

$$\text{WAPE} = \frac{\sum_{t=1}^{n} |A_t - F_t|}{\sum_{t=1}^{n} A_t}$$

$$\text{WAPE} = \left(\frac{\begin{array}{l} Abs\,(actual\,consumption\,month\,1 - forecasted\,consumption\,month\,1\,) + Abs\,(actual\,consumption\,month\,2 \\ - forecasted\,consumption\,month\,2) + Abs\,(actual\,consumption\,month\,3 - forecasted\,consumption\,month\,3\,) \\ + Abs\,(actual\,consumption\,month\,4 - forecasted\,consumption\,month\,4\,) + Abs\,(actual\,consumption\,month\, \\ 5 - forecasted\,consumption\,month\,5\,) + Abs\,(actual\,consumption\,month\,6 - forecasted\,consumption\,month\,6\,) \end{array}}{(Sum\,of\,all\,actual\,consumption\,in\,the\,last\,6\,months)} \right)$$

Figure 115: WAPE Formula with 6 month time window as example

Figure 116: Forecast Error (Monthly) Report – displayed by forecasting unit
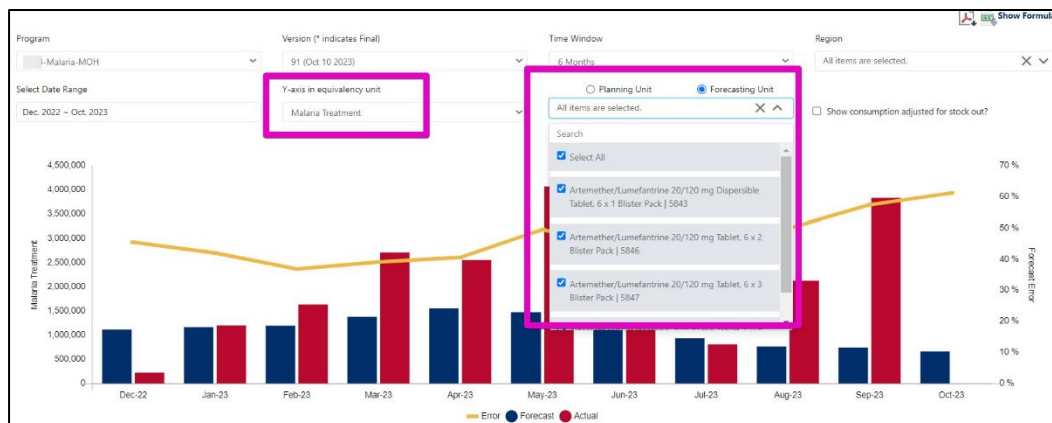
Figure 117: Forecast Error (Monthly) Report – displayed by equivalency unit

KK3. **Forecast Error (by Planning Unit)**

Purpose: to assess forecast accuracy for selected products during a specific month across countries.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Consumption → Forecast Error (by Planning Unit)
- **Notes:**
  - For the time window, non-seasonal products with predictable consumption pattern can have a short time window, but those that have a more variable consumption/those with seasons should have a long-time window, or at least long enough to consider the entire season
  - In the table, the forecast error percentages that are high (> 50% error) will be highlighted red
  - If there is missing data for actual or forecasted consumption, it will not be possible to calculate the forecast error and the user will see an error message in the table.
  - Forecast Error uses the Weighted Average Percent Error (WAPE) formula:

$$WAPE = \frac{\begin{pmatrix} Abs\,(actual\ consumption\ month\ 1 - forecasted\ consumption\ month\ 1\,) + Abs\,(actual\ consumption\ month\ 2 \\ - forecasted\ consumption\ month\ 2\,) + Abs\,(actual\ consumption\ month\ 3 - forecasted\ consumption\ month\ 3\,) \\ + Abs\,(actual\ consumption\ month\ 4 - forecasted\ consumption\ month\ 4\,) + Abs\,(actual\ consumption\ month\ 5 - forecasted\ consumption\ month\ 5\,) + Abs\,(actual\ consumption\ month\ 6 - forecasted\ consumption\ month\ 6\,) \end{pmatrix}}{(Sum\ of\ all\ actual\ consumption\ in\ the\ last\ 6\ months)}$$

1) The WAPE formula is using the previous 3-12 months of data depending on the selection in the 'Time Window' dropdown.

2) A month labeled 'Total actual consumption for last 6 months = 0' means that the summation of the actual consumption for the usable months in the selected time window was 0.

3) A month labeled 'No months in this period contain both forecast and actual consumption' means that there are no months in the selected time window that have both actual and forecast records in the same month.

4) The forecast error can go above 100% and the higher the %, the worse the forecast is.

Figure 118: WAPE Formula

Figure 119: Forecast Error (by Planning Unit) Report

LL. Shipment Reports

LL1. Shipment (Global)

Purpose: to aggregate procurement quantities by funding source, procurement agent, and procurement agent type across all countries and programs.

- **Accessible to:** Realm Admins, Program Admins/Users, and Report Viewers
- **Navigation:** Reports → Shipment → Shipments (Global)
- **Notes:**
  o The two graphs that appear first in the Shipments (Global) Report depict the aggregated quantity of shipments per country and cost of the shipments (in USD) per funding source for a single planning unit. For a tabular view of the data, the user may find details in the bottom two tables.
  o If a country does not procure the selected planning unit, it will not appear in the graph of the tables in the report.
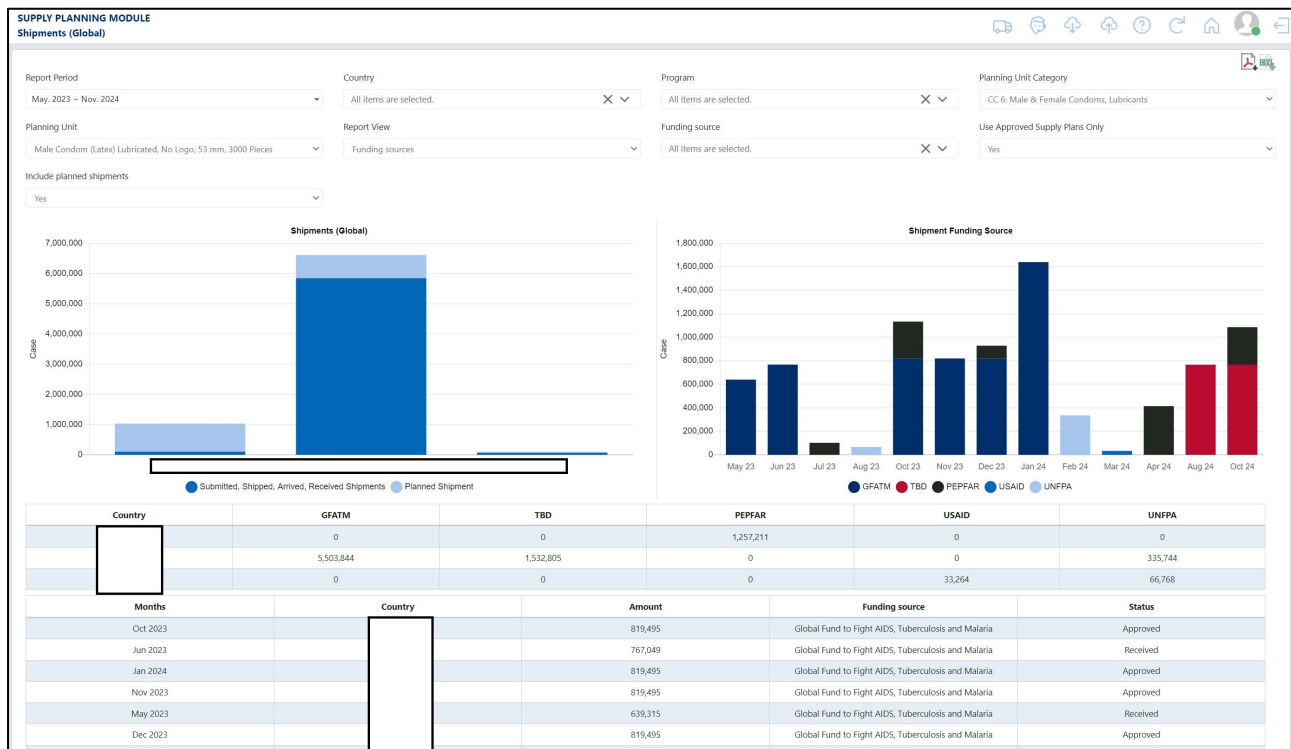
Figure 120: Shipment (Global) Report

LL2. Shipment Overview

Purpose: to aggregate procurement quantities by funding source or by procurement agent type across all countries and programs.

- **Accessible to:** Realm Admins, Program Admins/Users, and Report Viewers
- **Navigation:** Reports → Shipment → Shipment Overview
- **Notes:**
    - The two graphs that appear first in the Shipments Overview Report depict the aggregated quantity of shipments across countries and cost (in USD) of the shipments per funding source across planning units. Users may also choose to group the data by Procurement Agent Type. For a tabular view of the data, the user may find details in the bottom table.
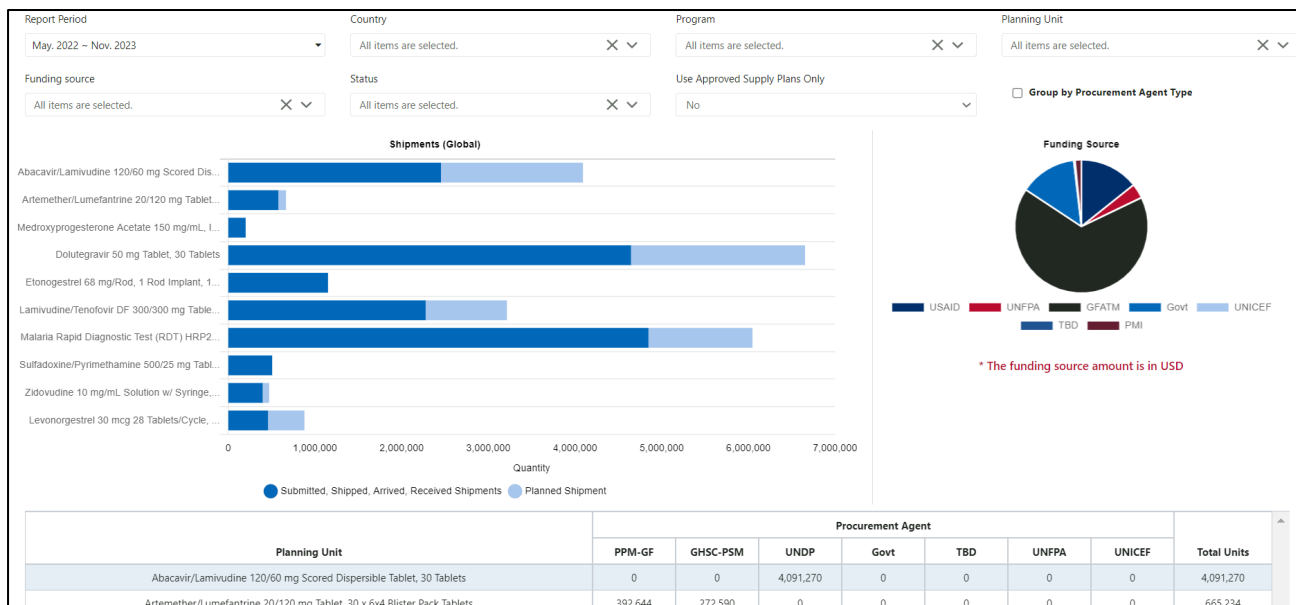
Figure 121: Shipment Overview Report

LL3. Shipment Details

Purpose: to provide a comprehensive view of all shipments for a program.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Shipment → Shipment Details
- **Notes:**
    - The top graphs shows total USD per month by shipment status
    - There are two tables below the graph: the first one provides a summary and the second one provides detailed information on shipments.
        - The summary table shows the total number of orders, and total costs per funding source, for the selected time period.
        - The detailed table contains the shipments disaggregated by planning unit, etc.
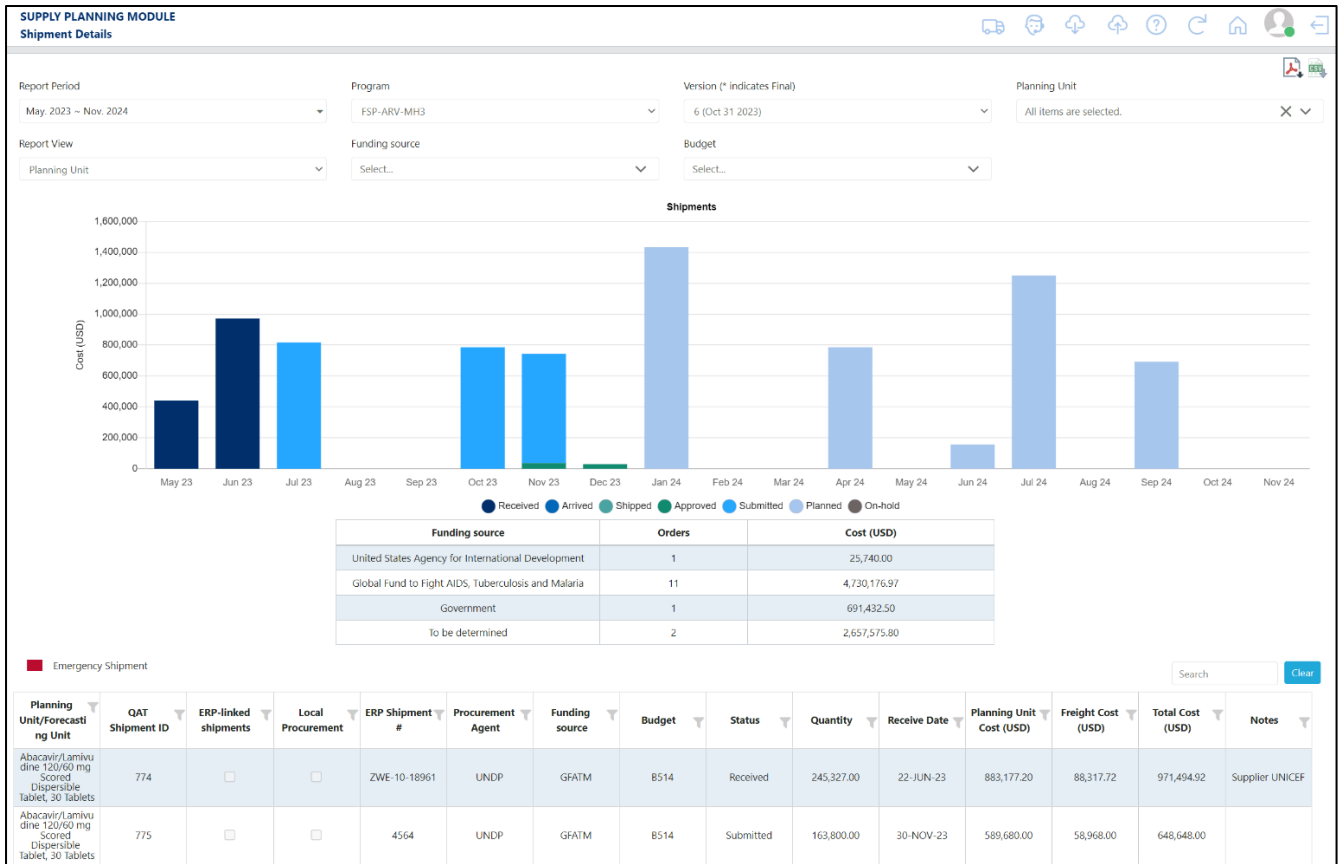
Figure 122: Shipment Details Report

LL4. Shipment Cost Details

Purpose: to provide a simple view of all shipments for a program and their total costs.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Shipment → Shipment Cost Details
- **Notes:**
    - Can be displayed by funding source, procurement agent, or planning unit.
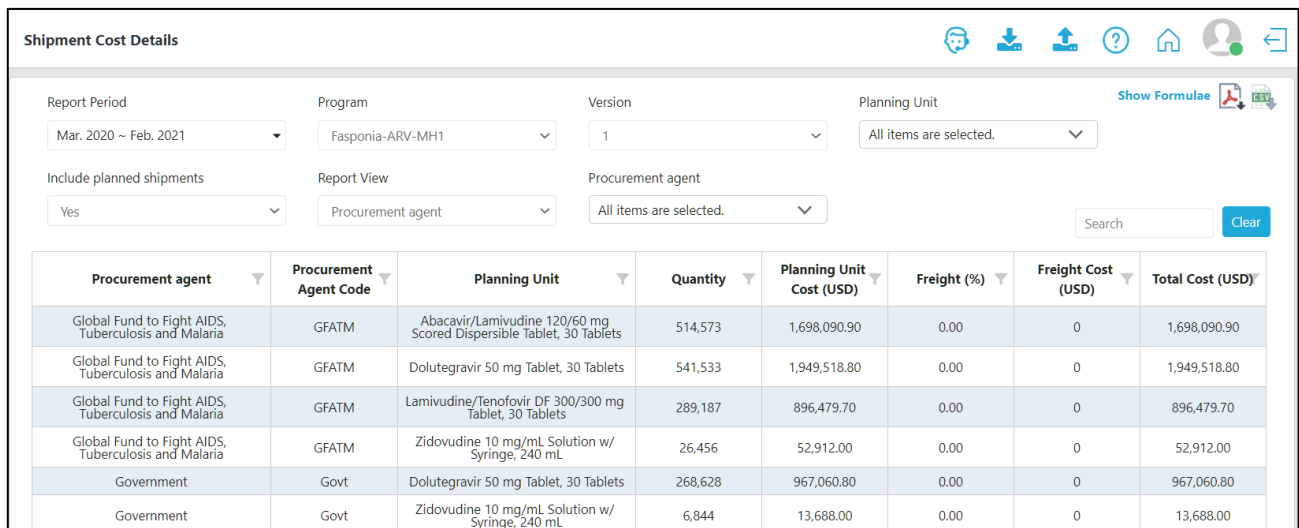
Figure 123: Shipment Cost Details Report

LL5. **Shipment Cost Overview**

Purpose: to provide a general view of the total shipment costs per calendar year for a program and planning unit, by funding source.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Shipment → Shipment Cost Overview
- **Notes:**
  - This report can only be viewed in PDF format
  - This report can be based on either the shipment receive date, or the shipment submitted date
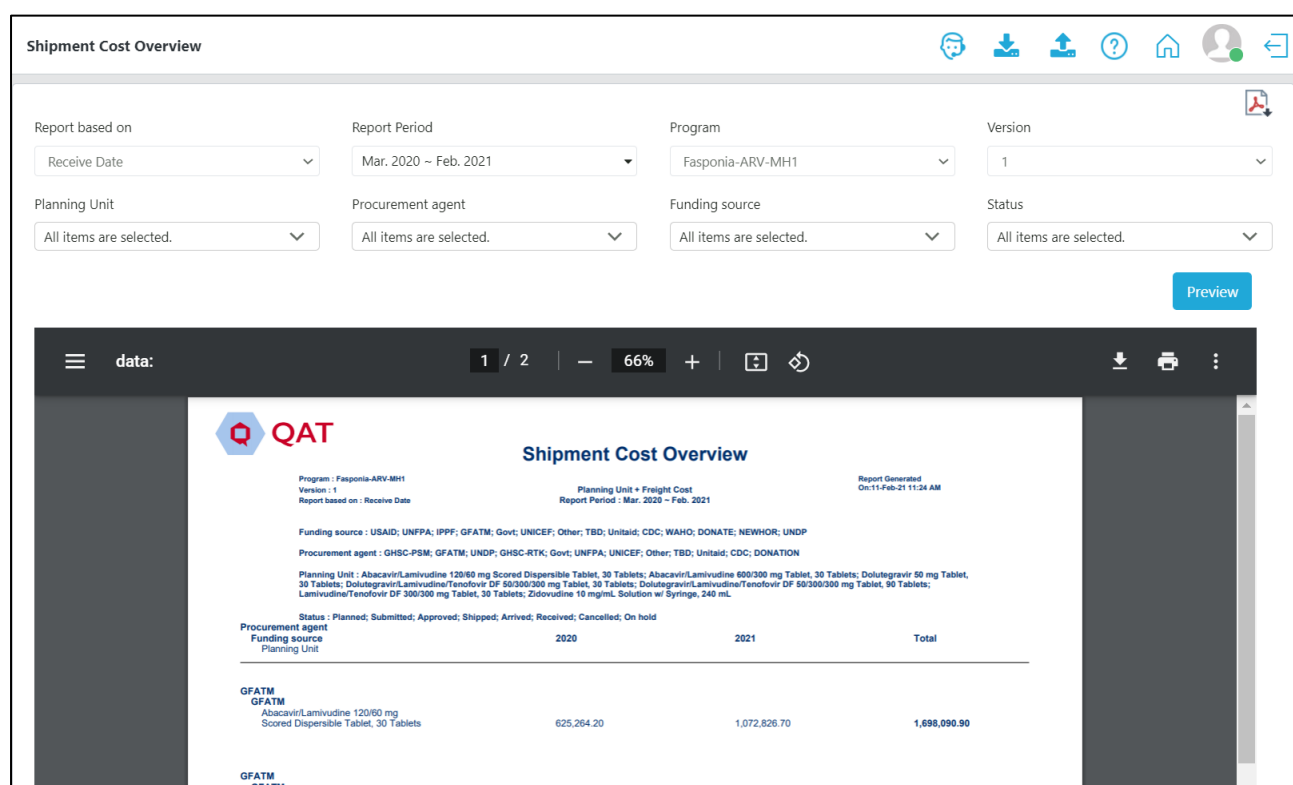
Figure 124: Shipment Cost Overview Report

LL6. **Budget**

Purpose: to show the different budgets assigned to a program(s), the amounts allocated to shipments, the amount overspent (if applicable), and estimated amounts remaining. This program dropdown in this report is multi-select since multiple programs can share the same budget.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Shipment → Budget
- **Notes:**
  - The graph shows every predefined Budget in a program and whether it is allocated to shipments (planned or ordered) and the remaining amount.
  - The tabular view of the graph also provides information on the funding source for each budget, start and end date, and other detailed information.
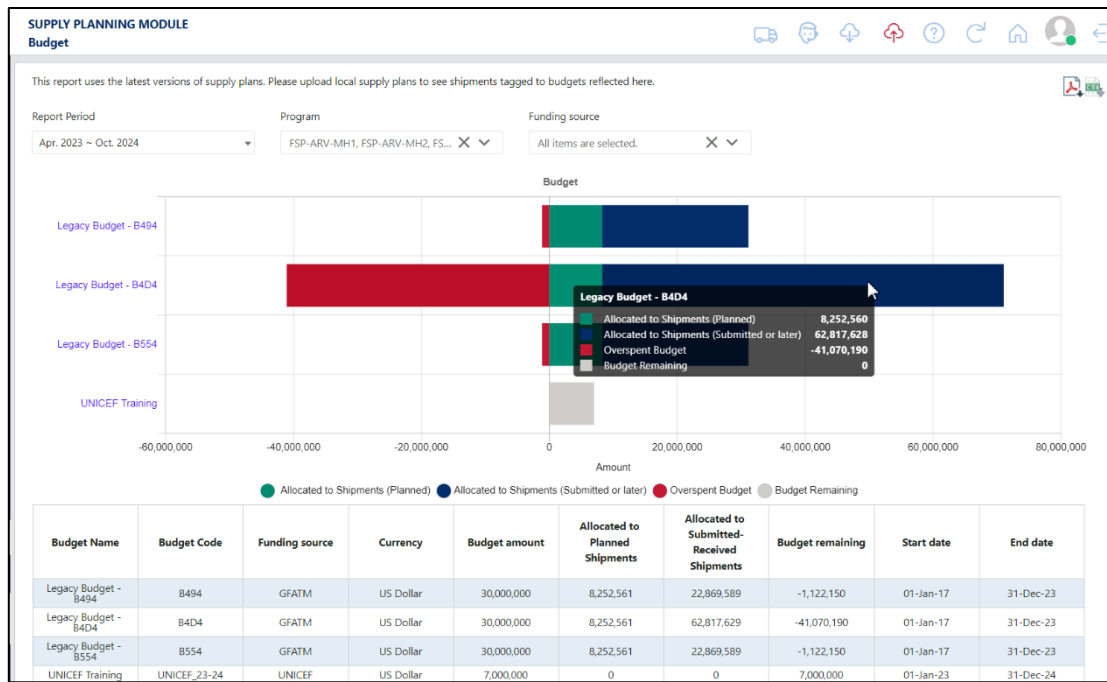
Figure 125: Budget Report

LL7. **Procurement Agent Lead Time**

Purpose: to show the detailed lead times (in months) for all planning units, by procurement agent.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Shipment → Procurement Agent Lead Time

Figure 126: Procurement Agent Lead Time Report

MM. **Inventory Reports**

MM1. **Expiries**

Purpose: to provide planners with estimated quantities of planning units expiring in the future based on batch/shelf life

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Inventory → Expiries
- **Notes:**
    - This report pulls from data previously entered by including batch information on shipments, inventory, and actual consumption, and shelf life per planning unit. It displays the batch numbers, the receive date of the batch, shelf life of that batch (or planning unit), expiry date, and cost of the expired product.
    - The report can include quantities in planned shipments expected to arrive and expiry during the selected timeframe.
    - It will calculate (based on shelf life, stock projections, and forecast consumption) how much of a particular batch is expected to expire and when.
        - For the expiry calculation, refer to **Annex 2: Business Rules**
    - The report will calculate a cost of expired product, based on the quantity expired and the planning unit default price set by the user in the Update Planning Units screen
    - The table is interactive. When the user clicks on the expired quantity, QAT will open a pop up with the batch ledger. If the user clicks on the batch number, QAT will open another browser window on the Supply Planning screen, and specifically on the batch details of the shipment that contained that batch number.

Planning Unit	Expired/Expiring Quantity	Batch Number	Auto Generated	Batch Start Date	Shelf Life (months)	Expiry Date	Total Cost
Dolutegravir 50 mg Tablet, 30 Tablets	24,632	Sh0RT-DTG	No	31-Jul-23	3	01-Oct-23	73,896
Dolutegravir 50 mg Tablet, 30 Tablets	33,724	Sh0RT-TLD2	No	30-Sep-23	5	01-Feb-24	101,172
Lamivudine/Tenofovir DF 300/300 mg Tablet, 30 Tablets	538	Sh0rt-TL1	No	03-Jul-23	4	01-Nov-23	1,555
Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	358	QAT0028890000618925 1001I8D	Yes	24-Oct-22	36	01-Oct-25	1,675

Figure 127: Expiries Report

MM2. **Cost of Inventory**

Purpose: for a selected month, provides an estimated cost of inventory based on actual or projected stock on hand and the planning unit catalog price.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Inventory → Cost of Inventory
- **Notes:**
    - The report can include quantities in planned shipments expected to arrive during the selected timeframe
    - The stock column could be based on an actual inventory or projected ending balance
    - This report uses the following formula:

Cost Of Inventory

$$Cost\ Of\ Inventory = (Ending\ Balance \times Catalog\ Price)$$

Figure 128: Cost of Inventory Formula

Cost of Inventory

Months	Program	Version	Include planned shipments
Feb. 2021	Fasponia-ARV-MH1	1	Yes

Show Formulae

Planning Unit	Stock	Actual Inventory Count	Catalog Price (USD)	Cost (USD)
Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets	769,073	No	0	0
Dolutegravir 50 mg Tablet, 30 Tablets	519,008	No	3.6	1,868,428.8
Lamivudine/Tenofovir DF 300/300 mg Tablet, 30 Tablets	200,516	No	3.1	621,599.6
Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	22,774	No	0	0
Abacavir/Lamivudine 600/300 mg Tablet, 30 Tablets	0	Yes	0	0
Dolutegravir/Lamivudine/Tenofovir DF 50/300/300 mg Tablet, 30 Tablets	0	Yes	0	0

Figure 129: Cost of Inventory Report

MM3. **Inventory Turns**

Purpose: to show the number of inventory turns per planning unit, program, country, or planning unit category at a particular point in time. Inventory turns are a way to measure the velocity of the supply plans. Inventory turnover is a key performance metric often used to signal supply chain management effectiveness. It is usually a backward looking metric, but because QAT uses forecast data to estimate stock projections into the future, the report can also be used to view estimated inventory turns based on the plans. Generally, higher turns mean a healthier supply chain – products are moving downstream and being replaced by fresh products more frequently. Low turnover implies low consumption, possibly excess inventory – it could point for instance to program targets being too ambitious.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Inventory → Inventory Turns
- **Notes:**
  - This reports calculates inventory turns at various levels: at the individual planning unit level, at an aggregate level for an entire program (multiple planning units), and at an aggregate level for an entire country (multiple programs), or commodity category.
  - Planned Inventory turns: are the possible months of stock for each month over 12 months if the inventory rules worked perfectly considering the Planning Unit's MIN and Reorder Interval.
    - At the planning unit level, the report utilizes the MIN and Reorder Interval from Planning Unit Settings to calculate the "Planned" inventory turns.
    - At the program level (multiple planning units) QAT utilizes the mode of all planned inventory turns of all Planning units under a specific program.

- At the country and/or Planning Unit Category level QAT utilizes the mode of all planned inventory turns of all Planning units under a specific country / PU Category
  - o Actual inventory turns:
    - At the planning unite level, QAT uses the following formula for each planning unit to calculate the actual inventory turns:

Figure 130: Inventory Turns Formula at the planning unit level

- For each planning unit, the report compares the actual and planned turns, and calculates the MAPE and MSE.
- To calculate the actual inventory turns at the program level, QAT will look for the mode across all planning units in that program. If no mode can be found, QAT will use the average from all planning units as that program's actual inventory turns.
- To calculate the actual inventory turns at the country (or commodity category) level, QAT will look for the mode across all programs. If no mode can be found, QAT will use the average.

Figure 131: Inventory Turns Report

MM4. **Stock Adjustment**

Purpose: to show a list of all the manually entered stock adjustments in a program. Note: automatically calculated adjustments will not display on this report.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Inventory → Stock Adjustment
- **Notes:**
  - o Automatically calculated adjustments (as a result of a difference between projected ending balance and an inventory count) do not appear in this report.

Stock Adjustment

Report Period	Program	Version	Planning Unit
Jan. 2019 ~ Dec. 2020	Fasponia-ARV-MH1	1	All items are selected.

Search | Clear

Data source	Planning Unit	Inventory Last Reported On	Stock Adjustment	Last modified by	Last modified date	Notes
None selected	Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	Mar-2019	441	Anchal C	12-Jan-21	ZADS 2917 ZAPS 5682 Warehouse 43948
None selected	Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	Sep-2019	-635	Anchal C	12-Jan-21	ZADS 7503 ZAPS 9267 W 30543
None selected	Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	Dec-2019	77	Anchal C	12-Jan-21	ZADS 6,350 ZAPS 8,621 W 28,861
None selected	Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	Jan-2020	-17,346	Anchal C	12-Jan-21	Expiry
None selected	Zidovudine 10 mg/mL Solution w/ Syringe, 240 mL	Apr-2020	-21,619	Anchal C	12-Jan-21	Potential expiry,Potential expiries from facilities

Figure 132: Stock Adjustment Report

MM5. **Warehouse Capacity (by Program)**

Purpose: displays the volume (in cubic meters) of all regions within a country (if a user enters such information upon setting up a program.

- **Accessible to:** Realm Admins, Program Admins, Report Viewers, and Program Users
- **Navigation:** Reports → Inventory → Warehouse Capacity (by Program)
- **Notes:**
  - This report is most useful for those countries with multiple regions.

Warehouse Capacity (by Program)

Country	Program
All items are selected.	Fasponia-ARV-MH1

Search | Clear

Country	Region	Program	GLN	Volume (m^3)
Fasponia	National	Fasponia-ARV-MH1		5,000,000

Figure 133: Warehouse Capacity (by Program)

MM6. **Warehouse Capacity (by Country)**

Purpose: displays the volume (in cubic meters) of all countries and regions within a country (realm-level access required).

- **Accessible to:** Realm Admins and Report Viewers
- **Navigation:** Reports → Inventory → Warehouse Capacity (by Country)
- **Notes:**
  - This report is most useful for those countries with multiple regions.

Country	Region	Volume (m^3) ↑	GLN	Status
Fasponia	National	5,000,000		Active
France	North	18,000	GLN-AAF93V421	Active
France	South	13,500	GLN-LP01149HM	Active

Figure 134: Warehouse Capacity (by Country)

Forecasting Module: Program Data

NN. **Introduction**

A forecast is an estimate/prediction of the quantities of products to be consumed/utilized by clients or consumers over a future period of time. In QAT, the forecast process is generally conducted in a specific order (see *Figure to the right*).

First, set up a program using Update Program Info or select a previous program using Download or Delete Program. After downloading the program, add information on the forecast period, threshold (%), products, and other program settings in the Update Version Settings and Updating Planning Unit screens. In QAT, users can either create forecasts by designing forecasting trees (tree-based forecast) or by leveraging historical consumption (consumption-based forecast) to reach a final forecast. For each product, choose consumption or tree methodology, or both!

Consumption-based forecasts are most useful in mature, stable programs that have a full supply of products and reliable data. This method can be the most reliable predictor of future consumption if future use is predicted to be very similar to the past. Ideally, 24+ months of monthly actual consumption data is available. If the necessary data for a

Figure 135: QAT Forecasting High-level Process Flow

consumption-based forecast is not available or not helpful in predicting future consumption, conduct a **tree-based forecast**, which flexibly accommodates all other forecast methods, such as morbidity, services, and demographic methods. Users can specify changes over time in a tree, either by directly specifying the rate of change or extrapolating from past data.

Once the various forecasts have been created, users can navigate to the Forecast Analysis and Outputs section to view and compare forecasts, and select the final forecast.

OO. **Program Information**

Purpose: Enables users to update their basic program information after initial creation.

Using this screen:
Program Admins can use the main screen to:
- Update Forecast Program Name, Program Manager, and the Notes field. Program Admins can also choose to disable or activate a program in this screen. For changes relating to the technical area, organization, or program display name, Program Admins must request the change from a Realm Admin through the [QAT Helpdesk System.](#)

Realm Admins can use the main screen to:
- Update the Technical Area, Organization, Forecast Program Name, Program Display Name, Program Manager, and the Notes field. Realm Admins can also choose to disable or activate a program in this screen.

PP. **Version Settings**

Version Notes	Date Committed	Committed by User	Forecast Start *	Forecast Period (Months)	Forecast End *	# Of Days In Month ⓘ	Freight % ⓘ	Forecast Threshold (high, %) ⓘ	Forecast Threshold (low, %) ⓘ

Purpose: Enables users to update their program settings and view details about previous versions. For viewing forecast results, use the screens in the Forecast Analysis Output section.

Using this screen:
Note: A forecast program must be downloaded to update version settings. All past versions of each forecast program will be in a read-only format; only the local version is available for updating and editing.

On this screen, users can:
1) Update the following program settings for the downloaded, local program:
   a. **Version Notes** – a free form editable text field that allows users a place to provide general notes about a particular forecast version. It is also visible and editable when uploading a program.
   b. **Date Uploaded/Uploaded by User** – denotes the user that uploaded each version of the forecast to the server and on what date. Useful for understanding the lifecycle of each program.
   c. **Forecast Start, Forecast Period (Months), and Forecast End** – based on the start & end date, QAT will automatically calculate the forecast period in months. Alternatively, users can choose to enter a forecast start date and number of months in the forecast period, and QAT will automatically calculate the forecast end date.
   d. **# Of Days in Month** – used in consumption-based forecasts for adjusting actual consumption against the number of days stocked out. A user can choose anywhere from 15 to 31 days; however, QAT will default to "calendar days." This field could be useful if a facility only wants to use business days (~20 days) to calculate the stockout rate.

   > **Stock Out Rate** = Stocked Out (days)/ (# of Days in Month).
   > **Adjusted Consumption** = Actual Consumption / Reporting Rate / (1 - Stock Out Rate)

   e. **Freight percentage** – used in forecasting output screens and reports for estimating total procurement costs. This field is not mandatory and can be updated at any time.
   a. **Forecast Threshold** – this metric is used in the Compare and Select screen. QAT compares available Consumption Forecasts and Tree Forecasts. For any Tree Forecasts, QAT will flag the percentage above the highest or below the lowest Consumption Forecast. The comparison will be highlighted in red text if it is outside of the threshold percentages set by the user in this screen. Assuming reliable actual consumption data, this comparison helps users determine if their Tree Forecasts are realistic. These two fields, high and low, are not mandatory and can be updated at any time.
2) See a historical lifecycle of each program through all its versions.
   a. View all version settings above
   b. (Right click) View the Forecast Validation screen (same screen as viewed during the Upload process) – which lists missing forecasts, missing data and all notes. This serves as an easy for users to understand previous forecasts without downloading them. Use the Monthly Forecast, Forecast Summary or Version Comparison screens to view the forecast outputs from other versions.

QQ. **Planning Units**

Purpose: Enables users to add and update planning units and the associated planning unit settings that will be used in their forecasts and for calculation in the forecast output screens.

Using this screen:

Note: A forecast program must be downloaded to add or update planning units and their settings.

1. **Add Planning Units** – Users will need to add any planning units in this screen that they would like to forecast. Planning Units can be added manually or copied and pasted from the Supply Planning module 'Update Planning Unit' screen, if the planning unit have already been added to a user's supply plan.
2. **Update Planning Unit Settings** – Users can also use this screen to update any planning units and their associated settings. Users should always Master Data Sync after updating any setting in order to see the changes take place in other forecasting module screens. Planning Unit settings and brief explanations is as follows:

Column Name	Description	Used Where?
Consumption Forecast? **Tree Forecast?**	For each PU, users can choose one or both methods. If the forecast type is checked for the PU, it will appear in the Consumption and Tree screens.	Building your forecasts and then analyzing in the Compare & Select screen
Stock on Hand *(start of forecast period)*	The actual or projected stock (quantity) at the beginning of your forecast period. Users can utilize the supply planning module to determine the SOH, if desired.	Forecast Summary to calculate the procurement gap
Existing Shipments *(forecast period)*	Total existing shipment quantity during the forecast period. Users can utilize the supply planning module to determine the existing shipment quantity (*it is recommended to not include planned shipment quantities unless there is a high likelihood of ordering*).	
Desired Months of Stock *(end of forecast period)*	The MOS you wish to have at the end of your forecast.	
Price Type	Choose a specific procurement agent or "Custom."	Forecast Summary to calculate the cost of the procurement gap
Unit Price	Auto-filled based on procurement agent or manually entered by a user.	

Table 9: Forecasting Module Planning Unit Settings

RR. **Equivalency Units**

Purpose: Enable users manage Equivalency Units. Equivalency Units (EUs) allow users to aggregate data across products that are different, but related. They allow users to group multiple forecasting units for aggregation in the Reports and Outputs.

Using this screen:
Mapping equivalency units to forecasting units
Use the main screen to manage mappings between equivalency units and forecasting units. Realm-level mappings are available to all users and are indicated by Program "Realm Level." However, program admins

can create program-specific mappings (by adding a row and tagging it to a specific EU). If there are any conflicts, program-specific mappings will take precedence and be used instead of realm-level mappings.

For example, a user is forecasting medicines to treat QATitis, a condition where people cannot stop using QAT. The user may forecast by different treatments (different forecasting units) but want to see how they are aggregated together. For the example below, a patient would need 14 tablets of FASPicillin, or 1 tube of FASPasone (cream), or 0.5 vials of FASPicaine, or 2 bars of chocolate to treat QATitis. Thus, if different patients are undergoing different treatments, a user can aggregate these different treatments by creating/using an Equivalency Unit (EU).

Equivalency Unit	Forecasting Unit	Conversion to EU	Average Treatment required to cure QATitis
1 Treatment for QATitis	1 tablet of FASPicillin	14	1 tablet a day for 2 weeks
1 Treatment for QATitis	5mL tube of FASPasone (cream)	1	0.5mL/day applied on the forehead over 10 days (1 tube total)
1 Treatment for QATitis	2mL vial of FASPicaine (injection)	0.5	One injection of 1mL (Two people can share one vial)
1 Treatment for QATitis	1 bar of white chocolate	2	2 bars of chocolate. The type of chocolate does not matter, as all chocolate contains the natural form of FASPicillin.
1 Treatment for QATitis	1 bar of dark chocolate	2	
1 Treatment for QATitis	1 bar of milk chocolate	2	

Table 10: EU Example - Treatment for QATitis

Steps to creating and managing equivalency units
1. A user should first check to see if the EU exists already in the QAT Master Data by navigating to "Realm Masters" → "Equivalency Units."
2. If the EU does not exist, click on "Manage Equivalency Unit" then "Add Row" and users can input the EU they would like to utilize for their specific program throughout QAT. This EU will be program-specific and will not be available to other programs. If there is an EU that would benefit the QAT community, users can request it via the [QAT Ticketing Helpdesk System](#).

<div align="center">

Manage Equivalency Unit

</div>

3. If the EU exists and a user would like to map forecasting units to the existing EU, they can click "Add Row" on the main screen and map the forecasting unit to the program-level EU. If a user would like to map the forecasting unit to an existing *realm-level* EU and thinks it would benefit the QAT community, users can request it via the [QAT Ticketing Helpdesk System](#).

Equivalency Unit (Name) *	Technical area *	Tracer Category *	Forecasting unit *	Unit *	Conversion To EU *	Notes	Program *	Active?
								☑
ARV Patient Months	Antiretrovirals	Adult ARV	Dolutegravir/Emtricitabine/Tenofovir AF 50/200/25 mg Tablet | 6037	Tablet	1		FSP-ARV-MH1-MWI	☑
ARV Patient Months	Antiretrovirals	Adult ARV	Dolutegravir/Lamivudine/Tenofovir DF 50/300/300 mg Tablet | 2665	Tablet	1		Realm Level	☑
ARV Patient Months	Antiretrovirals	Adult ARV	Nevirapine/Lamivudine/Zidovudine 200/150/300 mg Tablet | 209	Tablet	1		Realm Level	☑

4. Users can also edit program-specific EUs on the main screen as well.

5. User must click "Submit" when they have finished editing and Master Data Sync, in order to see the EU available from the dropdowns in the Reports and Outputs screens.

Where are equivalency units used?

- In the Forecasting Module 'Compare and Select' screen, the user can display their forecasts in EUs. Using the example above, a user that forecasts 10,000 bars of dark chocolate per month, could elect to display their forecast in the EU of "Treatments for QATitis" and display their forecast as 5,000 "Treatments for QATitis" per month instead.
- In the Forecasting Module 'Monthly Forecast' screen, the user can display their selected forecasts by individual planning units, or aggregate across planning units if they are connected by EUs. For example, if a user forecasted 10,000 bars of dark chocolate, and 10,000 bars of white chocolate and 14,000 per month, QAT would display 7,000 "Treatments for QATitis".
- In the Supply Planning Module 'Forecast Error (Monthly) Report' screen, users can also view the actual and forecasted consumption in Equivalency Units.

Forecast	Equivalent in "Treatments for QATitis"
10,000 bars of dark chocolate	5,000
10,000 bars of white chocolate	5,000
14,000 tablets of FASPicillin	1,000
Total	**7,000**

Forecasting Module: Forecasting

SS. Consumption Forecasts

Consumption-based forecasts, which are based on historical consumption data are most useful in mature, stable programs that have a full supply of planning units and reliable data. This method can be the most reliable predictor of future consumption if the future use is predicted to be very similar to the past. Thus, a user must be able to extrapolate historical data (ideally, 24+ months of monthly actual consumption data is available) and the data must be a series of data over time (i.e. actual <u>adjusted monthly</u> consumption).

There are four basic components for a consumption forecast:

$$Forecast \cong Base + Trend + Season + Random$$

Different extrapolation models will utilize different statistical methods to estimate these different components and produce a forecast. In QAT, users will follow three steps to produce a consumption-based forecast:

1. **Import/input** actual consumption data. This can be done by importing data from the QAT Supply Planning module or inputting data manually.
2. **Adjust** actual consumption data by adding reporting rate and stockouts, and/or interpolating missing data.
3. **Extrapolate** actual consumption data to produce a forecast. QAT has five different extrapolation methods to choose from: Moving Averages, Semi-Averages, Linear Regression, Triple Exponential Smoothing (TES, Holt-Winters), and Auto-Regressive Integrated Moving Average (ARIMA).

SS1. Import/Inputting Actuals

There are two ways a user can add actual consumption data to their program:

1. Importing actual consumption data from an existing program in the QAT Supply Planning module, or
2. Manually input data in the "Data Entry and Adjustments" screen in the QAT Forecasting module

Steps for Importing Data from the QAT Supply Planning module:

1. Navigate to the "Consumption-Based Forecast" → "Import from QAT Supply Plan" screen
2. Choose the existing Supply Plan Program, Version, Forecast Program, and Range of Actual Consumption data to import. *Note: only forecast programs that have been **downloaded** to the user's local computer will be available in the dropdown for "Forecast Program." See Download/Delete Program for how to download a program to the local computer.*
3. Users will then map the Supply Plan Planning Unit to the Forecasting Planning Unit. *Note: only planning units that have been added to the Forecast Program in the "Update Planning Units" screen will be available in the dropdown for "Forecast Planning Unit." See Forecasting Module Planning Units for how to add planning units to a forecast program.*

Figure 136: Step 1 for Importing Actual Consumption Data from the Supply Planning Module

4. Users choose which region should be imported into the forecast program.

Figure 137: Step 2 for Importing Actual Consumption Data from the Supply Planning Module

5. The last step will allow users to double-check the supply plan actual consumption data to make sure they are importing the correct unit of measure and months of data. If the data already exists in the forecast program, it will be <mark>highlighted yellow</mark>. If a user imports data that is highlighted yellow, this new import will override the data that already exists in the forecast program. Users can manually

uncheck the months of data not to import, if desired.

Figure 138: Step 3 for Importing Actual Consumption Data from the Supply Planning Module

6. Click "Import."

Steps for Inputting Actual Consumption Data Manually

1. Navigate to the "Consumption-Based Forecast" → "Data Entry and Adjustments" screen.
2. Select the forecast program and the desired review period. By default, QAT pre-selects a date range of 36 months prior to the start of the forecasting period. A non-editable table and all products related to this forecast program are displayed, along with their adjusted consumption data if you have previously entered that data; otherwise, you will see yellow cells indicating that no consumption data has been entered. By default, the products and consumption are shown in planning units. The user can also expand each row of the table to display the consumption by region, if managing a multi-region program.

Figure 139: Top Table in Data Entry & Adjustments Screen

3. On the top table, click on a planning unit to display the detailed data table below for that planning unit. The detailed data table will have a section for each region in your program.
4. The detailed data table allows users to add, edit, adjust, or delete historical consumption records.
   a. If you would like to enter data manually, enter the historical consumption for each region and month in the 'Actual Consumption' row.
   b. If you have imported data from QAT, you will see your imported historical consumption in the 'Actual Consumption' row.

Figure 140: Manual Data Entry Table for Actual Consumption

    c.   By default, data is assumed to be entered in the Planning Unit. However, the user can specify the appropriate unit for the detailed data by clicking on the "change" link under the Planning Unit name and in the subsequent pop-up, choosing to enter data using the planning unit, the forecasting unit quantities (applying a realm-managed conversion factor) or another user-entered unit (and conversion factor).

Figure 141: Button for Changing How Data is Manually Entered for Actual Consumption

Figure 142: Pop-up for Choosing How Data is Entered

5.   Once a user enters data in the "Actual Consumption" row in the bottom data table, click "Submit" in order to save the entries and visualize them in the graph.

    a.   Users can also copy & paste data from an excel or other tabular formats into the "Actual Consumption" row.
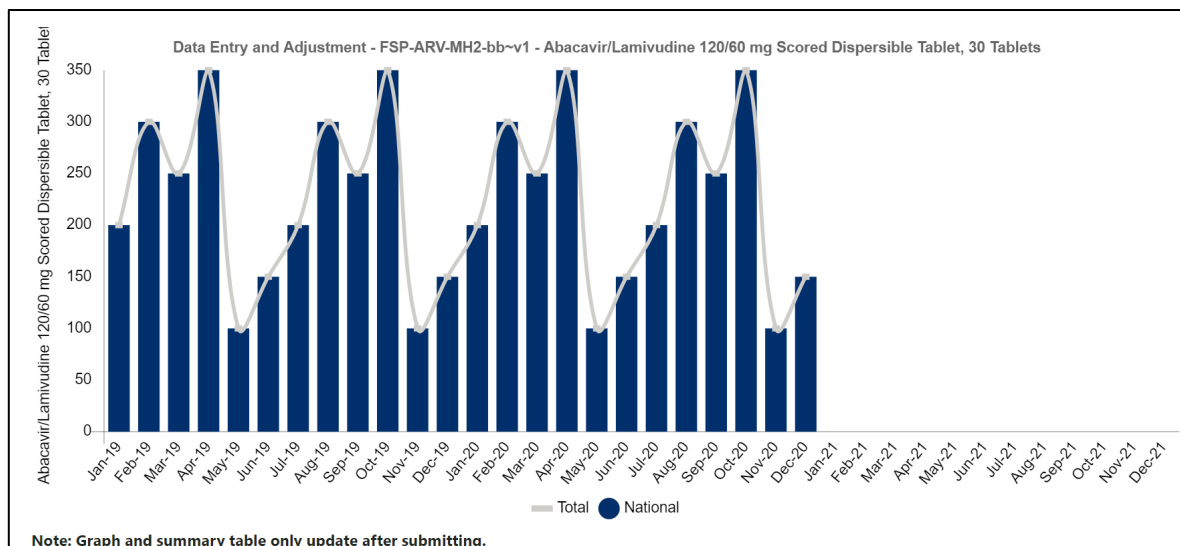
Figure 143: Graphical Display of Manually Entered Actual Consumption Data

SS2. **Adjustments**

Purpose: Enable users to prepare historical consumption data before moving on to the 'Extrapolation' screen. Historical actual consumption can be quantities sold, quantities dispensed to user, or quantities issued by storage facilities. On this screen, users can adjust historical consumption data that has been either manually entered on this screen or that has been imported from a QAT supply plan program (if you desire to import, please proceed first to the 'Import from QAT Supply Plan' screen).

Using this screen:
1. There are three ways to adjust the data:
    a. **Adjust for under-reporting**: The default value is 100% reporting every month. The user can change this to the correct value. QAT will calculate the adjusted consumption due to underreporting. The calculation assumes that facilities that did not report any consumption had the same consumption rate as the ones that did.

    b. **Adjust for stockouts**: For imported data, the number of stockout days is pulled in from the QAT supply plan program, if data is collected. The default value for stock out days is zero days (product assumed always in stock). The user can change this to the correct value and QAT will calculated the adjusted consumption due to stockouts. The calculation assumes that the days the product was stocked out would have had the same consumption rate as the rest of the time the product was in stock. The default value for number of days in a month are based on the calendar days, but users can adjust the number of days used for the stock out calculation in 'Update Version Settings'.

    Stock Out Rate = *Stocked Out (days)/ (# of Days in Month).*
    Adjusted Consumption = *Actual Consumption / Reporting Rate / (1 – Stock Out Rate)*

    For example, for a given month, a product had a consumption of 1,000 units, was out-of-stock for 5 out of 31 days in the month and the reporting rate was 98%:
    Stock Out Rate = *5 days stocked out / 31 days in a month = 16.1%.*
    Adjusted Consumption = *1,000 units / 98% Reporting / (1 – 16.1%) = 1,217 units.*

    c. **Adjust for missing values**: Click the green 'Interpolate' button in the middle right of the screen to search for periods where the consumption value is blank and replace them with an

interpolated value. QAT interpolates by finding the nearest values on either side (before or after the blank), calculates the straight line in between them and uses that straight-line formula to calculate the value for the blank(s). Note that QAT will not interpolate for months where actual consumption is zero. QAT will only interpolate if there is at least one data point before and one data point after the blank value(s). Mathematically:

- Where x's represent months, and y's represent actual consumption,
- Where known data values are (x_0 , y_0) and (x_1 , y_1)
- Where any unknown data values are (x, y)
- The formula for the interpolated line is

$$y = y_0 + (x - x_0)\frac{y_1 - y_0}{x_1 - x_0}$$
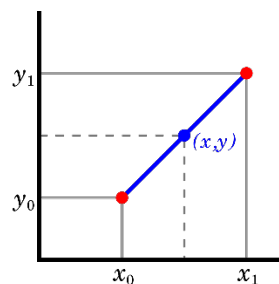
2. Use Detailed Data table to review the adjusted consumption
3. Click 'Submit' to save any entered/adjusted data. Once the adjustments are saved, the Graph will update (note that it is required to click Submit for this to happen)
4. Repeat steps 1-3 for each planning unit that needs to be adjusted.

SS3. **Extrapolation**

Purpose: Enable users to create a forecast by identifying trends and seasons from historical time series data entered by the user in the 'Data Entry and Adjustment' screen. Several statistical extrapolation options are available and will be described below. Extrapolations from consumption data are made on a planning unit-by-planning unit basis.

Using this screen:
1) **Getting started on extrapolation:**
   - Before you use this screen, please ensure you have completed the 'Data Entry and Adjustment' screen for each planning unit and region you would like to extrapolate
   - Use the filters at the top of this screen to select the planning unit, region to extrapolate, and date range for historical data to utilize.
   - The user may select one -or several of the extrapolation methods available in QAT, as appropriate to the general consumption pattern and available data, as will be discussed below. See sections 2-4 below for an explanation of the extrapolation methods and how to best choose methods for your forecast.
   - Note that changes in this screen are optional – QAT automatically applies the default extrapolation parameters to all planning units after the Adjustments screen has been completed. The user then makes the final forecast selection in the 'Compare and select' screen.

2) **Extrapolation methods available in QAT**
   Forecast methods in QAT are organized from simple to sophisticated.

a. **Moving Average:** Moving average is an average that moves along time, dropping older data as it incorporates newer data. For QAT to calculate the moving average, enter the number months in the past that you would like to use in the calculation of the average. The user may select any positive integer for this field. Entering 5 for example would mean that the projection for the next month in the series would be the average of the preceding five months' consumption. This method is most useful for short-term forecasts and is sensitive to trends. It is not appropriate for seasonal data

b. **Semi-Averages:** Semi-average estimates trends based on two halves of a series. QAT divides the actual data into two equal parts (halves) and the arithmetic mean of the values of each part (half) is calculated as the 'y' values of two points on a line. The slope of the trend line is determined by the difference between these 'y' values over time as defined by the difference of the midpoints of the two halves of the series, or 'x' values, of the points. This method is sensitive to trends and useful for short- and medium-term forecasts but is not appropriate for seasonal data.

c. **Linear Regression:** Linear regression models the relationship between two variables by fitting a linear equation to observed data. Confidence interval: between 0% and 100% (exclusive) e.g., 90% confidence level indicates 90% of possible future points are to fall within this radius from prediction represented by the regression line. This method is not appropriate for seasonal data.

d. **Triple Exponential Smoothing (Holt-Winters)**: In statistics, different types of smoothing are used to filter out the noise so that we can see patterns in a time series dataset more clearly. Exponential smoothing uses older data at exponentially decreasing weights over time. Smoothing parameters in exponential smoothing are set between 0 and 1, with values close to 1 favoring recent values and values close to 0 favoring older values. Users utilizing triple exponential smoothing can choose from four parameters:
   - **alpha**, applies to the level or baseline of the dataset. Higher alpha values give more weight to the more recent data
   - **beta,** determines how strongly recent trends should be valued as compared to older trends
   - **gamma,** reflects the seasonal component of the forecast. Seasonal generally refers to repeating patterns *within a year*. The higher the gamma, the more weight will be applied to the most recent seasonal component of the data.
   - **Confidence interval:** between 0% and 100% (exclusive) e.g. 90% confidence level indicates 90% of future points are to fall within this radius from prediction.

e. **ARIMA:** ARIMA or autoregressive integrated moving average enables two statistical models designed for stationary time series to be integrated and applied to non-stationary time series, that is, time series that have trends or seasons. It is often applied to short term forecasts. "Auto-regressive" means each point in the regression is influenced by its previous values and "moving average" implies that each point is an average, a linear combination of one or more adjacent points. Both the auto-regression and the moving average are "integrated" together to fit a best model for the series through differencing, or literally using the difference between points on a time series for the analysis instead of the raw values. ARIMA models have three parameters:
   - p or AR (lag order): the number of lag observations in the model
   - d or I (degree of differencing): the number of times that the raw observations are differenced. This value is normally 1 (if there is a trend) or 0 (no trend). Other higher values are possible but not expected.

- q or MA (order of the moving average): the size of the moving average window or the number of differenced observations to be averaged.
- QAT's default values for ARIMA parameters are p = 0, d = 1, q = 1.
- Confidence interval: between 0% and 100% (exclusive) e.g. 90% confidence level indicates 90% of future points are to fall within this radius from prediction.

3) Which extrapolation method should I use?
Below are some considerations for selecting a forecast method. Forecast methods in QAT are organized from simple to sophisticated. In general,
- More sophisticated models are more sensitive to problems in the data
- If you have poorer data (missing data points, variable reporting rates, <12 months of data), simpler forecast methods are likely more useful.

The choice of extrapolation method depends on the expected pattern in the data. Some typical patterns include:
- Stationary, where the range of observed values over time hover around an average. Models applied to such datasets may include
  - Moving Average
  - ARIMA
- Trending with no seasonal component, where the observed values have an increasing or decreasing trend. Models applied to such datasets may include
  - Semi-averages
  - Linear Regression
- Trending and Seasonal, where the observed values in a dataset have both trend and seasonal components. Models applied to such datasets may include
  - ARIMA
  - Triple Exponential Smoothing (Holt-Winters)
- Seasonal without trend, where the observed values have a seasonal component but no trend. Models applied to such datasets may include
  - Triple Exponential Smoothing (Holt-Winters)

The models suggested here are neither exhaustive nor exclusive. QAT enables the user to apply a variety of extrapolation methods and then to compare them using best fit or forecast error metrics.

The second step is to consider whether the forecast values are expected to reflect closely the historical patterns in your data and so whether you will use the error metrics to inform your selection. When choosing an output, (whether by disregarding the error metric or not) it will be important to document your rationale for doing so to inform discussions or reviews of your forecast and to help future forecasters to support their decisions.

4) How do I interpret errors? [1]
QAT automatically calculates forecast error metrics using several methods. These include:
- MAPE (Mean Absolute Percentage Error): can be interpreted as the average percentage difference between predictions and their intended targets in the dataset. For example, if MAPE is 15% then your predictions are on average 15% away from the actual values.
  - *MAPE = [(1/No. of Observations) * ∑ (|(actual – forecast)|/actual)] x 100*

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[1] https://stephenallwright.com/mse-vs-mae/; https://www.obviously.ai/post/introducing-wape

- WAPE (Weighted Absolute Percentage Error): WAPE is an appropriate metric for when the dataset used has low or intermittent values. A WAPE percentage of 5 means that the forecast was off by 5% over the entire dataset for a certain evaluation period. Depending on the use case, it is recommended to choose a model that gives the least WAPE value.
    - *WAPE = [($\sum^n$ | (actual – forecast) | / $\sum^n$ (actuals)] x 100*

- RMSE (Root Mean Squared Error): RMSE can be interpreted as the average error that the model's predictions have in comparison with the actual, with extra weight added to larger prediction errors. Generally, the closer RMSE is to zero, the more accurate the model.
    - *RMSE = sqrt [$\sum^n$ (actual – forecast)^2] / No. of observations*

- MSE (Mean Squared Error): MSE is the aggregated mean of the squared difference between the actuals and predictions. Large errors are highlighted due to this squaring. MSE is useful when working on models where occasional large errors must be minimized. Generally, the closer it is to 0, the more accurate the model.
    - *MSE = $\sum^n$ [(actual – forecast)^2] / No. of Observations)*

- R^2 (the squared correlation between the dependent variable and the fitted values): R^2 = 1 – [sum squared regression (SSR) / total sum of squares (SST)], where the sum squared of the residuals for the regression (SSR) is the sum of its residuals squared, and the total sum of squares (SST) is the sum of the distance the data is away from the mean, all squared. The R^2 value is always a number between 0 and 1. R^2 is a measure the fit of a regression line to a series of historical observations with values closer to 1 indicating a stronger correspondence between the actual and predicted (regression model) values. It is not a measure of error and should not be used by itself to assess the fitness of a prediction, but in combination with other error metrics and the user's knowledge of the program.
    - *R^2 = 1 – [sum squared regression (SSR) / total sum of squares (SST)]*

Apart from R^2 the lower the score, the more closely the forecast method result fits the historical data. In models where historical patterns in a data set are expected to be reflected in the future values, a low error value could be used to help select a preferred extrapolation method, and QAT will highlight these best fits in a table. However, if substantial changes which do not fit the historical data are anticipated, the best fit extrapolation may not be the most appropriate forecast to select.

To make the best selection between extrapolation methods for your purpose, before reviewing error metrics, the most important thing is first understanding which method of extrapolation is most appropriate for the expected pattern in the data.

TT. **Tree Forecasts**

Users can conduct a tree-based forecast if the necessary data for a consumption-based forecast is not available or not helpful in predicting future consumption. Tree forecasts flexibly accommodate all other forecast methods, such as **morbidity, services, and demographic methods**. Users can specify changes over time in a tree, either by directly specifying the rate of change or extrapolating from past data.

TT1. **Building a Tree**

Purpose: Enable users to:
1. View a list of their existing trees
2. Edit an existing tree by clicking any row
3. Delete or duplicate existing trees by right clicking on a row

- Users may also duplicate an existing tree to another program. Users must have access to both programs and have both downloaded to their local computer to duplicate across.

4. Add a new tree to a downloaded program by clicking on the 'Create or Select' dropdown in the top right corner of the screen. New trees can be built:
   - manually - select '+ Draw Your Own Tree'
   - from a tree template - select the name of the desired template. If a user would like to see a tree template added to QAT that does not exists and it would benefit the QAT community, they can submit a change request to the QAT Ticketing Helpdesk System.

Note: Forecast Viewers can view any tree that has been uploaded to the server and they have access to; however, only Forecast Users/Admins will be able to create and edit/update trees.

Using this screen:
- A forecast program must first be downloaded in order to build a tree (either manually or from a tree template).
- Before building and editing a tree, first add the forecast program's planning units in the 'Update Planning Units' screen.
- Building a tree similar to an existing tree? Duplicate an existing tree by right clicking on a row and selecting "Duplicate Tree." Instead, if a user wants to keep the structure of the tree constant and only change the numbers, build only one tree, and use the scenario feature instead.
- Building a tree similar to an existing tree in a *different* program? Duplicate an existing tree to a *different* program by right clicking on a row and selecting "Duplicate Tree."
- Want to start from a template instead? See Tree Template section
- Users can also delete trees by right clicking on a row and selecting "Delete Tree."

a. Node Types & Functions

Building the Tree: The forecast tree is built from the top down, using different types of "nodes". See the Node Types and Node Actions below. Each forecast tree must start with either an Aggregation node or a Number node, and include one or more Planning Unit nodes, which form the forecast output.

Node Actions:
- 🗑 Delete: Deletes the selected node and all its children.
- 🗐 Copy: Copies the selected node and all its children. QAT will add the copied node to the same parent, but to the right-side of the original.
- 🔗 Branch Template: Adds a tree template as a branch below the chosen node.
- ➕ Add: Adds a child to the selected node.
- 🔽/◀ Collapse/Expand: Collapse/Expands the current node and all it's children. Users can also hover over the dot to choose which node to expand and click once to expand that node and all it's children. Additionally, there is a "Collapse Tree" checkbox at the top of the Build Tree screen that will collapse every node except for the top node.
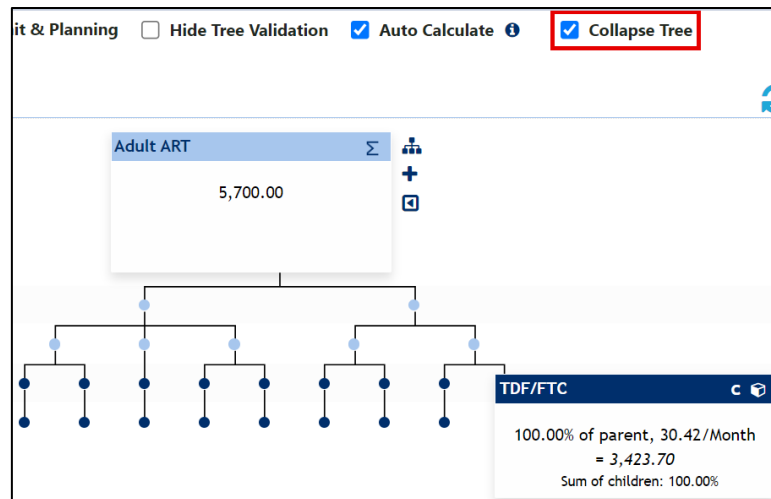
Figure 144: Example of a Collapsed Forecasting Tree

Node Types:

Node Type	Value	Potential Children	Advanced Functionality
Aggregation ∑	Sum of children nodes.	∑ or Number	-
Number #	Defined at this node	% or 📦	↕, 🔗, 📈
Percentage %	Defined as a percentage of the parent.	% or 📦	↕, 🔗
Forecasting Unit 📦	Defined as a percentage of the parent and forecasting unit parameters. Can be two different use types: ○ **C**: Continuous ○ **d**: Discrete	🔗	↕, 🔗
Planning Unit 🔗	Defined as a percentage of the parent and planning unit parameters.	-	↕, 🔗

- ∑ **Aggregation node-specific attributes:** none – it is defined by the sum of its children. *For example, if there are two children nodes below the Aggregation node equal to 50 and 100, QAT would automatically add these numbers to define the Aggregation node: 50 (child) + 100 (child) = 150 (Aggregation parent).*
- **# Number node-specific attributes:**
  - Node Unit: dropdown consisting of either patient, client, customer, people, or unit
  - Month: choose the month/year this data was reported from. *For example, if a user wants to define a number node as Country Population and the data is from January 2020, the node month should be Jan. 2020.*
  - Node Value: Define the number value for this node. *For example, if the Country Population in January 2020 is 500,000, the node value should be 500,000.* If this value changes over time, users can utilize the Modeling/Transfer tab to specify the change.
- **% Percentage node-specific attributes:**
  - Node Unit: dropdown consisting of either patient, client, customer, people, or unit
  - Month: choose the month/year this data was reported from. Typically, this will be the start month/year of the forecast.
  - Percentage of Parent: define the percentage of the parent node. *For example, if half of the parent number node, Country Population, are female, the percentage of parent would be 50%.*
  - Parent Value for Month: non-editable and provided only as a reference.

- o <u>Node Value</u>**:** auto-calculated by QAT based on the percentage defined by the user and the parent value. This field is non-editable.
- 🎲 **Forecasting Unit node-specific attributes:**
  - o <u>Month:</u> choose the month/year this data was reported from. Typically, this will be the start month/year of the forecast.
  - o <u>Percentage of Parent:</u> define the percentage of the parent node.
  - o <u>Parent Value for Month:</u> non-editable and provided only as a reference.
  - o <u>Percentage of Parent Value for Month:</u> non-editable and provided only as a reference.
  - o <u>Tracer Category:</u> dropdown that can be used to help narrow-down forecasting units, but will be auto-filled once the forecasting unit is chosen.
  - o <u>Copy from Template:</u> advanced functionality, in which a user can utilize a Usage Template to assist with building a tree efficiently. This dropdown is not required.
  - o <u>Forecasting Unit:</u> dropdown of all available forecasting unit in user program. If a forecasting unit is not available in the dropdown, user should first add it to the 'Update Planning Unit' screen.
  - o <u>Planning Unit:</u> dropdown filtered based on forecasting unit chosen. If there is only one planning unit associated with the forecasting unit, this field will automatically be pre-filled.
  - o <u>Type of Use:</u>
    - 🇩 Discrete: Every _____ [parent node unit] requires _____ [forecasting unit of measure] _____ times per [day/week/month/year] for _____ [day/week/month/year]
      - o <u>Single Use:</u> allows user to determine if this forecasting unit is used over a specific period of time. If "yes" is selected, the length of time for discrete calculations is not needed.
    - 🇨 Continuous: Every _____ [parent node unit] requires _____ [forecasting unit of measure] every _____ [day/week/month/year]
  - o <u>Lag in months:</u> used to detail if a forecasting unit is delayed or has a phased-product usage. See Advanced Techniques for more information.
- 🔀 **Planning Unit node-specific attributes:** node automatically created when the forecasting unit is added to a tree. Most attributes in the add/edit node screen are non-editable and only for reference; however, a few can be updated based on specific circumstances:
  - o <u>Month:</u> choose the month/year this data was reported from. Typically, this will be the start month/year of the forecast.
  - o <u>Calculation Override:</u> users can choose to use QAT's auto-calculation for number of Planning Units by clicking "Yes" or manually input a value by clicking "No." See Advanced Techniques for more information.

Changes Over Time

While the tree structure stays constant throughout time, node percentages and values can change over time. Use the date dropdown to view the tree at any month. The three functionalities below are available in each node and allow the user to control how nodes change over time:

- ⇅ **Modeling:** Allows user to specify the exact rate of change
- 🔗 **Transfer**: Allows users to link two nodes together – so the decrease from the source node is linked to the increase of the destination node. Useful for transitions.
- 📈 **Extrapolation:** Allows users to use historical data to extrapolate future change.

For more information and specific examples of changes over time, see Modeling/Transfers.

b. Building Tree Basics
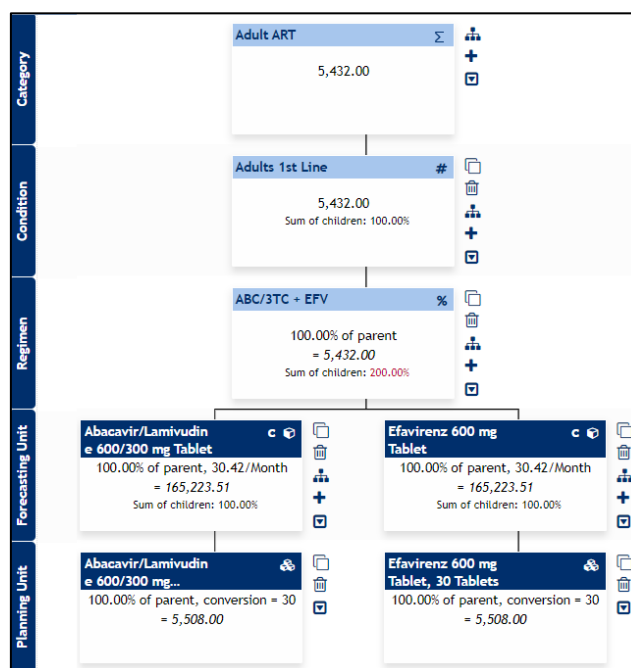
Figure 145: Simple Forecasting Tree Example

Forecasting trees are built from the top-down using different types of nodes. Each forecast tree must start with either an Aggregation node or a Number node, and include one or more Planning Unit nodes. Planning Unit nodes must be the child of a Forecasting Unit node. Thus, a user must have at least three levels of nodes (Aggregation/Number node, Forecasting Unit node, and Planning Unit node) in order to produce a forecast output.

Steps for Building a Manual Tree:
2. Download a program
3. Navigate to the Forecasting Tree → Manage Tree screen
4. In the top-right of the screen, click the blue 'Create or Select' dropdown and select '+ Draw your own tree' from the dropdown
5. Define the tree details, such as the forecasting method (demographic, morbidity, or services), tree name, and region.
    1. Once created, users can edit tree details by clicking on the ⚙ icon next to the Tree dropdown.
    2. (optional) By clicking on the ⚙ icon next to the Scenario dropdown, users can add, edit, and delete tree scenarios. For more information, see Scenarios in the section below.
6. By default, QAT will begin with a number node with a value of zero on Level 0. Click on this default node to edit/update the node.
7. Add a new node (child) below the parent node by clicking on ✚ and choosing the appropriate Node Type. Based on the parent, QAT will automatically filter which child node types are available. Continue to add nodes based on available data until ending with a Forecasting Unit node and it's associated Planning Unit node.
    1. To delete a node, simply click the 🗑 icon, but note that this will also delete the child nodes under the one being deleted
    2. To copy a node, click on the 🗐 icon. This will copy that node and the child nodes, inserting them under the same parent and to the right.

3. As a validation feature, QAT will flag a Planning Unit (PU) node with a red border under two circumstances: 1) if a user has added a Forecasting Unit (FU) and PU, and later changes the FU and mistakenly forgets to also change to the correct corresponding PU, or 2) if a user creates a tree from a tree template which has PUs, but the user does not have those PUs in their program.
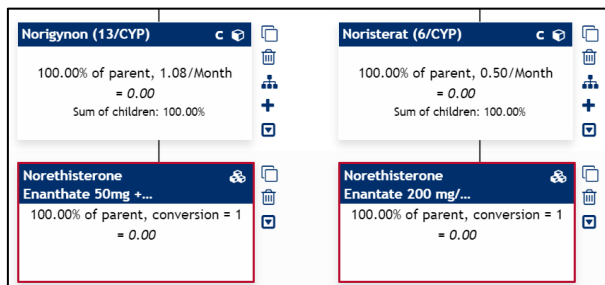
To correct this, users can click on the PU node and choose the appropriate PU from the dropdown list.

4. *Tip: users can "clean-up" their tree by clicking any of the checkboxes available (Hide Planning Unit, Hide Forecasting Unit and Planning Unit, or Hide Tree Validation) at the top of the tree.*

8. (optional) Users can insert a tree template within the body of their tree by clicking the 🏛 icon to add a branch template. This branch will be added below the current node as a child. This improves the efficiency of adding multiple batches of nodes (a branch) that are the same or similar across an existing tree or a new tree by utilizing templates. For more information on branch templates, refer to Branch Templates

9. (optional) Name the levels of a tree on the y-axis by double-clicking on each dark blue rectangular box. This will make a tree easier to read and will be defined in the dropdowns on the Modeling Validation screen.

10. QAT trees are **automatically saved** to the local computer (for saving a tree to the server, please see Upload Version. The quantities that appear in the nodes are also automatically calculated as a tree changes; however, if QAT is running slow while editing the tree, users can uncheck the "Auto-Calculate" box to stop the backend auto-calculations. To manually see the updated calculations after each edit, users will need to click the ⟳ icon.

   1. Users can download their trees as PDFs to share with stakeholders by clicking on the 📄 icon.

   2. Users can download an outline form of their tree to double check the Sum of Children validation, node values, and their nodes by clicking on the 📄 icon.

c. Scenarios

Using Scenarios: Scenarios are used to model different values for the same tree. Scenarios are useful when users would like to analyze the outcome of different changes over time (ex: national target vs. status quo, different levels of seasonality, transitioning planning units at different rates, etc.), but would like to keep the same base structure. If instead, a user would like to create a tree with different structures (e.g. different regimens, different methodologies), it is recommended to create another tree (tip: utilize the duplicate tree function!). To add, edit or delete a scenario, use the ⚙ icon next to the scenario dropdown. Use the scenario dropdown to select which scenario to view and edit

.

Fixed for All Scenarios	Unique to each Scenario
Tree structure Node Title Node Type	Node value Month Notes Modeling/Transfer/Extrapolation

Note: Per Planning Unit, users can only choose one scenario/one tree as final in the Compare and Select screen.

d. Modeling/Transfers

Purpose: If a node changes over time, a user can utilize the Modeling/Transfer tab to model growth/loss within a single node or a transfer from one node to another. Note that this functionality is only available for Number (#) Nodes and Percentage (%) Nodes (including Forecasting Units and Planning Units).

Using this tab:

Users can **manually** enter any desired changes over time (growth/loss/transfer) in the top table, or they can utilize the ▦ **Modeling Calculator** for calculating the monthly rate of change (see 'Modeling Calculator' section below for more information). Each entry must be added as separate rows per change in the top table (ie. a node cannot grow and transfer in one data entry row – these must be two separate rows).

- **Rules for Transfer Nodes:**
  - Number nodes can only transfer to other number nodes and must belong to the same level.
  - Percentage nodes can only transfer to other percentage nodes and must belong to the same parent.
  - Transfers are always negative from the source node and positive to the destination node.
  - Extrapolation is not allowed on a node that also has a transfer, whether that be to/from another node.

- **Modeling Types:**

Modeling Type	# Node Calculation	% Node Calculation
Linear (#)	+/- a static number each month	N/A
Linear (%)	+/- a static percentage each month, calculated based on the starting month	N/A
Exponential (%)	+/- a percentage each month, calculated on the previous month as a rolling percentage	N/A
Linear (% point)	N/A	+/- a static percentage each month (e.g. if the starting month is 30% and the change is +1% each month, next month is 31%, the next is 32%, and so on)

- Click on "**Show Monthly Data**" to show a table & graph with the node value across time
  - This feature is helpful to see how modelling and transfer inputs affect the monthly data in both a graphical and tabular form.
  - In the tabular data, users may add a manual change for a specific month or input a seasonality index percentage (only available for # nodes), as needed.
  - If a user checks "Manual Change affects future month," the manual amount added to the end of the month will carry over to the beginning of the next month. If neither of these fields are relevant, users can uncheck "Show (seasonality &) manual change" to hide these columns.

Examples:

- **Simple Growth** (linear #) - the example below shows a population growth each month by 500/month from January 2022 to December 2024.

Description	Start date	End date	Transfer	Modeling type	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator	Calculated change for Apr.2022
Simple Growth	Jan-2022	Dec-2024		Linear (#)	Increase	%	500		500.0000

- **Simple Loss** (linear #) - the example below shows attrition each month by 100/month from January 2022 to December 2024. QAT utilizes a negative number to denote a decrease or loss.

Description	Start date	End date	Transfer	Modeling type	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator	Calculated change for Apr.2022
Simple Loss (Attrition)	Jan-2022	Dec-2024		Linear (#)	Decrease	%	100		-100.0000

- **Simple Growth** (linear %) – the example below shows a steady population growth each month by 2% from January 2022 to December 2024. QAT has calculated this change to be increasing the population by 108.64 each month.

Description	Start date	End date	Transfer	Modeling type	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator	Calculated change for Apr.2022
Simple Growth	Jan-2022	Dec-2024		Linear (%)	Increase	2%			108.6400

- **Simple Growth** (exponential %) - the example below shows a population growth each month by 1% from January 2022 to December 2024. Because the growth is exponential, the change differs each month.

Description	Start date	End date	Transfer	Modeling type	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator	Calculated change for Apr.2022
Simple Growth	Jan-2022	Dec-2024		Exponential (%)	Increase	1%			55.9660

Month	Change from previous month	Adults 1st line Forecast
Dec-2021	0.0000	5,432
Jan-2022	54.3200	5,486.32
Feb-2022	54.8632	5,541.1832
Mar-2022	55.4118	5,596.595

  - QAT calculates this change to be 54.32 in Jan-22 month,
  - QAT calculates this change to be 54.86 in Feb-22 month, and
  - QAT calculates this change to be 55.41 in Mar-22

- **Multi-year Loss** – the example below shows a different rate of attrition (loss) each year. Year 1 (January 2022 to December 2022) decreases the population by 1% or 54.32 each month, Year 2 (January 2023 to December 2023) decreases the population by 2% or 95.6 each month, etc. QAT utilizes a negative number to denote a decrease or loss.

Description	Start date	End date	Transfer ⓘ	Modeling type ⓘ	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator ⓘ	Calculated change for Apr.2022 ⓘ
Year 1 Loss (Attrition)	Jan-2022	Dec-2022		Linear (%)	Decrease	1%		🖩	-54.3200
Year 2 Loss (Attrition)	Jan-2023	Dec-2023		Linear (%)	Decrease	2%		🖩	0
Year 3 Loss (Attrition)	Jan-2024	Dec-2024		Linear (%)	Decrease	3%		🖩	0

Month	Change from previous month	Adults 1st line (No seasonality)	Adults 1st line Forecast
Dec-2021	0.0000	5,432	5,432
Jan-2022	-54.3200	5,377.68	5,377.68
Feb-2022	-54.3200	5,323.36	5,323.36
Mar-2022	-54.3200	5,269.04	5,269.04
Apr-2022	-54.3200	5,214.72	5,214.72
May-2022	-54.3200	5,160.4	5,160.4
Jun-2022	-54.3200	5,106.08	5,106.08
Jul-2022	-54.3200	5,051.76	5,051.76
Aug-2022	-54.3200	4,997.44	4,997.44
Sep-2022	-54.3200	4,943.12	4,943.12
Oct-2022	-54.3200	4,888.8	4,888.8
Nov-2022	-54.3200	4,834.48	4,834.48
Dec-2022	-54.3200	4,780.16	
Jan-2023	-95.6032		
Feb-2023	-95.6032		
Mar-2023	-95.6032		

- **Transfer** – the example below shows a transfer of 250 patients each month for one year, January 2022 to December 2022, from the current node (Adults 1st Line) to another node (Adults 2nd Line). This transfer will also appear on the other node (Adults 2nd Line) greyed-out to signify a non-editable change.

Description	Start date	End date	Transfer ⓘ	Modeling type ⓘ	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator ⓘ	Calculated change for Apr.2022 ⓘ
Transfer	Jan-2022	Dec-2022	To Adults 2nd line	Linear (#)	Decrease	%	250	🖩	-250.0000

Description	Start date	End date	Transfer ⓘ	Modeling type ⓘ	+/-	Monthly Change (%)	Monthly Change (#)	Modeling Calculator ⓘ	Calculated change for Dec. 2021 ⓘ
Transfer	Jan-2022	Dec-2022	From Adults 1st line	Linear (#)	Increase	%	250		0

🖩 **Modeling Calculator:**
Click on the modeling calculator icon if you need assistance to calculate the monthly rate of change. The modeling calculator **Ending Value/Change** is available for all nodes except Aggregation Nodes, and the modeling calculator **Annual Target** is only available for Number Nodes. Begin by select a **Modeling Type** (Linear #, Linear %, or Exponential %), and then a **Target Type** (Ending Value/Change or Annual Target):

- **Ending Value/Change:** Use this if you have target value (non-cumulative) or total desired change over a specific period, rather than a known monthly rate of change.
  1. The **Start Date** and **Target Date** will be filled in based on the original inputs for Start date and End date in the modeling table, which are by default, based on the forecast period. The user can change these if desired. These two dates will flow back into the modeling table.
  2. The **Start Value** is the node value at beginning of the month for the Start Date, as calculated by QAT. In other words, the Start Value is the node value *before* any modeling changes occur. This field is calculated and cannot be directly changed by the user. If the Start Date is the month after the "Month" on the Node Data tab, then the Start Value is equal to the "Node Value" provided by the user on the Node Data tab.
  3. **Period** is calculated as Target Date - Start Date (in months). This value is not displayed in the front-end of QAT, but is used in the formulas below.
  4. Based on the available data or assumptions, enter data in one of the following fields: **Target Ending Value**, **Target Change (%)** or **Target Change (#)**

5. After an input is provided, the other fields will be automatically populated, as well the final **'Calculated Month-on-Month Change'**.
6. When user clicks 'Accept', the **Monthly Change (% or #)** will be populated back in the main modeling table, based on the formulas below. All negative changes will be displayed as "decrease" and positive changes displayed as "increase", with the number shown in absolute value.

If user enters **Target Ending Value**:

	Linear (%)	Linear (#)	Exponential (%)
Target Change (%)	(Target Ending Value - Start Value) / Start Value		
Target Change (#)	-	Target Ending Value - Start Value	-
Calculated Month-on-Month Change	(Target Ending Value - Start Value) / Period		
Monthly Change (%)	(((Target Ending Value - Start Value)/ Period) / Start Value) * 100	-	((Target Ending Value / Start Value) ^ (1 / Period) - 1) * 100
Monthly Change (#)	-	Change (#) / Period	-

If user enters **Target Change (%)**:

	Linear (%)	Linear (#)	Exponential (%)
Target Ending Value	Start Value + (Start Value * Target Change (%)/100)/100		
Target Change (#)	-	Target Ending Value - Start Value	-
Calculated Month-on-Month Change	(Start value * Target Change (%)) / 100 / Period		
Monthly Change (%)	(((Target Ending Value - Start Value) / Period) / Start Value) * 100	-	(Target Ending Value / Start Value) ^ (1 / Period) - 1) * 100
Monthly Change (#)	-	Target Change (#) / Period	-

If user enters **Target Change (#)**:

	Linear (#)
Target Ending Value	Start Value + Target Change (#)
Change (%)	(Target Ending Value - Start Value) / (Start Value * 100)
Calculated Month-on-Month Change	Target Change (#)/ Period

Monthly Change (#)	Target Change (#) / Period

- **Annual Target:** Use this if you have target values (cumulative over a year). Instead of simply dividing annual targets by 12, which creates a stairstep pattern that is, the calculator will help provide a smooth forecast.
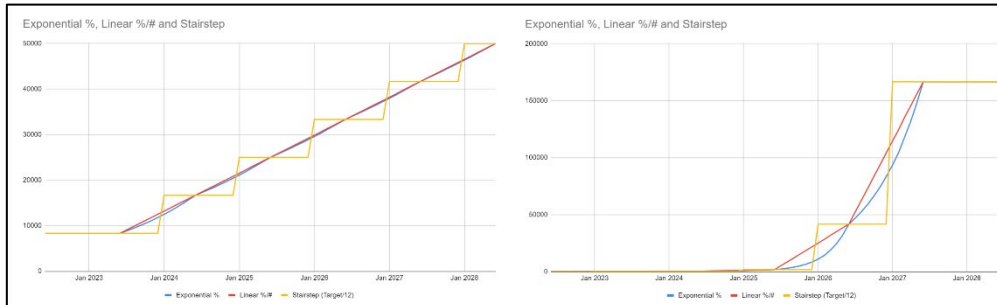
1. Select the first month of your target and the number of years of targets available.
   - QAT will autofill in the yearly rows in the table based on the chosen first month of target, assuming targets are for 12-month periods.
2. In the table, enter figures for the year before the target (the actual) and each target year.
3. After data entry, click "Calculate" (see below for calculation approach and formulas).
4. Review the differences between the desired targets and the QAT calculated numbers. If differences are large, consider if the rate of change follows a linear or exponential pattern and change the **Modeling Type** (Linear #, Linear %, or Exponential %) and re-calculate if needed.
5. When user clicks "Accept," QAT populates the calculated values in two places:
   - Node Value tab - Starting Month and Starting Value
   - Modeling/Transfer tab – one row is created per 12-month period after the Starting Value. **Note that these are not the same periods as the Target Years** (see below).

Annual Target Calculation Approach: QAT assumes that 1/12th of the annual actual value was achieved in the midpoint of the actual year, and 1/12th of the annual targets will be reached by the midpoint each target year. QAT then effectively interpolates between those midpoints by calculating a linear or exponential monthly rate of change. This monthly rate of change is then applied to both years - the second half of the first year and the first half of the second year. To achieve this, QAT calculates the following fields:

Field	Explanation / Formula
Annual Change (%)	Change from previous year. Calculated for each year after the first year. = (Current Year Value - Previous Year Value) / (Previous Year Value)
Monthly Change (%) / Monthly Change (#)*	Exponential Rate = (Year 2 Value/Year 1 Value)^ (1/12) -1 Linear Rate = Annual Change / 12
Node Month**	= n-7, where n is the first month of the target.
Node Value**	Assumed to be the first value (the actual value) provided by the user divided by 12, since this is assumed to be the midpoint of the year. = Year Value/12
Calculated Total	Beginning with the Node Month and Node Value, and applying the Monthly Change (% or #), QAT calculates each monthly value, then provides sums the values across 12-month periods.

Difference (Target vs Calculated, #)	Calculated for each year after the first Actual year. This difference will be large if the annual change varies significantly between years. = Calculated Total – Target
Difference (Target vs Calculated, %)	Calculated for each year after the first Actual year. This difference will be large if the annual change varies significantly between years. = (Calculated Total - Target) / Target.

* These values don't appear in the 'Modeling Calculator' section, but populate in the top modeling/transfer node table after user clicks "accept."

** These values don't appear in the 'Modeling Calculator' section, but populate into the main node fields after use clicks "accept."

e. Advanced Techniques

Tips for specific use cases:

- **Delayed or phased product usage?** Sometimes, the product consumption is delayed in relation to the other higher levels of the tree. In the relevant **Forecasting Unit** node, use the **Lag** field to indicate this delay.
    - o For example, if the product usage will begin 2 months after the parent node dates, enter "2" in this field.
    - o This field can also be used where the product switches over time – for example, if forecasting units A, B, and C are used in secession for two months at a time, you can set up your tree with Forecasting Unit A (discrete for 2 months, lag=0), Forecasting Unit B (discrete for 2 months, lag=2), Forecasting Unit C (discrete for 2 months, lag = 4).
- **Desire a specific value for number of Planning Units per patient?** For discrete usage only, a user can specify a specific value for number of Planning Units per patient by choosing "No" for "Use QAT's Autocalculation for # of Planning Units?" Unless overridden by a user, QAT will utilize the auto-calculation by default.

- **Repeating Forecasting usages?** If multiple Forecasting Unit nodes share the same settings, consider using the Usage Template screen to save your common usages, and then using the "Copy from Template" field to populate the fields in the forecasting unit nodes.

Extrapolation Node

Purpose: The extrapolation tab allows users to forecast future node values by extrapolating from past values. This functionality is only available for number nodes, and is similar to the 'Extrapolation' screen, but is conducted in a tree node instead. More details on extrapolation methods can be found under Extrapolation.

Using this tab:
1. First, select the checkbox next to 'Extrapolate' in the Add/Edit Node.
2. Select 'Show Data'.
3. In the table, enter any actual values and reporting rates for your past data. From this input, QAT will calculate adjusted historical values. If you need to change the period for data, change the start and end month at the top of the node under 'Start Month for Historical Data'.
4. If there is missing data, use the green Interpolate button to fill in missing data. Interpolate can only be used if there is data on both sides of the month missing data.

5. (optional) Select which forecast method(s) you wish to display and update the extrapolation parameters.
6. Click "Extrapolate." All selected forecasts will display in the main table and the graphs.

    NOTE: The minimum values needed to get correct graphs and reports for the various features are below:

    * TES, Holt-Winters: Needs at least 24 months of actual consumption data

    * ARIMA: Needs at least 14 months of actual consumption data

    * Moving Average, Semi-Averages, and Linear Regression: Needs at least 3 months of actual consumption data

7. (optional) In the table, add any manual changes (+/-). These changes are added or subtracted on top of the extrapolated values.
8. After reviewing the main table, the error table, and the graphs, select the desired forecast method at the bottom of the screen and click "Save."
9. Note: If you change any inputs, you will be required to extrapolate again to update calculations, before selecting a new method.

TT2. **Modeling Validations**

Purpose: Once a tree has been built, users can use the Modeling Validation screen to view the change over time. This is useful if the forecast has applied modeling/transfers in one or mode nodes.

Using this screen:

- Go to 'Tree Forecast' and select 'Modeling Validations'.
- Select the screen filters using the dropdowns.
    - **Program**: You must be online to view program versions on the server. When offline, only downloaded local programs can be selected.
    - **Level**:
        - When creating a tree, it is useful to re-name the levels. The 'level' dropdown in this screen will show the different level names that you have chosen. This makes it easier to identify what the data is showing, rather than using level 0,1,2,3, etc.
        - The level dropdown will automatically group Planning Unit and Forecasting Unit into it's own levels in case these nodes are on separate levels of your tree. Therefore, if you also have a level called 'Forecasting Unit', selecting the 'FU' level and 'Forecasting Unit' level will populate the same results. However, if you have a forecasting unit on level 4 and another one on level 5, the 'FU' level will show both of those.
    - **X-Axis Display:** The data can be shown by months (default) or aggregated by calendar year or fiscal year. (See Figure 154)
        - When aggregating by year, it is helpful to use the 'Show Data' feature to confirm which months are included in the aggregated chart, and to confirm if there is data for all the months that are expected
        - When aggregating by fiscal years - you must select the which month your fiscal year starts in. For example, if your Fiscal Year 2023 is from October 2022 to September 2023 – you can select the option that . QAT will always show the examples using the current calendar year.
    - **Y-Axis Display**: The data can be shown by number of units, as well as by percentage. (See Figure 149 versus Figure 147)
- To view the tabular data, select the '**Show Data**' blue button in the bottom right of the screen.
- When viewing the **graph**, the user can hide elements by clicking on the legend. To unhide, re-click on that part of the legend.

- This screen can be **exported** in both CSV and PDF format by selecting the icon(s) in the top right corner.

Figure 146: Modeling Validation Screen (by number and month)
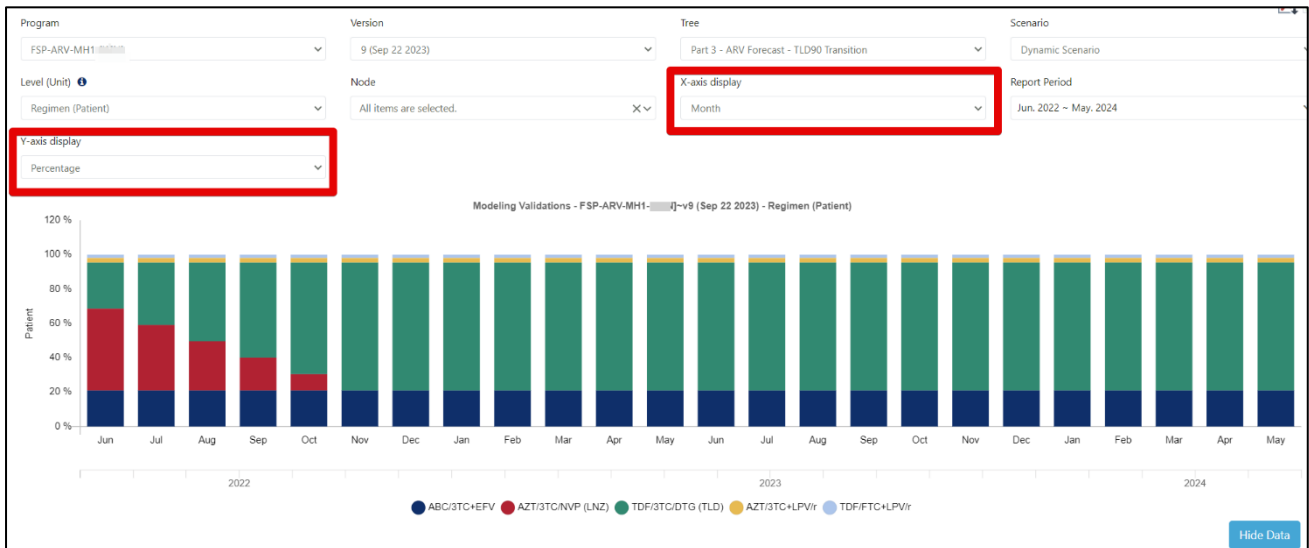
Figure 147: Modeling Validation Screen (by percentage and month)
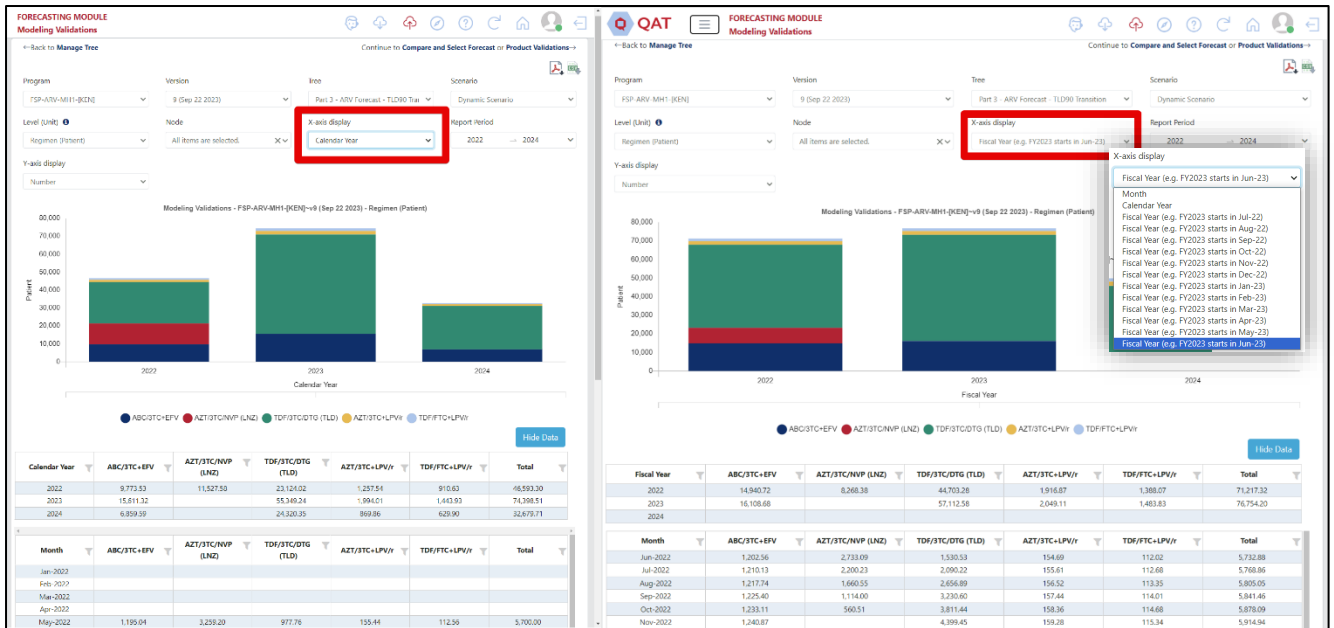
Figure 148: Modeling Validation Screen (by Calendar Year vs by Fiscal Year)

TT3. **Product Validations**

Purpose: Once a tree has been built, users can use the Product Validations screen to check the usage for the products in the forecast tree. This is useful for seeing multiple products at a time.

Using this screen:
- Go to 'Tree Forecast' and select 'Product Validations'.
- Select the screen filters using the dropdowns.
  - Only downloaded local programs can be selected in this screen.
- This screen can be exported in both CSV and PDF format by selecting the icon(s) in the top right corner.

Figure 149: Product Validations

TT4. **Using Templates**

a. Tree Templates

Purpose: To enable users to begin designing their forecast tree from a pre-established template. *Note: tree templates are managed at the realm (global) level.*

Using tree templates:
User can add tree templates in two different locations: 'Manage Tree' screen or 'Tree Templates' screen. Note: a program must be downloaded in order to create a tree template.

Method 1:
1. Navigate to 'Tree Forecast' → 'Manage Trees'.
2. In the top-right of the screen, click the blue 'Create or Select' dropdown and select the desired tree template.
3. In the "Tree Details" Pop-up:
    a. Confirm or update the Program, Forecast Method, Tree Name, Regions, and Notes sections.
    b. If there are any planning units that are in the template but are missing from the program, QAT will flag them in a bottom section of this pop-up (see Figure 150), wherein a table displays any missing planning units.
        i. If there are planning units that are missing in the program (including those inactive or unchecked for Tree Forecast) and are recommended for utilizing the chosen tree template, users can click the "Add/update selected planning units" button and QAT will automatically add the planning units to the user's program.
        ii. If the user would like to create the tree without the recommended planning units, users can click the "Create tree without adding planning units" button and the planning units will not be added to the user's program. This could be useful when a

user would like to utilize a tree structure but have different planning units they would like to forecast.

Figure 150 Tree Details Pop-up with 'Missing Planning Units'

   c. Note that all of the tree details can be updated at a later stage by clicking the gear icon ⚙️ next to the tree dropdown and planning units can be added by navigating to the 'Update Planning Units' screen.

4. QAT will automatically create the tree template for the user's program and navigate to the 'Build Tree' screen.

Method 2:
1. Navigate to 'Tree Forecast' → 'Tree Templates.'

Figure 151: Tree Templates Screen

2. Review the different tree template options, paying special attention to the Forecast Method & the Start Node type. Users can click on any row to review the tree template, its structure, and various nodes.
   a. Note: those nodes that start with a Percentage node are used specifically for Branch Templates and cannot be used as a tree template. Users must first create a starting node (Number or Aggregation), before adding a Branch Template (for more information, please see Branch Templates).
3. Once a user has reviewed the tree template, they can click "Use this template" in the top right corner of the screen.
4. Continue to follow steps 3-4 from Method 1 to finalize the tree template creation.

General Recommendations on Tree Templates:
- In general, tree templates contain values of "0" and "0%" at all levels except the forecasting and planning unit nodes. User can then customize the tree based on their requirements – for example:
  o Click each node to edit the values to actual values.
  o Rename any node titles.
  o Replace any products by either:
    ▪ editing the forecasting unit node – but be sure to also open the child planning unit node and select the correct planning unit.
    ▪ deleting the forecasting & planning unit nodes and adding new ones.
  o Copy any nodes or branches (user can copy multiple nodes by copying the top of a branch of nodes).
  o Delete any nodes or branches.
  o Add notes to explain any information sources.
- If there is a Tree Template that would benefit the QAT community, users can request it via the QAT Ticketing Helpdesk System.

b. Branch Templates

Purpose: Branch templates enable users to add a tree template, including the structure and all the various child nodes as a branch <u>within</u> a pre-existing tree. *Note: branch/tree templates are managed at the realm (global) level.* If there is a Tree/Branch Template that would benefit the QAT community, users can request it via the QAT Ticketing Helpdesk System.

<u>**Using Branch Templates:**</u>
1. Users should first review the different tree/branch template options, paying special attention to the Forecast Method & the Start Node type in the 'Tree Forecast' → 'Tree Template' screen.
2. Navigate to 'Tree Forecasts' → 'Manage Trees,' and select the desired tree.
3. Click on the ⛃ symbol. This will add the branch template as a child to the selected node.
   a. Based on the parent node chosen, QAT will only display branch templates that are allowed to be added as potential children based on the Start Node in the 'Tree Template' screen (see Node Types & Functions for the potential children options for each node type).
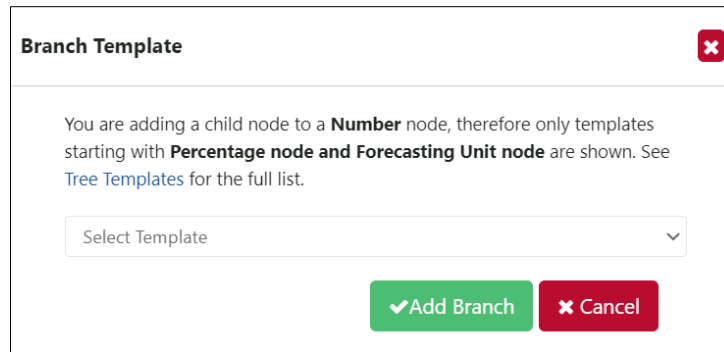
Figure 152: Adding a Branch Template

4. Once a branch template is chosen, click "Add Branch."
5. If there are any planning units that are in the branch template, but are missing from the program, QAT will flag them in a bottom section of this pop-up (see Figure 153), wherein a table displays any missing planning units.
    a. If there are planning units that are missing in the program (including those inactive or unchecked for Tree Forecast) and are recommended for utilizing the chosen branch template, users can click the "Add/update selected planning units" button and QAT will automatically add the planning units to the user's program.
    b. If the user would like to add the branch without the recommended planning units, users can click the "Add branch without adding planning units" button and the planning units will not be added to the user's program. This could be useful when a user would like to utilize a branch structure but have different planning units they would like to forecast.
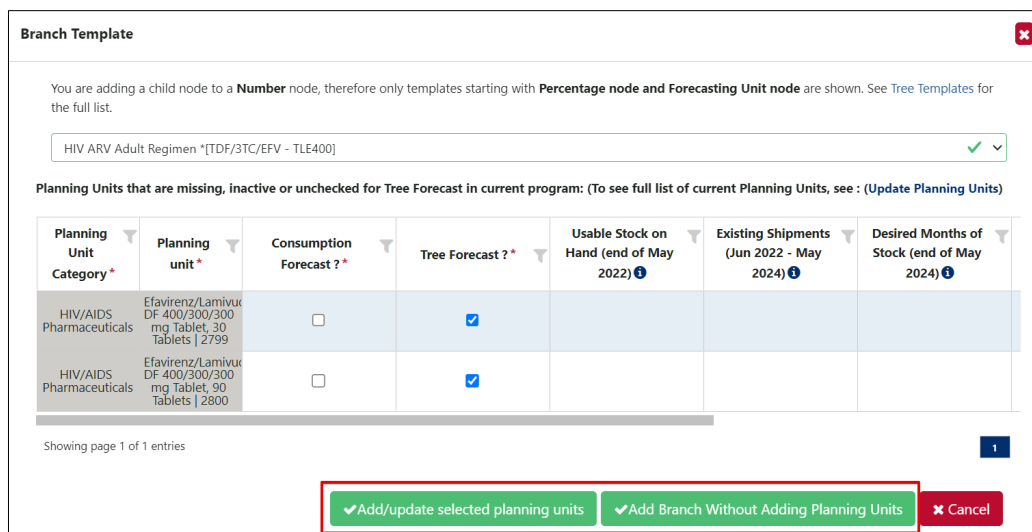
Figure 153: Adding PUs from a Branch Template to a Program

c. Usage Templates

Purpose: Usage templates allow the user to fill in the details for a forecasting unit node all at once. Usage templates can be global or program specific. Note that program-specific templates are managed by forecast program admins. User must be online to manage templates, but can be offline to use them.

To use usage templates
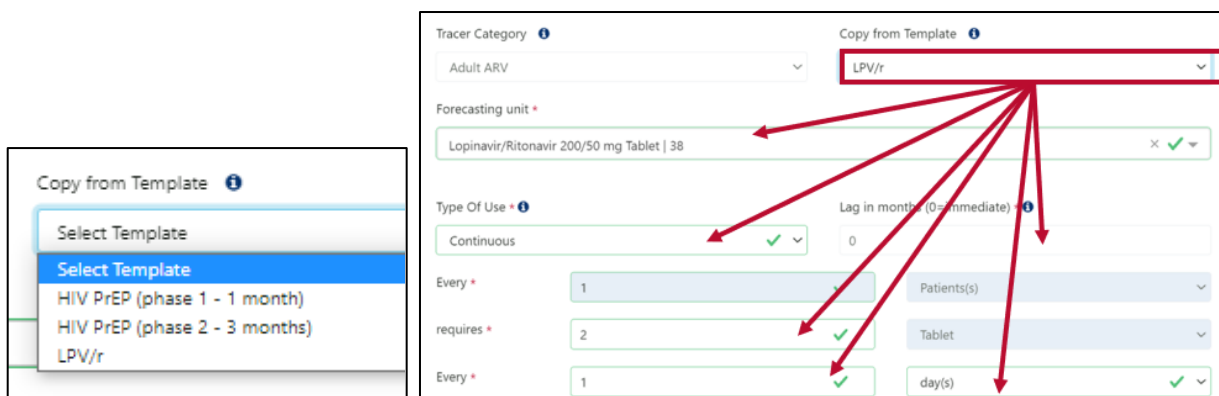
Figure 154: Using a Usage Template in a forecasting unit node

1. Ensure the program has the planning unit related to the usage template. Remember, usage templates are based on the forecasting unit, but each planning unit is related to a specific forecasting unit. For example, if the program has the planning unit "*Lopinavir/Ritonavir 200/50 mg Tablet, 120 Tablets*", all usage templates with the associated forecasting unit "*Lopinavir/Ritonavir 200/50 mg Tablet*" will be available when designing the tree.
2. In the Build Tree screen, create or edit an existing forecasting unit node (See Section B1for more). If creating a new node, be sure to first select the node type as "forecasting unit", and double check that the 'month' and 'percentage of parent' fields are correct.
3. (optional) Select a Tracer category to filter the available usage templates
4. Using the "Copy From Template" dropdown, select the desired usage templates
5. All subsequent fields will be populated
6. Click "Update" to save changes.

To manage usage templates (forecast program admins only)
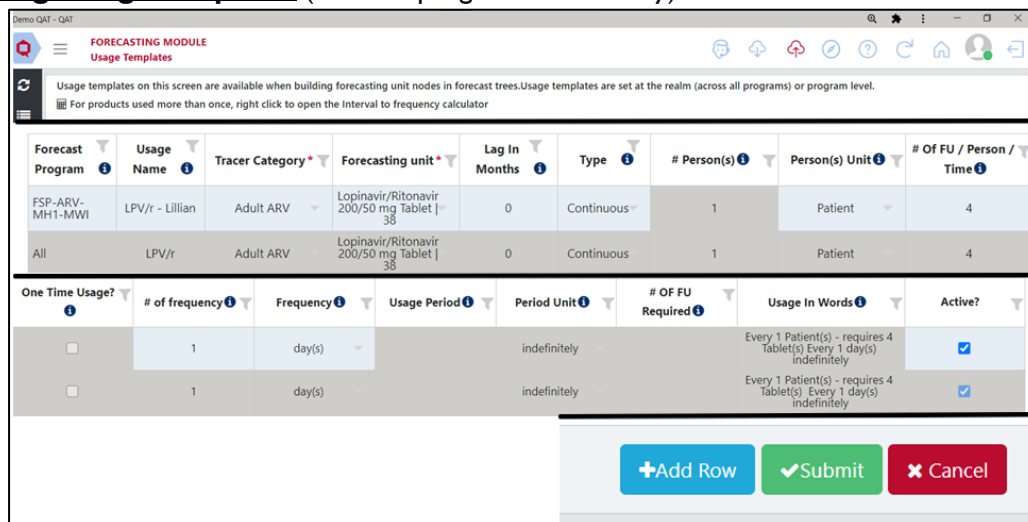
Figure 155: Managing Usage Templates

1. Ensure QAT is in online mode and navigate to Tree Templates > Usage Templates. Global templates will be greyed out and not editable.
2. To create a new usage template, click "add row." To edit an existing usage template, skip to the next step.
3. Populate or edit the row for the usage template as desired
   - The "usage name" column is what will appear in the dropdown.
   - Use the horizontal scroll bar to access all the fields in the table.

- Use the tooltips (hover mouse over "i" icons) to guide you
- Use the second to last column "Usage in words" to verify that everything is entered correctly.
- For products used more than once, there is a calculator to help you convert interval to frequency. Right click on the row you are editing to open the "Calculate Usage Frequency" screen. Enter the interval and desired frequency unit (day, month, week or year) and the calculated frequency number and unit will be populated in the table.

Figure 156: "Calculate Usage Frequency" screen

4. Click "Submit" when finished.

Forecasting Module: Reports and Outputs

UU. Compare and Select

Purpose: Enable users to compare all the available forecasts (from tree and consumption methods), and select their final forecast. In this screen, users select their forecasts one planning unit and region at a time. For selecting forecasts across multiple planning units and regions, use the Forecast Summary screen. Users should utilize all three sections (two tables & one graph) on this screen for comparing data and choosing a final forecast.

Using this screen:
1. Check to make sure all expected forecasts appear in the Compare & Select table. To add forecasts, navigate to the Manage Tree screen to build a tree forecast or the Extrapolation screen to build a consumption-based forecast. Users may also need to double-check the Update Planning Units screen to make sure the Consumption Forecast or Tree Forecasts methods have been checked/unchecked for each Planning Unit.
   a. Note: The ⚠ symbol denotes that there is no forecast quantity available; the entire row will be gray and non-editable as there is nothing to display or select.
2. Review available forecasts for each planning unit using the following information on the screen:
   a. **Forecast Error (%):** this error is calculated using the Weighted Absolute Percentage Error (WAPE) calculation. If the forecast error is highlighted in green text, this forecast has the lowest forecast error out of the available forecasts. Example WAPE calculation using the default 6-month time window:

$$WAPE = \left(\frac{\begin{array}{l} Abs\,(actual\,consumption\,month\,1 - forecasted\,consumption\,month\,1\,) + Abs\,(actual\,consumption\,month\,2 \\ - forecasted\,consumption\,month\,2\,) + Abs\,(actual\,consumption\,month\,3 - forecasted\,consumption\,month\,3\,) \\ + Abs\,(actual\,consumption\,month\,4 - forecasted\,consumption\,month\,4\,) + Abs\,(actual\,consumption\,month \\ 5 - forecasted\,consumption\,month\,5\,) + Abs\,(actual\,consumption\,month\,6 - forecasted\,consumption\,month\,6\,) \end{array}}{(Sum\,of\,all\,actual\,consumption\,in\,the\,last\,6\,months)} \right)$$

   If 6 months of data is not available, QAT will utilize as many months as available and denote it in this column. *Note: the forecast error is not always reliable for tree forecasts – unless a tree forecast has a significant overlap with the past actual data, there may not be past forecast data available for comparison.*

b. **Compare to Consumption Forecast**: QAT compares available Consumption Forecasts and Tree Forecasts. For any Tree Forecasts, QAT will flag the percentage above the highest or below the lowest Consumption Forecast. The comparison will be highlighted in red text if it is outside of the threshold percentages set by the user in the Version Settings screen. Assuming reliable actual consumption data, this comparison helps users determine if their Tree Forecasts are realistic. This statistic will not be available for consumption forecasts.

c. **Graph**: Visually compare the different forecasts. The forecast selected in the top table will appear **bolded** in the graph.

d. **Tabular Data Table**: Compare the data between forecasts side-by-side by clicking the "Show Data" button below the graph. Any **bolded**/*bolded italicized purple* data fall within the forecast period.

3. Select the final forecast in the top Compare & Select table. Repeat steps 1-3 for each planning unit and region. Once completed, continue forward to the Monthly Forecasts to verify all planning units together.

Tips on Using the Graph & Tabular Data:

- By default, QAT will display all available forecasts by Planning Unit and any actuals entered or imported from QAT Supply Planning module in the graph; however, a user may deselect the "Display?" checkbox for any forecasts in the top table if they do not wish to view it in the graph.
- A user may view the graph in Planning Unit, Forecasting Unit, Equivalency Unit, and for a specific period of time. If a user chooses to "Show only Forecast Period," the graph will display only the period of time the user chose as the forecast period in the Version Settings screen.

VV. **Monthly Forecast**

Purpose: Enable users to view the final (*selected*) forecasts for a single program, and displays the forecast by planning unit and month. This output aggregates all regional forecasts into one total forecast. To view disaggregated regional forecasts, users can export the output as a CSV. This report is great for verifying all planning units in one place, as it has multiple report view options:

- Planning Unit or Forecasting Unit
- Aggregated by Equivalency Unit
- Monthly or yearly graph & tabular data
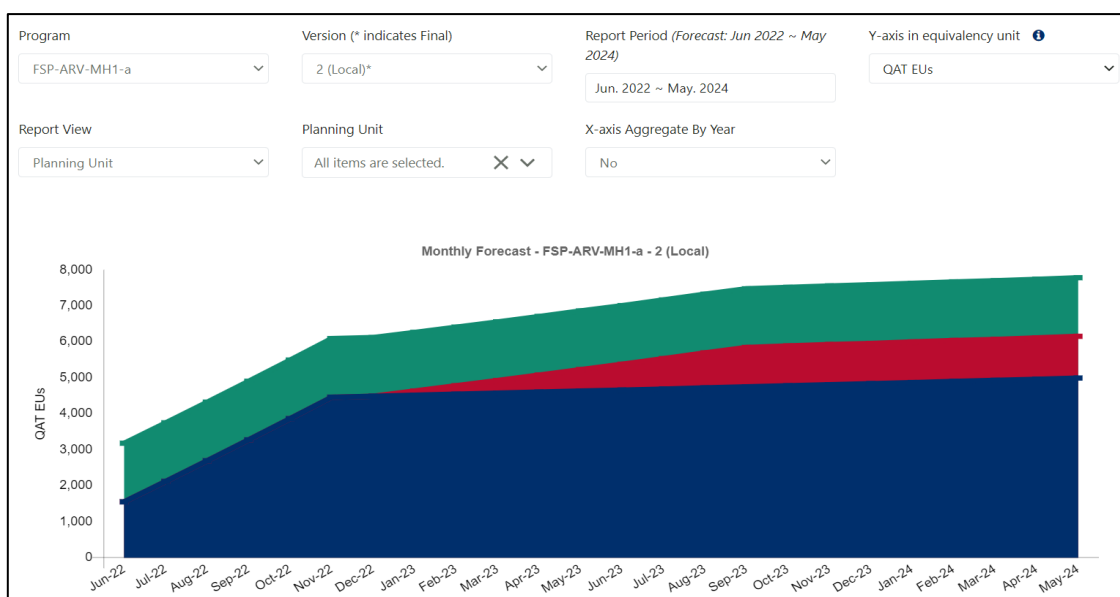
Figure 157: Monthly Forecast Displayed with Y–axis in EUs

Display	Region	Planning unit	Forecast	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
☑	National	● Abacavir/Lamivudine 120/60 mg Scored Dispersible Tablet, 30 Tablets	(TES Holts-Winters)	47,685	46,683	44,468	42,064	43,301	41,247	39,060	33,037	31,735	30,495
☑	National	● Abacavir/Lamivudine 600/300 mg Tablet, 30 Tablets	(Part 2 C. Full ARV forecast (C) - Dynamic)	1,219	1,227	1,235	1,242	1,250	1,258	1,266	1,274	1,282	1,290
☑	National	● Dolutegravir 50 mg Tablet, 30 Tablets	(Linear Regression)	32,328	33,285	34,242	35,199	36,156	37,113	38,070	39,027	39,984	40,941
☑	National	● Dolutegravir/Lamivudine /Tenofovir DF 50/300/300 mg Tablet, 30 Tablets	(Part 2 C. Full ARV forecast (C) - Dynamic)	1,552	2,119	2,694	3,275	3,864	4,461	4,489	4,517	4,545	4,574
☑	National	● Dolutegravir/Lamivudine /Tenofovir DF 50/300/300 mg Tablet, 90 Tablets	(Part 3. Full Adult ARV forecast - MMD transition - Dynamic)	0	0	0	0	0	0	0	116	235	352
☑	National	● Efavirenz 600 mg Tablet, 30 Tablets	(Part 2 C. Full ARV forecast (C) - Dynamic)	1,219	1,227	1,235	1,242	1,250	1,258	1,266	1,274	1,282	1,290

Figure 158: Monthly Forecast Tabular Data

Using this screen:
- Only selected forecasts will be shown in this output. To select a forecast for a product, go to the 'Compare and Select Forecast' screen. To see total forecasts across products, go to the 'Forecast Summary' screen.
- The **Report Period** will be used to determine the period of time that will display in the graphical/tabular output and must be within the forecast period.
- Use the parameters to view the graph/tabular data either by forecasting units or planning units as well as showing the y-axis in equivalency units.
- **Equivalency Units** (EUs) allow users to aggregate data across planning units or forecasting units that are different but have the same equivalency unit. See Equivalency Units for more information.
- The 'X-axis Aggregate By Year' filter allows you to view the data aggregated by year instead of by month.
- For the graph view, there are 3 ways you can hide which planning units that are being displayed:
    1. Use the filter at the top to select the planning unit(s).
    2. Click on a planning unit in the legend of the graph.
    3. Uncheck the 'Display' checkbox on the far left of the tabular view.

WW. **Forecast Summary**

Purpose: Enable users to see a summary of their final (selected) forecasts for the entire forecast period. To view the forecasts by month, use the 'Monthly Forecast' screen instead.
- **Regional View:** Use this view to see your forecast across planning units and regions. Directly update the forecast method for every region-planning unit combination and add notes in the table, if desired. Forecast selections can also be updated in the 'Compare and Select Forecast' screen.
- **National View:** Use this view to see your forecast at a national level and evaluate your procurement surplus or gaps.

WW1. **Regional View**

1. Utilize the dropdowns at the top of the screen to select the Program and Version
2. Ensure the "Regional View" radio button under Display.
3. View a summary of all the planning units, their select forecast quantity and the notes, by region.

4. (if a local version is selected), user can update the selected forecast by double clicking any of the cells under the "Selected Forecast" column as well as any notes in the "Notes" column.

Figure 159 Forecast Summary - Regional View

WW2. **National View**

Figure 160 Forecast Summary - National View

1. Utilize the dropdowns at the top of the screen to select the Program and Version
2. Ensure the "National View" radio button under Display.

3. View the resulting surplus gap analysis. *Note: This is not a full supply plan, but a high-level procurement surplus/gap analysis. We recommend importing your forecast into the supply planning module for granular supply planning.*
4. Click the "hide calculations" checkbox to see a simplified version of the table.
5. For the data to display here properly, enter the following data:
    a. **Under Update Planning Unit**:
        i. **Stock** – at the beginning of your forecast period
        ii. **Existing shipments** – during your forecast period
        iii. **Desired Months of stock** – at the end of your forecast period
        iv. **Price Type** and **Unit Prices**
    b. **Under Update Version Settings:**
        i. **Freight %** - Freight cost is calculated as a percentage of product cost

Formulas used to calculate the Procurement Surplus/Gap
- Project Stock at Forecast end = (Starting Stock) + (Existing Shipments) - (Forecasted Quantity)
- Desired Stock at Forecast end = (Forecasted Quantity * Desired Months of Stock) / (Number of Months in Forecast Period)
- Procurement Surplus/Gap = (Projected Stock at Forecast end) - (Desired Stock at Forecast end)

For example, a forecast from Jan 2021 to Dec 2023 (36 month forecast)

Total Forecasted Quantity	Stock (end of Dec 2020)	Existing Shipments (Jan 2021 - Dec 2023)	Stock (end of Dec 2023)	Desired Months of Stock (end of Dec 2023)	Desired Stock (end of Dec 2023)	Procurement Surplus/Gap
360,000	5,000	20,000	5,000 + 20,000 - 360,000 = -335,000	5	(360,000 * 5) / 36 = 50,000	-335,000 - 50,000 = -385,000

Formulas used to calculate the Procurement Costs
Note: the cost is only calculated if there is a procurement gap, not if there is a surplus
- Product Cost = Procurement Gap * Unit Cost
- Freight Cost = Product Cost * Freight Percentage
- Total Cost = Product Cost + Freight Cost

For the example above, assuming a unit cost of 0.10 USD and a freight % of 7%:
- Product Cost = -385,000 * 0.10 = $38,500
- Freight Cost = $38,500 * 7% = $2,695
- Total Cost = $38,500 + $2,695 = $41,195

Annex 1: Application & Realm Administrator Manual

A. Introduction

While the focus of the user manual is to guide program administrators and users on how to supply plan in QAT, the objective of this annex is to provide guidance on functionalities available to application and realm administrators only. Application masters are mainly available to the App Administrator (with a few exceptions), while Realm Level Masters are available to both App and Realm Administrators.

B. Application Dashboard

The functions available on the Application Dashboard will be visible according to the **user's role**. Below is an explanation of the tiles unique to App and Realm Level Admins. For an explanation of other tiles (tickets and program), please see Navigation and Menu Bar.

In the screenshot below, the role assigned is "**App Level Admin**".
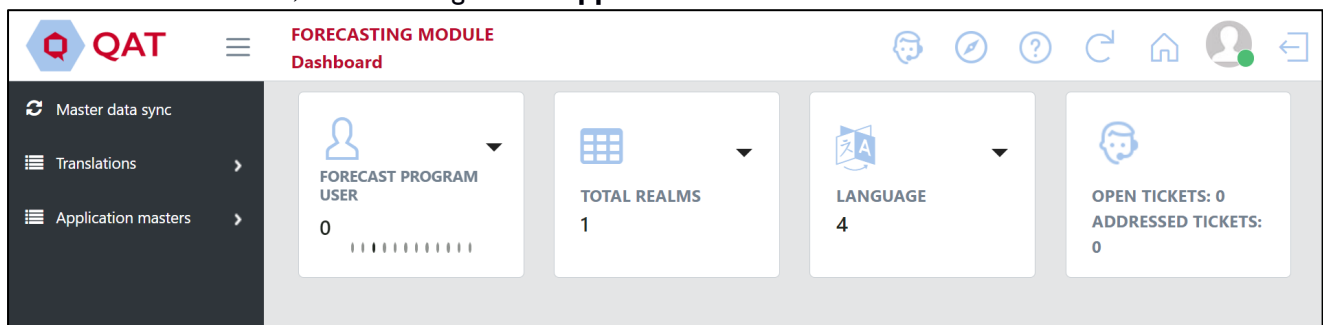
Figure 161: App Level Admin Dashboard

In the screenshot below, the role assigned is "**Realm Level Admin**".
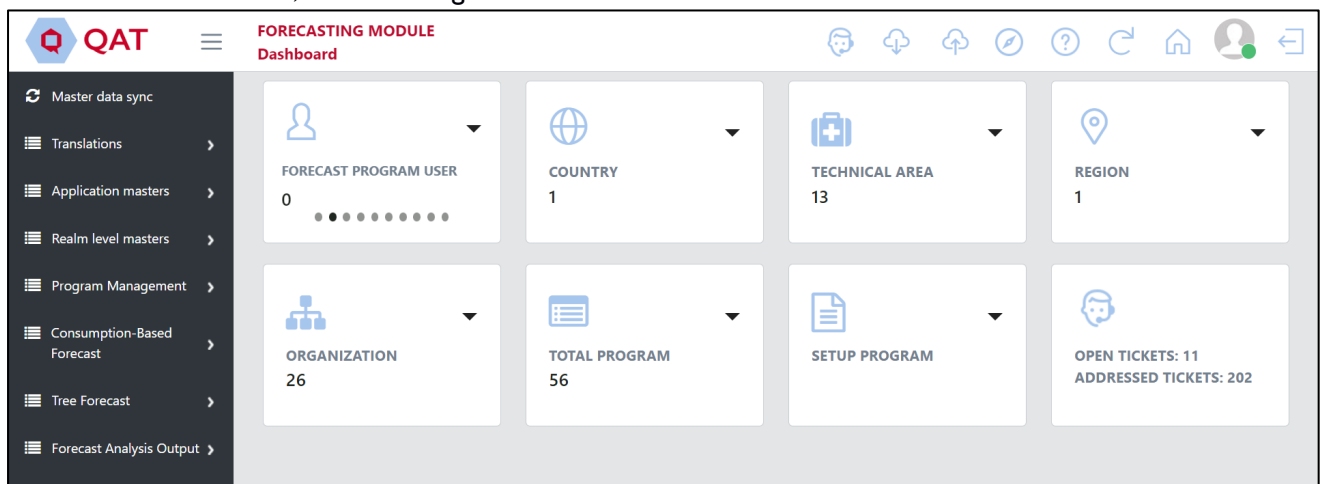
Figure 162: Realm Level Admin Dashboard

Which Admins?	Screenshot	Explanation
App & Realm	**Program user** PROGRAM LEVEL ADMIN 14 Go to User Management Add User	This tile displays the **number of users in each role.** Clicking on the pull-down button displays two functions ("Go to User Management" and "Add User"). Both redirect users to the "Application Masters" > "User" (See Users for more)
App	**Total Realms** TOTAL REALMS 1 Go to Realm Management Add Realm	This tile displays the **total number of realms** in the app. Clicking on the pull-down button displays two functions ("Go to Realm Management" and "Add Realm"). Both redirect users to the Realms screen, which is also accessible in the left menu under *Application Masters > Realms* (See Realm for more)
App	**Language** LANGUAGE 4 Go to Language Management Add Language	This tile displays the **number of languages** in the app. Clicking on the pull-down button displays two functions ("Go to Language Management" and "Add Language"). Both redirect users to the Language screen, which is also accessible in the left menu under *Application Masters > Language* (See Language for more)
Realm	**Country** COUNTRY 4 Go to Realm Country Management Add Realm Country	This tile displays the **number of countries** in the realm. Clicking on the pull-down button displays two functions: "Go to Realm Country Management" brings users to a table of countries, which is also accessible in the left menu under *Realm Masters > Country*. "Add Realm Country" brings users to the Realm screen, which is also accessible in the left menu under *Application Masters > Realm,* where users can map countries to the realm. (See Realm Country for more)
Realm	**Technical Area** TECHNICAL AREA 14 Go to Technical Area Management Add Technical Area	This tile displays the **number of technical areas** in the realm. Clicking on the pull-down button displays two functions ("Go to Technical Area Management" and "Add Technical Area"). Both redirect users to the Technical Area screen, which is also accessible in the left menu under *Application Masters > Technical Area* (See Technical Area for more)
Realm	**Region** REGION 7 Go to Region Management Add Region	This tile displays the **number of regions** in the app. Clicking on the pull-down button displays two functions ("Go to Region Management" and "Add Region"). Both redirect users to the Language screen, which is also accessible in the left menu under *Application Masters > Region*. (See Realm Country for more)
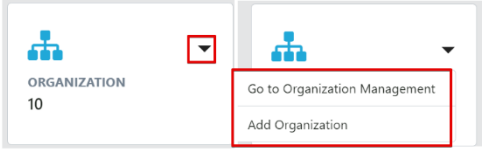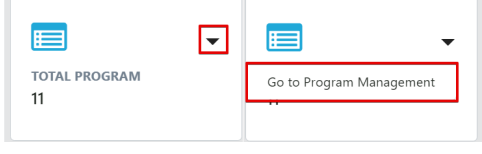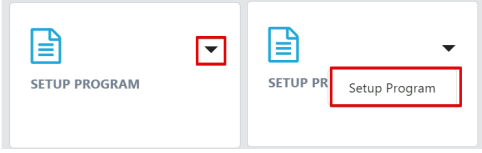
Realm	Organization	This tile displays the **number of organizations** in the app. Clicking on the pull-down button displays two functions ("Go to Organization Management" and "Add Organization"). Both redirect users to the Language screen, which is also accessible in the left menu under *Application Masters > Organization*. (See [Organization](#) for more)
Realm	Total Program	This tile displays the **number of programs** in the app. Clicking on the pull-down button displays ("Go to Program Management", which redirects users to the Update Program Info screen, which is also accessible in the left menu under *Program Management > Update Program Info*. (See [Program Information](#) for more)
Realm	Setup Program	This tile allows users to click on the pull-down button to navigate to the "Setup Program" screen, which is also accessible in the left menu under *Program Management > Setup Program*. (See [Setting up a new program](#) for more)

Table 11 : App and Realm Admin Tiles

C. **Managing Master Data**

Application Masters is the top-most data hierarchy level in QAT. Application master data applies to all the Realms and Programs within QAT. Most of it is only accessible to Application Admins, though a few of the Application functions are available to Realm Admins such as adding and updating users and assigning roles to users. Application Admins can select the specific application-wide master data they want to add or update.

Realm Level Masters covers all the master data for that Realm which apply to its programs and supply plans. The Realm Admin will be able to view, create and edit this master data. Programs, Technical Areas, Planning Units and Procurement Agents are a few examples of realm master data that the Realm Admin can add and maintain. A lot of the realm level masters are accessible for viewing to Program Admins; however, they do not have the ability to add/update this data.

Program Level Masters is the third level of hierarchy in QAT. While program admins cannot add programs, they can update the program information (e.g., lead times, freight costs, etc.) within their assigned program(s). Program Admin and Program Users can also add and update the program's data (consumption, inventory, shipments).

C1. **Application Masters**

a. Database Translation

The database translation screen, which is accessible for application admins is used to translate "Dynamic labels" that are stored in QAT. The dynamic labels are included in drop-down lists throughout QAT as well as be labels that reference other labels (e.g. QAT Problem List problems that reference shipment IDs).

For every dynamic label, there must be at least an English translation as identified by the red asterisk next to 'English' in the below figure. The translations for the other software languages are highly recommended but not required to save a translation.

To edit a translation, double-click that cell and input the desired text. Then click the "Submit" button. The submitted translation(s) will not be changed on the front end in QAT until the next software release.
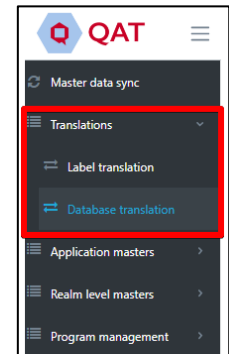
Label for	English*	French	Portuguese	Spanish
us_role	Application level Admin	Administrateur au niveau de l'application	Admin no nível do aplicativo	Administrador de nivel de aplicación
us_role	Realm level Admin	Administrateur au niveau du domaine	Admin em nível de região	Nivel administrativo
us_role	Program level Admin	Administrateur au niveau du programme	Admin em nível de programa	Administrador de nivel de programa
us_role	Program User	Utilisateur du programme	Usuário do programa	Usuario del programa

Figure 163: Database Language Translation Screen

b. Label Translation

The Label translation screen is used to translate "static labels" that do not reference other QAT labels and are not part of drop-down lists. Table column headers are an example of a static label in QAT.

For the static labels, there must be at least an English translation as identified by the red asterisk next to 'English' in the below figure. The translations for the other software languages are highly recommended but not required to save a translation.

To edit a translation, double-click that cell and input the desired text. Then click the "Submit" button. After you click submit, the translation will immediately reflect in QAT for all users.

Figure 164: Label Translation Screen

c. Country

QAT displays a Country table listing all default countries in the application, but new countries can be added, as needed.

To view a list of the current countries that are in QAT:
1. Go to "Application Masters" and click on "Country."
2. The application administrator can view and filter the countries by their status of "Active" or "Disabled." Additionally, the user can search for a specific country by using the search bar.

Figure 165: List of Countries

To add a country:
1. In the top right corner of the country list, click on the "+" icon.
2. A new screen "Add Country" will be opened as shown below.
3. Enter the new Country, Country Display Name, Country Display Name2, and Currency and click on the "Submit" button.
    a. **Note**: Country Display Name is always the three-letter country code (e.g., Angola = AGO). Country Display Name2 is always the two-letter country code (e.g., Angola = AO).

Figure 166: Add Country Screen

To update a country:
1. To update a current country, go to the Application Admin country list.
2. Click on the country that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button. This can include "disabling" a country or making one "active."

Figure 167: Update Country Screen

d. Currency

To view a list of the current currencies that are in QAT:
1. Go to "Application Masters" and click on "Currency."
2. A list of currencies and their attributes, such as conversion rate will be shown as below:

Figure 168: Currency List

To add a currency:
1. In the top right corner of the currency list, click on the "+" icon.
2. A new screen "Add Currency" will be opened as shown below.
3. Enter the new Currency, Currency Display Name, Conversion Rate to 1 USD, and whether it should Sync Online. When all information has been entered, click on the "Submit" button.
   a. **Note:** The conversion rate to 1 USD can be entered manually or it can be obtained from the integration with the public online source by selecting "Yes" on the "Sync online conversion rate", which is the default.

Figure 169: Add Currency Screen

To update an existing currency:
1. To update an existing currency, go to the Application Admin currency list.
2. Click on the currency that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button.

e. Dimension

Dimensions denote various measurable values, such as length, volume, weight, or height.

To view a list of the current dimensions that are in QAT:
1. Go to "Application Masters" and click on the "Dimension."
2. A list of dimensions will be shown as below:

Figure 170: List of Dimensions

To add a dimension:
1. In the top right corner of the Dimension List, click on the "+" icon.
2. A new screen "Add Dimension" will be opened as shown below.
3. Enter the new dimension and click on the "Submit" button.

Figure 171: Add Dimension Screen

To update a dimension:
1. To update a current dimension, go to the Application Admin dimension list.
2. Click on the dimension that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button.

f. Language

QAT is available in four different languages: English, French, Spanish, and Portuguese.

To view a list of the current languages that are in QAT:
1. Go to "Application Masters" and click on the "Language."
2. A list of languages will be shown as below:

Figure 172: List of Languages

To add a language:
1. In the top right corner of the language list, click on the "+" icon.
2. A new screen "Add Language" will be opened as shown below.
3. Enter the new Language and the Language Display Name and click on the "Submit" button.
4. **Note:** All QAT database and display labels must be translated in order for a new language to appear across QAT. Please see Database Translation and Label Translation in Appendix 1 for more information.

Figure 173: Add Language Screen

To update a language:
1. To update a current language, go to the Application Admin language list.
2. Click on the language that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button. This can include "disabling" a language or making one "active."

g. Roles

Application Administrators are able to create and edit role types for the entire application as the need arises to modify the business rules that certain roles can access. For a list of the current roles, access, and associated functions, please see Annex 3: User Role Matrix.

To view a list of the current roles that are in QAT:
1. Go to "Application Masters" and click on the "Roles."
2. A list of roles will be shown as below:

Role ID	Role
ROLE_APPLICATION_ADMIN	Application level Admin
ROLE_DATASET_ADMIN	Forecast Program Admin
ROLE_DATASET_USER	Forecast Program User
ROLE_FORECAST_VIEWER	Forecast Viewer
ROLE_INTERNAL_USER	Internal user
ROLE_REALM_ADMIN	Realm level Admin
ROLE_PROGRAM_ADMIN	SP Program level Admin
ROLE_GUEST_USER	SP Viewer - Supply Plan Review
ROLE_PROGRAM_USER	Supply Plan Program User
ROLE_SUPPLY_PLAN_REVIEWER	Supply Plan Reviewer
ROLE_VIEW_DATA_ENTRY	Supply Plan Viewer - Data
ROLE_REPORT_USER	Supply Plan Viewer - Reports

Figure 174: Current list of roles

To add a role:
1. In the top right corner of the role list, click on the "+" icon.
2. A new screen "Add Role" will be opened as shown below.

3. Enter the new Role, Business Function, and Can Create Role and click on the "Submit" button.
4. For a description and more information on individual business functions, see Annex 4: Business Functions
5. "Can Create Role" allows the new role to create users and assign them to specific roles and access. For example, a Realm Admin can create a user, assign them as a Program Admin, and determine which countries and programs the user will have access to.

Figure 175: Add Role Screen

To update a role:
1. To update a current role, go to the Application Admin role list.
2. Click on the role that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button.
4. For a description and more information on individual business functions, see Annex 4: Business Functions
5. "Can Create Role" allows the new role to create users and assign them to specific roles and access. For example, a Realm Admin can create a user, assign them as a Program Admin, and determine which countries and programs the user will have access to.

Figure 176: Edit Role Screen

h. Realm

QAT is subdivided into realms, each one governed by their own master data (inclusive of product catalog, funder names, procurement agent names, etc.). Future realms could be set up for other fields such as education supply chains, agriculture supply chains, etc. For information and functions that can be performed by a Realm Admin, see [Realm Level Masters](#).

To view a list of the current realms that are in QAT:
1. Go to "Application Masters" and click on the "Realm."
2. A list of realms will be shown as below:

Realm	Realm display name	Min guardrail for MIN MOS	Min guardrail for MAX MOS	Max guardrail for MAX MOS	Min Qpl Tolerance	Min Qpl Tolerance CutOff	Max Qpl Tolerance	Data entry restriction for Actual Consumption	Data entry restriction for Forecast Consumption	Data entry restriction for Inventory	Min Count for Mode	Min Percentage for Mode
Global Health	GHR	1	1	9,999	2	5	2	9	9	9	0	0.00

Figure 177: List of Realms

To add a realm:
1. In the top right corner of the realm list, click on the "+" icon.
2. A new screen "Add Realm" will be opened as shown below.
3. Enter the new Realm, Realm Display Name, Min Guardrail for MIN MOS, Min Guardrail for MAX MOS, and Max Guardrail for MAX MOS. Continue to add all tolerance and restriction values for the realm and then click on the "Submit" button.
   a. When adding a user to QAT, if they are not assigned a realm, they will be automatically assigned to the realm that is considered the "default." There can only be one default realm per QAT instance.
   b. **Note**: the MIN/MAX guardrails are the absolute inferior and superior limits for setting program MIN/MAX parameters; they are set at the realm level. This means a program

cannot have a MIN MOS that is less than the "Min guardrail for MIN MOS", or a MAX MOS that is greater than the "Max guardrail for MAX MOS"

Figure 178: Add Realm screen

To update a realm:
1. To update a current realm, go to the Application Admin realm list.
2. Click on the realm that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button. This can include "disabling" a realm or making one "active."

To add a country to a realm
1. To add a country an existing realm, go to the Application Admin realm list
2. Right click on the realm and then click on "Map countries to this realm" as shown below:

Figure 179: Map Countries

3. From this new window, the application admin can add a country by clicking the "Add Row" button at the bottom of the screen. The new country cannot already exist in the realm to be added. For more information on how to add a country see Application Masters: Country.
4. From this new window, the application admin can also make a country "Active" as programs are on-boarded to QAT, or inactive by using the checkbox in the last column.
5. When all updates and changes have been made, click "Submit."

Figure 180: Mapping countries to a Realm

i. Users

Adding and updating users and their roles/access controls is available to both application administrators and realm administrators.

To view a list of the current user that are in QAT:
1. Go to "Application Masters" and click on the "User."
2. A list of users will be shown, along with information, such as email, last login date, and status.

To add a new user:
1. In the top right corner of the realm list, click on the "+" icon.
2. A new screen "Add User" will be opened as shown below.
3. Enter the new user's name, email address, organization & country, role, and language and click "Submit."
4. For a detailed description on roles, their function, and access, see Annex 3: User Role Matrix

To update an existing user or manage user access controls:
1. Navigate to the user list.
2. Click on the user that needs to be changed or updated.
3. Update the information or access controls as needed and then click on the "Update" button. This can include "disabling" a user or making one "active."

Figure 181: Add User Screen

j. Usage Period

Usage period is used in the forecasting module for users to associate a time period with certain elements of the forecast (e.g. how often a planning unit is used).

To view a list of the current units that are in QAT:
1. Go to "Application Masters" and click on "Usage Period."
2. A list of usage periods and their attributes, such as whether it's active or not will be shown as below:

Usage Period *	Conversion Factor To Month *	Active?	Last Updated By	Last Updated Date
day(s)	30.41666667	☑	Anchal C	01-Sep-21
month(s)	1.00000000	☑	Anchal C	01-Sep-21
week(s)	4.33333333	☑	Anchal C	01-Sep-21
year(s)	0.08333333	☑	Anchal C	01-Sep-21

Figure 1826: List of Usage Periods

To add a usage period:
1. In the bottom right corner of the unit list, click on the "+ Add Row" button.
2. A new row appear.
3. Enter the usage period name, conversion factor, and click on the "Submit" button.

To update an existing usage period:
1. To update an existing usage period, go to the Application Admin usage period list.
2. Double-Click on the usage period name or conversion factor that needs to be changed or updated. To de-activate or re-activate, select the checkbox.
3. Update the information as needed and then click on the "Submit" button. This can include "disabling" a usage period or making one "active."

k. Unit

Unit is a fixed quantity (in this case a value like mL, gm or even Box) used as a standard of measurement.

To view a list of the current units that are in QAT:

1. Go to "Application Masters" and click on "Unit."
2. A list of units and their attributes, such as dimension will be shown as below:

Unit	Unit Display Name	Dimension	Last Updated By	Last Updated Date	Status
2 mL	2 mL	Volume	Anchal C	01-Jan-20	Active
500 gm	500 gm	Weight	Anchal C	01-Jan-20	Active
Ampoule	Ampoule	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Applicator	Applicator	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Bag	BAG	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Book	Book	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Bottle	BOT	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Box	BOX	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Can	CAN	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Capsule	Capsule	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Card	Card	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Carton	CTN	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Case	CAS	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Cassette	Cassette	Each / Items / Pieces	Anchal C	01-Jan-20	Active
Coil	COL	Each / Items / Pieces	Anchal C	01-Jan-20	Active

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Figure 183: List of Units

To add a unit:
1. In the top right corner of the unit list, click on the "+" icon.
2. A new screen "Add Unit" will be opened as shown below.
3. Enter the new Unit, Unit Display Name, and its corresponding Dimension and click on the "Submit" button.

To update an existing unit:
1. To update an existing unit, go to the Application Admin unit list.
2. Click on the unit that needs to be changed or updated.
3. Update the information as needed and then click on the "Update" button. This can include "disabling" a user or making one "active."

Figure 184: Updating a Unit Screen

I. Upload User Manual

The user manual can be uploaded at any time by an application admin.

To upload a new version:
1. Go to "Application Masters" and click on "Upload User Manual"
2. Click on 'Select File' or 'Browse'
3. Select the user manual you want to upload, from your computer. Note that the file must be in PDF format.
4. Click "Submit".

C2. Realm Masters

The QAT application is subdivided into Realms, each with their own master data (inclusive of product catalog, funder names, procurement agent names, etc.) Realm is the second level of hierarchy in the QAT system.

A Realm covers all the programs and their supply plans. For example, "Global Health" is a Realm under which various programs are managed. Other realms could be set up for other fields such as education supply chains, agriculture supply chains, etc.

a. Country

The Country menu under Realm Level Masters allows Application and Realm Admins to create/assign regions to previously created countries.

A region could be "National" for single-region programs, or it could be any number of regions for multi-region programs. The decision to add regions depends on how inventory and consumption data will be entered into QAT. Note that QAT shipments are always National and may not be attributed to Regions.

1. Go to "Realm Level Masters".
2. Click on "Country" and the screen below will be shown.
3. Right click on a specific country that needs to be updated.
4. Click on "Map Region" to show the Realm Country Region screen.

Figure 185: Mapping regions to a country within a realm

5. Enter a Region description as well available warehouse volume and Global Location Number (GLN) of your warehouse.
6. Select the status ("Active" or "Disabled") as shown in the screen.
   a. **Note:** To add multiple regions, click the blue "+ Add row" button, or right-click on the form and select "Insert new row before" or "Insert new row after".
7. Click "Submit" to save your changes or "Cancel" to close the form without saving.

Figure 186: Adding multiple regions to a country

b. Data Source

A data source is the location where data that is being entered into QAT originates from. Users should apply data sources to all transactional records (Consumption, Inventory, Adjustments and Shipments) in QAT. The

user selects data sources as required from drop down lists. The selection of data sources for each transactional record will depend on which Data Source Type that applies to that type of transactional record. **Application and Realm Admins** can add/edit Data source(s) as follows:

Add a Data Source
Go to the top right corner in the "Data Source" screen and click on the blue "+" icon.
1. A new screen showing "Add Data Source" will appear.
2. Enter the required details and click on the "Submit" button.
3. Click on the "Cancel" button to not add the data source.

Figure 187: Adding a data source

Update Data Source
1. Go to the "Data Source" screen.
2. Click on the data source row that you want to update.
3. A new screen showing "Update Data Source" will appear.
4. Enter the updated details.
5. If you want to activate/de-activate that data source, select the corresponding circle.
6. Click on the "Submit" button.
7. Click on the "Cancel" button to keep the existing information.

c. Data Source Type

Refers to the type of data a source is providing information for. There are four data source types: actual consumption, forecast consumption, inventory, shipments. **Application and Realm Admins** can add/edit Data Source Type.

Add Data Source Type
1. Go to "Realm Level Masters" and then on "Data Source Type" to show the below table.

Figure 188: Data Source type

2. Click on the blue "add" button on the top right corner. A new screen showing "Add Data Source Type" will be opened.

Figure 189: Add Data Source type

3. Enter the required details and click on the "Submit" button.

Update Data Source Type
11. Go to the Data Source Type List.
12. Click on any parameter that needs to be changed or updated.
13. Click on the "Update" button.

d. Funding Source

Funding Source refers to the entity providing funding for procurement for the program. **Application and Realm Admins** can add/edit Funding Sources.

To add a Funding Source

4. Go to "Realm Level Masters" and click on "Funding Source" to display the list of current funding sources.

Figure 190: Realm-level funding sources

4. Click on the blue "+" (add) button below the profile icon.
5. A new screen "Add Funding Source" opens.
6. Enter the required details and click on the "Submit" button to save your changes or "Cancel" to close the form without saving.

Figure 191: Add Funding Source

To update a Funding Source
1. Go to the Funding Source List.
2. Click on the funding source that needs to be changed or updated.
3. Enter the required information and click on the "Update" button.

Figure 192: Update Funding Source

e. Manufacturer

The manufacturer of a commodity is master data that is not accessible/visible to main users of QAT. However, they are part of shipment/order data that can/will be received from order management systems along with manufacturer-specific commodity attributes.

To add a manufacturer

1. Go to "Realm Level Masters" and then click on "Manufacturer" to display the below table.

Figure 193: Realm-level Manufacturers

2. Click on the blue "+" button to open a new "Add Manufacturer" screen.
3. Enter the required details.
4. Click "Submit" to save changes or "Cancel" to close the form without saving.

Figure 194: Add Manufacturer

Update Manufacturer
1. Go to the Manufacturer screen.
2. Click on the manufacturer that needs to be updated.
3. Enter the required information and click on the "Update" button.

f. Organization

An organization is a group of people with a particular purpose, which can be a private or government body. **Application, Realm Admins, Program Admin, Program User and Guest User** can list/view organizations.

To add an Organization
1. Go to "Realm Level Masters" and then click on "Organization" to display the below table.

Figure 195: Organization

2. Click on the blue "+" button to open a new "Add Organization" screen.
3. Enter the required details.
4. Click "Submit" to save changes or "Cancel" to close the form without saving.

Figure 196: Add Organization

Update an Organization
1. Go to the Organization screen.
2. Click on the record that needs to be updated.
3. Enter the required information and click on the "Update" button.

Figure 197: Update Organization

g. Organization Type

Organization names can be customized per user need; however, in order to maintain standardization through master data, QAT includes an "organization type" that can be managed by a realm administrator.

The realm administrator assigns an organization type to each organization in QAT; for example, in the Global Health Realm, country A might request their program name include the organization Ministry of Health and Wellness (MOHW), while country B requires their program name to include Ministry of Health and Social Welfare (MOHSW). This level of customization is possible in QAT, while maintaining standardization through the Organization Type masters. In the example above both MOHW and MOHSW would be assigned the organization type "Govt", as any ministry of health would be considered a governmental entity, regardless of what that ministry of health if called in each country.

As organization type is realm-level master data, QAT users can request new organization types if those don't already exist, through the ticketing function.

Figure 198 - Organization types in the Global Health Realm

Add Organization Type

1. Go to "Realm Level Masters" and then click on "Organization Type" to display a list of current Organization types.

Organization Type Name	Last Updated By	Last Updated Date	Status
CMS	Anchal C	20-Aug-21	Active
Govt	Anchal C	20-Aug-21	Active
Intl. donor	Anchal C	20-Aug-21	Active
SMO	Anchal C	20-Aug-21	Active
TBD	Anchal C	20-Aug-21	Active

2. Click on the blue "+" button to open the "Add Organization Type" screen
3. Enter the required details.
4. Click "Submit" to save changes or "Cancel" to close the form without saving.

Note: QAT does not allow to put space before starting the name of organization type. Spaces are only allowed in between words if the organization type name consists of multiple words.

Update an Organization Type

1. Go to "Realm Level Masters" and then click on "Organization Type",
2. Click on an existing organization type to display below screen.

3. Enter the required details.
4. Click "Submit" to save changes or "Cancel" to close the form without saving.

h. Product

QAT supports data standardization within each realm through master data management. An essential piece of master data are products. In QAT, "Product" refers to the multiple tiers of commodities that should be configured and managed by realm: forecasting units, planning units, procurement units, and alternate reporting units. Products in QAT can be **edited/added by Application or Realm Admins**, except for

the alternate reporting units, which are managed at the country/program level. **Country-level users** can also request new planning/forecasting units to be added to the QAT catalog by raising a ticket.

Forecasting Unit

The forecasting unit is the QAT equivalent of the product base unit. It will be used for estimating future demand, i.e., the forecast. For example: one tablet, one milliliter, one condom. These forecasting units have a one-to-many relationship with the planning unit, that is, many planning units (e.g., TLD, Bottle of 90 tablets, TLD, Bottle of 180 tablets, etc.) may relate to a single forecasting unit (e.g., 1 tablet TLD)

To see the list of all forecasting units in the realm-level catalog:
1. Go to "Realm Level Masters"
2. Click on "Product" and then "Forecasting Unit".

Planning Unit Category	Tracer Category	Unit	Generic name (INN)	Forecasting Unit	Last Updated By	Last Updated Date	Status
HIV/AIDS Pharmaceuticals	Pediatric ARV	mL	abacavir	Abacavir 20 mg/mL Solution	Anchal C	02-Dec-20	Active
HIV/AIDS Pharmaceuticals	Pediatric ARV	mL	abacavir	Abacavir 20 mg/mL Solution w/ Syringe	Anchal C	03-Dec-20	Active
HIV/AIDS Pharmaceuticals	Adult ARV	Tablet	abacavir	Abacavir 300 mg Tablet	Anchal C	03-Dec-20	Active
HIV/AIDS Pharmaceuticals	Pediatric ARV	Tablet	abacavir	Abacavir 60 mg Tablet	Anchal C	03-Dec-20	Active
HIV/AIDS Pharmaceuticals	Pediatric ARV	Tablet	abacavir	Abacavir 60 mg Scored Tablet	Anchal C	03-Dec-20	Active
Essential Medicines	Other Pharma	Ampoule		Aminophylline 250 mg/10 mL Ampoule	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Tablet	amoxicillin	Amoxicillin 250 mg Tablet	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Tablet	amoxicillin	Amoxicillin 250 mg Dispersible Tablet	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Capsule	amoxicillin	Amoxicillin 250 mg Capsule	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Ampoule		Atropine 0.6 mg/mL Ampoule	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Vial	benzylpenicillin	Benzylpenicillin 5 MU Vial	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Vial	ceftriaxone	Ceftriaxone 250 mg Vial	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Vial	ceftriaxone	Ceftriaxone 250 mg Powder Vial	Anchal C	03-Dec-20	Active
Essential Medicines	Other Pharma	Tablet	cefuroxime	Cefuroxime 250 mg Tablet	Anchal C	02-Dec-20	Active
Essential Medicines	Other Pharma	Vial	chloramphenicol	Chloramphenicol 1 g Powder Vial	Anchal C	02-Dec-20	Active

Figure 199: List of Forecasting Units

To add forecasting units:
1. Go to "Realm Level Masters"
2. Click on "Product" and then "Forecasting Unit".
3. Click the blue "add" button on to the top right corner of the Forecasting Unit screen.
4. A new screen called "Add Forecasting Unit" will be opened.
5. Enter the required details and click "Submit".

To edit/update forecasting units:
1. Go to "Realm Level Masters"
2. Click on "Product" and then "Forecasting Unit".
3. Click on any forecasting unit that needs to be changed or updated.
4. Edit the required information.
5. Click on "Update" to save the changes.

Figure 200: Update Forecasting Unit

Planning Unit

By default, supply planning in QAT is managed in Planning Units. A planning unit description is usually inclusive of a full description of the product up to the primary packaging; thus, its nomenclature generally follows the pack size in which <u>dispensing</u> happens, i.e., one bottle of 30 tablets, one blister of 10x10 capsules, etc. Planning Units can also have volumetric data attributed to them to enable more detailed planning, but this screen is view only for Program Administrators, and its purpose is to show volumetric data for each planning unit, not to edit or add.

To see the list of all planning units in the realm-level catalog:
1. Go to "Realm Level Masters".
2. Click on "Product" and then "Planning Unit".

Figure 201: List of Planning Units

To add planning units:
1. Go to "Realm Level Masters".
2. Click on "Product" and then "Planning Unit".
3. Click the blue "add" button on to the top right corner of the Planning Unit screen.

4. Enter the required details.
5. Click the "Submit" button to save the changes.

To edit/update planning units:
1. Go to "Realm Level Masters".
2. Click on "Product" and then "Planning Unit".
3. Click on any forecasting unit that needs to be changed or updated.
4. Edit the required information.
5. Click on "Update" to save the changes.

Planning Unit Volume

As mentioned in the Planning Unit section, planning units can have volumetrics attributed to them to enable more detailed planning. However, this screen is view only for program Admins, and its purpose is to show volumetric data for each planning unit, not to edit or add. **Application and Realm admins** can add/edit planning unit volumetric data in the Planning Unit screen.

To add volumetric data to planning units:
Application and Realm admins can add/edit planning unit volumetric data from the Planning Unit screen.

1. Go to "Realm Level Masters".
2. Click on "Product" and then "Planning Unit".
3. Right click on the planning unit to be edited.
4. Click "Map Volumes"
5. Use the blue "Add Row Button" to add a new row if needed or edit the Planning Unit details in the existing planning unit row.
6. Click on the "Submit" button.
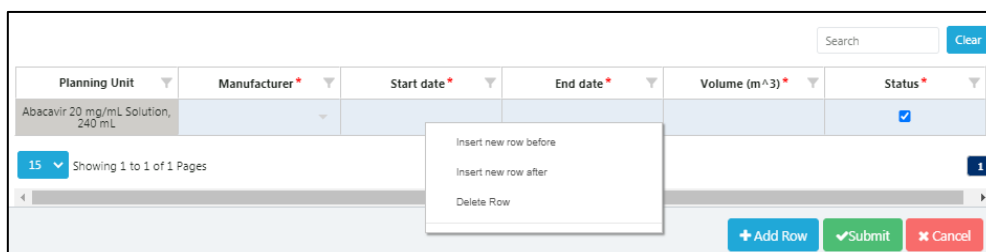
Figure 202: Adding volumetric data to planning units

Planning Unit Category

At the realm-level, planning units should grouped in broad categories, such as HIV/AIDS pharmaceuticals, Reproductive Health Pharmaceuticals & Devices (in the Global Health Realm) in order to filter searches and reports. **Application and Realm Admins** can add/edit planning unit categories.

To add planning unit categories
1. Go to "Realm Level Masters"
2. Click on "Product" and then "Planning Unit Category"
3. Write the name of the new category to add, click "Add" and then "Submit".
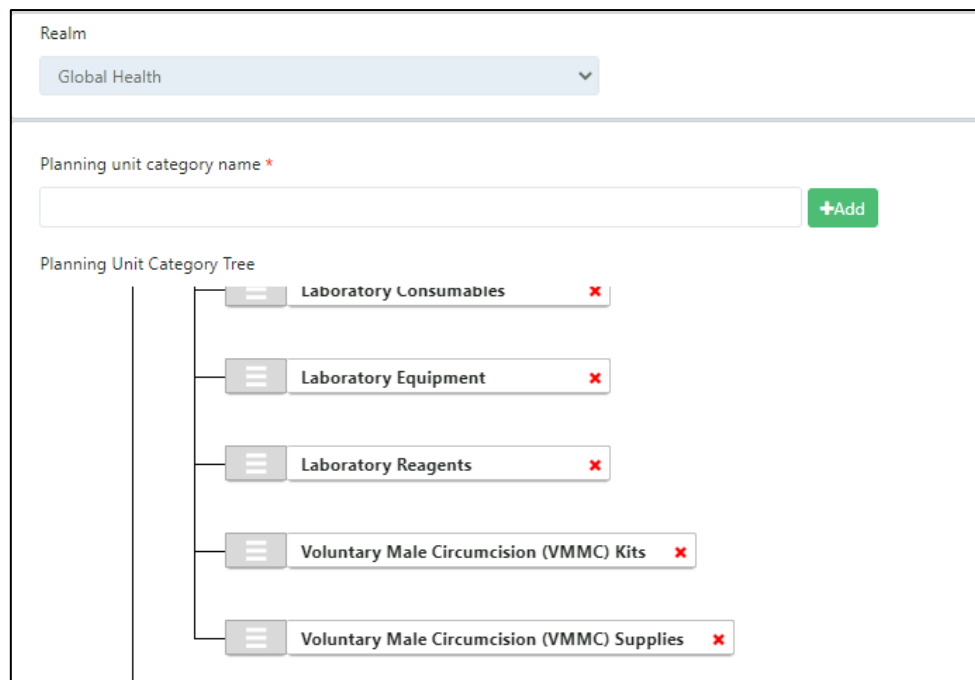
Figure 203: Viewing/adding planning unit categories

Alternate Reporting Unit

See Section 4.A3 Alternate Reporting Unit for more.

Procurement Unit

An item-level description of the "planning unit" including supplier/manufacturer-specific attributes such as GTIN and order prices, that can be manually added/edited by **Application and Realm Admins** or received automatically through integration and mapping QAT planning units to a procurement agent order management system. Procurement units are specific to each procurement agent. Procurement units are not visible to/editable by country/program-level users.

To add procurement units to the realm-level catalog, the Application or Realm Admin must:
1. Go to "Realm Level Masters" and Click on "Product".
2. Click on "Procurement Unit" and a table of procurement units will be displayed.
3. Click on the blue "add" button on the top right corner of the screen.
4. Enter all the required details on the "Add Procurement Unit" screen and click "Submit".
   a. **Note:** Required details include planning unit name, manufacturer, conversion factor, volume and weight attributes, units per pallet and per container, etc.

To edit/update procurement units:
1. Go to "Realm Level Masters" and Click on "Product".
2. Click on "Procurement Unit" and a table of procurement units will be displayed.
3. Click on any procurement unit that needs to be changed or updated.
4. Edit the required information.
   a. **Note:** Details such as planning unit name and manufacturer are not editable.
5. Click on the "Update" button to save the changes.

Figure 204: Add/Update Procurement Unit

Tracer Category

Tracer categories are a second tier, less broad grouping of product types specific to a Realm. **Application Admins and Realm Admins** can add/edit Tracer categories. For example, Adult antiretrovirals are a tracer category belonging to the broader grouping HIV/AIDS Pharmaceuticals (Planning Unit Category).

Figure 205: List of tracer categories

To add tracer categories to the realm-level catalog:
1. Go to "Realm Level Masters" and Click on "Product".
2. Click on "Tracer Category" and a Tracer category table will be shown for the selected Realm.
3. Click the blue "add" button on the top right corner of the screen.
4. Enter all the required details on the "Add Tracer Category" screen and click "Submit".

To update/edit tracer categories:
1. Go to "Realm Level Masters" and Click on "Product".
2. Click on "Tracer Category" and a Tracer category table will be shown for the selected Realm.
3. Click on any row that needs to be changed or updated.
4. Update the required information and click "Update" to save the changes.

Figure 206: Update Tracer Category

i. Equivalency Unit

Equivalency Unit enables users to manage aggregate data across product that are different, but related. Equivalency Units can be used in the compare and select forecast screen, the monthly forecast screen, and the forecast error (monthly) screen.

To add an Equivalency Unit Mapping:
1. Go to "Realm Level Masters" and Click on "Equivalency Unit".
2. Click on the '+Add Row' button in the bottom right of the screen. You can also right click on any row and select 'Add Row'.
3. Enter the required details and click on the "Submit" button.
   a. Realm level mappings are available to all users and are indicated by all. These are created and managed by Realm Admins. Program specific mapping can be created and managed by program admins. If there are any conflicts, program specific mappings will take precedence and be used instead of realm level mappings.

For example, a user is forecasting medicines to treat QATitis, a condition where people cannot stop using QAT. The user may forecast by different treatments (different forecasting units) but want to see how they are aggregated together.

Equivalency Unit	Forecasting Unit	Conversion to EU	Average Treatment Required to cure QATitis
1 Treatment for QATitis	1 tablet of FASPicillin	14	1 tablet a day for 2 weeks
1 Treatment for QATitis	5mL tube of FASPasone (cream)	1	0.5mL/day applied on the forehead over 10 days (1 tube total)
1 Treatment for QATitis	2mL vial of FASPicaine (injection)	0.5	One injection of 1mL (Two people can share one vial)
1 Treatment for QATitis	1 bar of white chocolate	2	2 bars of chocolate. The type of chocolate does not matter, as all chocolate contains the natural form of FASPicillin.
1 Treatment for QATitis	1 bar of dark chocolate	2	
1 Treatment for QATitis	1 bar of milk chocolate	2	

Creating and Managing Equivalency Units:
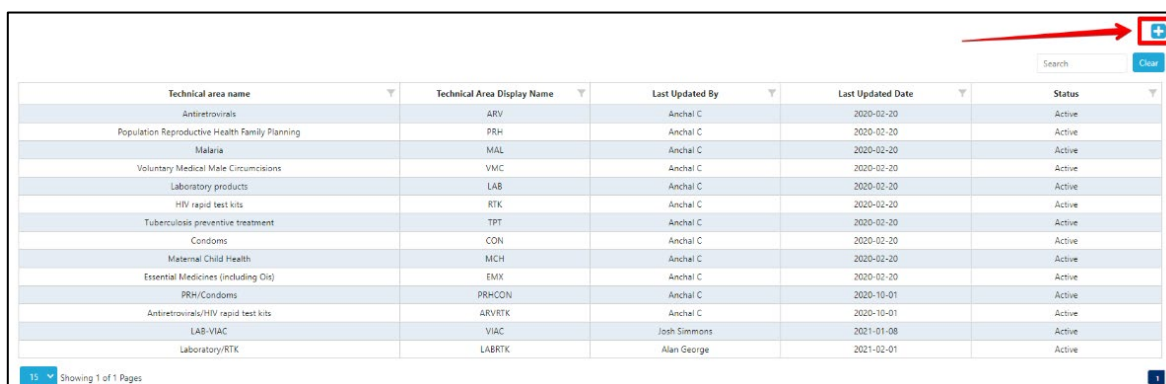
If you don't see an equivalency unit that you would like to map or you would like to edit an existing equivalency unit, click on the Manage Equivalency Unit button in top right of the screen. From there, you can edit a pre-existing equivalency unit or select 'Add Row' and add a new one.

j. Technical Area

Technical Area is a key component of a QAT program and specifies the focus of that program. For example, in the Global Health Realm, the technical areas are aligned with medical conditions or health care, treatment and prevention programs such as Malaria, Family Planning and HIV/AIDs, each of which requires a variety of medicines and supplies. **Application Admins and Realm Admins** can add/update Technical Area(s).
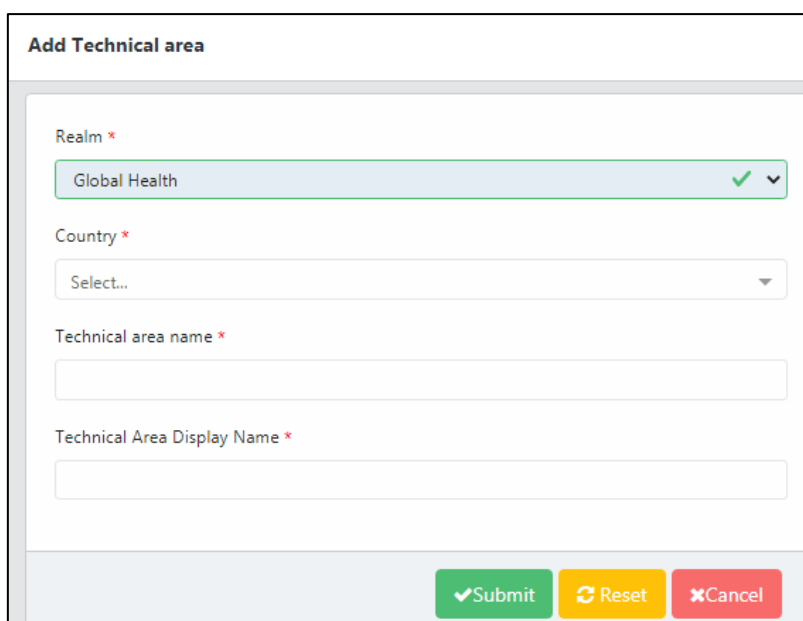
To add a Technical Area:

1. Go to the top right corner in the Technical Area screen and click on the blue "+" button. A new screen showing "Add Technical Area" will open:

Figure 207: Add Technical Area Screen

Figure 208 Add Technical Area

2. Enter the required details and click on the "Submit" button.
   a. If you do not wish to proceed with creating a new technical area, and you have not clicked submit, click on the "Cancel" button and QAT will close the form without saving and take you back to the Technical Area screen.

To update a Technical Area:
1. To update the technical area, go to the Technical Area Screen.
2. Left click on the technical area that you wish to update.
3. Enter the desired edits to the technical area and click the "Submit" button.
4. If you want to disable or re-activate the technical area, click the circle next to that option and click the "Submit" button"
   a. By clicking on the "Reset" button, the information in the technical area will not go away, rather it will reset to what it was prior to updating it.

Figure 209: Update Technical Area

k. Procurement Agent

A Procurement Agent selects the vendors, establishes payment terms, strategic vetting, selection, the negotiation of contracts and actual purchasing of goods that are shipped to a program. Procurement Agents are generally hired by the agency funding a particular shipment (a "Funding Source" in QAT) and identified by the Program-level user when planning a shipment. Procurement Agents are managed by **Application Level Admins** and **Realm Level Admins**.

To see the list of realm level procurement agents:
1. Go to "Realm Level Masters" from the sidebar menu.
2. Click on "Procurement Agent".

To add a Procurement Agent
1. On the Procurement Agent screen, go to the top right corner of the screen and click on the blue "+" button.
2. A screen titled "Add Procurement Agent" will appear.

3. Enter the required details.
4. Click on the "Submit" button to save the procurement agent.
    a. Before submitting, if you wish to not proceed with that procurement agent, click the "Cancel" button.
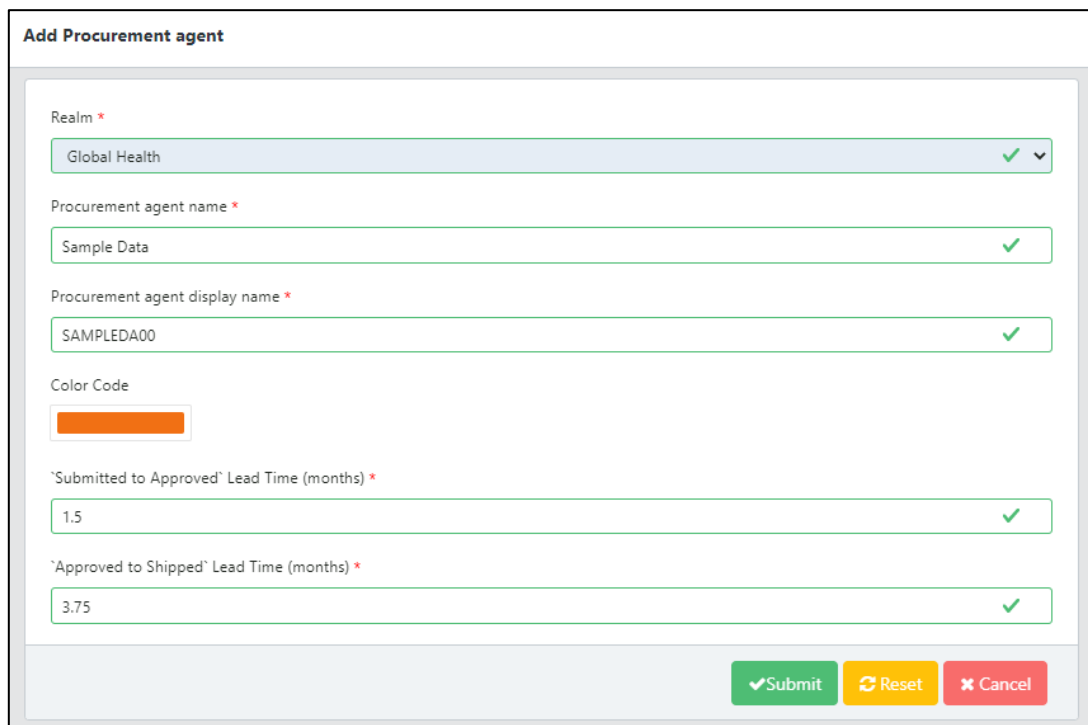
Figure 210: Add Procurement Agent

To update a Procurement Agent:
1. Go to the Procurement Agent screen.
2. Left click on the Procurement Agent that needs to be updated.
3. A screen labeled "Update Procurement Agent" will appear.
4. Input the desired change(s), for example modifying the agent's color code or Lead Times.
5. If you want to either activate or disable the procurement agent, select the corresponding option at the bottom of the screen.
6. Click the "Update" button to save changes or cancel to close the form without saving.

Planning Unit Details for Mapping to a Procurement Agent:

Planning Unit	The planning unit is the product to be planned in QAT. It is a product with full description up to the primary packaging (e.g. bottle of 30 tablets, 10x10 blister pack, etc.).
Procurement Unit	The procurement unit is a higher-level description of the Planning Unit which includes supplier-specific attributes such as costs and GTINs.
SKU Code	Stock Keeping Unit (SKU) Code is a feature used to identify specific products and often printed on the product and case labels. The SKU code should match with what is in the procurement agent's catalog.
Catalog Price	Price included in the procurement agent's catalog.
MOQ	Minimum Order Quantity refers to the minimum amount that can be ordered from a procurement agent for that specific planning unit.

Units per Container	The maximum number of units for a planning unit that can fit in a container used by the procurement agent to ship the product to a program.
Units per Pallet	Units per pallet defines the number of planning units that can be packed onto a standard pallet, per pallet dimension. Units per pallet describes the individual items on a pallet into single "units" that can be moved easily with a pallet jack or forklift truck.
Volume	The volume of the planning unit.
Weight	The weight of the planning unit.
GTIN	The Global Trade Item Number is an identifier for trade items, developed by GS1. Such identifiers are used to look up product information in a database which may belong to a manufacturer.

Table 12: Procurement Agent Planning Unit Details

To add a Procurement Agent Planning Unit:
1. Go to the "Procurement Agent" screen.
2. Right click on the desired procurement agent that you want to add a planning unit to. Then select "Map Planning Unit".
3. A screen titled "Add Procurement Agent Planning Unit" will appear.
4. Either click on the "Add Row" button or right click and select "Insert New Row" to add a row.
5. Enter the details for the new planning unit. Refer to the table above for definitions on any of the data elements.
6. If you enter information for "MOQ", "Unit Per Pallet" or "Unit Per Container", this procurement agent/planning unit combination will be considered a *strategic product. (*Refer to Shipment Data section to learn more about strategic products).
7. Click the "Submit" button.

To update a Procurement Agent Planning Unit:
1. Go to the "Procurement Agent" screen.
2. Right click on the desired procurement agent that you want to update a planning unit(s) for. Then select "Map Planning Unit".
3. A screen titled "Add Procurement Agent Planning Unit" will appear.
4. Enter the details for the existing planning unit by double clicking into the cells and typing in the information. Refer to the table above for definitions on any of the data elements.
5. If you enter information for "MOQ", "Unit Per Pallet" or "Unit Per Container", this procurement agent/planning unit combination will be considered a *strategic product. (*Refer to Shipment Data section to learn more about strategic products).
6. Click the "Submit" button.

Note: If the procurement agent's catalog is integrated with QAT, the planning units and associated details in QAT will automatically reflect that catalog and any change you manually make in QAT will be overridden automatically with the data from the procurement agent's catalog at the time their data updates.

Figure 211: Map Procurement Agent Planning Unit

To add a Procurement Agent Procurement Unit:

1. Go to the "Procurement Agent" screen.
2. Right click on the desired procurement agent that you want to add a planning unit to. Then select "Map Procurement Unit".
3. A form titled "Add Procurement Agent Procurement Unit" will appear.
4. Either click on the "Add Row" button or right click and select "Insert New Row" to add a row.
5. Enter the details for the new procurement unit. Refer to the table above for definitions on any of the data elements.
6. All the fields are required except for the GTIN field which is optional.
7. Click the "Submit" button.

To update a Procurement Agent Procurement Unit:

1. Go to the "Procurement Agent" screen.
2. Right click on the desired procurement agent for which you want to update a procurement unit(s). Then select "Map Procurement Unit".
3. A form titled "Add Procurement Agent Procurement Unit" will appear.
4. Enter the details for the existing procurement unit by double clicking into the cells and typing in the information. Refer to the table above for definitions on any of the data elements.
5. All the fields are required except for the GTIN field which is optional.
6. Click the "Submit" button.

Note: If the procurement agent's catalog is integrated with QAT, the procurement units and associated details in QAT will automatically reflect that procurement agent's catalog and any change you make manually in QAT will be overridden by the integration at the time of the next update.

Figure 212: Map Procurement Agent Procurement Unit

l. Procurement Agent Type

Procurement agents can be customized per program need; however, in order to maintain standardization through master data, QAT includes an "procurement agent type" that can be managed by a realm administrator.

The realm administrator assigns a procurement agent type to each procurement agent in QAT; for example, in the Global Health Realm, country A might request their program shipments include the procurement agent Joint Medical Store, while country B requires their program shipments to include National Medical Store. This level of customization is possible in QAT, while maintaining standardization through the procurement agent Type masters. In the example above both procurement agents would be assigned the procurement agent type "Government".

As procurement agent type is realm-level master data, QAT users can request new organization types if those don't already exist, through the ticketing function.

Procurement Agent Type Name
Bilateral Donor
Multilateral Donor
Government
Non-Government Organization
TBD
Other

Figure 213 – Procurement agent types in the Global Health Realm

Add Procurement Agent Type

1. Go to "Realm Level Masters" and then click on "Procurement Agent Type" to display a list of current Organization types.

Procurement Agent Type Name	Procurement Agent Type display name	Last Updated By	Last Updated Date	Status
Bilateral Donor	Bilateral	Lillian Gu	12-Jul-22	Active
Multilateral Donor	Multilat	Lillian Gu	12-Jul-22	Active
Government	Gov	Lillian Gu	12-Jul-22	Active
Non-Government Organization	NGO	Lillian Gu	12-Jul-22	Active
TBD	TBD	Lillian Gu	12-Jul-22	Active
Other	Other	Lillian Gu	12-Jul-22	Active

2. Click on the blue "+" button to open the "Add Procurement Agent Type" screen
3. Enter the required details.
4. Click "Submit" to save changes or "Cancel" to close the form without saving.

Realm *

Global Health

Procurement Agent Type Name *

Procurement Agent Type display name *

✔Submit   ⟳ Reset   ✖ Cancel

Note: QAT does not allow to put space before starting the name of procurement agent type. Spaces are only allowed in between words if the procurement agent type name consists of multiple words.

Update a Procurement Agent Type

1. Go to "Realm Level Masters" and then click on "Procurement Agent Type",
2. Click on an existing Procurement Agent type to display below screen.

Realm *

Global Health

Procurement Agent Type Name *

Government   ✔

Procurement Agent Type display name *

Gov   ✔

Status   ● Active   ○ Disabled

✔Update   ⟳ Reset   ✖ Cancel

3. Enter the required details.
4. Click "Update" to save changes or "Cancel" to close the form without saving.

m. Forecast Method

This screen enables realm admins to add or edit forecast methods which can be used by users when creating forecast programs.

Add a Forecast Method:

1. Go to "Realm Level Masters" and then click on "Forecast Method" to display a list of current forecast methods.

Forecast Method Type *	Forecast Method *	Active?	Last Updated By	Last Updated Date
Consumption	Consumption	☑	Anchal C	01-Sep-21
Tree	Demographic	☑	Anchal C	01-Sep-21
Tree	Morbidity	☑	Anchal C	01-Sep-21
Tree	Services	☑	Anchal C	15-May-22

2. Click on the blue "+Add Row" button to add a blank row
3. Enter the required details.
4. Click "Submit" to save changes.

D. Setting Up a New Program

A Realm or Application administrator can create a new program when required. Each program must consist of a country, technical area (can be 1 or more), region(s) and organization. Once the program is setup in QAT, program admins will have the ability to update certain program settings. Information on updating these settings can be found in the "Program Information" section.

To set up a new <u>Supply Planning</u> Program follow these steps:
1. Go to "Program Management" from the sidebar menu.
2. Click on "Setup Program".

OR

1. Go to "Program Management" from the sidebar menu and select "Update Program Info".
2. Click on the blue "+" icon in the top right corner of the screen. This button will redirect the user to the "Set up Program" screen.

Figure 214: Supply Planning Module Setup Program Screen

3. Fill in the Realm section and click on "Next". If the user only has access to one realm then this will automatically be selected for the user.
4. Next, select the Country that the program is for and click "Next". If the country is not listed, the Application admin will need to add or activate that specific country for the realm.
5. Select the Technical Area(s) that the program is for and click "Next". If the Technical Area is not listed, the Application admin will need to add or activate that Technical Area for the realm.

    Note: Multiple Technical Areas can be selected using the Technical Area dropdown list.

Figure 215 Setting-up a program with multi-select technical areas

6. Select the Organization that the program is for and click "Next". If the Organization is not listed, the Application admin will need to add or activate that Organization for the realm.
7. Select the Region(s) that the program is for and click "Next". If a Region the user needs is not listed, the Application admin will need to add or activate that Region for the realm. This step allows for one or more selections.
8. Step 6 is where the user will provide the Program Data. Fill in all the required details.

Figure 216: Add Program Data

9. The final step to setup the program is to add in the planning unit(s). All of the fields in this step are required in order to proceed. Any field that is left blank will be highlighted yellow until it is filled in.
10. Click "Submit".

To set up a new __Forecasting__ Program follow these steps:
1. Go to "Program Management" from the sidebar menu and select "Update Program Info".
2. Click on the blue "+" icon in the top right corner of the screen.
3. Complete the required fields for Country, Technical area, Organization, Region, Forecasting Program, Program Manager, and the Version 1 Settings (Forecast Start, Forecast Period, Forecast End). The Version Settings can be updated at any time by the Program Admins.

- Forecast Start, Forecast Period (Months), and Forecast End – based on the start & end date, QAT will automatically calculate the forecast period in months. Alternatively, users can choose to enter a forecast start date and number of months in the forecast period, and QAT will automatically calculate the forecast end date.

4. Click "Submit"

Figure 217: Forecasting Module Setup Program Screen

Annex 2: Business Rules

A. Introduction

This document outlines the key formulas and business rules that underpin the Quantification Analytics Tool (QAT) application.

B. Supply Planning Module: Supply Planning

1. **Opening Balance:**
    Opening balance for a month is the same as that of the Ending balance of last month and if that is the first month then the opening balance is 0.

    Formula:
    Opening balance of first month = 0
    Opening balance for current month = Ending balance of previous month

2. **Expired Stock:**
    Expired stock is calculated as the sum of the Ending balance of all the batches of the previous month that are available and have the expiry date same as that of the current month.

    Formula:
    Expired Stock = Sum of Ending balance of batches that are expiring this month

3. **Total Shipment:**
    Total shipment is calculated as the sum of all the shipments with received date(if present or expected delivery date) is the same as that of current month and the shipment status is not cancelled and if that particular shipment needs to be accounted for that is to be considered in the Ending balance.

    Formula:
    Total shipments = Sum of all the shipments whose receive date or expected delivery   date is equal to the month

4. **Final Stock and Adjustment:**
    Final stock is calculated as the sum of stock of all the regions and final adjustment is calculated as sum of the adjustments of all the regions based on certain conditions.
    a. If the region has reported both the actual stock and the adjustment then we only consider the actual count while doing the sum and the adjustment is ignored for that region even if someone has entered the data for adjustment.
    b. If the region has only reported the adjustment then that adjustment is considered while doing the sum.

    For example, if Region A has reported both the stock count and the manual adjustment so in that case we only consider the stock count and ignore the adjustment. And If Region B has reported only the adjustments then we take the sum of all the adjustments for that region. And then we sum up the counts for both the regions as final stock and final adjustment.

Formula:
Final Stock = Sum of stock for all the regions
Final Adjustments = Sum of adjustments of all the regions for which there is no stock qty available.

5. **Adjusted Consumption**
If the consumption is forecasted consumption then Adjusted Consumption is
same as that of Forecasted Consumption. If the consumption is actual consumption then Adjusted Consumption is calculated as Ratio of multiplication of actual consumption qty and No of days in month to Difference of No of days in month and Number of days of Stockout

Formula:
Adjusted Consumption for Forecasts = Forecasted Consumption Qty

Adjusted Consumption for Actuals = (Actual Consumption Qty * No of days in Month)/No of days in month - Days of stockout)

6. **Final consumption:**
Final consumption is calculated as the sum of adjusted consumption of all the regions based on some conditions.
- If all the regions have not reported the actual consumption, we take the max of sum of forecasted consumption and sum of adjusted actual consumption.
- If all the regions have reported the actual consumption, we take the sum of adjusted consumption as final consumption.

For example, if region A has reported actual consumption as well as forecasted consumption but region B has only reported forecasted consumption and sum of forecasted consumption for both the regions is greater than the sum of adjusted consumption so we will consider the forecasted consumption. And if suppose region A and region B both have reported the actual as well as forecasted consumption and even if sum of forecasted consumption is greater than sum of adjusted consumption, we will still consider the adjusted consumption as final consumption.

Formula:
Final consumption (If all the regions have not reported the actual consumption) = MAX (Sum of adjusted consumption for all the regions, Sum of forecasted consumption for all the regions)

Final consumption (If all the regions have reported the actual consumption) = Sum of adjusted consumption for all the regions

7. **Projected inventory:**
Projected inventory is calculated as sum of opening balance, total shipments, total adjustments and deduction of total final consumption and expired stock.

Formula:
Projected inventory = Opening balance + Total shipments + Final adjustments - Final consumption - Expired stock

8. **Calculate National Adjustment:**
National adjustments is calculated based on three conditions:
   a. If all the regions have reported the actual stock count and projected inventory is not equal to final inventory
   b. If some of the regions have reported the actual stock count and final inventory is greater than sum of projected inventory and final adjustment

c. If any of the regions have reported the actual stock count and projected inventory is less than 0

And based on the above conditions if any of the conditions is satisfied then national adjustment is calculated as difference between final inventory and projected inventory otherwise it is considered as 0.

Formula:
National adjustments = Final stock - Projected inventory

9. **AMC:**
Average monthly consumption(AMC) is calculated as the ratio of sum of full demand of months in past and the full demand of months in future to the total number of months for all the non-zero final consumptions and including the current month in months in future. If consumption is actual Full Demand will be equal to the sum of the unmet demand in addition to the actual consumption. If the consumption is forecasted the full demand is equal to the forecasted consumption. Both months in past and months in future are based on the mapping of program planning units.

Formula:
AMC = Sum (Full Demand in No. of months in past) + Sum (Full Demand in No. of months in future)/Total number of months

10. **Min MOS:**
Min MOS is calculated as Max of Min MOS and Min MOS guardrail. Min MOS is based on the mapping of the program planning unit and Min MOS guardrail is based on the realm.

Formula:
Min MOS = Max of (Min MOS, Min MOS guardrail)

11. **Max MOS:**
Max MOS is calculated as Min of Max of sum of Min MOS and reorder frequency and the Min Max guardrail and Max Max guardrail. Reorder frequency is based on the mapping of the program planning unit and Min Max guardrail and Max Max guardrail are based on the realm.

Formula:
Max MOS = Min(Max(Min MOS + Reorder frequency, Min Max guardrail),Max Max guardrail)

12. **Min Stock:**
Min stock is calculated by multiplying the AMC and Min MOS.

Formula:
Min Stock = AMC * Min MOS

13. **Max Stock:**
Max stock is calculated by multiplying the AMC and Max MOS.

Formula:
Max Stock = AMC * Max MOS

14. **Max Quantity:**
Max Quantity is calculated as sum of Min Qty and multiplication of reorder frequency and AMC

Formula
Max Qty = Min Qty + (Reorder Frequency * AMC)

15. **Ending Balance:**
    Ending balance is calculated based on certain conditions:
    a. If all the regions have reported the actual stock count then the Ending balance is equal to the final stock.

        Formula:
        Ending balance = Final Stock

    b. If some of the regions have reported the actual stock count and if the final stock is greater than the sum of projected inventory and national adjustment, then the Ending balance is equal to the final stock.

        Formula:
        Ending balance = Final Stock

    c. Otherwise Ending balance is calculated as the sum of projected inventory and national adjustment.

        Formula:
        Ending balance = Projected inventory + National adjustment

16. **Demand during Stockout:**
    If the consumption is forecasted consumption, then Demand during Stockout is 0. If the consumption is actual consumption, then Demand during Stockout is calculated as Ratio of multiplication of actual consumption qty and No. of days in month to Difference of No of days in month and Number of days of Stockout.

    Formula:
    Demand during Stockout for Forecasts = 0

    Demand during Stockout for Actuals = (Actual Consumption Qty * No of days in Month)/No of days in month - Days of stockout)

17. **Unmet demand:**

    Unmet demand is calculated as a difference of 0 with difference of Projected Inventory and Demand during Stockout only if Projected Inventory is less than 0 otherwise Unmet demand is 0.
    Formula:
    Unmet demand = 0 - Projected Inventory - Demand during Stockout (if Project Inventory is <0)

18. **MOS:**
    MOS is calculated as the ratio of Ending balance to that of AMC.

Formula:

MOS = Ending balance / AMC

19. **When to suggest shipments (Plan by MOS):**

QAT suggests the shipmet for a month when MOS for the month and following two months is less than that of the Min MOS and if the month is greater than the current month

Formula:

When to suggest shipments = If MOS for month and following two months < Min MOS

20. **Suggested shipment quantity (Plan by MOS):**

Suggested shipment quantity is calculated as the difference between Max stock and Ending balance

Formula:

Suggested shipment quantity = Max stock - Ending balance
- If MOS for current month and following two months is less than Min MOS
  Suggested Order Qty = (Max Stock - Ending Balance + Unmet Demand)
- If MOS is '0' and AMC is greater than > 0 and the following two months are less than Min MOS
  Suggested Order Qty = (Max Stock - Ending Balance + Unmet Demand)
- If MOS is '0' and AMC is greater than > 0 and one of the following two months is greater than Min MOS
  Suggested Order Qty = (Min Stock - Ending Balance + Unmet Demand)

21. **When to suggest shipments (Plan by Qty):**

QAT suggests the shipment for a month when Ending Balance for the month + Distribution lead time and following two months is less than that of the Min Qty or when Ending Balance for month is 0 and AMC is greater than 0 and if the month is greater than the current month

Formula:

When to suggest shipments = If Ending Balance for month + X (Distribution Lead Time) and following two months < Min Qty or
When to suggest shipments = If Ending Balance for month = 0 and AMC is not equal to 0

22. **Suggested shipment quantity (Plan by Qty):**

Suggested shipment quantity is calculated as the difference between Max stock/Min Stock and Sum of Ending balance and Unmet Demand

Formula:
- If Ending Balance for current month + X months (Distribution Lead Time) and following two months is less than Min Qty
  Suggested Order Qty = (Max Qty for current month + X months (Distribution Lead Time) - Ending Balance + Unmet Demand)
- If Ending Balance is '0' and AMC is greater than > 0 for current month + X months (Distribution Lead Time) and the following two months are less than Min Qty
  Suggested Order Qty = (Max Qty for current month + X months (Distribution Lead Time) - Ending Balance + Unmet Demand)
- If Ending is '0' and AMC is greater than > 0 for current month + X months (Distribution Lead Time) and one of the following two months is greater than Min MOS
  Suggested Order Qty = (Min Qty - Ending Balance + Unmet Demand)

23. **Batch calculations:**

Below are the steps for the all the batch allocations:

a. **FEFO Calculations:**
We first calculate the unallocated FEFO that is we calculate the total remaining quantity of the final consumption and final adjustment which will be used in case of FEFO calculations and for which we do not have the batch information. So, the unallocated FEFO is calculated based on two different conditions

    i. If the sum of final adjustment and national adjustment is less than 0 then unallocated FEFO is calculated as difference between final consumption and the sum of final adjustment and national adjustment.

    Formula:
    Unallocated FEFO = Final consumption - (Final adjustment + National adjustment)

    ii. If the sum of adjustment and national adjustment is greater than 0 then unallocated FEFO is the same as that of final consumption.

    Formula:
    Unallocated FEFO = Final consumption

We sort all the batches based on the expiry date in ascending order that is sort the batches in the order which is expiring first

We then loop across all the batches for doing the FEFO calculations

We calculate the opening balance for a batch which is the same as that of the Ending balance for the same batch in the previous month. And if the batch is created then the opening balance is considered as 0.

Formula:
Opening balance of newly created batch = 0
Opening balance of remaining batches = Ending balance

We then calculate the Expired stock quantity which is equal to the Ending balance of the same batch from the previous month and is only calculated when the expiry date of the batch is the same as that of the current month otherwise it is 0.

Formula:
Expired Stock (If expiry date is same as that of current date) = Ending Balance
Expired Stock (Otherwise) = 0

We then calculate the temp Ending Balance. Temp Ending Balance is calculated as sum of opening balance, total shipments, total adjustments and deduction of total final consumption and expired stock.

Formula:
Temp Ending Balance = Opening Balance + Shipment Qty + Adjustment Qty - Consumption Qty - Expired Stock

We then calculate the Ending balance amount which is calculated based on two different conditions

    i.   If temp Ending Balance is greater than or equal to unallocated FEFO then Ending balance is equal to the difference between the temp Ending balance and unallocated FEFO also in this case we make the unallocated FEFO as 0 since we have allocated all the quantity to the batch.

    Formula:
Ending balance = Temp Ending Balance - unallocated FEFO
Unallocated FEFO = 0

    ii.   If temp Ending Balance is less than unallocated FEFO then Ending balance is equal to 0 since we will fully consume this batch. Also we then deduct the temp CB from the unallocated FEFO since we have consumed that much of the quantity.

    Formula:
Ending balance = 0
Unallocated FEFO = Unallocated FEFO - Temp Ending balance

We repeat this process for every batch in the order of their expiry date.

b. LEFO Calculations:
We first calculate the unallocated LEFO that is we calculate the total remaining quantity of the final consumption and final adjustment which will be used in case of LEFO calculations and for which we do not have the batch information. So, the unallocated LEFO is calculated based on two different conditions

    i.   If the sum of final adjustment and national adjustment is greater than 0 then unallocated LEFO is calculated as difference between 0 and the sum of final adjustment and national adjustment.

    Formula:
Unallocated LEFO = 0 - (Final adjustment + National adjustment)

    ii.   If the sum of adjustment and national adjustment is less than 0 then unallocated LEFO is 0.

    Formula:
Unallocated LEFO = 0

    iii.   If unallocated LEFO is not equal 0 then we continue otherwise we break.

We sort all the batches based on the expiry date in descending order that is sort the batches in the order which is expiring first

We then loop across all the batches for doing the LEFO calculations

We then calculate the temp Ending Balance. Temp Ending Balance is the same as that of Ending the balance of batch after FEFO calculations.

Formula:
Temp Ending Balance = Ending balance after FEFO calculations

We then calculate the Ending balance amount which is calculated based on two different conditions

    i.   If temp Ending Balance is greater than or equal to unallocated LEFO then Ending balance is equal to the difference between the temp Ending balance and unallocated LEFO also in this case we make the unallocated LEFO as 0 since we have allocated all the quantity to the batch.

            Formula:
            Ending balance = Temp Ending Balance - unallocated LEFO
            Unallocated LEFO = 0

    ii.   If temp Ending Balance is less than unallocated LEFO then Ending balance is equal to 0 since we will fully consume this batch. Also we then deduct the temp CB from the unallocated LEFO since we have consumed that much of the quantity.

            Formula:
            Ending balance = 0
            Unallocated LEFO = Unallocated LEFO - Temp Ending balance

We repeat this same process for the rest of batches till unallocated LEFO is not equal to 0.

C. Supply Planning Module: QAT Problem List

C1. Data Quality

1. Missing recent actual consumption inputs (within the last <%X %> months)
   a. **Suggestion:** Please provide Actual consumption in <%REGION %> region for the month of <%DT %>.
   b. **Logic:** QPL will check actual consumption for the past three months and current month. If actual consumption for all of the past three month and current month is missing, then the problem is flagged.

2. Missing recent inventory inputs (within the last <%X%> months)
   a. **Suggestion:** Please provide Stock count in <%REGION %> region for the month of <%DT%>.
   b. **Logic:** QPL will check stock for the past three months and current month. If stock for all of the past three month and current month is missing, then the problem is flagged.

3. Missing recent actual consumption inputs for months in gaps
   a. **Suggestion:** Please provide Actual consumption in <%REGION %> region for the month of <%DT %>.
   b. **Logic:**
      i. QPL will check actual consumption inputs for the current month (consider as t) and for the month which will be current month minus two months (consider as t-2) i.e. t and t-2 if both the months have actual consumption and current month minus one

month (consider as t-1) i.e. t-1 don't have actual consumption. Then in this case the problem is flagged.

    ii. QPL will check actual consumption inputs for the current month minus one month (consider as t-1) and for the month which will be current month minus three months (consider as t-3) i.e. t-1 and t-3 if both the months have actual consumption and current month minus two month (consider as t-2) i.e. t-2 don't have actual consumption. Then in this case the problem is flagged.

C2. Procurement Schedule

1. Shipments have receive dates more than <%X%> days in the past
   a. **Suggestion:** Please check to make sure shipment <%SHIPMENT_ID %> was received, and update either the receive date or the shipment status.
   b. **Logic:** QPL will check the receive date for all the shipments and if the receive date is past and has also crossed the buffer time period then the problem is flagged. For example, buffer time for this problem is 14 days so if the receive date of the shipment plus the buffer days are past then the problem is flagged for each shipment.

2. Shipment have not been submitted for over <%X%> days since target date
   a. **Suggestion:** Based on lead times, shipment <%SHIPMENT_ID%> should have been submitted by now. Please double-check to ensure that the status or receive date is accurate.
   b. **Logic:** QPL will check the submitted date for all the shipments and if the submitted date is past and has also crossed the buffer time period then the problem is flagged. For example, the buffer time for this problem is 3 days. Hence if the submitted date of the shipment plus the buffer days have already passed, then the problem is flagged for each shipment.

C3. Supply Planning

1. No Forecasted consumption <%X %> months into the future
   a. **Suggestion:** Please provide Forecasted consumption in <%REGION %> region for the month of <%DT %>.
   b. **Logic:** QPL will check forecasted consumption for future 18 months. If forecasted consumption for any one of the month is missing then the problem is flagged. The problem gets into in-compliance state if and only if all the 18 months have forecasted consumption.

2. Dynamic forecasting is not used for commodity groups ARV
   a. **Suggestion:** Please check consumption data in region <%REGION%> during period <%DT%> as we encourage forecasting with dynamic monthly values, showing that factors such as program scale or seasonality have been taken into account.
   b. **Logic:** QPL will check whether the planning unit of the program falls in the commodity group ARV then QPL will check forecasted consumption for future 18 months if any four consecutive months within the future 18 month span have the same forecasted consumption quantity then the problem is flagged.

3. Dynamic forecasting is not used for commodity groups MALARIA
   a. **Suggestion:** Please check consumption data in region <%REGION %> during period <%DT%> as we encourage forecasting with dynamic monthly values, showing that factors such as program scale or seasonality have been taken into account.
   b. **Logic:** QPL will check whether the planning unit of the program falls in the commodity group MALARIA then QPL will check forecasted consumption for future 18 months if any four consecutive months within the future 18 month span have the same forecasted consumption quantity then the problem is flagged.

4. Dynamic forecasting is not used for commodity groups VMMC
    a. **Suggestion:** Please check consumption data in region <%REGION%> during period <%DT%> as we encourage forecasting with dynamic monthly values, showing that factors such as program scale or seasonality have been taken into account.
    b. **Logic:** QPL will check whether the planning unit of the program falls in the commodity group VMMC then QPL will check forecasted consumption for future 18 months if any four consecutive months within the future 18 month span have the same forecasted consumption quantity then the problem is flagged.

5. Supply Plan does not follow minimum/maximum parameters
    a. **Suggestion:** Re-evaluate supply plan to meet the Min/Max parameters. If overstocked, consider delaying/canceling shipment(s), review future expiries, or donating stock. If understocked, consider planning & ordering, expediting, or increasing shipment quantity.
    b. **Logic:** QPL will check to see if each planning unit is overstocked or understocked at any point during the next 18 months according to the minimum and reorder parameters defined at individual program-levels. QAT will then count the number of months the planning unit is overstocked and understocked and subdividing it in two different time windows: those months within lead time (1-6 months) and those within the planning window (7-18 months). The QPL will also denote the number of shipments being received in the next 1-6 months and the next 7-18 months.

6. Stock outs in the next 1-6 months/Stock outs in the next 7-18 months
    a. **Suggestion:** Consider planning & ordering, expediting, or increasing shipment quantity. Communicate the potential stockout(s) with relevant stakeholders.
    b. **Logic:** QPL will check to see if each planning unit is stocked out (zero MOS) at any point during the next 18 months. QAT will then count the number of months the planning unit is stocked out and subdividing it in two different time windows: those months within lead time (1-6 months) and those within the planning window (7-18 months). The QPL will also denote the number of shipments being received in the next 1-6 months and the next 7-18 months.

C4. Other (Manual Problems)

1. These are specific questions or clarifications manually entered by the supply plan reviewer that are not automatically flagged by QAT. The problem description, suggestion, and the criticality are determined by the supply plan reviewer. QAT does not conduct any specific logic for this problem as it must be manually added, updated, and resolved by the supply plan reviewer.

D. Supply Planning Module: Other QAT Reports

1. **WAPE (Weighted Absolute Percentage Error)**
   WAPE (Weighted Absolute Percentage Error) is being used to calculate forecast error. This calculation is used in forecast error reports which helps supply plan owners to review forecast error in order to monitor the strength for their forecast. The WAPE formula is using the previous 3-12 months of data depending on the selection in the 'Time Window' dropdown.

   WAPE is Dividing the sum of absolute differences by the sum of actual values for a particular time window. Time window can be 3,6,9 or 12

   Formula:

WAPE=((Abs(actual consumption month 1-forecasted consumption month 1)+ Abs(actual consumption month 2-forecasted consumption month 2)+ Abs(actual consumption month 3-forecasted consumption month 3)+ Abs(actual consumption month 4-forecasted consumption month 4)+ Abs(actual consumption month 5-forecasted consumption month 5)+ Abs(actual consumption month 6-forecasted consumption month 6)) / (Sum of all actual consumption in the last 6 months))

Note: Time window considered as 6 months

2. **Shipment Cost**
   It is the total cost required to received order at warehouse

   Formula:
   Shipment Total Cost = (Product Cost+ Freight Cost) * conversion rate to USD

3. **Cost of Inventory**
   This calculation provide us cost of available product

   Formula:
   Cost of Inventory = ending balance* catalog price

4. **Average Stock**

   Formula:
   Average stock= sum (ending balance for 'n' months) / n

   Note: "n" is number of months

5. **Inventory Turns**
   It is the ratio of consumption versus average stock. User can select to view the table in two ways: by country or by PU category. Can be multi-select for countries or PU category, highest level calculation (aggregation/average from each PU under program or from each program that contains that PU category). Then will calculate the turns for each planning unit under that program.

   Formula:

   Planned Inventory Turns (IT)

   At PU level
   The calculation is done by determining the possible months of stock for each month over 12 months if the inventory rules worked perfectly considering the Planning Unit's MIN and Reorder Interval.

   Consumption = 1 MOS/month ; Total consumption over period = 12 MOS

   Average MOS is calculated based on the MIN and the Reorder Interval

   For example:
   1. If the MIN is 3 and reorder is 9 and the first month is a re-order month then:

a. The average MOS over 12 months would be 7.25

b. The Planned inventory turn is the Total consumption 12 divided by the calculated Average months of stock over 12 month. Thus 12 /7.25 = 1.7

Reor-der in-terval	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Total months
12	12	11	10	9	8	7	6	5	4	3	2	1	78
11	1	11	10	9	8	7	6	5	4	3	2	1	67
10	2	1	10	9	8	7	6	5	4	3	2	1	58
9	3	2	1	9	8	7	6	5	4	3	2	1	51
8	4	3	2	1	8	7	6	5	4	3	2	1	46
7	5	4	3	2	1	7	6	5	4	3	2	1	43
6	6	5	4	3	2	1	6	5	4	3	2	1	42
5	2	1	5	4	3	2	1	5	4	3	2	1	33
4	4	3	2	1	4	3	2	1	4	3	2	1	30
3	3	2	1	3	2	1	3	2	1	3	2	1	24
2	2	1	2	1	2	1	2	1	2	1	2	1	18
1	1	1	1	1	1	1	1	1	1	1	1	1	12

At Program level:

MODE (Planned inventory turns of all Planning units under a specific program)

At Country and/or PU category level:
MODE (Planned inventory turns of all Planning units under a specific country / PU Category)

Actual Inventory Turns (IT)

At PU level
1.Total Consumption for the last 12 months / Average Stock on hand over last 12 months

At Program level
1. First option is to look for a mode.
2. If the count of MODE Value < 3 (variable setting), QAT uses AVG, if the count of the MODE value is > 3 (variable setting), then
3. The mode will be determined if the value occurs in at least 20% (variable setting), of the program's total number of planning units. (Example: program contains 100 PUs, 20 of those have turns = 1.2 and the rest all have different turns; so the turns for the program will be 1.2)
4. If above condition (20%) is found multiple times in the dataset, QAT to use the LOWEST inv. turns mode of the set (Example:, Program contains 100 PUs; 60 PUs have different turns; 20 PUs have inv turns = 1.2, another 20 PUs have inv. turns = 2.5; QAT will display 1.2 as the inv. turns for that program)
5. If no definitive mode can be found based on above rules, then Program level inv turns will be the average of all PU inventory turns under that program

At Country and/or PU category level
1. First option is to look for a mode.
2. If the count of MODE Value < 3 (variable setting), QAT uses AVG, if the count of the MODE value is > 3 (variable setting), then

3. The mode will be determined if the value occurs in at least 20% (variable setting) of the that country's (or PU category) total number planning units

4. Rule: If above condition is found multiple times in the dataset, QAT to use the LOWEST inv. turns mode of the bunch (e.g., Country contains 1000 PUs; 600 PUs have different turns; 200 PUs have inv turns = 1.6, another 200 PUs have inv. turns = 2.2; QAT will display 1.6 as the inv. turns for that Country/PU category)

5. Rule: If no definitive mode can be found based on above rules, then Country/PU category level inv turns will be the average of all PU inventory turns under that country/PU category

Note: Actual consumption precedes forecasted consumption in calculation if available

6. **Procurement Agent Total Lead Time:**
   This is the total time required to receive a product in the warehouse since the date when order was planned. It also depends on shipment mod (sea or air). This calculation is used to calculate the expected delivery date so that user can order products before stock out

   Formula:
   Procurement Agent total Lead Time(by Air) = Planned to Submitted Lead Time in months +Submitted to Approved Lead Time in months+ Approved to Shipped Lead Time in months+ Shipped to Arrived Lead Time in months(by Air)+Arrived to Received Lead Time in months

   Procurement Agent total Lead Time(by Sea) = Planned to Submitted Lead Time in months +Submitted to Approved Lead Time in months+ Approved to Shipped Lead Time in months+ Shipped to Arrived Lead Time in months(by Sea)+Arrived to Received Lead Time in months

7. **Expiries Report:**
   This report calculates the expired quantity for each planning unit as well as the linked batch number to show dates of when the expiry occurred. Also included, the total cost of expiry for products that have expired.

   Formula:
   Total Cost of Expiry= Expiring Quantity * Unit-price of product from shipment (if batch didn't come from shipment, default catalog price is used)

E. **Forecasting Module: Tree Forecasts**

1. **Aggregation Node**
   Value for the aggregation node for a month is calculated as sum of the values of the children nodes for that same month

   Formula:
   Value of node for a month = Sum(Node values of child nodes)

2. **Number Node**
   Value for the number node for a month is defined at node.

   Formula:
   Value of node for a month = Value defined at the node

   There are three types of modeling/transfer that can be applied
   a. **Linear Number:**

If linear number modeling is applied then the value of that node is increased or decreased by a fixed, monthly quantity.

If linear number transfer is applied then the value of that node is decreased from this node and the same amount is increased in the transferred node.

- **Formula for modeling:**
Value for a node for a month = Value defined at the node +/- Fixed,monthly quantity
- **Formula for transfer:**
Value of transfer from node for a month = Value defined at the node - fixed, monthly quantity

Value of transfer to node for a month = Value defined at the node + fixed, monthly quantity

b. Linear Percentage:
If linear percentage modeling is applied then a percentage of starting month is increased or decreased from each month.

If linear percentage transfer is applied then a percentage of starting month is decreased from this node and the same amount is increased in the transferred node for each month.

- **Formula for modeling:**
Value for a node for a month = Value defined at the node +/- Percentage of starting month value
- **Formula for transfer:**
Value of transfer from node for a month = Value defined at the node - Percentage of starting month value

Value of transfer to node for a month = Value defined at the node + Percentage of starting month value of transfer from node

c. Exponential Percentage:
If exponential percentage modeling is applied then a percentage of preceding month value is increased or decreased from each month.

If exponential percentage transfer is applied then a percentage of preceding month value is decreased from this node and the same amount is increased in the transferred node for each month.

- **Formula for modeling:**
Value for a node for a month = Value defined at the node +/- Percentage of preceding month value
- **Formula for transfer:**
Value of transfer from node for a month = Value defined at the node - Percentage of preceding month value

Value of transfer to node for a month = Value defined at the node + Percentage of preceding month value

3. Percentage Node
Value for the percentage node is calculated as percentage of the parent node value

Formula:

Value of node for a month = (Value defined at the node * Value of parent Node/100)

There is only type of modeling/transfer that can be applied
a. Linear (% point):
If linear (% point) modeling is applied then the value is calculated as the sum of Percentage of the node and linear (% point) percentage value of the parent node.

If linear number transfer is applied then the percentage value of that node is decreased from this node and the same amount is increased in the transferred node.

- **Formula for modeling:**
Value for a node for a month = (Value defined at the node +/- Linear % point Value) * Node value of parent / 100
- **Formula for transfer:**
Value of transfer from node for a month = (Value defined at the node - Linear % point Value) * Node value of parent / 100

Value of transfer to node for a month = (Value defined at the node + Linear % point Value) * Node value of parent / 100

4. **Forecasting Unit Node**
   Value for the percentage node is calculated as percentage of the parent node value based on forecasting unit parameters

   Formula:
   Value of node for a month = (Value defined at the node * Value of parent Node/100)

   There is only type of modeling/transfer that can be applied
   a. Linear (% point):
   If linear (% point) modeling is applied then the value is calculated as the sum of Percentage of the node and linear (% point) percentage value of the parent node.

   If linear number transfer is applied then the percentage value of that node is decreased from this node and the same amount is increased in the transferred node.

   - **Formula for modeling:**
   Value for a node for a month = (Value defined at the node +/- Linear % point Value) * Node value of parent / 100
   - **Formula for transfer:**
   Value of transfer from node for a month = (Value defined at the node - Linear % point Value) * Node value of parent / 100

   Value of transfer to node for a month = (Value defined at the node + Linear % point Value) * Node value of parent / 100

5. **Planning Unit Node**
   Value for the percentage node is calculated as percentage of the parent node value based on planning unit parameters

   Formula:

Value of node for a month = (Value defined at the node * Value of parent Node/100)

There is only type of modeling/transfer that can be applied
a. Linear (% point):
If linear (% point) modeling is applied then the value is calculated as the sum of Percentage of the node and linear (% point) percentage value of the parent node.

If linear number transfer is applied then the percentage value of that node is decreased from this node and the same amount is increased in the transferred node.

- **Formula for modeling:**
Value for a node for a month = (Value defined at the node +/- Linear % point Value) * Node value of parent / 100
- **Formula for transfer:**
Value of transfer from node for a month = (Value defined at the node - Linear % point Value) * Node value of parent / 100

Value of transfer to node for a month = (Value defined at the node + Linear % point Value) * Node value of parent / 100

F. Forecasting Module: Consumption Forecast

1. **Interpolate**
QAT interpolates by finding the nearest values on either side (before or after the blank), calculates the straight line in between them and uses that straight-line formula to calculate the value for the blank(s). Note that QAT will not interpolate for months where actual consumption is zero. QAT will only interpolate if there is at least one data point before and one data point after the blank value(s).

Mathematically:
- Where x represents months, and y represents actual consumption,
- Where known data values are (x_0, y_0) and (x_1, y_1)
- Where any unknown data values are (x, y)
- The formula for the interpolated line is

Formula:
$y = y_0+(x-x_0)*(y_1-y_0)/(x_1-x_0)$

2. **Stockout Rate**
Stockout Rate is calculated as percentage of ratio of Stockout rate in days to that of no of days in a month

Formula:
Stockout Rate = (Stockout Rate(days)/No of days in month) * 100

3. **Adjusted Consumption**
Adjusted Consumption is calculated based on Actual Consumption, Reporting Rate, Stockout Rate(days), No of days in month using below formula

Formula:

If Actual Consumption is empty then,
Adjusted Consumption = ""
Otherwise,
Adjusted Consumption= (Actual Consumption/Reporting Rate/(1-(Stockout Rate(days)/No of days in month)))*100

4. **Conversion Factor for Data entry and Adjustment Screen**

If the Actual Consumption is in Forecasting Unit then
Conversion Factor = 1/Planning Unit Conversion Factor

If the Actual Consumption is in Planning Units then
Conversion Factor = 1

If the Actual Consumption is in Other Unit then
Conversion Factor = 1/Conversion to FU(User Entered)

5. **Adjusted Consumption in terms of Planning Unit**
Adjusted Consumption in terms of planning unit is calculated by multiplying Adjusted Consumption with Conversion Factor

Formula:
Adjusted Consumption(Planning Unit) = Adjusted Consumption * Conversion Factor

6. **Forecast Error (%)**

- **WAPE** (Weighted Absolute Percentage Error) divides the sum of absolute differences by the sum of actual values for a particular time window. Time window is 6 months.

  Formula:
  WAPE = ((Abs(actual consumption month 1-forecasted consumption month 1)+ Abs(actual consumption month 2-forecasted consumption month 2)+ Abs(actual consumption month 3-forecasted consumption month 3)+ Abs(actual consumption month 4-forecasted consumption month 4)+ Abs(actual consumption month 5-forecasted consumption month 5)+ Abs(actual consumption month 6-forecasted consumption month 6)) / (Sum of all actual consumption in the last 6 months))

- **RMSE (**Root mean square error) is calculated as square root of ratio of summation of square of difference between forecast - actual to number of observations.

  Formula:
  RMSE = Square root [Summation(Square(Forecast – Actual)) / No. of Observations]

- **MAPE (**Mean absolute percentage error) is calculated as ratio of 1 is to number of observations multiplied by summation of absolute difference between actual and forecast to multiplication of absolute actual and 100

  Formula:
  MAPE = (1/No of Observations) * Summation(Absolute(actual – forecast) / Absolute(actual)) * 100

- **MSE** (Mean squared error) is calculated as multiplication of ratio of 1 to no of observations and summation of square of difference between actual and forecast.

  Formula:
  MSE = (1/No of Observations) * Summation(Square(actual – forecast))

- **R squared**
  R2 = 1 – [sum squared regression (SSR) / total sum of squares (SST)]. The sum squared of the residuals for the regression is the sum of its residuals squared, and the total sum of squares is the sum of the distance the data is away from the mean, all squared. By "sum of squares" we mean the sum of squared deviations between **actual** values and the mean (SST), or between **predicted** values and the mean (SSR). The R2 value is always a number between 0 and 1. R2 is a measure the fit of a regression line to a series of historical observations with values closer to 1 indicating a stronger correspondence between the actual and predicted (regression model) values. It is not a measure of error and should not be used by itself to assess the fitness of a prediction, but in combination with other error metrics and the user's knowledge of the program.

  Formula:
  R2= 1- [SSR / SST]

G. Forecasting Module: Reports & Outputs

G1. Compare & Select

1. **Compare to Consumption Forecast** is displayed only when there are both tree and consumption forecasts. It displays the values as
   - Higher than H% than the highest consumption forecast or
   - Lower than L% than the lowest consumption forecast

   Formula:
   H% = (Sum(Selected tree forecast)-Sum(Consumption Forecast))/Sum(Consumption Forecast)
   L% = (Sum(Selected tree forecast)-Sum(Consumption Forecast))/Sum(Consumption Forecast)

G2. Forecast Summary

1. **Stock or Unmet Demand**
   Stock or Unmet demand is calculated as difference between sum of stock and existing shipments for a planning unit and total forecasted consumption

   Formula:
   Stock or Unmet Demand = (Stock for a planning unit + Existing Shipments for a planning unit) -(Total forecasted consumption)

2. **Desired Stock**
   Desired Stock is calculated as Ratio of multiplication of months of stock for a planning unit and total forecasted consumption to No of months in forecast period

   Formula:
   Desired Stock =((Months of stock for a planning unit) *(Total Forecasted Consumption) /(No of months in forecast period))

3. **Procurement Surplus/Gap**
   Procurement surplus is calculated as difference between stock and desired stock

   Formula:
   Procurement Surplus = Stock or Unmet Demand - desired Stock

4. **Procurements Needed**
   Procurements Needed is calculated as multiplication of Procurement surplus/Gap and unit price.

   Formula:
   Procurements Needed = Procurement surplus * Unit price

5. **Freight Cost**
   Freight cost is calculated as multiplication of ratio of Freight percentage by 100 and sum of procurements needed

   Formula:
   Freight Cost = Freight Percentage /100 * Total procurement Needed

6. **Total Cost**
   Total Cost is calculated as sum of sum of procurements needed and Freight cost

   Formula:
   Total Cost = Sum of Procurements Needed + Freight Cost

H. **Supply Planning and Forecasting Module: Uploading Versions**

The below section details the different conditions that QAT looks for when identifying conflicts in a version upload (for both a supply plan program and a forecast program).

The following example will be used throughout the explanation below: A user is trying to upload local version 8 and the latest version available on the server is version 10. Once any conflicts are resolved and the user confirms, the uploaded version will be version 11. QAT compares the 3 different versions:

    a. Server v8 (this is the server version that the user downloaded prior to making edits)
    b. Local v8 (this is the version the user intends to upload)
    c. Server v10 (this is the latest server version)

Depending on the data type, QAT either compares actual records, or compares modified dates. Actual records cannot be compared for some data because the data is too vast and complex.

Actual records are compared	Modified dates are compared

• Supply Planning Module
   o Actual/Forecasted consumption, Inventory, Adjustment, Shipment records
   o QAT Problem List
   o ERP Shipment Linking*
• Forecasting Module
   o Planning Unit Settings
   o Version Settings
   o Selected Forecast
	• Forecasting Module
	   o Actual consumption, adjustments, extrapolation
	   o Tree

* For ERP linking, before the below logic, QAT first checks if the ERP shipment is already linked to another program. If it is linked, then QAT highlights in red and does not allow upload.

Using the logic outlined below (testing each condition in sequential order), QAT determines if data is

- **Newly added on the local version (Local v8)** ← Condition 1
- **Newly added on the server version (Server v10)** ← Condition 2
- **Unchanged since the previous server version (Server v8)** ← Condition 3a
- **Updated on the local version (Local v8) with no conflicts** ← Condition 3b
- **Updated on the server version (Server v10) with no conflicts** ←Condition 3c
- **Or, a conflict between the local and server versions.** ← Condition 3d

a. Condition 1: Newly added data in local version

First, QAT checks each data point in the local version (Local v8) to confirm if it is newly added data. If so, data is shown as **green** in the upload screen.

a. Server v8 - Record does not exist
b. Local v8 - Record exists
c. Server v10- Record does not exist

Below are some examples for this condition:

1. **Consumption (Supply Planning):** For example, there is an actual consumption record in local v8 for May 2023, planning unit A, alternate reporting unit B, region X. QAT checks server v10 and server v8 to see if an actual consumption record in May 2023, planning unit A, alternate reporting unit B, region X exists. If not, local v8 is the latest.
2. **Inventory (Supply Planning):** For example, there is an inventory record in local v8 for May 2023, planning unit A, alternate reporting unit B, region X, Data Source Y. QAT checks server v10 and server v8 to see if an inventory record in May 2023, planning unit A, alternate reporting unit B, region X, Data Source Y exists. If not, local v8 is the latest.
2. **Adjustments, Shipments, QPL (Supply Planning):** Since IDs are only assigned after the supply plan is uploaded, QAT checks the IDs for each record in local v8 to see if they are "0". Records with the ID "0" were newly created in this local version, so for these records, local v8 is the latest. QAT does not check server versions.
3. **Trees (Forecasting):** Since IDs are only assigned after the forecast is uploaded, QAT checks the IDs for each tree in local v8 to see if they are "0". Trees with the ID "0" were newly created in this local version, so for these, local v8 is the latest. QAT does not check server versions.
4. **Planning Unit Settings (Forecasting):** QAT checks if that planning unit ID is present in the Sever v8 and Server v10. If the planning unit ID does not exist in either, local v8 is the latest.
5. **Consumption Data and Extrapolation (Forecasting):** QAT checks if the data for this planning unit and region is present in Server v10 based on the presence of the modified date. If the planning unit and region data is not present in Server v10, local v8 is the latest.
6. **Selected Forecast (Forecasting):** QAT checks if a selected forecast exists for this planning unit and region in Server v10. If no selection is present in Server v10, local v8 is the latest.

b. Condition 2: Newly added data in server version

If Condition 1 fails, QAT checks the latest server version (Server v10) to see if that data was newly added by comparing it with local version (Local v8). QAT does not check previous server version (server v8). If the data is not present on the local version, that means the data was newly added on the latest server version, and there is no conflict with the local version. This data will be added to the newly uploaded version (Server v11) and data is shown as **blue** in the upload screen.

a. Server v8 - Record does not exist

b. Local v8 - Record does not exist
c. Server v10 - Record exists

Below are some examples for this condition:

1. **Consumption Inventory, Adjustment, Shipment, QPL (Supply Planning)**: For example, there is an actual consumption record with unique ID #A in server v10. QAT checks if the unique ID#A is also present in local version v8. If the unique ID is not present in local version, server v10 is the latest.

2. **Trees:** For example, there is tree with unique ID #B in server v10. QAT checks if the unique ID#B is also present in local version v8. If the unique ID is not present in local version, server v10 is the latest.

3. **Planning Unit Settings (Forecasting):** For example, there is planning unit with planning unit ID #C in server v10. QAT checks if the planning unit #C is also present in local version v8. If the Planning Unit ID is not present in local version, server v10 is the latest.

7. **Consumption Data and Extrapolation (Forecasting):** After QAT finds data for a planning unit and region server v10, QAT looks at the same planning unit and region in local v8 looks for a modified date. If the modified date does not exist in the local v8, server v10 is the latest.

8. **Selected Forecast (Forecasting):** After QAT finds data for a selected forecasts for a particular planning unit and region in server v10, QAT looks for the same planning unit and region in local v8 looks for a selected forecast. If the selected forecast does not exist in the local v8, server v10 is the latest.

c. Condition 3a: Local and latest server are the same

If the conditions above fail, QAT checks each data point in the local version (Local v8) to see if they are same as the latest (v10) server version. If same, the <u>data is shown un-highlighted in the upload screen</u>.

a. v8 server – Record is X
b. v8 local – Record is X
c. v10 latest server – Record is X

Below are some examples for this condition:

1. **Consumption, Inventory, Adjustment, Shipments, QPL, version settings, planning unit settings and selected forecasts:** QAT compares each record in local version (v8) with the latest server versions (v10). For example, for actual consumption record for the month June 22, QAT checks each field (ARU, data source, quantity, days of stock out, etc) to see if the local (v8) and the latest server version (v10) are the same. If they are the same, then no changes have been made since server v8, or they were updated to be the same value.

2. **Consumption (Forecasting) and Trees:** QAT compares the last modified date for each record in local version (v8) with the last modified date of the latest server version (v10). If they are the same, then no changes have been made since server v8.

d. Condition 3b: Changes only in local version

If the conditions above fail, then QAT compares to see if the previous server version (Server v8) and the latest server version (server v10) are the same. If so, QAT infers that the local version (local v8) was changed and <u>data is shown as **green** in the upload screen.</u>

Below are some examples for this condition:

1. **Consumption, Inventory, Adjustment, Shipments, QPL, version settings, planning unit settings and selected forecasts:** For example, an actual consumption record for June 22 has "Warehouse Reports" as the data source in v8 local. If the data source field for the previous (v8)

and latest (v10) server versions are both "LMIS Reports", this indicates that the data was modified in local version, so local v8 is the latest.

    a. v8 server – data source is LMIS Reports
    b. v8 local – data source is Warehouse Reports
    c. v10 latest server - data source is LMIS Reports

2. **Consumption (Forecasting) and Trees:** If the last modified dates of the previous (v8) and latest (v10) server versions are the same, this indicates that the data was modified in local version, so local v8 is the latest.

    a. v8 server - last modified date is 15 Sep 2023, 12:00:00
    b. v8 local - last modified date is 20 Sep 2023, 15:15:00
    c. v10 latest server - last modified date is 15 Sep 2023, 12:00:00

e. Condition 3c: Changes only in latest server version

If the conditions above fail, then QAT compares to see if the previous server version (Server v8) and the local version (local v8) are the same. If so, QAT infers that the latest server version (server v10) was changed and the <u>data is shown as **blue** in the upload screen.</u>

Below are some examples for this condition:
1. **Consumption, Inventory, Adjustment, Shipments, QPL, version settings, planning unit settings and selected forecasts:** For example, an actual consumption record for June 22. If the data source value in v8 server and v8 local are the same, this indicates that the data was modified in latest server version (v10), so server v10 is the latest.

    a. v8 server - data source is LMIS Reports
    b. v8 local - data source is LMIS Reports
    c. v10 latest server - data source is Warehouse Reports

2. **Consumption (Forecasting) and Trees:** If the last modified dates of the previous server version (v8) and the local version (v8) are the same, this indicates that the data was modified in latest server version (v10), so server v10 is the latest.

    a. v8 server - last modified date is 15 Sep 2023, 12:00:00
    b. v8 local - last modified date is 15 Sep 2023, 12:00:00
    c. v10 latest server - last modified date is 20 Sep 2023, 15:30:00

f. Condition 3d: Changes in both local and latest server version (same parameter)

If the conditions above fail, this means that the 3 versions are not matching and there is a conflict. If so, <u>data is highlighted <mark>yellow</mark> in the upload screen.</u>

Below are some examples for this condition:
1. **Consumption, Inventory, Adjustment, Shipments, QPL, version settings, planning unit settings and selected forecasts:** For an actual consumption record for the month of June 22**, if** the data source value does not match for any of the versions, this indicates that the data is modified in both local (v8) and latest server (v10) versions, so QAT highlights the row in <mark>yellow</mark> to indicate a conflict for the user to resolve.

    a. v8 server - data source is LMIS Reports

b. v8 local - data source is SDP Reports
c. v10 latest server - data source is Warehouse Reports

2. **Consumption (Forecasting) and Trees**: If the last modified date does not match for any of the versions, this indicates that the data is modified in both local (v8) and latest server (v10) versions, so QAT highlights the row in yellow to indicate a conflict for the user to resolve.

a. v8 server - last modified date is 15 Sep 2023, 12:00:00
b. v8 local - last modified date is 16 Sep 2023, 13:00:00
c. v10 latest server - last modified date is 20 Sep 2023, 15:30:00

a. v8 server - last modified date is 28 A Sep 2023, 12:00:00
b. v8 local - last modified date is 16 Sep 2023, 13:00:00
c. v10 latest server – tree is missing

g. Condition 4: Changes in both local and latest server version (different parameters)

After checking all the conditions, QAT checks to see if any records that have a combination of 3b and 3c, but for different fields. If so, data is highlighted yellow in the upload screen.

1. **Consumption, Inventory, Adjustment, Shipments, QPL, version settings, planning unit settings and selected forecasts:** For an actual consumption record for the month of June 22, the data source is updated in the local version (Condition 3b) and quantity is changed in server version (condition 3c). In this case, QAT does not know which version to use, so QAT highlights the row in yellow to indicate a conflict for the user to resolve.

Version	Data Source (Condition 3b)	Quantity (Condition 3c)
v8 server	LMIS Reports	50
v8 local	Warehouse Reports	50
v10 latest server	LMIS Reports	55

2. **Consumption (Forecasting) and Trees:** This does not apply to since only the modified date is compared for these two data types

Annex 3: User Role Matrix

Role	Role description
Application Admin	For managing app-wide settings (labels), create roles
Realm Admin	For managing realm specific parameters and realm masters (planning units, technical areas, orgs etc.)
Supply Plan Program Admin	For managing program specific parameters (lead times, planning units, ARUs, budgets etc.)
Supply Plan Reviewer	For those reviewing/approving supply plans.
Supply Plan Program User	For those actively supply planning and needing to enter data.
Supply Plan Viewer - Reports	For anyone who only need to view reports (not including supply planning), but not enter data. Depending on the access settings, could be at global or program/country level.
Supply Plan Viewer - Supply Plan Review	Supplemental role to reports viewer, for those who need to see status of supply plan review process. (Includes SP Notifications)
Supply Plan Viewer - Data	Supplemental role to reports viewer, for those who need to access raw data entry screens for viewing and to see status of supply plan review process. This role allows downloading of supply plan data (allows for offline viewing), without ability to upload back to server.
Forecast Program Admin	For managing program specific parameters (forecast period, planning units, equivalency units, usage templates, etc.).
Forecast Program User	For those actively forecasting and needing to enter data/build forecasts.
Forecast Viewer	For anyone who only need to view forecasts and forecast outputs, but not enter data.

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
Application Masters											
View Application Dashboard	Y	N	N	N	N	N	N	N	Y	Y	Y

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
Label Translations	Y	N	N	N	N	N	N	N	N	N	N
Database Translation	Y	N	N	N	N	N	N	N	N	N	N
Manage Country	Add/manage	N	N	N	N	N	N	N	N	N	N
Manage Role	Add/manage	N	N	N	N	N	N	N	N	N	N
Manage Language	Add/manage	N	N	N	N	N	N	N	N	N	N
Manage Currency	Add/manage	N	N	N	N	N	N	N	N	N	N
Manage Dimension	Add/manage	N	N	N	N	N	N	N	N	N	N
Manage Unit	Add/manage	N	N	N	N	N	N	N	N	N	N
Manage User	Add/manage	Add/manage	N	N	N	N	N	N	N	N	N
Assign role to user	Y	Y	N	N	N	N	N	N	N	N	N
Manage Realm	Add/manage	Manage	N	N	N	N	N	N	N	N	N
Upload User Manual	Y	N	N	N	N	N	N	N	N	N	N
Usage Period	Manage	View	N	N	N	N	N	N	N	N	N
Realm level Masters											
View Realm Dashboard	N	Y	N	N	N	N	N	N	N	N	N
Realm Country	N	Add/Manage	N	N	N	View	N	N	N	N	N
Region	N	Add/Manage	N	N	N	N	N	N	N	N	N
Data Source	N	Add/Manage	View	N	View	N	View	N	N	N	N
Data Source Type	N	Add/Manage	View	N	View	N	View	N	N	N	N
Funding Source	N	Add/Manage	View	N	View	N	View	N	N	N	N
Create/manage Organization	N	Add/Manage	View	N	View	N	View	N	N	N	N
Organization Type	N	Manage	N	N	N	N	N	N	View	View	N
Procurement Agent	N	Add/Manage	View	N	View	View	N	N	N	N	N
Procurement Agent Type	N	Manage	N	N	N	N	N	N	N	N	N
Supplier	N	N	N	N	N	N	N	N	N	N	N

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
Alternate Reporting Unit	N	Add/Manage	Add/Manage	N	N	View	N	N	N	N	N
Forecasting Unit	N	Add/Manage	View	N	N	N	N	N	View	View	View
Planning Unit	N	Add/Manage	View	N	N	N	N	N	View	View	View
Planning Unit Category	N	Add/Manage	View	N	View	N	N	N	View	View	N
Planning Unit Volume	N	Add/Manage	N	N	N	N	N	N	View	View	N
Procurement Unit	N	Add/Manage	N	N	N	N	N	N	N	N	N
Tracer Category	N	Add/Manage	View	N	View	N	View	N	View	View	N
Equivalency Unit	N	Manage	N	N	N	N	N	N	Manage	Manage	N
Technical Area	N	Add/Manage	View	N	View	N	View	N	View	View	N
Forecast Method	N	Manage	N	N	N	N	N	N	View	View	N
Program Management											
View Program Dashboard	N	Y	Y	Y	Y	N	N	N	Y	Y	N
Setup/create a Program	N	Y	N	N	N	N	N	N	Y	N	N
Update program info	N	Manage	Manage	N	N	N	N	N	Manage	N	N
Planning unit (for a program)	N	Add/Manage	Add/Manage	N	N	N	N	N	Add/Manage	N	N
Map Procurement Agent	N	Add/Manage	Add/Manage	N	N	N	N	N	Add/Manage	N	N
Budget	N	Add/Manage	Add/Manage	N	N (they can see in Budget report)	N	N	N	N	N	N
Import / Export Program	N	Y	Y	N	Y	N	N	N	Y	Y	Y
Download Program	N	Y	Y	Y	Y	N	Y	N	Y	Y	N
Upload version	N	Y	Y	N	Y	N	N	N	Y	Y	N
PipeLine Program Import	N	Y	N	N	N	N	N	N	N	N	N
View supply plan version & review	N	Y	Y	Y	Y	N	N	Y	N	N	N

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
Review/Approve a Version	N	N	N	Y	N	N	N	N	N	N	N
Notification Cc Approve	N	Y	Y	Y	Y	N	Y	Y	N	N	N
Notification Cc Upload	N	N	Y	N	N	N	N	N	N	N	N
Notification Cc Reject	N	N	Y	Y	N	N	N	N	N	N	N
Notification to Approve	N	N	N	N	N	N	N	N	N	N	N
Notification to Upload	N	N	N	Y	N	N	N	N	N	N	N
Notification to Reject	N	N	N	N	N	N	N	N	N	N	N
Update Version Settings	N	Manage	N	N	N	N	N	N	Manage	View	View
Supply plan data											
Supply plan data (consumption / inventory / shipments) in data entry screen	N	Add/Edit	Add/Edit	N	Add/Edit	N	View	N	N	N	N
ERP shipment linking and delinking	N	Y	Y	N	Y	N	N	N	N	N	N
Import Quantimed data	N	Y	Y	N	Y	N	N	N	N	N	N
Supply planning											
Manage/edit Supply Plan	N	Y	Y	Y	Y	N	N	N	N	N	N
View Supply Plan	N	Y	Y	Y	Y	N	Y	N	N	N	N
Scenario Planning	N	Y	Y	Y	Y	N	N	N	N	N	N
View Supply Plan Report	N	Y	Y	N	Y	Y	N	N	N	N	N
Reports											
View QAT Problem List report	N	Y	Y	N	Y	N	N	N	N	N	N

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
View Program Catalog Report	N	Y	Y	N	Y	Y	N	N	N	N	N
Stock Status Reports											
View Stock Status Over Time report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Stock Status Matrix report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Stock Status Snapshot report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Stock Status Snapshot (Global) report	N	Y	Y	N	Y	Y	N	N	N	N	N
Consumption Reports											
View Consumption (forecast vs actual) report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Consumption (Global) report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Forecast Error (Monthly) report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Forecast Error by (by planning unit) report	N	Y	Y	N	Y	Y	N	N	N	N	N
Shipment Reports											
View Shipment (Global) report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Shipment Overview report	N	Y	Y	N	Y	Y	N	N	N	N	N

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
View Shipment Details report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Shipment Cost Details report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Shipment Cost Overview report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Budget report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Procurement Agent Lead Time report	N	Y	Y	N	Y	Y	N	N	N	N	N
Inventory Reports											
View Expiries report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Cost of Inventory report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Inventory Turns report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Stock Adjustment report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Warehouse Capacity (by program) report	N	Y	Y	N	Y	Y	N	N	N	N	N
View Warehouse Capacity (by country) report	N	Y	Y	N	Y	Y	N	N	N	N	N
Consumption-Based Forecast											
Import from QAT Supply Plan	N	Y	N	N	N	N	N	N	Y	Y	N
Data Entry and Adjustment	N	Y	N	N	N	N	N	N	Y	Y	View
Extrapolation	N	Y	N	N	N	N	N	N	Y	Y	View

Business Function	Application Admin	Realm Admin	Supply Plan Program Admin	Supply Plan Reviewer	Supply Plan Program User	Supply Plan Viewer - Reports	Supply Plan Viewer - Data	Supply Plan Viewer - Supply Plan Review	Forecast Program Admin	Forecast Program User	Forecast Viewer
Tree Forecast											
Manage Tree	N	Y	N	N	N	N	N	N	Y	Y	View
Tree Templates	N	Y	N	N	N	N	N	N	Y	Y	View
Usage Templates	N	Manage	N	N	N	N	N	N	Manage	View	View
Modeling Validations	N	Y	N	N	N	N	N	N	Y	Y	Y
Product Validations	N	Y	N	N	N	N	N	N	Y	Y	Y
Forecast Analysis Output											
Compare and Select Forecast	N	Y	N	N	N	N	N	N	Y	Y	Y
Monthly Forecast	N	Y	N	N	N	N	N	N	Y	Y	Y
Forecast Summary	N	Y	N	N	N	N	N	N	Y	Y	Y
Version Comparison	N	Y	N	N	N	N	N	N	Y	Y	Y

Annex 4: Business Functions

Business functions are a set of capabilities available to the user. They are used when creating roles (see **Roles (App Admin** only**)**). Each role has one or more business functions.

For master level data, the verbs used in the business functions are as follows:

- **List** – Allows user to see the table with the existing data for that master data element. If only "List X" is chosen, the user can only see "X" but cannot edit or add.
- **Edit** – Allows user to update or edit the master data element. Note: Always include "list" along with "edit" or the user will not be able to see the screen to edit data elements. **(NOTE: An entity cannot be deleted. Users can only 'Disable" entities.)**
- **Add** – Allows user to add a new record for the master data element. Note: Always include "list" along with "add" or the user will not be able to see the screen to add data elements.
- **Manage**: Allows user to perform all of the aforementioned functions

The above business function can be provided to users in any combination. For example:

- User A has only "List" access, so they can only view existing data ("read only")
- User B has only "List" + "Edit" access, so they can view and edit existing data, but cannot add 'new' entities.
- User C has "List" + "Add" access, so they can add new entities and view the list of entities.
- User D has "Add" + "Edit" + "List" (Manage) access that enables performing all 3 actions.

#	Menu Option	Business Function	Business Function Description ("Allows enabled user/s to…")
1	Translations	Label translations	Input/update the "static labels" for QAT enabled languages – which are reflected during new releases
2		Database Translation	Input/update the "dynamic labels" for QAT-enabled languages - which are reflected immediately
3		View Translations	View the translations, whether label or database
4	Application Masters	Application Dashboard	View the application dashboard
5		View Application-level Masters	View the master CRUDs at Application level
6		Manage Country	Setup and manage the country
7		Manage Currency	Setup and manage the currency
8		Manage Dimension	Setup and manage the dimension
9		Manage Language	Manage the language setup and administration activities
10		Manage Role	Manage the role creation and assignments
11		Create Realm	Create new realms (this is restricted to Application Admin role)
12		Edit Realm	Update/edit data related to an existing realm to which he/she has been provided access

13		List Realm	view the list of realms to which he/she has been provided access
14		Show Realm Select	View the list of Realms available at the Application level
15		Manage Region	Setup and manage regions at country level
16		Manage User	View, add, and update users, as well has assign specific access and roles
17		Manage Unit	Setup and manage the units for the dimensions
18		Upload User Manual	Upload new version of user manual
19		Manage Usage Period	Add, edit, view usage periods.
20	Realm Masters	View Realm Level Masters	View all Master screens at Realm level
21		Manage Realm Country	Manage the country
22		List Data Sources	Manage data sources at realm level
23		Manage Data Source	
24		List Data Source Type	Manage data sources types at realm level
25		Manage Data Source Type	
26		List Funding Source	Manage funding source at realm level
27		Manage Funding Source	
28		Supplier	Manage manufacturers at the realm level
29		Manage Supplier	
30		Organization	Manage organizations at realm level
31		Manage Organization	
32		Organization Type	Manage organization types at realm level
33		Map Procurement Agent	Assign procurement agents to a program.
34		Add Procurement Agent	Add/remove/edit procurement agents at the program level
35		Add Program Specific Prices	Add program specific prices for different procurement agents
36		Manage Forecasting Unit	Manage product attributes as listed in the options
37		List Forecasting Units	
38		Manage Country Planning Unit	
39		List Planning unit	
40		Product Category	
41		Manage Product Category	
42		Manage Planning Unit Capacity	
43		Procurement Unit List	
44		Manage Procurement Unit	
45		Tracer Category	
46		Manage Tracer Category	
47		Technical Area	Manage Technical area at Realm level
48		Manage Technical Area	
49		Manage Equivalency Unit	Add, edit, view equivalency units
50	Program Management	View Program Level Masters	View all program level masters
51		Alternate Reporting Unit (ARU) List	Manage product attributes as listed in the options
52		Set Up Program	Manage a program, including updating program-level parameters (program name, lead time, freight %, etc.)
53		Edit Program	
54		List Programs	

55		Manage Planning Units	Manage Planning units, including updating parameters (AMC settings, inventory parameters, shelf life, etc.)
56		List Budget	Manage budget at the program level
57		Manage Budget	
58		Delete Local Programs	Delete local programs
59		Import Program	Import program
		Export Program	Export Program
60		Download Program	Download program data (user can download the program and also use the "Down arrow" icon on the top right-hand corner of the screen
61		PipeLine Program Import	Import pipeline data into QAT application
62		Upload a version	Upload a local version to the server
63		Supply Plan Version and Review	List and review the supply plan version list
64		Approve a Version	To approve a final supply plan (enables the user to also access the supply plan & review screen). The "Reviewed" check box function and "Resolved" status are also embedded in this Business Function
65		Manage Integrations	Add or edit a program integration
66		Notification Bcc approve	Receive email in BCC that supply plan was approved
67		Notification Bcc upload	Receive email in BCC that supply plan was uploaded
68		Notification Bcc reject	Receive email in BCC that supply plan was rejected
69		Notification To upload	Receive email that supply plan was uploaded
70		Version Settings	Update and view forecasting program version settings
71	Supply Plan Data	Shipment Delinking	Link, delink and update ERP shipment data
72		Manual Tagging	
73		View Program Data Tab	View Supply Plan Data tab
74		Quantimed Import	Manage import of data from Quantimed
75		QAT Forecast Import	Import forecast from QAT Forecasting module
76	Supply Planning	Supply plan	View and edit access to the 'Supply Planning' Screen
		Scenario planning	Perform supply plan-based scenario planning
77		Supply plan report	View a supply plan report
78	Forecasting	Forecasting Module	Access to the forecasting module
79	Tree Forecasting	Tree	Add, edit, view forecasting tree(s)
80		Tree Templates	Add, edit, view tree templates
81		Modeling Validation	View the Modeling Validation output
82		Product Validation	View the Product Validation output
83		Usage Template	Add, edit, view usage templates

84	Consumption Forecasting	Data Entry and Adjustment	Access to Data Entry and Adjustment screen
85		Extrapolation	Access to Extrapolation screen
86		Import from QAT supply plan	Import consumption data from supply planning module
87	Reports	View Reports	View all reports available
88		QAT Problem List	View the QAT Problem list and add new problem entries
89		Create Problem	Create & update a "problem" data in QAT Problem List
90		Edit Problem	
91		Program Catalog	View the program catalog report
92		Stock Status Over Time	View of Stock Status data over time
93		Stock Status Matrix	View the Stock Status matrix data
94		Stock Status Snapshot	View a snapshot of the stock status data
95		Stock Status Snapshot (Global)	View the global (across countries and programs) stock status data
96		Consumption (Forecast vs Actual)	View a comparison of the consumption (forecast vs actuals)
97		Consumption (Global)	View the global (across countries and programs) consumption data
98		Forecast Error (Monthly)	View a monthly forecast error list
99		Forecast Error (by Planning Unit)	View a planning unit based forecast error report
100		Shipments (Global)	View the shipments at global (across countries and program) level
101		Shipment Overview	View of all Shipments
102		Shipment Details	View the Shipment details
103		Shipment Cost Details	View the Shipment cost report
104		Shipment Cost Overview	View of the Shipments costs
105		Budget	View the budget
106		Procurement Agent Lead Time	View the procurement agent lead times
107		Expiries	View the expired inventory details
108		Cost of Inventory	View cost of inventory report
109		Inventory Turns	View the inventory turns
110		Stock Adjustment	View the manual stock adjustment data
111		Warehouse Capacity (by program)	View program-wide warehouse capacity
112		Warehouse Capacity (by country)	View the country-wide warehouse capacity
113		Compare and Select Forecast	View the compare and select forecast report
114		Compare Version	View the compare version report
115		Forecast Summary	View the forecast summary report
116		Monthly Forecast	View the monthly forecast report

Annex 5: PipeLine Program Import

In certain cases, users will be granted a special set of credentials that can import PipeLine databases if they desire to set up their program this way (see Setting up a new program in Annex 1).

Step 1: Convert the .accdb file into a JSON file:
About the PipeLine Access DB to JSON conversion tool: Since the QAT system is only able to import program data in JSON format and PipeLine databases are in .accdb format, QAT has a downloadable tool for converting the .accdb file into a JSON file, thus allowing importation into QAT. Once installed, this tool does not require internet access to run. Also, this tool allows the user to choose their preferred language.

1. Confirm that you have the appropriate System Configuration Requirements:
    - Operating System: *Windows / Linux / Ubuntu*
    - Other Software : *Java JDK 1.8 and above.*
2. Confirm that your PipeLine data is fully updated
    - The database cannot have negative inventory values.
    - All the shipment, stock, consumption data must be updated.
3. Go to "Program Management" and click on "PipeLine Program Import".
4. On the top right corner click on the "Add" button. It will lead to a file input screen.
5. Click on the downward arrow button on the top right corner.
6. Click the "Download PipeLine Converter" will on the screen, then select your computer's operating system (Windows or Linux). The converter will be downloaded in zip file.
7. Open the converter file and run the tool (.exe file / .java executable file), the following screen will be displayed:
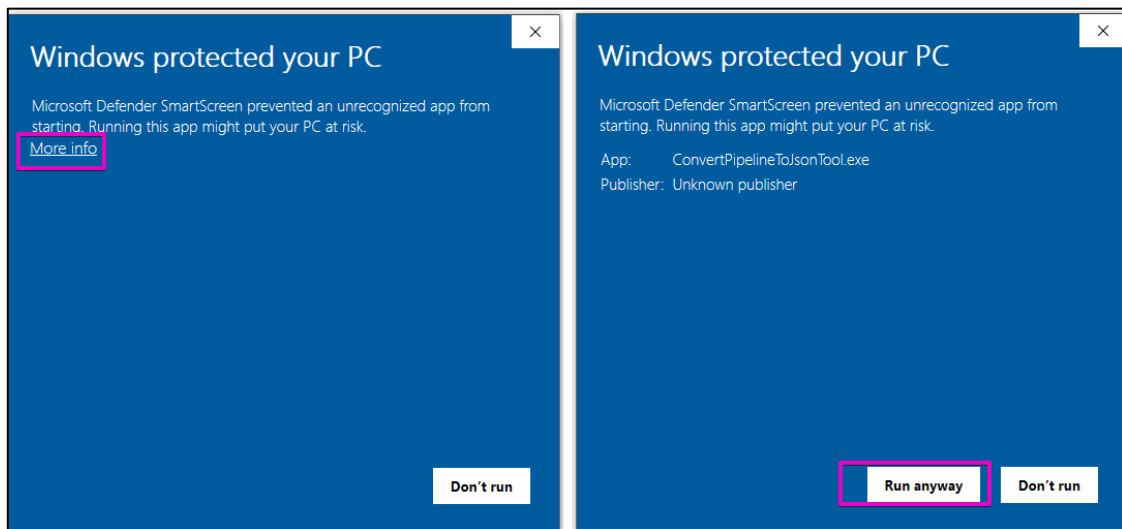
Figure 218: Caution Message during PipeLine Import
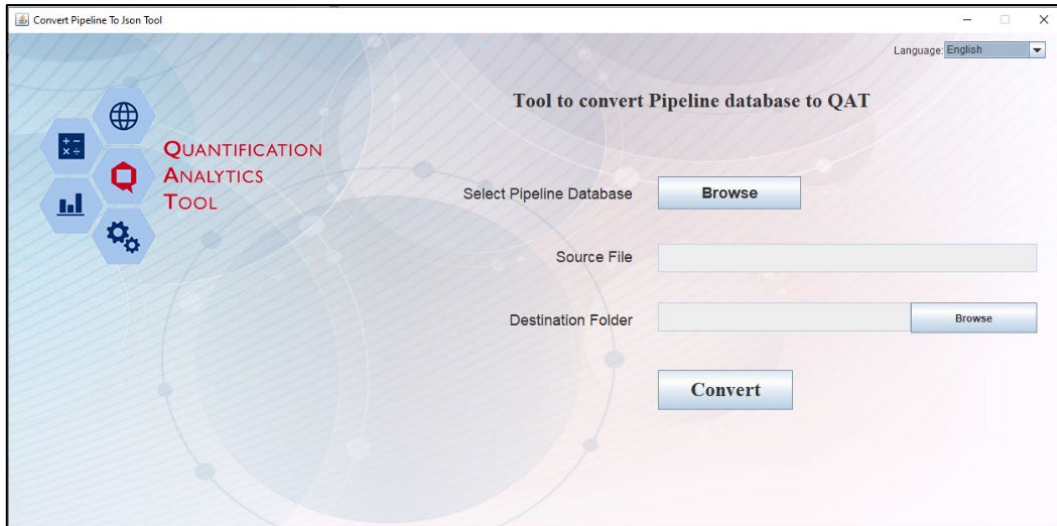
Figure 219: PipeLine Import Screen

8. Click on first Browse button to search for the desired .accdb file to import.
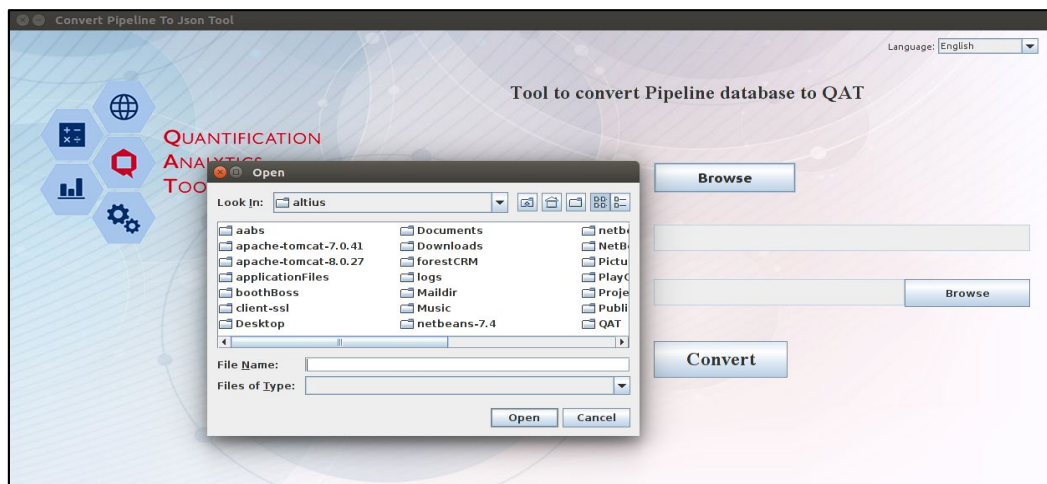
Figure 220: PipeLine Import Screen – Browse

9. Click the second Browse button to select the location where the converted file will be stored on the user's local machine.
10. Click on Convert. When the file is converted into. json format, you will receive the notification below:
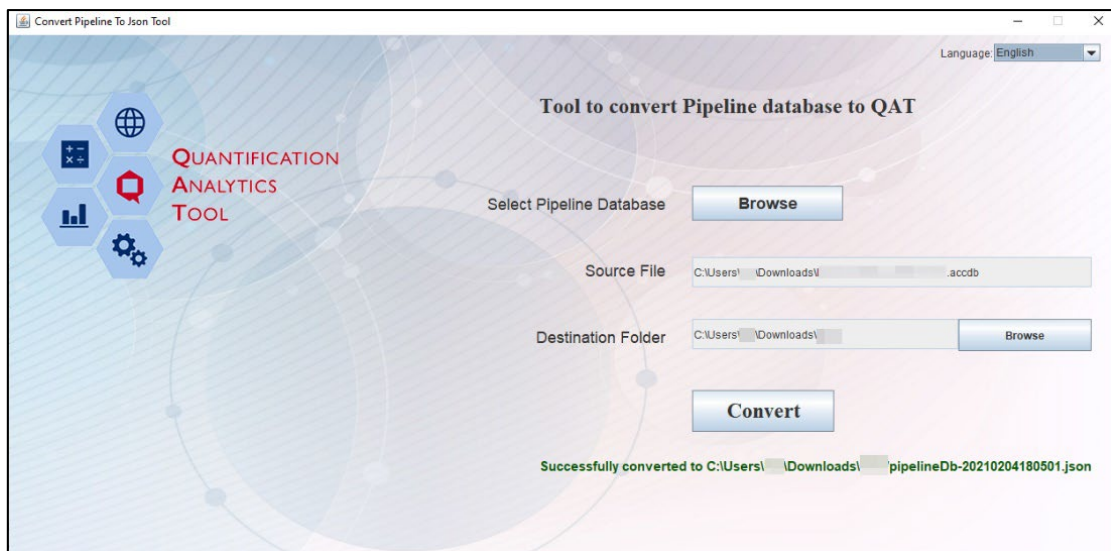
Figure 221: Successful Import PipeLine Screen

Step 2: Upload the JSON file into QAT:
11. In QAT go to "Program Management" > "PipeLine Program Import" menu item.
12. Click on the "Add" button, and a new screen will be opened. Browse to find the converted JSON file (from Step 1) from the local machine. Click on "Submit".
13. After completing the process, the user will get a message that the program is successfully imported.
14. This program will be shown as a row in the program list. Click on that row to continue to Step 3.

Note: While doing the program setup the QAT user can select multiple technical areas from the technical area dropdown list.
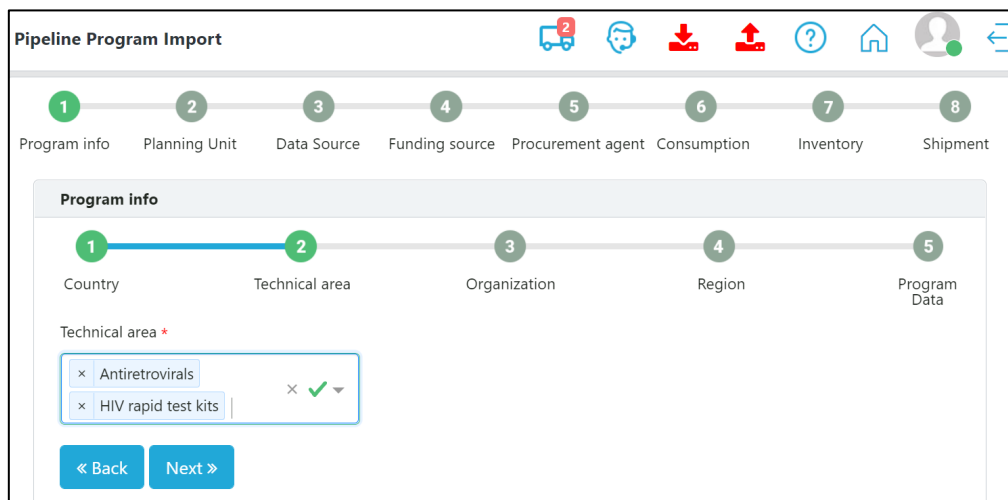
Figure 222 Pipeline program import, multiple technical areas

Step 3: Configure data for import into QAT
After importing PipeLine data, the user will navigate through a series of screens where there will be prompts to enter data. After editing data on one screen, the user should click "Next" to move to the following data entry screen. If needed, navigate to previous screens by clicking "Back". The user should navigate through the following screens: Program Info, Planning Units, Data Source, Funding Source, Procurement Agent, Consumption, Inventory, and Shipments.

Figure 223: PipeLine Import - Country

Each of these major screens have sub-screens where users need to enter data and map current PipeLine data to QAT realm-level master data; for example, the PipeLine products need to be mapped to QAT's planning units. At the last step (Shipment screen) a pop-up will be displayed if any program contains negative inventory.

Figure 224: PipeLine Import - Planning Units

After the file is successfully imported to QAT:
1. The users can go to "Program Management".
2. Click on the "Programs" menu item.
3. The program list will show the imported program.
4. Now the user can "Download", "Import" and "Export" that program.