

How to Build a Traceability Solution With **THE QLIKTAG PLATFORM**

V 1.0

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| OVERVIEW

A great Traceability application has the capability of tracking and tracing a product at any level, both downstream as well as upstream, within a supply chain. Enterprises operate in increasingly global and complex supply chains involving multiple trading partners. The Qliktag Connected Smart Products Platform is built on the foundation of connectivity and collaboration to generate and utilize the best quality data. It lets you bring all business partners involved in a distribution channel on to a single platform to create a seamless, real-time log of your product's journey from manufacturer to consumer.

Robust Tracking & Traceability solutions provide complete visibility and clarity into supply chain operations, enabling you to optimize logistics and improve on inadequacies by quickly zeroing on problem areas to take corrective measures. By keeping track at a batch and individual serial level of each product, responding to situations where the quality of a product has been compromised to initiate product recalls, becomes a more efficient process. Create positive experiences for consumers at the point of consideration by leveraging traceability data and transforming it into delightful interactions and customer experiences.

THE CONNECTED SMART PRODUCTS APPROACH TO A TRACKING & TRACEABILITY SOLUTION

The Qliktag Connected Smart Products Platform relies on alpha-numeric serialized codes, embedded into a digital tag like a datamatrix, barcode, QR code or an NFC sticker, affixed onto the packaging, starting from an individual level to a batch. It enables you to easily serialize any type of product and identify every instance of this product through a digital twin of it created on the platform. A product instance manifests each time data is pushed to create a new product in the system.

This serialized code acts as a unique identifier for each individual product moving up and down the supply chain. This scannable serialized code of a product integrates all the data pertaining to events, handlers and transactions in a distribution channel against the digital record of its physical counterpart on the web in real time. It records and updates its location, time-stamp and vendor activity. With the platform, you can also establish associations between various entities such as batch and individual serial items to reflect the dependency of one on the other.

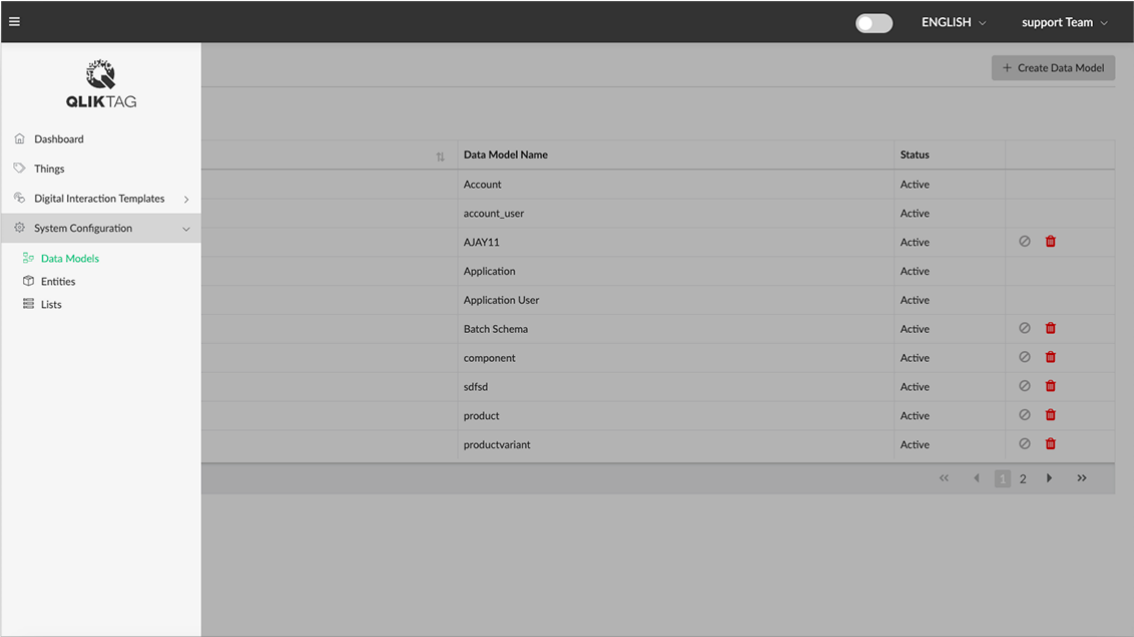
The next step to activating traceability functions is delivering the data to both consumers and supply chain partners. The Qliktag Platform's Digital Interaction Editor helps you design the visual manifestation of your products' traceability data, which can be pulled up on a smartphone without having to write any code.













CONFIGURING THE QLIKTAG PLATFORM

For this solution, the main entities for which digital twins were maintained are: **Batch**, **Product SKU**, **Product Serial Item** and **TrackLog**. Tracklog is a distinct, stand-alone entity which records all business transactions against each Batch or individual Serial Item. It is set up separately and associated with the Batch & Serial Item entities.

1. Configuring Data Models & Entities

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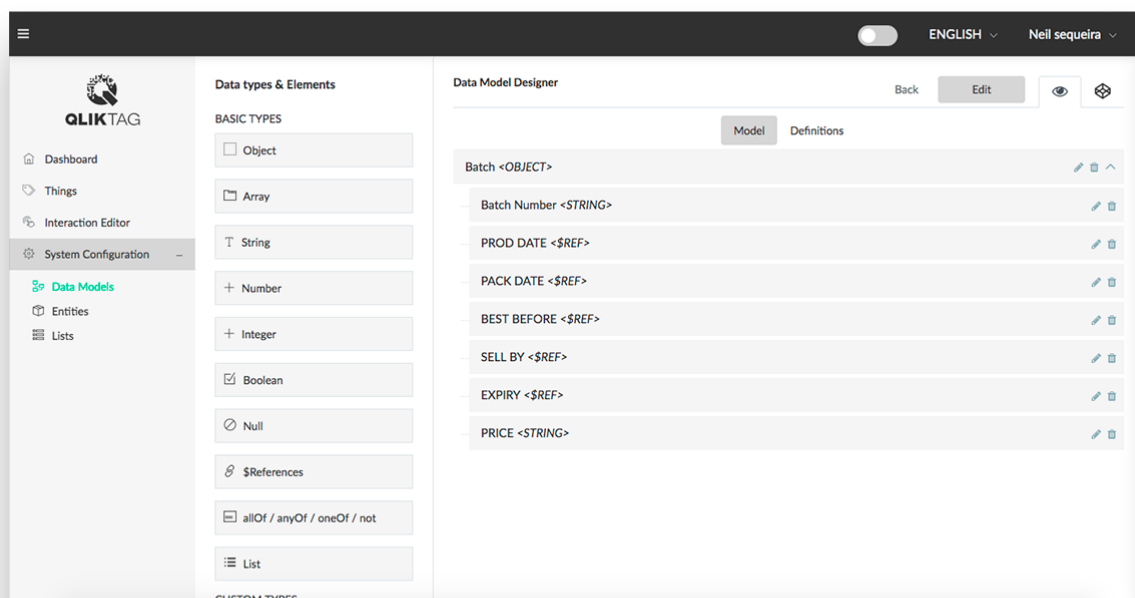


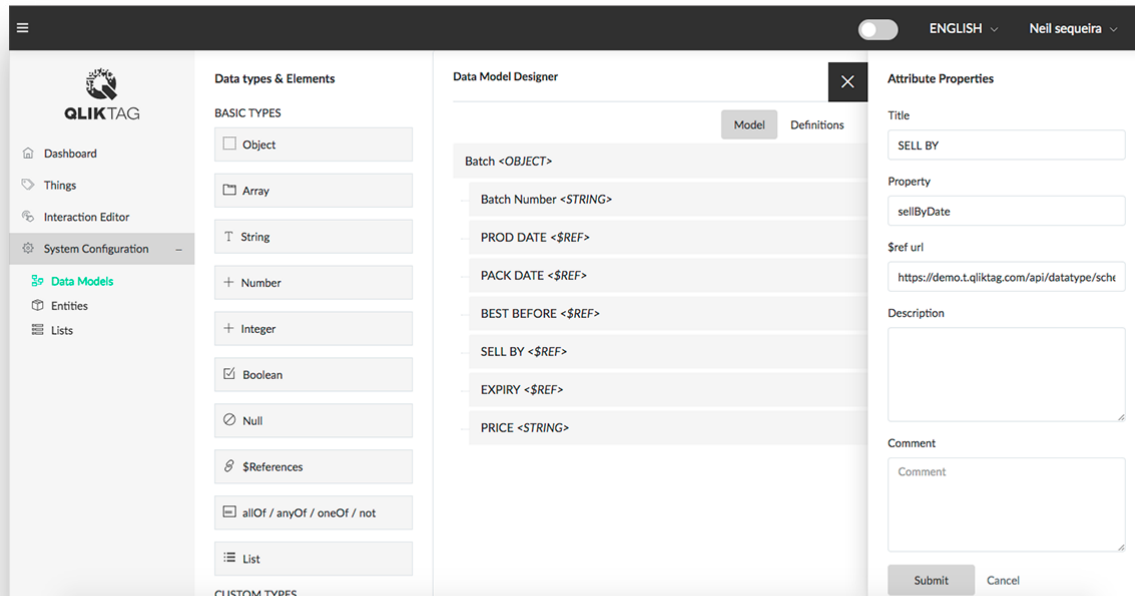
Data Model Name	Status	
Account	Active	
account_user	Active	
AJAY11	Active	 
Application	Active	
Application User	Active	
Batch Schema	Active	 
component	Active	 
sdfsd	Active	 
product	Active	 
productvariant	Active	 

Four primary Data Models were created for the Track & Trace solution. Depending on the desired flexibility and to meet the complexity of particular business requirements, the data models may be configured differently. The recommended Data Models are as follows:

A Batch Data Model: Manufacturing batch level data, often printed on a product or batch at the end of a production line and specific to each Lot or Batch of products manufactured. This includes attributes for:

- a. Batch Number / Lot Number**
- b. Date of Manufacture**
- c. Date of Packaging**
- d. Best Before Date**
- e. Sell By Date**
- f. Expiry Date**
- g. Retail Price**





B Product Data Model: Data related to a specific product SKU including attributes you wish to store at an SKU level, such as:

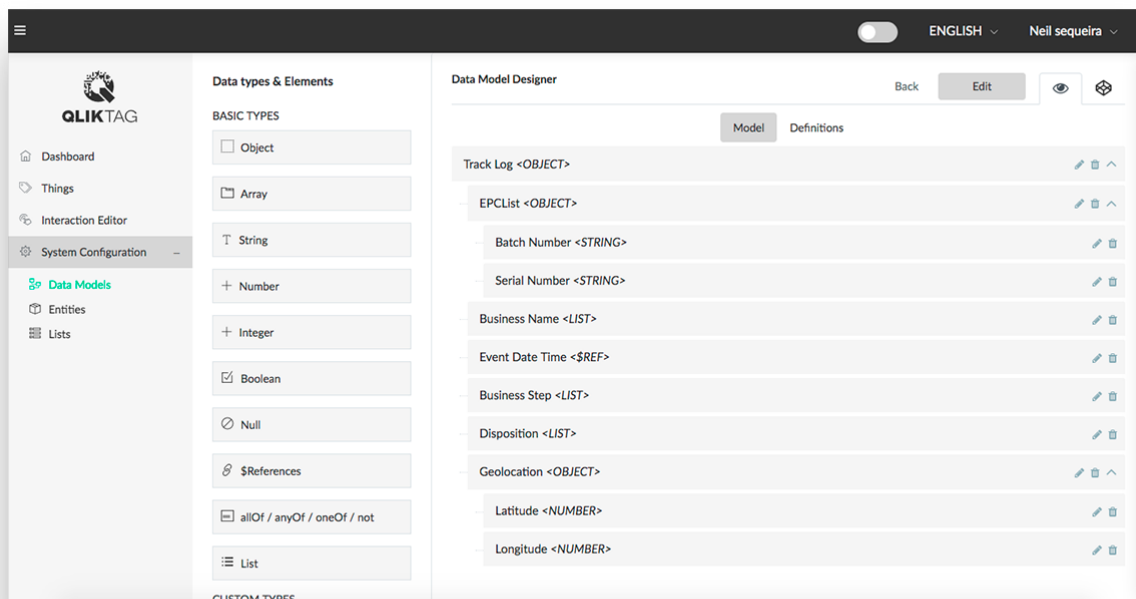
- a. **Product GTIN / UPC Number**
- b. **Target Market**
- c. **Product Name**
- d. **Consumer Description**
- e. **Product Net Weight**
- f. **Product Origin**
- g. **Ingredient Information**
- h. **Instructions**

C Serial Item Data Model: Allows serialization of products or identification at an individual serial item level. This Data Model can be setup with a single attribute:

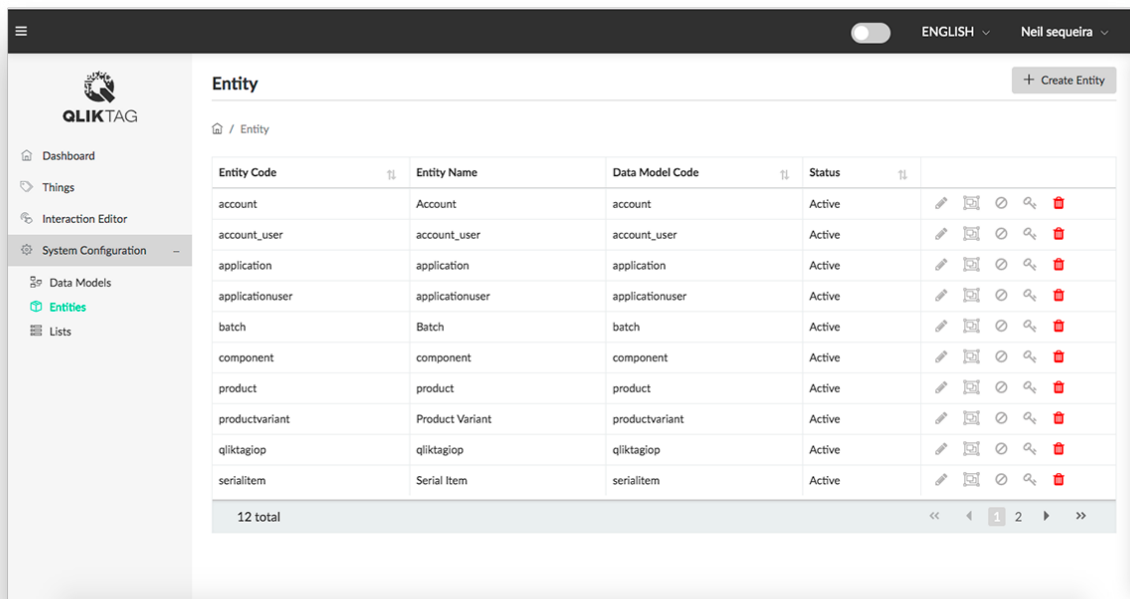
- a. **Serial Number**

D TrackLog Data Model: Repository for all business events recorded on scanning a product at a batch or serial item level as it passes through the supply chain from its place of origin to the customer, maintaining its item history. The attributes for the TrackLog Data Model include:

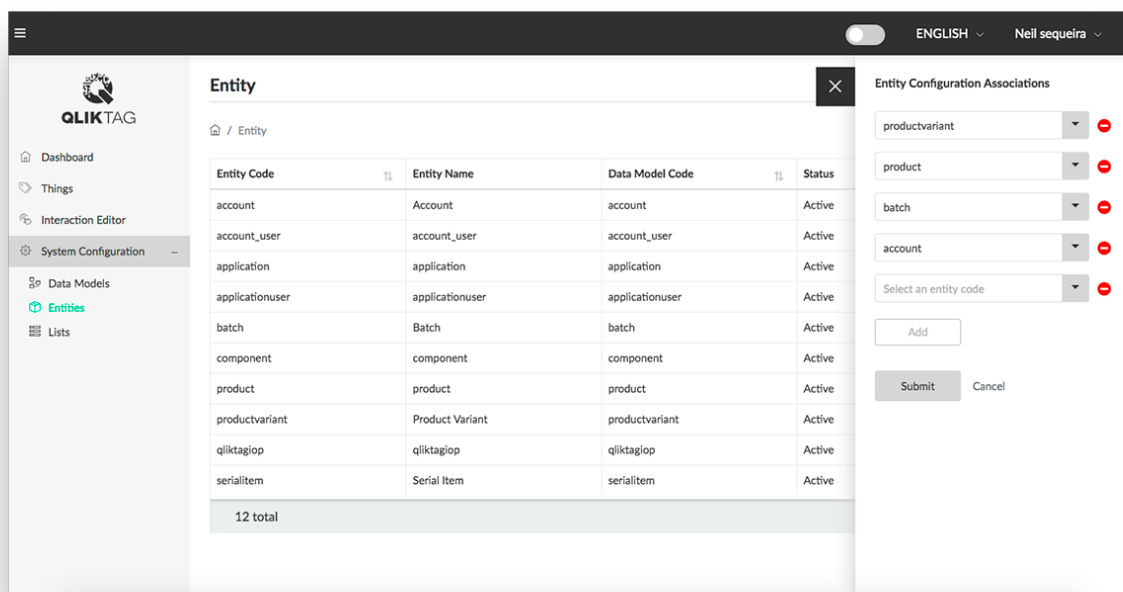
- a. Batch Number
- b. Serial Number
- c. Business Name
- d. Event DateTime
- e. Business Step
- f. Disposition
- g. Location Latitude
- h. Location Longitude

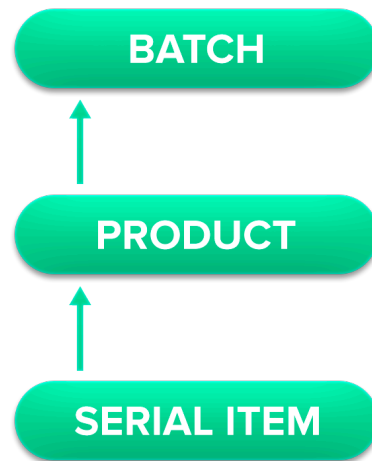


To create **Entities**, click on “**Systems Configuration**” and select “**Entities**”. Here you can define Entities for the four Data Models you have created by assigning them a name and then linking them to the Data Models created. For example, an Entity named “**Batch**” can be linked to the **Batch Data Model**.



Once the entities have been defined, click on “**Entity Configuration Associations**” for the selected entity to establish associations between different entities, making one dependent on the other. For example, **Batch** will be the entity at the top of a hierarchy, with a **Product** entity representing an SKU dependent on it. Similarly, a **Serial Item** entity in this case will have an association setup with Batch and Product entities, being dependent on them both.





2. Completing Configuration

Complete the configuration of products as “Connected Things” by putting down access controls and identity management systems for supply chain partners and other users to be integrated into your environment on the QLIK-TAG platform.

Proceed to do so by configuring **“Rules & Validations”**, **“Lists”** of values referred to as attributes within data models (e.g. Business Events) and **“User Roles & Permissions”**.

<input type="checkbox"/>	List Item Code	List Item Name	Status	
<input type="checkbox"/>	STOCKING	STOCKING	Active	
<input type="checkbox"/>	ARRIVING	ARRIVING	Active	
<input type="checkbox"/>	REPAIRING	REPAIRING	Active	
<input type="checkbox"/>	INSTALLING	INSTALLING	Active	
<input type="checkbox"/>	DEPARTING	DEPARTING	Active	
<input type="checkbox"/>	REMOVING	REMOVING	Active	
<input type="checkbox"/>	UNLOADING	UNLOADING	Active	
<input type="checkbox"/>	DESTROYING	DESTROYING	Active	
<input type="checkbox"/>	CONSIGNING	CONSIGNING	Active	
<input type="checkbox"/>	COMMISSIONING	COMMISSIONING	Active	

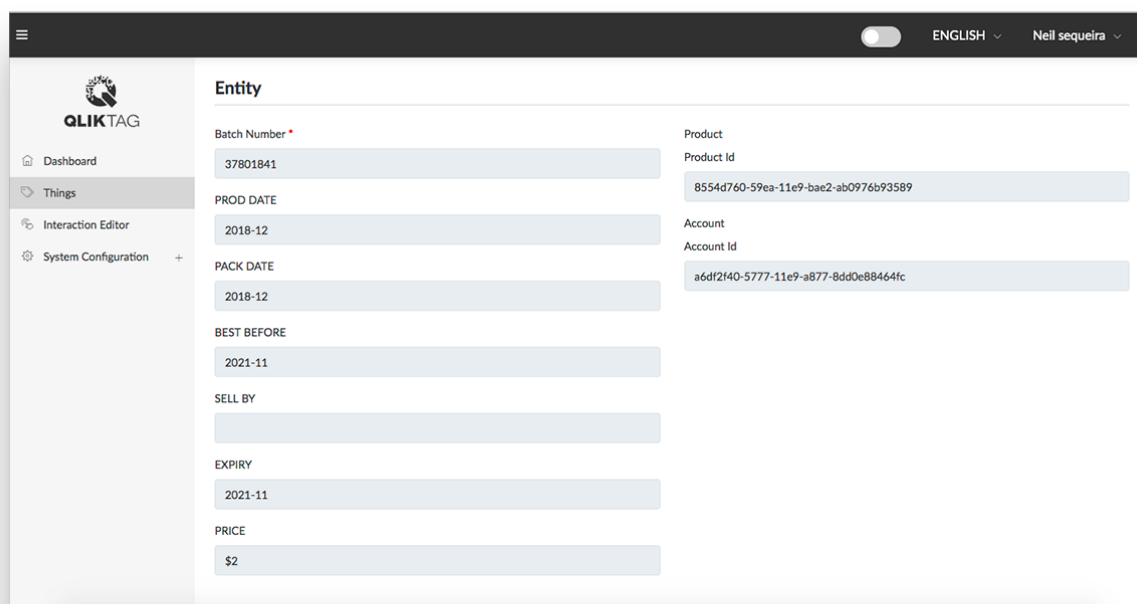
0 selected / 28 total

3. Adding Entity Instances

The next step after configuring and saving entities (Batch, Product, Serial Item & TrackLog), is the creation of **Entity Instances** by adding data for the entities you've created via the UI i.e. Batch Information, Product SKU Information and Serial Item Numbers.

To create Entity Instances, click on **“Things”** in the main menu and proceed to select the desired entity. Use the form view to enter data for the selected entity.

Another possibility is to use **Standard APIs** to interface with factory floor systems, serialization systems and other third party systems to push this data into the Qliktag Platform in order to create these **“Things”**.



The screenshot shows the 'Entity' form in the Qliktag application. The interface includes a top navigation bar with a menu icon, a toggle switch, 'ENGLISH', and the user name 'Neil sequeira'. A left sidebar contains the Qliktag logo and navigation links: 'Dashboard', 'Things' (selected), 'Interaction Editor', and 'System Configuration'. The main content area is titled 'Entity' and contains a form with the following fields:

Field	Value
Batch Number *	37801841
PROD DATE	2018-12
PACK DATE	2018-12
BEST BEFORE	2021-11
SELL BY	
EXPIRY	2021-11
PRICE	\$2
Product	
Product Id	8554d760-59ea-11e9-bae2-ab0976b93589
Account	
Account Id	a6df2f40-5777-11e9-a877-8dd0e88464fc

4. Connecting the Track & Trace Mobile Scanning Application

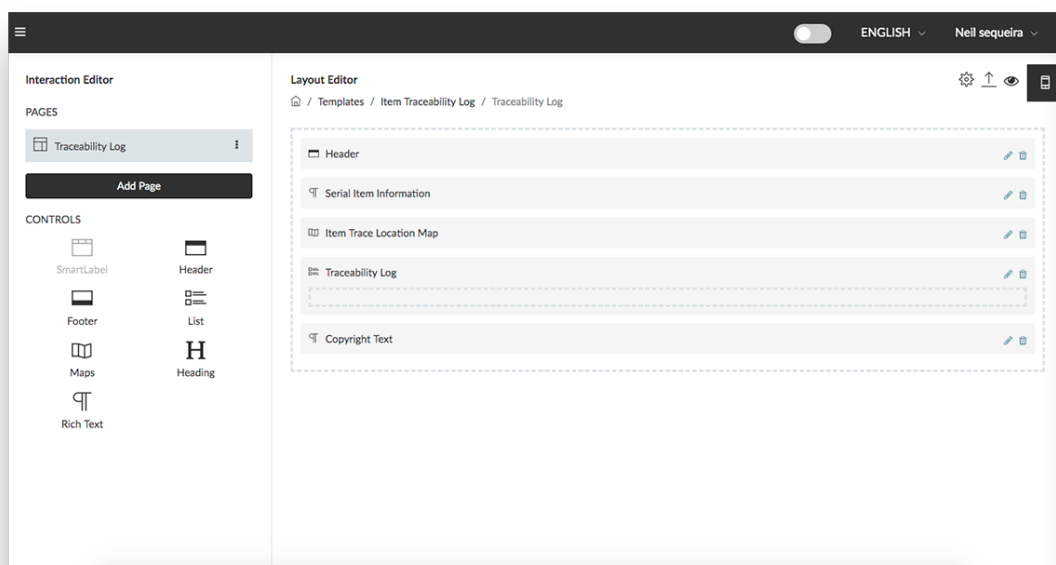
To be able to record business events within a supply chain against products using applications for barcode or RFID scanning, both the scanning applications and the hardware components need to be integrated with the Qliktag Platform through Standard APIs.

For the purpose of this use case, a mobile application was developed using Ionic to scan a data matrix tag on the packaging of a batch/lot or an individual serial item. The mobile app reads the identifier (Batch Number or Serial Number), and through a **Standard API** query, fetches information about that product to display it to the user. The user can now key in specifics like Business Name, Business Step and Disposition by clicking on the “**Log Event**” feature that pops up upon scanning the data matrix. The app also captures the time-stamp and geolocation from the mobile device, writing it back to the Qliktag Platform to create an entry in the TrackLog Entity.

DESIGNING DIGITAL INTERACTIONS FOR THE TRACEABILITY LOG

The scanning and logging actions complete the “Tracking” part of the solution. With a detailed item history for each product in place, build relevant and interesting interactions to dispense the accumulated data to the user, whether they be a supply chain participant or the end consumer.

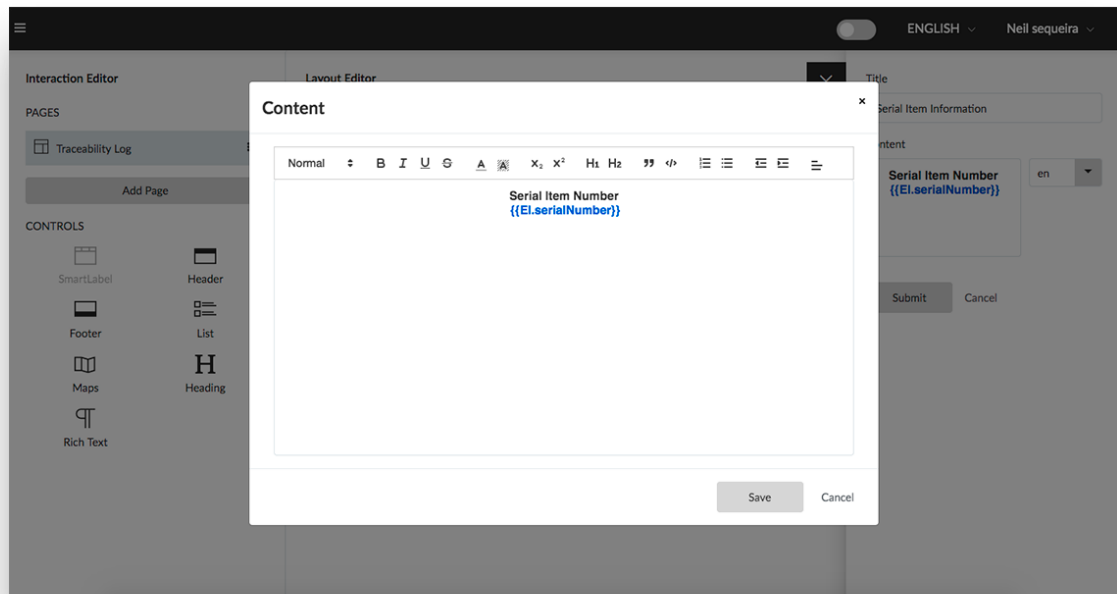
Click on “**Visual Interaction Templates**” and use the “**Digital Interaction Editor**” to begin designing your Track & Trace Log interactions and customized User Interfaces.



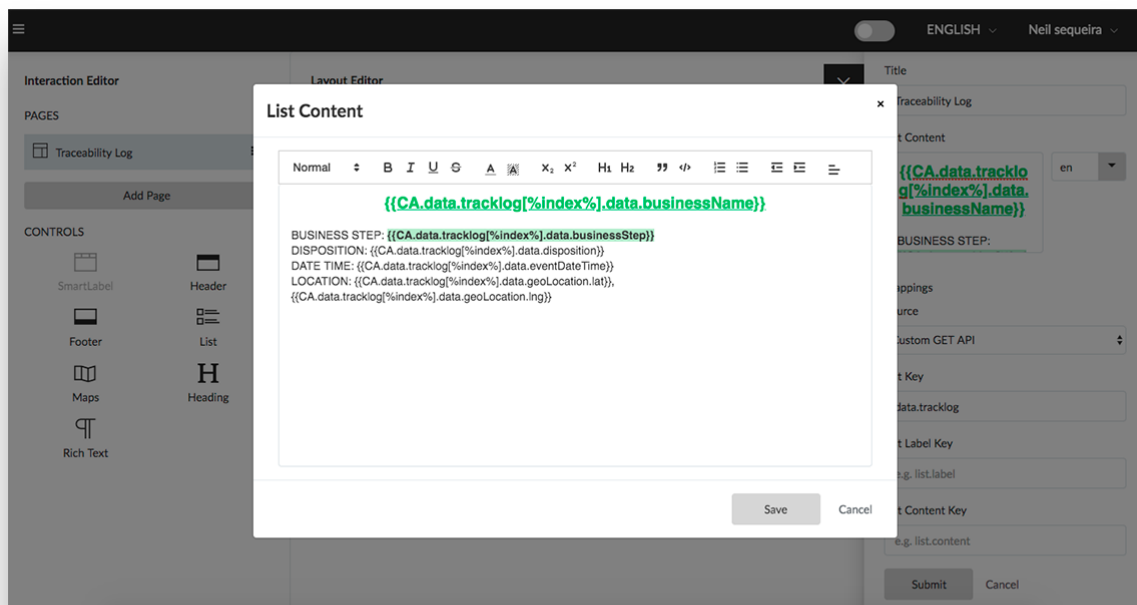
Begin by creating a page in the Digital Interaction Editor. The Digital Interaction Editor features a drag and drop “**Controls**” panel to rapidly build User Interfaces without writing any actual code. The primary controls in the panel are:

Header Control: Creates a page header section to display the “Serial Number” of the scanned item by using the `{{ShortCode}}` for the Serial Item attribute to display the serial number where the `{{ShortCode}}` is placed.

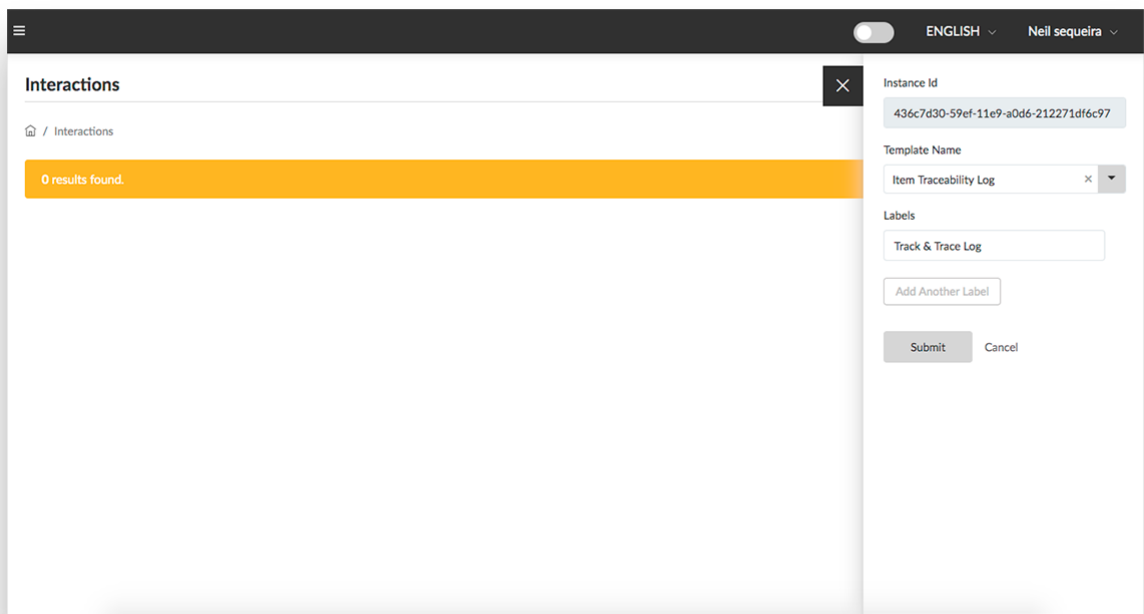
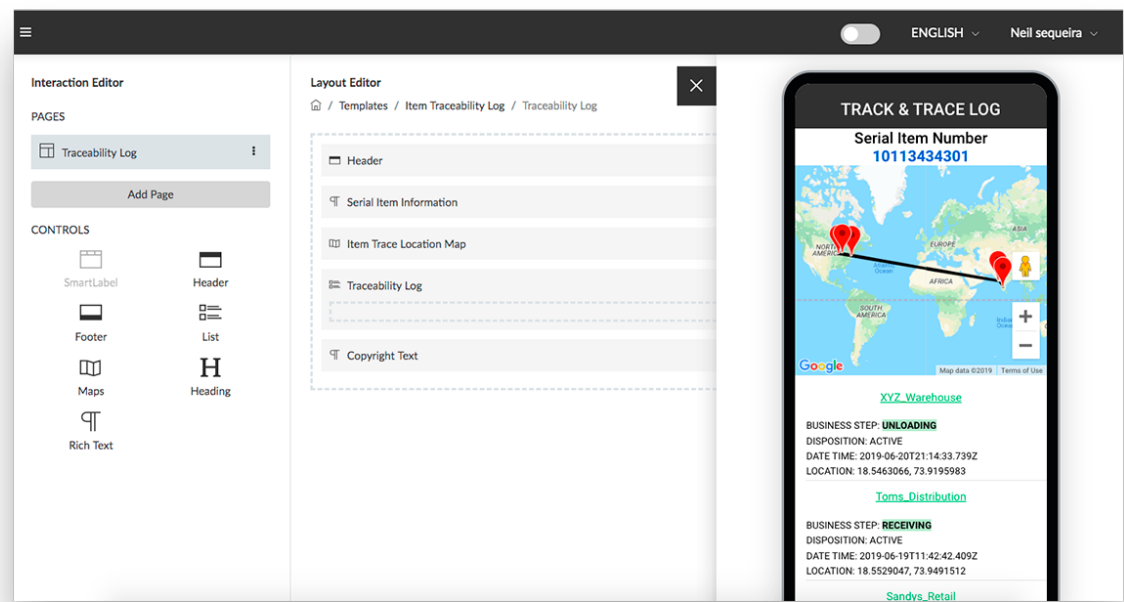
Map Control: Uses `{{ShortCode}}` to pull the values of the **Latitude & Longitude** attribute from the TrackLog entity to render a map. The map’s appearance is also customizable.



List Control: Pulls and displays all transactions and business events from the TrackLog in chronological order using {{ShortCode}}.



Once the Interaction Template is published, it can be applied to the “Things” within the “Things” section and accessed by means of the URLs generated there or activated through QR codes.



NOTE

This document serves only as an example of how the Qliktag Platform can be used to configure and set up intelligent traceability solutions. You may choose to configure your solution differently using different data models, hardware scanners or RFID gates to identify products and send the information back to the platform or deliver the traceability data in a completely different way.

The Qliktag Platform provides the technology layer that brings together hardware scanning devices, factory floor systems and end consumers looking for product transparency to aggregate data and make it accessible over the web via meaningful and intelligent experiences. The guidelines can help products deliver critical information about themselves and develop a robust solution to gain complete clarity on the movement of a product, from individual to batch levels, to optimize logistics and supply chain transparency.