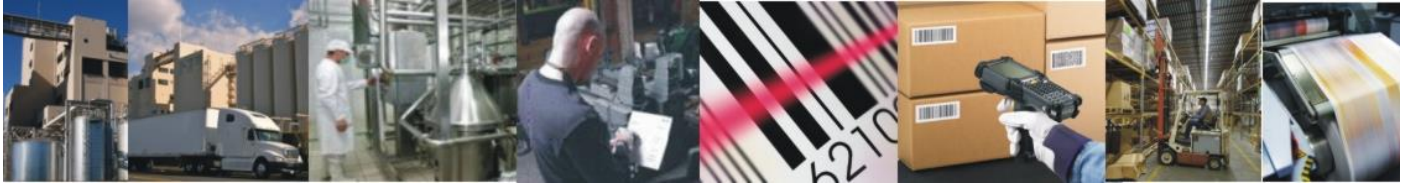


## KnarrTek Overview



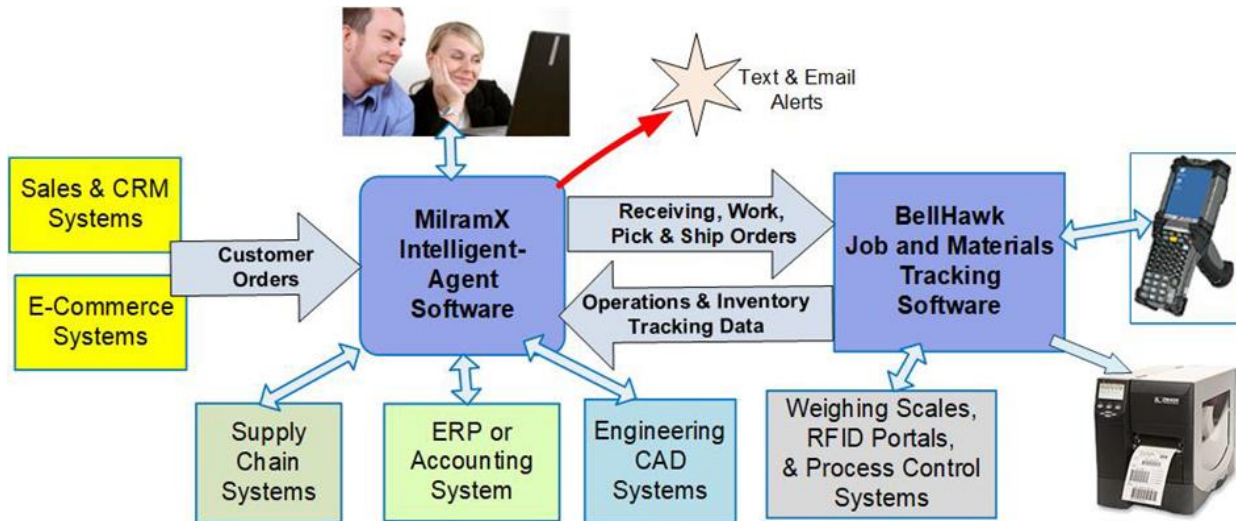
### Introduction

KnarrTek provides expertise, software and supporting services to enable its clients to implement operations tracking & management solutions for situations where conventional inventory, asset, or job tracking, warehouse management or ERP systems cannot meet their needs, without extensive customization.

These situations include:

1. Tracking containers, kits, assemblages, totes, pallets and shipping containers which contain many different parts. This is required throughout the industrial supply chain.
2. Tracking individual containers of material by their lot and serial number and expiration dates. This is required in a wide variety of regulatory compliance and standards applications.
3. Tracking the same part in different containers by multiple different part numbers, which happens when parts are purchased from multiple different suppliers.
4. Tracking rolls, reels, and sheets of material of different lengths and widths but having the same part number. This typically happens when dimensioned materials are left over from a manufacturing process or construction job and returned to stock. It also happens when wire and similar products are taken from a reel as part of a customer order.
5. Tracking which containers of raw material were used to make intermediate products, which were used to make which containers of finished products, and where they were shipped to. This materials traceability data is essential for determining the source of defects and for recalling defecting products without requiring an overly broad recall.
6. Determining the labor and materials cost of making semi-custom products by tracking work-in-process in containers or individual assemblages and adding up the costs for each product or container of products, as they progress from raw materials to finished products.
7. Tracking materials and work-in-process for many different customer jobs and projects in multiple different locations. This includes warning users of they attempt use materials purchased for another customer job or project.
8. Collecting and disseminating materials traceability history for regulatory compliance. This applies to materials in the food, medical, and pharmaceutical supply chains as well as many other supply chains, where human health and safety may be at risk.

## KnarrTek Software



KnarrTek provides two software platforms:

1. BellHawk<sup>®</sup> uses technologies such as barcode and RFID scanning and mobile computing to track containers of material and serialized items in multiple different locations, including outdoors. It is primarily to solve materials tracking problems which cannot be solved using conventional inventory, job, and asset tracking systems, which track materials by location.
2. MilramX<sup>™</sup> which is used to exchange information consumed and produced by BellHawk with a wide variety of other systems within an organizations IT infrastructure as well as its supply chain trading partners. MilramX uses an intelligent-agent paradigm to enable many different data transfers to take place at the same time. MilramX can also monitor data from many sources in real-time and use the information it derives to send text messages or Emails to people who need to be alerted when specific situations arise.

Together these software platforms can be used to automatically plan and schedule manufacturing, distribution, and installation operations, including those at multiple different geographic locations, as well as to help ensure that customer orders get delivered on time.

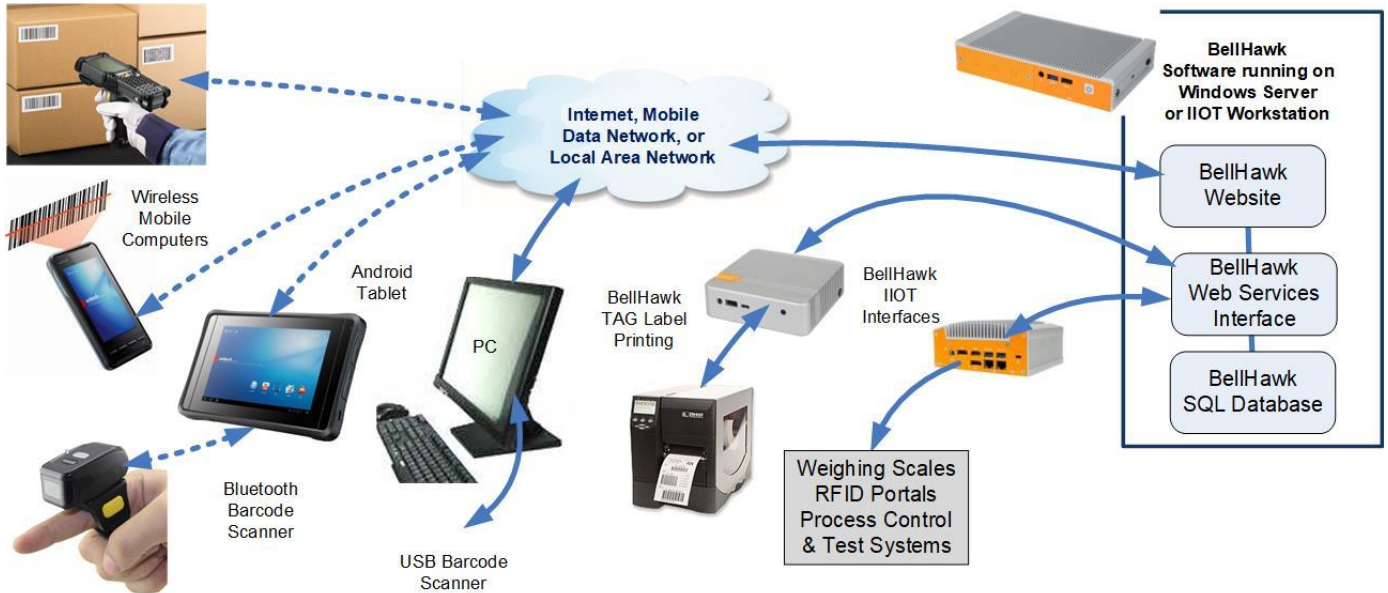
BellHawk can be configured to meet most operations tracking requirements working “out-of-the-box” but is designed to be easily customized to meet application-specific requirements if needed.

Interfaces to many systems can be quickly implemented by writing Python scripts for MilramX intelligent agents with most of the interfacing code either provided or automatically generated by the MilramX software platform. This can be done by the customer’s own staff, or by the staff at KnarrTek.

BellHawk is available “in the Cloud” on a quarterly subscription basis, over the Internet, on Windows Servers in the USA managed by KnarrTek. This is ideal for smaller customers who do not have their own IT staff. BellHawk and MilramX are also available on an annual rental basis for installation on a customer’s own computers. This is ideal for mid-sized organizations, which have their own IT staff.

Both software packages are also available for purchase by larger organization that need to embed BellHawk and MilramX within their own IT ecosystem.

## Equipment Supported by BellHawk



The BellHawk software can be run on a Windows Server computer or a Windows IIOT (Industrial Interface of Things) computer. It consists of a specialized web-server, with a web-services interface, and a SQL Server database.

Barcode data capture is done through a web-browser running on a wide variety of devices equipped with an internal or external barcode scanner. As a result, no special software is required to be loaded onto each device.

Data can be captured and viewed over a local area network, over the Internet, or through a mobile-phone data network, enabling data capture in widely dispersed geographic locations.

BellHawk can also print-out customized barcode labels on demand from any data entry device on a wide-variety of barcode and combination barcode/RFID label printers.

BellHawk will also work with most RFID mobile and fixed station equipment as well as having interfaces to weighing scales and other process control equipment.

This equipment may be provided by the client themselves or purchased through a KnarrTek partner.

For small applications, MilramX can be run on the same Windows IIOT computer as BellHawk but mostly it is run on a Windows Server computer. MilramX can also be run on local or remote Windows IIOT computers to collect data from RFID portals, process control, and test systems, as well as from floor and bench weighing scales.

## Example Applications of KnarrTek Software



### KnarrTek Services

KnarrTek consists of a small team of experts who have many years of experience in assisting clients in the industrial, medical, construction, food and defense supply chains to implement material tracking and traceability solutions.

Some of the services provided by KnarrTek include:

1. Operational needs analysis
2. Solution design
3. Pilot trials of the software
4. Project management
5. Software customization – solution tailored to needs of your organization
6. Installation and deployment support
7. Support and training in use of software
8. Systems integration
9. Ongoing support.

KnarrTek's staff works as a team with its clients to achieve the least costly solutions to meet each client's operational needs. To this end KnarrTek encourages its clients to do as much of the implementation process as they have people with the time and skills available to carry out the needed tasks.

But, where a client's staff do not have time or the necessary skills to implement a system, the KnarrTek team is available to fill the gaps, or even to deliver a complete turnkey solution with minimal interference with the regular duties of the client's staff.

## KnarrTek's Clients

KnarrTek provides software and services for three levels of clients:

1. **Entry-level.** These clients use the BellHawk software, typically on a stand-alone basis, through KnarrTek's BellHawk Online Cloud-based service on servers managed by KnarrTek. This is ideal for smaller organizations, without their own IT staff, who are looking for a simple low-cost subscription service.
2. **Industrial-Level.** These clients typically operate a single site. They install the BellHawk software on their own computers and integrate BellHawk with their ERP or accounting system, as well as possibly with other systems, using MilramX. Here the integration may be done by the staff of KnarrTek, the client's own IT staff, or a joint team. Typically, limited customizations are made to BellHawk and the software is licensed on an annual rental basis.
3. **Enterprise-Level.** These clients are similar to Industrial-Level clients except they typically have multiple warehouses and/or manufacturing plants. In this case, clients typically purchase a license to the software and the software is extensively customized to meet the needs of the enterprise. Customizations and integrations may be done by the staff of KnarrTek, the client's own IT staff, or a joint team. For large organizations, with an in-house software development team, source code licenses are available.

## Container-Based Tracking

What makes the BellHawk software platform special for many of these applications is its use of container-based tracking, which is analogous to the tracking methods used by organizations such as Amazon, FedEx and UPS.

Here BellHawk software tracks individual containers of material, each with its own tracking barcode and/or RFID tag.

This is in contrast to traditional inventory tracking and warehouse management systems, as well as ERP systems, which track the quantity of inventory at a location.

Container-based tracking is the GS1 (Global Supply Chain One) standard for tracking materials in the global supply chain and is required for materials tracking and traceability by US Government agencies such as the FDA, USDA, FASA, DOT, and DOD.

Container-based tracking enables the BellHawk software to track:

- Materials in each container by lot, serial number, and expiration date
- Multiple materials in nested containers, such as on pallets or in totes



- The status of work-in-process materials
- Materials at many different geographic locations
- Materials of different length and/or width having a common part number
- Precisely which materials, from which supplier, were used to make each batch of product
- The labor and materials cost of make-to-order products or engineer to order projects.

Container-based tracking also enables BellHawk to print out barcode labels on demand for each individual container, including GS1 compatible tracking barcodes containing GTIN, Lot and Serial number and expiration dates, as required by the FDA for tracking pharmaceuticals and other medical products.

To understand how the materials tracking methods used by BellHawk differs from traditional inventory tracking methods, please see the video “Container-Based vs Item-Locator Inventory Tracking Methods” [which can be reached from the Videos link at the bottom of www.KnarrTek.com](#).

## **In Summary**

If you have a materials tracking application which cannot be solved using a conventional inventory, asset, or job tracking system, or using an ERP or warehouse management system, or you simply have an “oddball” materials or operations tracking problem, please give us a call at (774)415-7878 or send an Email to [Client-Support@KnarrTek.com](mailto:Client-Support@KnarrTek.com) to setup a no-cost on-line discussion with one of our experts.