ASSET MANAGEMENT WORKFLOWS FOR cSTART USING SNIPE-IT

E. Blomley*, J. Gethmann, J. Natal, R. Ruprecht, M. Schuh, J. L. Steinmann, A.-S. Mueller
Karlsruhe Institute of Technology, Karlsruhe, Germany

Abstract

The cSTART project at the Institute for Beam Physics and Technology (IBPT) at the Karlsruhe Institute of Technology (KIT) is introducing a new system to manage all accelerator-related components called Snipe-IT. As the new components arrive, one of the first steps is entering them into the asset database, which creates a unique identifier. This identifier is then also used during the quality inspection process as the main reference. The asset-to-asset associations possible with Snipe-IT provide a simple and efficient method for structuring the components in cabinets and along the storage ring. The flexible custom fields allow to track references to other data sources, which provide the more technical information such as CAD drawings, cable routing, and device documentation. In addition, it also allows to track component specific information. This contribution describes the established workflows, status, and lessons learned using a generic IT asset management system for accelerator component management.

MOTIVATION

Since the commissioning of KARA (Karlsruhe Research Accelerator) at KIT in 2001, the accelerator landscape has expanded to a network of beamlines, laboratories, the linac-based test facility FLUTE (Ferninfrarot Linac und Test Experiment), the upcoming VLA-cSR (Very Large Acceptance - compact Storage Ring) within the cSTART project (compact STorage ring for Accelerator Research and Technology) [1], and a LPA (laser-plasma accelerator) [2] each introducing hundreds of components with distinct life-cycle-demands. Over the years, documentation and tracking have been carried out with heterogeneous tools and inconsistent naming conventions, creating gaps that hinder efficient hardware and software deployment across all IBPT sites. By adopting Snipe-IT [3] — an open-source web-based asset-management system — we can assign a single and persistent identifier to every asset like magnet, power supply, detector module and support device, leverage its extensive feature set and active developer community, and benefit from continuous maintenance, even though the software was not originally designed for particle-accelerator components. The successful use of Snipe-IT on other accelerator facilities [4] motivated our adaptation and guaranteed baseline compatibility with accelerator-related workflows.

FEATURES

Snipe-IT provides a modern and flexible set of features, some make the tool especially interesting for adaptation in this context.

* edmund.blomley@kit.edu

Custom Fields

Custom fields let the database designer create any amount of user-defined data columns, which can be grouped into field-sets, for any asset type, enabling storage of metadata such as serial numbers, calibration dates, as well as device class specific parameters, such as network-related information for network-capable devices or device-specific parameters only relevant for magnets or cameras or motors. These fields are searchable, can be mandatory or optional, and support drop-down lists, numeric values, dates, and free-text entries, making the inventory adaptable to diverse accelerator-instrumentation needs. They can also be made unique or require to adhere to a regex expression which is useful for defining fields related to naming conventions.

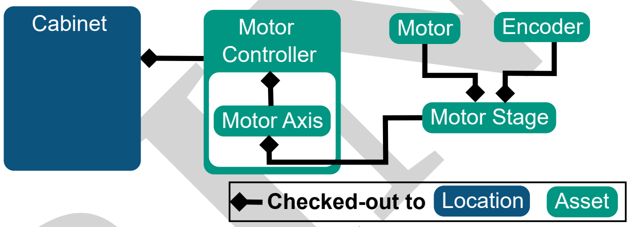

Figure 1: Asset-to-asset-to-location checkout example. Using the built-in checkout system to represent the actual device setup while each component remains a fully fledged asset. In this example the motor axis is considered to be one of multiple axes which can be individually exchanged inside the motor controller crate.

Figure 2: Basic labels. This minimal label is used during the initial registering of new devices based on an already existing generic entries in the database.

Asset Association

In Snipe-IT, assets can be checked out not only to people but also to other assets or to defined locations, enabling the creation of association chains that reflect the physical layout of an accelerator. For example, a motor encoder and motor can be checked out to a motor stage, which in turn is checked out to the motor axis, and finally to the motor controller — each element remains a fully fledged asset with its own custom fields. Cabinets can be represented as locations, allowing a controller to be checked out to a cabinet that belongs to a larger area (see Fig 1).

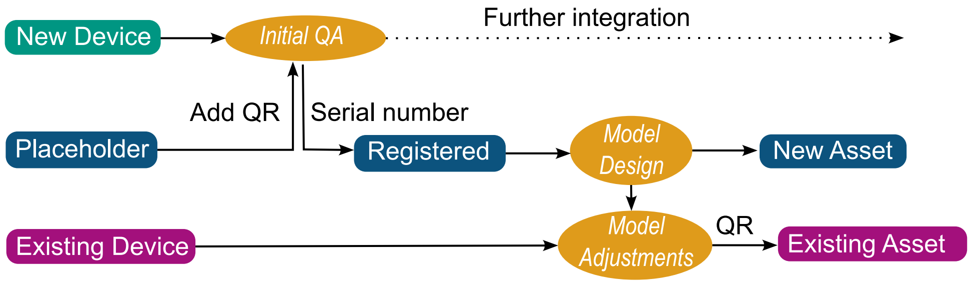

Figure 3: Workflow for cSTART device to database integration. Over the next months more and more devices for the cSTART storage ring will arrive. During the initial visual inspection a unique label based on a placeholder database entry will be added to each device in exchange of device specific unique identifier such as the serial number. In the database the device now is tracked as a registered device, but still with only a minimal amount of information. The asset model design and further integration of the device can then happen independently of each other without blocking or slowing down the process. After the asset model design potential similar existing devices are evaluated and potentially also added to the database, leading to a steady increase of tracked assets across cSTART and the existing accelerators.

Because checkout is a built-in Snipe-IT capability, these relationships are automatically recorded, searchable, and require no additional custom-field configuration.

Label Engine

The label engine is the third key feature, allowing administrators to design labels in any dimensions and to embed arbitrary custom fields together with the QR code. This ranges from minimalist QR-only stickers to fully detailed tags that display serial numbers, calibration dates or location codes, removing the need to look up the asset in the database during routine work. It supports bulk batch printing — e.g., 187 QR codes on a single DIN A4 sheet — and (see Fig. 2), but also generates individual more complex labels on dedicated label printers.

Maintenance Logs

Although not a primary selection criterion, Snipe-IT enables the creation of regular audit schedules and the logging of maintenance actions for each asset, delivering traceable histories with minimal overhead.

ADAPTATION

The adoption of Snipe-IT aims to establish a single authoritative source for all components and their life cycle data. Integrating the system into an operational accelerator is demanding: it involves bulk import of devices, designing coherent asset models with appropriate custom fields, and migrating legacy logs and documentation. Instead of starting in one random corner, we are defining a clear approach for a gradual integration of assets around certain key events happening on different time scales and involving various groups and therefore distributing the work load.

The Role of cSTART

Key events, which already started happening, are the arrival of new components for the upcoming KIT accelerator facilities LPA and cSTART including the VLA-cSR and the FLUTE injection line, which will connect the electron source FLUTE with the VLA-cSR. These new components undergo various inspections and tests on-site as part of the quality assurance (QA) process.

New components are first entered as generic placeholders, printed with QR-code labels, and tagged during visual inspection with only model and serial data; the full asset model, custom fields, and documentation are added asynchronously afterwards, keeping inspections uninterrupted while the database matures along with hardware delivery.

While adding the asset models for cSTART we keep in mind similar devices of the existing accelerators KARA and FLUTE and use the opportunity to add those devices into the database as well. The bulk of cSTART components are typical devices associated with storage rings: magnets, power supplies, and beam diagnostics. The timescale of the arrival of LPA and cSTART components is over the next six to twelve months. A visual presentation of this workflow can be seen in Fig. 3.

Transfer Line for LPAs

The new Terawatt (TW) laser beamline for the LPA consists of only a handful of components: mostly movable stages, mirrors, and cameras, and are being built up over the next two to three months, thereby extending the inventory alongside the larger cSTART project.

Network Restructuring

In parallel to the implementation on the cSTART and LPA projects, the KARA accelerator network will be restructured this summer. Because the overhaul will involve virtually every network-connected device, it presents an ideal opportunity to register each serviced component in the asset database as it is updated.

Reconstruction of FLUTE

Due to construction restraints the FLUTE accelerator is fully removed from its location, but will be set up again towards the end of the cSTART build-up phase, providing another opportunity to add more devices to the asset database, again on a different schedule.

Schedule

Figure 4 shows the plan of the graduate integration of devices into the asset database over the next 12 months.

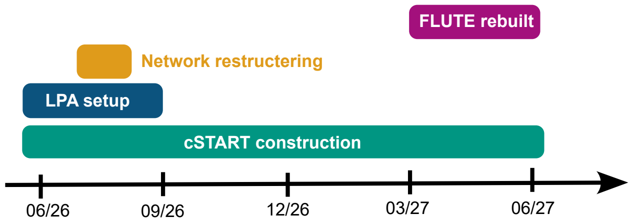

Figure 4: Adaptation schedule. Various events over the next 12 months requiring to work with specific groups of devices providing the opportunity for a gradual adaption of the new asset database. After that period a significant percentage of devices and models will exist in the database.

EXISTING DATASOURCES

We aim to eliminate ad-hoc device spreadsheets and stop using generic wikis for documentation, but we will not replace dedicated databases that already manage specific aspects of device information. Instead, we will use Snipe-IT's custom fields to store hyperlinks or references to these external sources (see Table 1). After the initial adoption phase, we might reevaluate the optional migration of selected data into Snipe-IT if the user community finds it beneficial, avoiding the forced consolidation pitfalls of past approaches.

Table 1: Linked Existing Data Sources

Data source	Description
Charm++	Network database with integration to KIT network services
KIT Inventory	Central KIT purchase database
EPLAN	Cable planning
Autodesk Vault	3D CAD models
Electrical Safety	Electrical safety compliance
Docs server	Device manuals, firm- and software
XWiki	Historically device documentation, but also operating procedures

STATUS

The device database is prepared with generic placeholder assets. The first actual devices were added recently, 36 BPM readout systems for cSTART. This triggered the integration of the BPM devices for KARA, as they are considered similar devices.

While we will continue to add cSTART devices as they arrive, we will focus on integrating all LPA related devices, which are mostly on-site already, and prepare for the network restructuring process, which will lead to a high number of devices being added. Again, to be non-blocking, also most of these devices will only be added with the minimum amount of required information, with the asset model design being postponed to later point in time.

SUMMARY & OUTLOOK

Snipe-IT is poised to become the primary lookup source for all accelerator devices, exploiting its native features within the accelerator environment. Procedures have been developed to integrate new devices, and a strategy is in place to integrate existing devices in the long run. Although it will take some time and require considerate effort to integrate all devices and consolidate the scattered information, we are confident that this will be a worthwhile effort. Figure 5 shows a glimpse of the currently registered and modeled assets.

Future work will leverage the REST API to harmonize data sources, synchronize a targeted data subset, and embed directly into the control-system interface. Additionally, we explore the option of incorporating lattice information, turning the database into a lattice repository for physics simulations. These API-driven extensions will enhance interoperability with our existing services while preserving Snipe-IT's core asset-management capabilities.

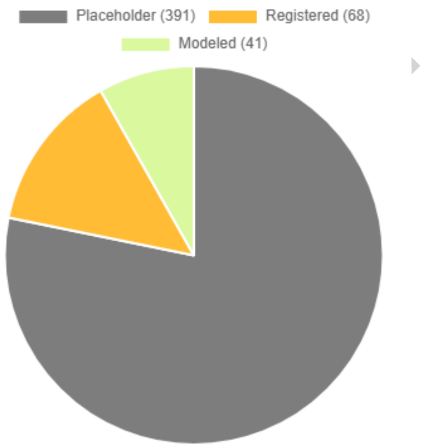

Figure 5: Status of assets in the database: **Registered** – devices already carry a label and minimal identification data; **Modeled** – devices have a complete asset model with all custom fields; **Placeholder** – pre-printed labels awaiting attachment on arrival.

REFERENCES

[1] R. Ruprecht *et al.*, "cSTART – Status on the compact electron STorage ring for non-equilibrium Accelerator Research and Technology", presented at the IPAC'26, Deauville, France, May 2026, paper TUP3016, this conference. cSTART – Status on the compact electron STorage ring for non-equilibrium Accelerator Research and Technology

[2] A. Saw *et al.*, "Laser-Plasma Electron Injector Development for the cSTART storage ring", presented at the IPAC'26, Deauville, France, May 2026, paper TUP3046, this conference.

[3] Snipe-IT, https://snipeitapp.com/.

[4] J. Lee *et al.*, "Cost-effective asset management for accelerator control systems: design and implementation for the ALS-U controls system", in *Proc.* IPAC'24, Nashville, TN, May 2024, pp. 3289-3291. doi:10.18429/JACoW-IPAC2024-THPG18