Synoptics in CERN's Accelerator Controls

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Stateful Scalable Vector Graphic

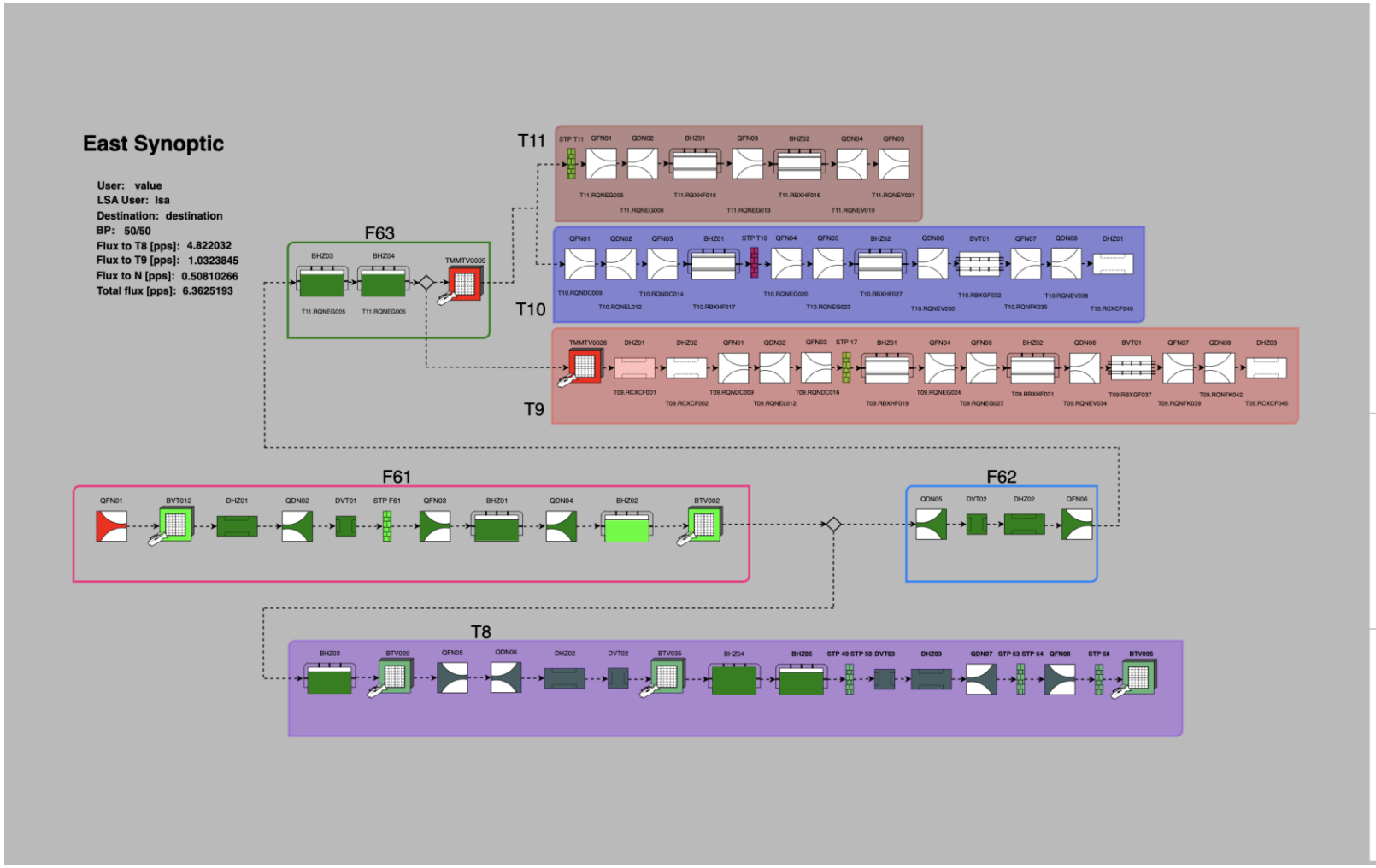
AKA SSVG

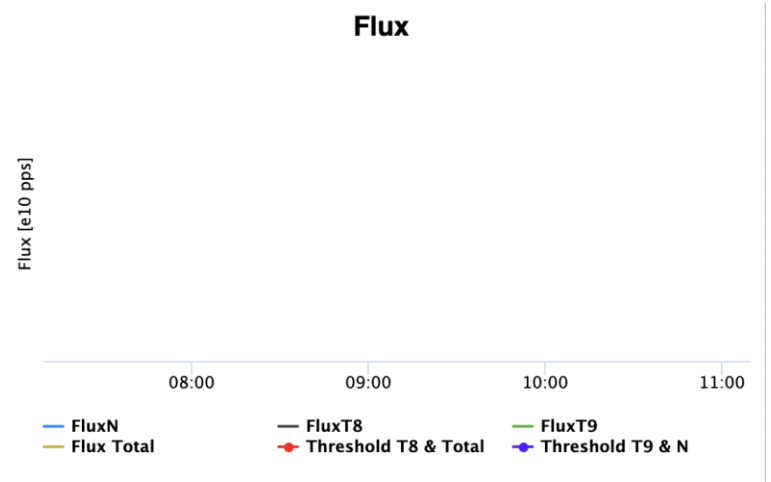
SSVG (Stateful SVG)

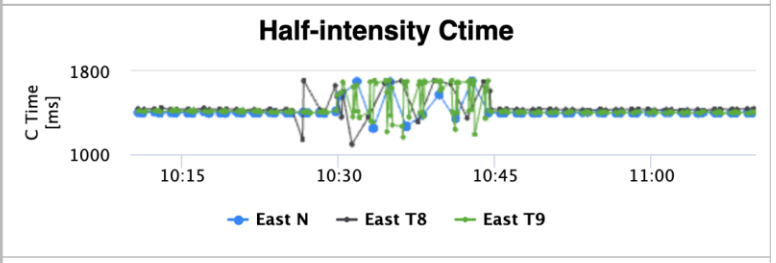
- An SSVG[1] is an SVG image file, extended with additional metadata that is ignored by an SVG renderer.
- WRAP can read this metadata, infer what data sources are accepted and how the SVG image should transform based on the in-coming data source values, e.g. device property updates, WRAP variable.
- Workflow:
  - Inkscape – Design the SVG => static, not leveraging any other information system (exception: CAD export tools)
  - SSVG Editor – Add states and link to SVG elements
  - WRAP editor – Bind the states to controls variables, integrate in your app

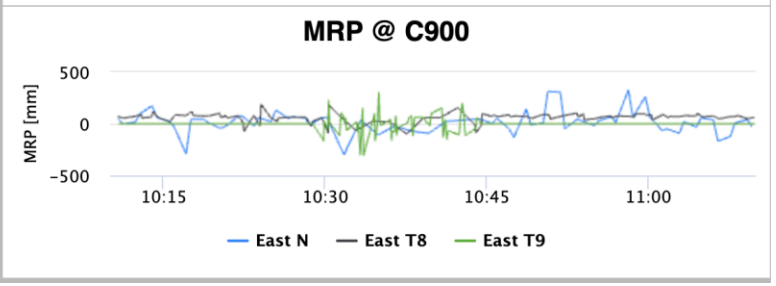
[1] developed by Sylvain Fargier (BE-CEM)

Proton Synchroron Experimental Area

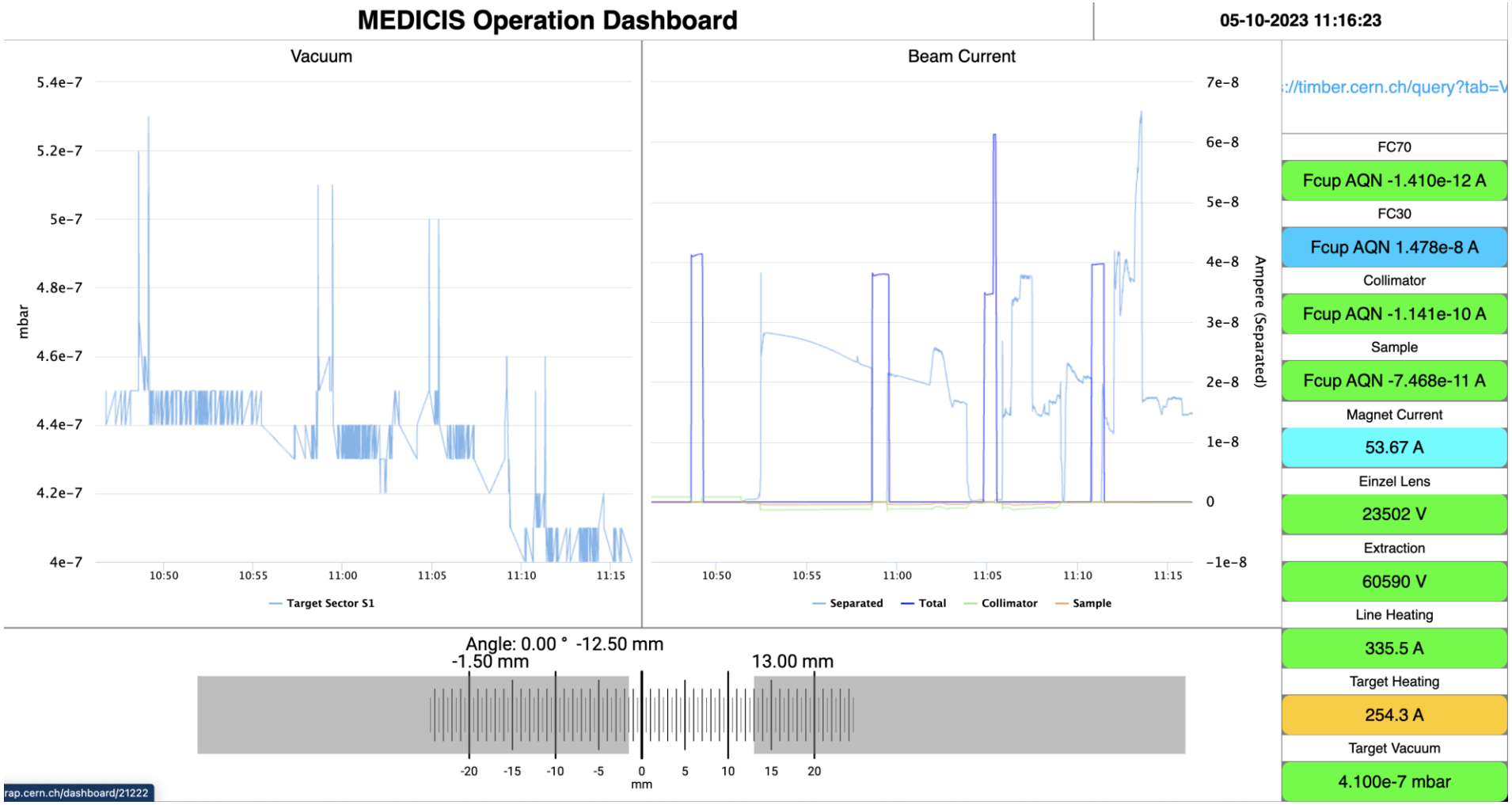




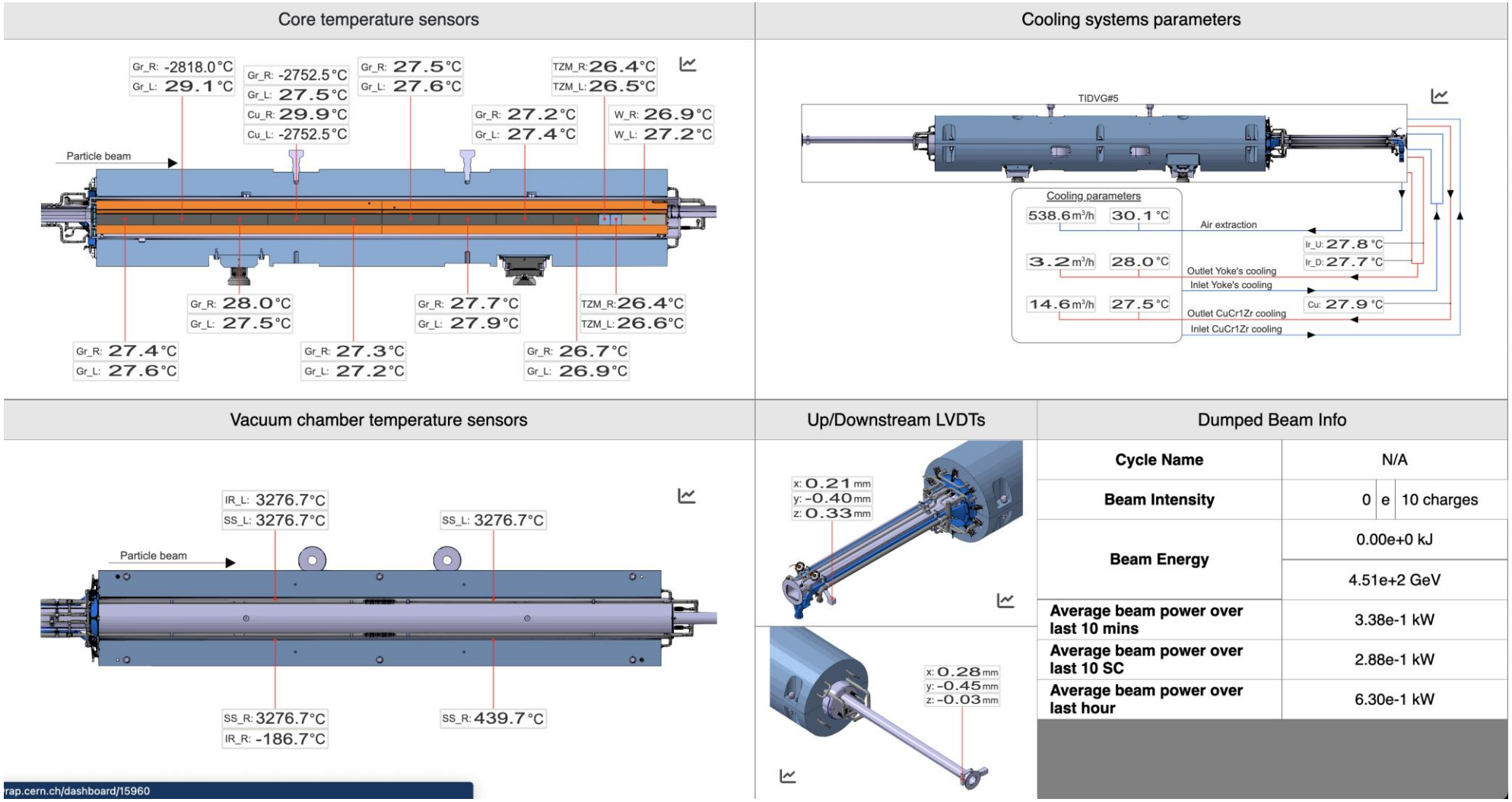




A picture is worth a 1’000 words

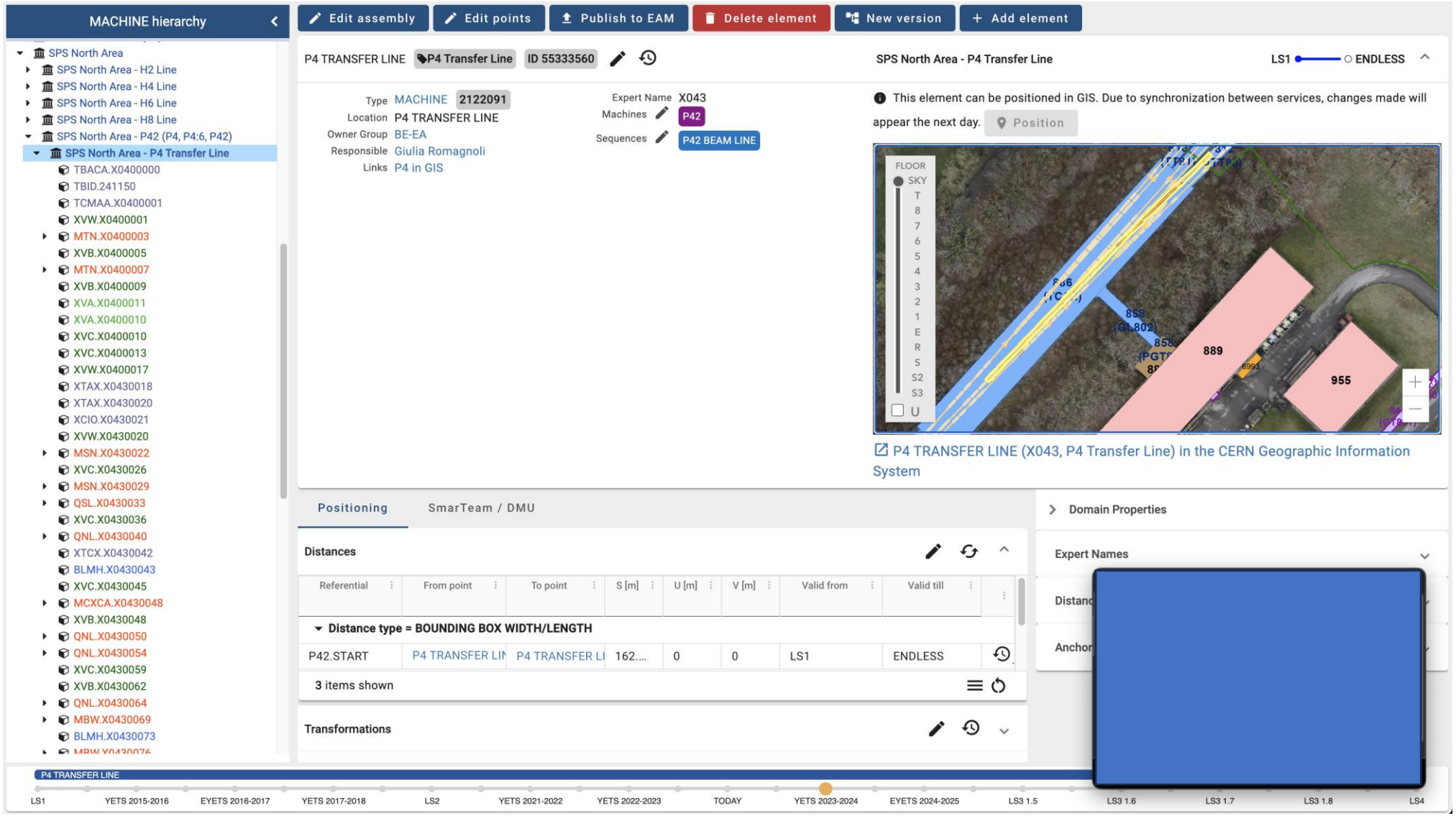


CAD export example



Leveraging Layout Data

Current Layout web interface

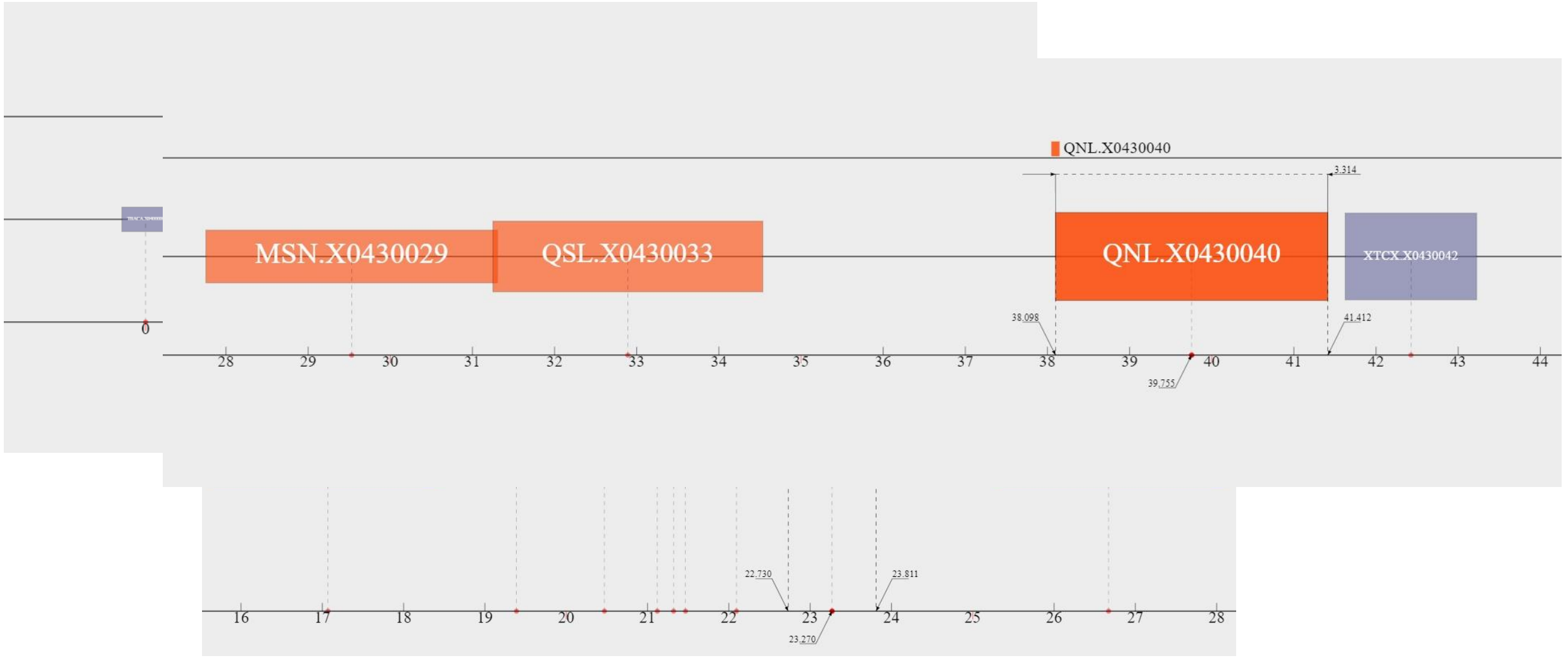


Use cases from CERN's North Area

- Interactive synoptics (i.e. filtering of elements, details, etc.)
- REST API
  - Static synoptics from beam-line selection + element selection
  - API returns JSON with layout data and meta-data to describe synoptics
  - In the future, the result could be integrated with live controls data
- Rendering: SVG or Three.JS
  - All based on data provided by Layout (coordinates, colour, etc.)
  - Simple approach, one element becomes a box with at-scale dimensions.
  - Proper position on the x-axis
  - Hover function to indicate the name and the dimensions
- Next steps:
  - Filtering by element types (today only the beam-line is supported), Layout version, etc.
  - Out-of-scale representation

Examples - **WIP**

- Measurements (length, cumulative distance, etc.)
- Viewpoint (side view, top view)
- Could be used to debug data (e.g. overlapping elements)



Challenge for rendering

- At-scale synoptics
  - Problem of scale (14m dipole magnet vs 10cm fieldbus connection box)
    - How to label the elements?
  - Scale of the accelerator (e.g. I want 1km of LHC)
    - Clustering of data at low-zoom level
    - Observation window
  - How to declutter the elements and labels?