SMART MANUFACTURING

Visualizations for Near-Real-Time Dashboards for Manufacturers

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Abstract

Data from the **Koh Young SPI** (solder paste inspection) machine can be **collected**, **stored**, and **visualized** to support the **SMT** (solder manufacturing technology) processes at **Jabil**. **Cimetrix's software package** is built on the **ELK Stack** (**Elasticsearch** and **Kibana**). This allows data to be stored in **powerful indexes** while also being displayed in **interconnected visuals**. Our **dashboard** uses **near-real-time** data from the **Koh Young machine** to display insights on the **volume % parameter** from **scanned boards**.

Method

- **Establish** machine **connectivity**
- Ensure **data matches**
- **Test visuals** with offline data
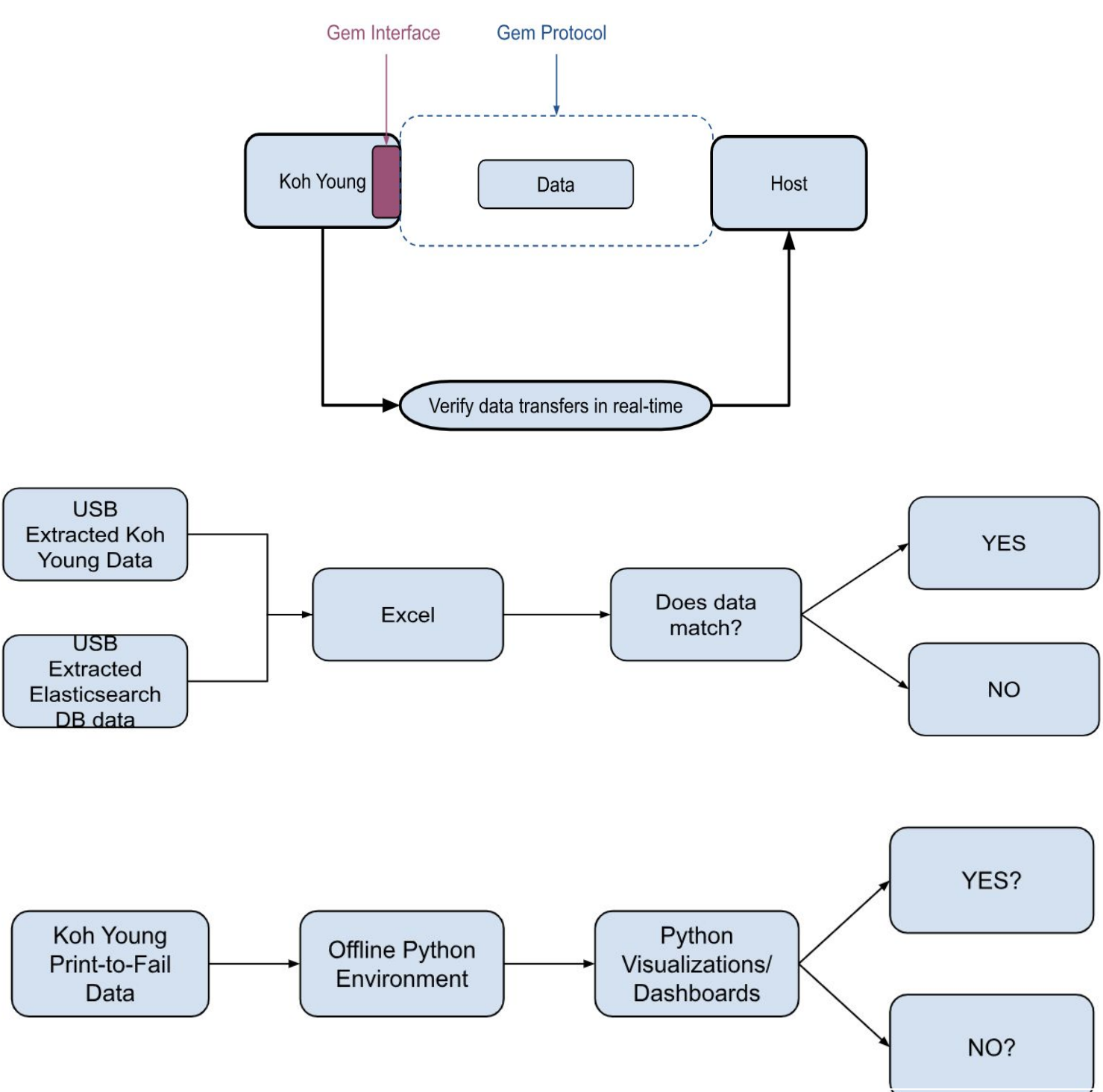
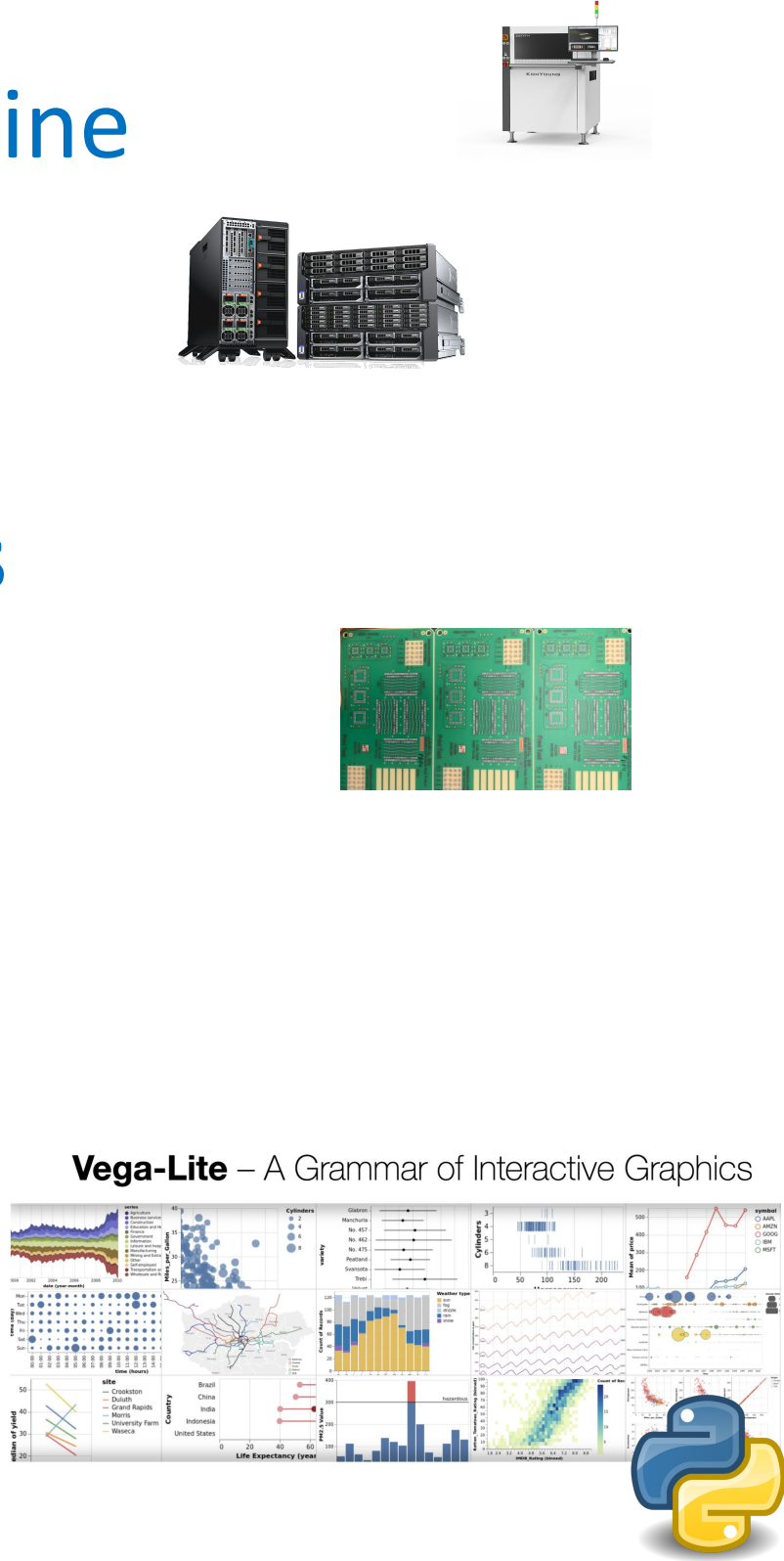Images: Feasibility Checks 1, 2, & 3

Materials

Equipment
- Koh Young SPI Machine
- Cimetrix Package

Experiment Materials
- Print-to-Fail Boards
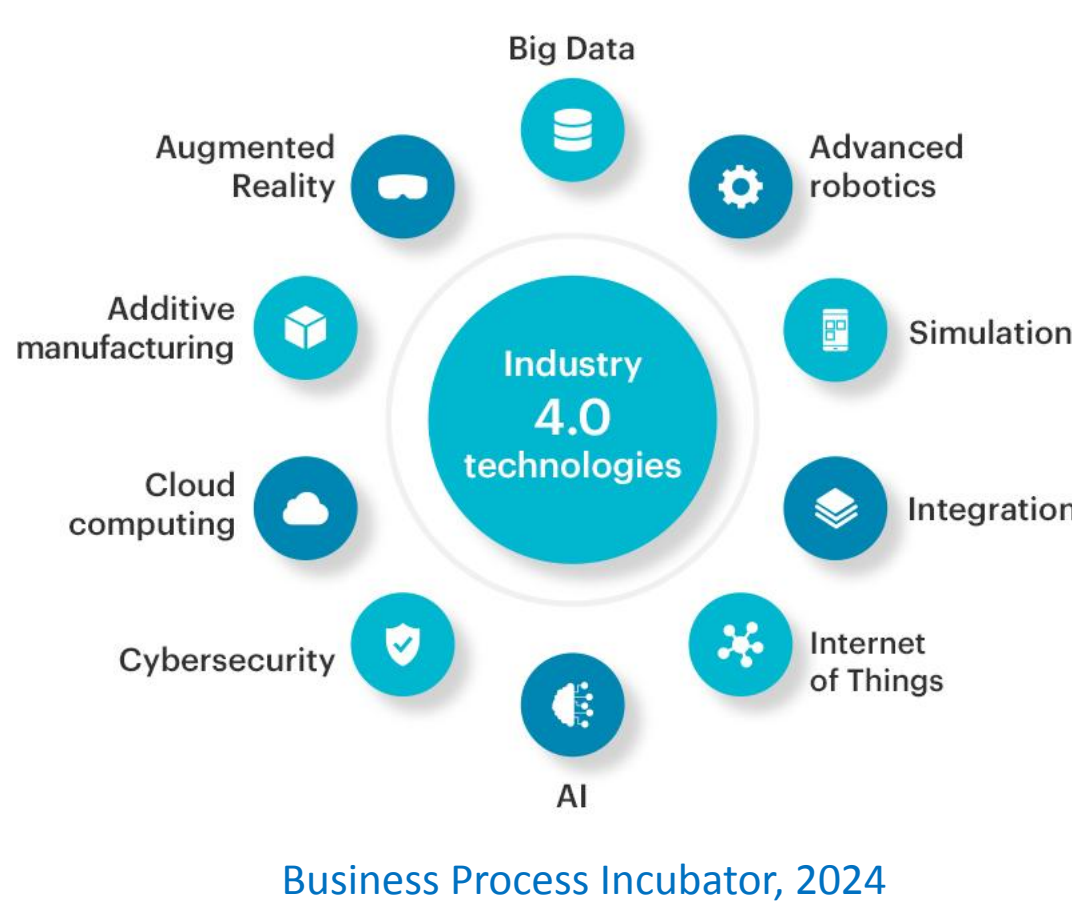- Flash Drives

Softwares
- Python, Vega-Lite
- Kibana
- Elasticsearch

Background

Industry 4.0 and Smart Factories:
- Requires seamless data communication between machines and computers
- Establishing a data protocol is the crucial first step
- Enables advanced manufacturing processes and real-time monitoring

Business Process Incubator, 2024

Results

A **dashboard on Kibana** containing **interconnected visuals** "paints a picture" of the boards through data. **Data** can be **filtered** by seconds, minutes, weeks, months, or years by the use of same **Elasticsearch index.**
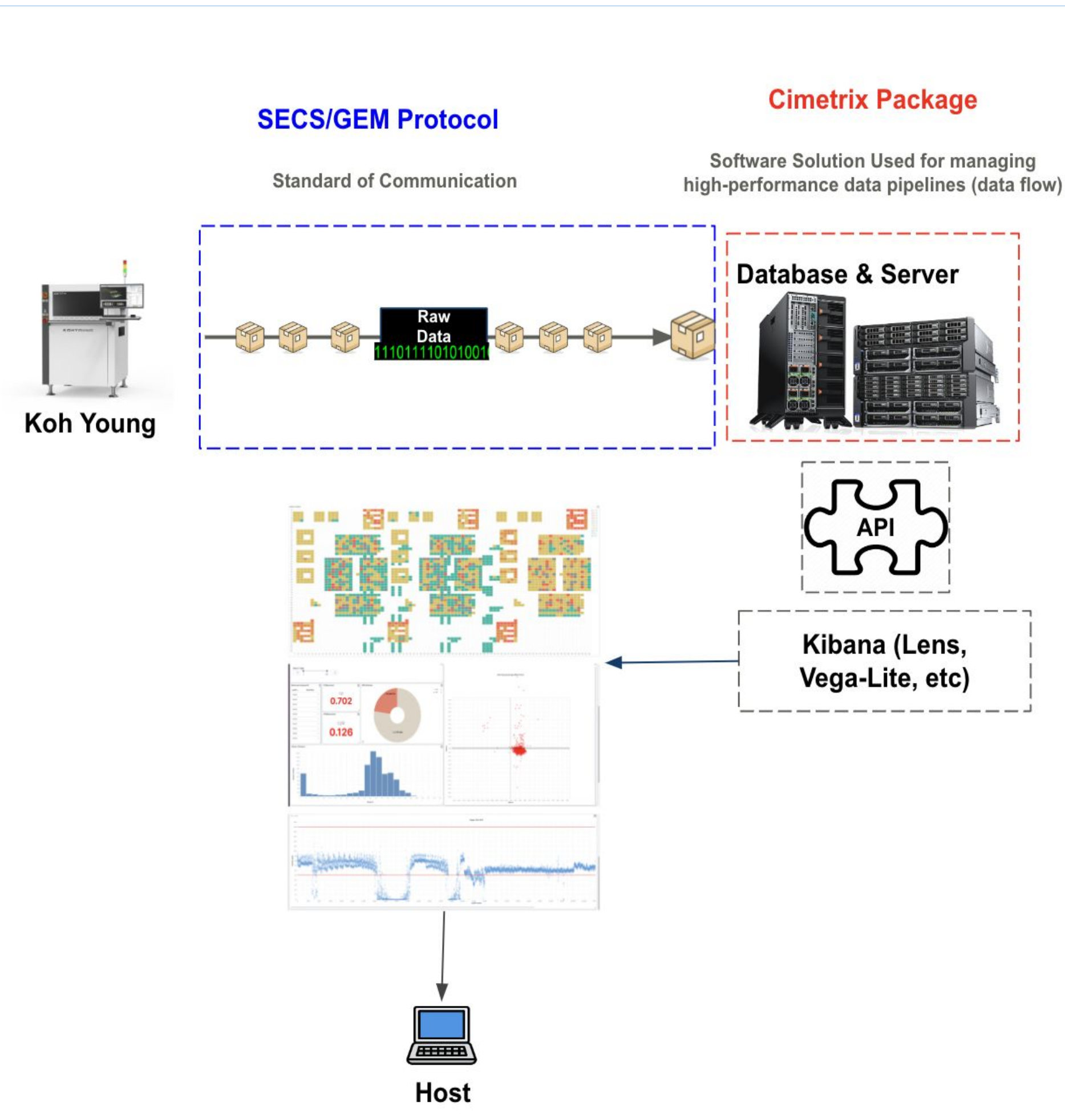

Image: Screenshot of Dashboard Contains Several Visuals

Scan the **QR Code** for a **walkthrough** of our **dashboard**:

Architecture

Objectives

- **Understand** smart manufacturing and its **complexities**.
- **Establish data transfer** from **Koh Young machine** to **Cimetrix server** on the **host computer.**
- **Create visualizations** in **Kibana** using drag-and-drop indexes.
- **Create custom** SPC **charts** using **Vega-lite** coding language.
- **Create dashboard** using interconnected visuals and global filters in **Kibana**.

Next Steps

Our project has **scalability**. **Jabil** can connect to other **machines** in the **SMT line**. From there, multiple SMT lines can be connected. Eventually, whole **factories** in other **countries** may be effectively **observed** and **controlled** by ways of a r**emote engineer** using a **dashboard**.

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JABIL