Vehicle Electronics and Architecture, & Ground Systems Cyber Engineering

ENABLING IMPLEMENTATION AND DEPLOYMENT UTILIZING VICTORY TOOLS

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- The VICTORY standard is designed to increase interoperability between systems on Army ground vehicles.

- Problem: Resistance to adoption of new standards and protocols due to cost of software design, development and testing

- Solution: VSSO, SwRI, and TARDEC developing reusable software tools to reduce risks and costs associated with adopting and deploying VICTORY.
  - libVictory
  - VICTORY Service Toolkit

- ## VICTORY native hardware: no adaptation but not yet available

- ## Hardware adapters vs software adapters
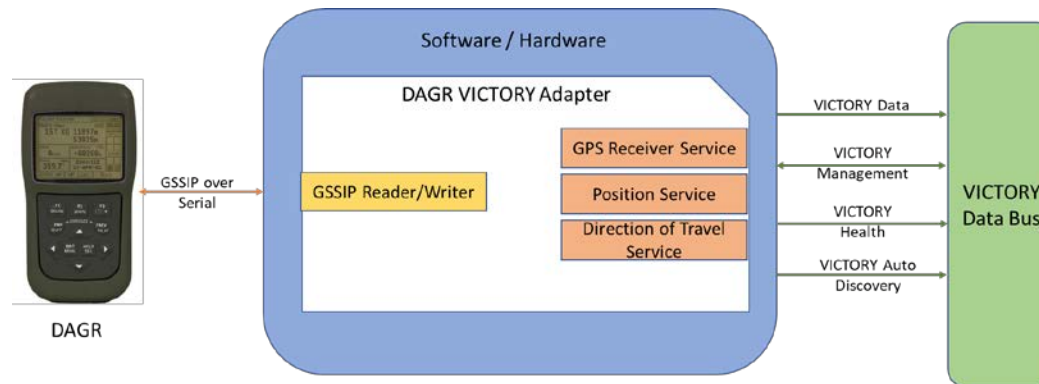
- ## Hardware adapter: VICTORY Smart Cable

  – M. Moore, K. Saylor, and J. Klein, "A Cost-Effective Approach to Adapting Current-Force Equipment to VICTORY Standard In-Vehicle Networks", 2016 NDIA Ground Vehicle Systems Engineering and Technology Symposium (GVSETS), Novi, MI, August 4, 2016

- ## Software adapters: VICTORY Service Toolkit (VSTK)

  – Shared Processing Unit hosts software to convert legacy interface to VICTORY management, data, and health interfaces

DISTRIBUTION STATEMENT A. Approved for public release; distribution unlimited.

- C++ library and API that simplifies VICTORY client and service instantiation
  - Implements the network sockets, serialization/deserialization, and processing logic
  - Handles SOAP req/resp, data and health publishing, VCL parsing
  - Can be used in the hardware, software adapters, and hardware adapters
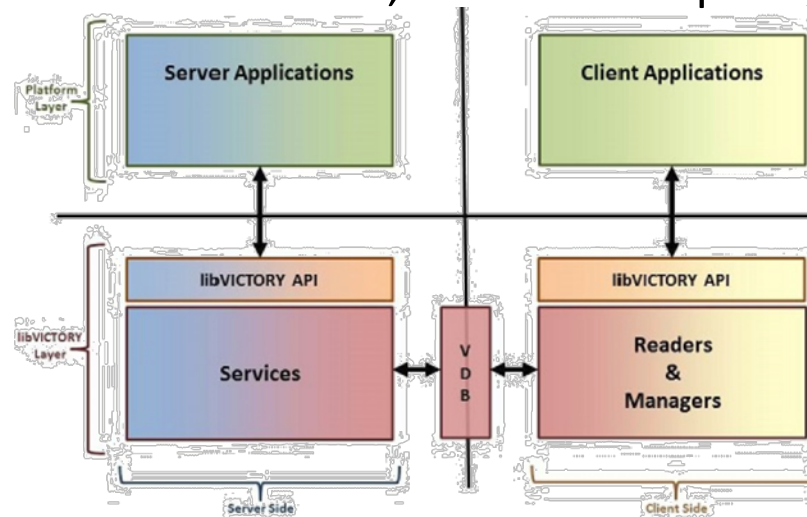
- Supported Component Types

Component Type	Service	Client
Authentication		✓
Automotive System	✓	✓
Camera Gimbal	✓	✓
Data Logger	✓	✓
Direction-of-Travel	✓	✓
GPS Receiver	✓	✓
Intercom	✓	✓
Orientation	✓	✓
Policy Enforcement		✓
Position	✓	✓
Power Distribution System	✓	✓
Remote Weapon Station	✓	✓
Shared Processing Unit	✓	✓
Threat Detection and Reporting	✓	✓
VDB Management	✓	✓
Vehicle Configuration	✓	✓
Video or Image Encoder	✓	✓
Video or Image Sensor	✓	✓

- Government open-source, DoD Community Source Usage Agreement version 1.1 (Distribution C with Export Control Restrictions)

- Available through VICTORY portal

- Questions? Contact Lenny Elliott: leonard.d.elliott.civ@mail.mil

- libVictory: not a complete solution for software adapter

- What's needed to complete the picture?

  – Driver for each unique piece of hardware

  – A main application(s) to adapt driver data/command/control to libVictory Component Types
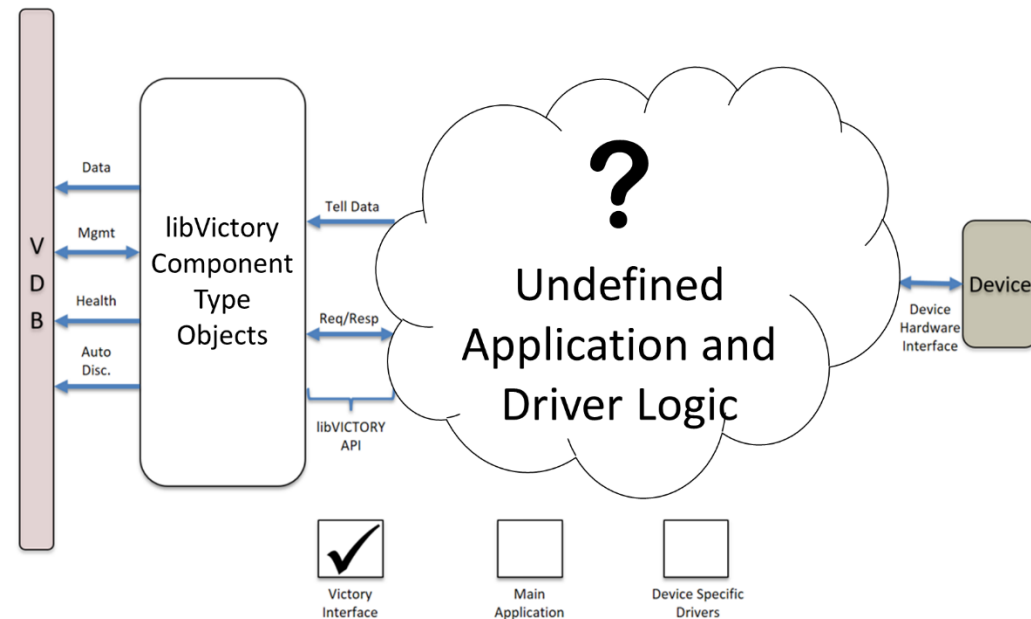
- VSTK + libVictory: A complete device to VDB software adapter
  - Main application
  - Device drivers
 - Plugin Framework
- APIs
  - Driver
  - Adapter

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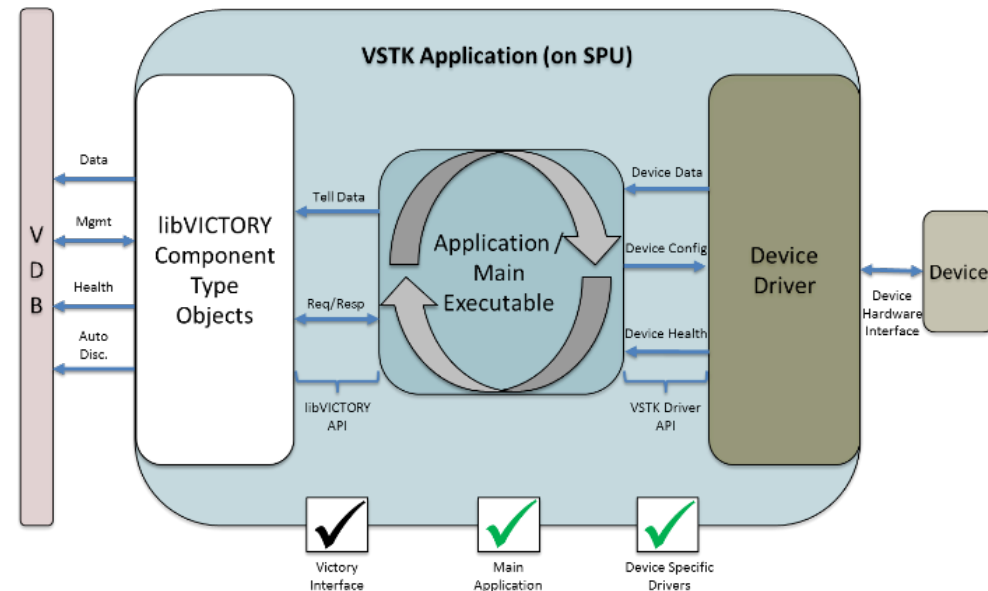
- **Plugin Framework**
  - Two components
    - Drivers
    - Service Adapters
  - Each component is a shared object file (.so)
  - VSTK instantiates drivers and adapters per configuration
  - Single driver can be "connected" to one or more adapters
    - Pub/Sub mechanism
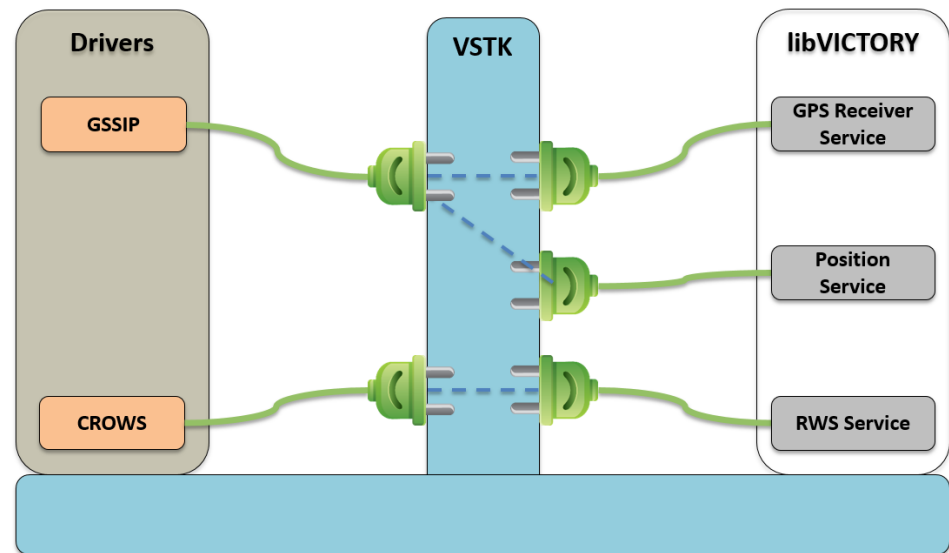
- Driver to service adapter connections are defined in a config file

- Future Improvement: VSTK has management interface for describing connections and start/stop/restart control of services
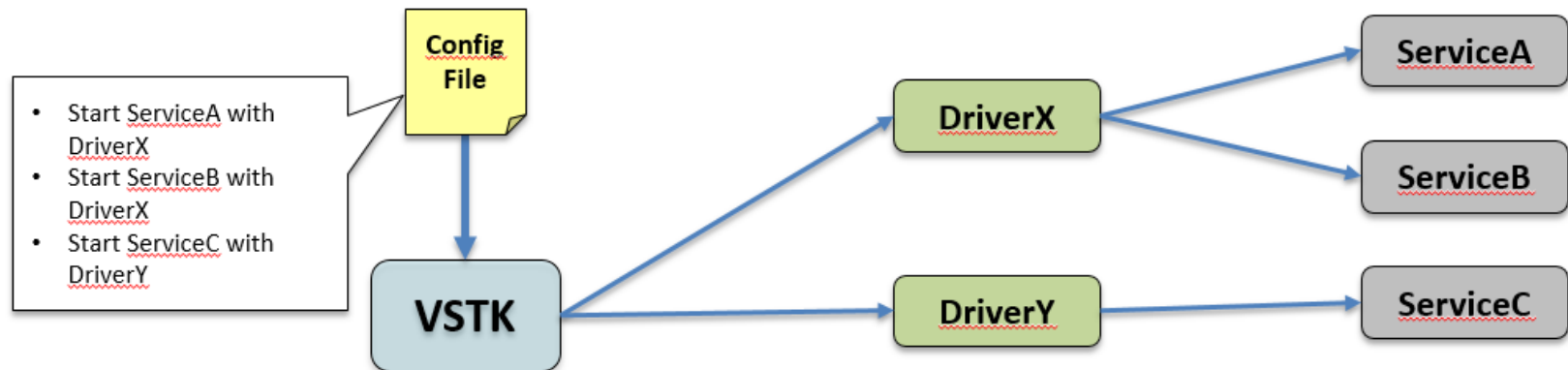
- Driver API

  – Defines standard data structures and command/control interfaces for device drivers

  – e.g. GSSIP GPS Device

    - Command:

    ```
    STATUS setOperatingMode(GpsTypes::GpsOperatingMode operatingMode);
    ```

    - Data:

    ```
    boost::signals2::signal<void (GpsTypes::Position)> updatePosition;
    ```

      – Pub/Sub via Boost Signal/Slots to push data updates from driver (publisher) to VICTORY service adapter (subscriber)

- Adapter API

  – Defines standard data structures and command/control interfaces between device drivers API and VICTORY service APIs (e.g. libVictory

- What is the status?
  - VSTK application and plugin framework
  - GPS Receiver and Position Driver and Adapter APIs
- Once formally funded:
  - Remaining APIs defined
  - Software formal qualification testing
  - Hosted on VSSO portal as Government Open Source
- For more information, contact Adam Thornton at adam.thornton@swri.org