MyJVN Product Dictionary Challenge

for Collaboration with Vulnerability Database and Asset Management

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JVN and My Contributions

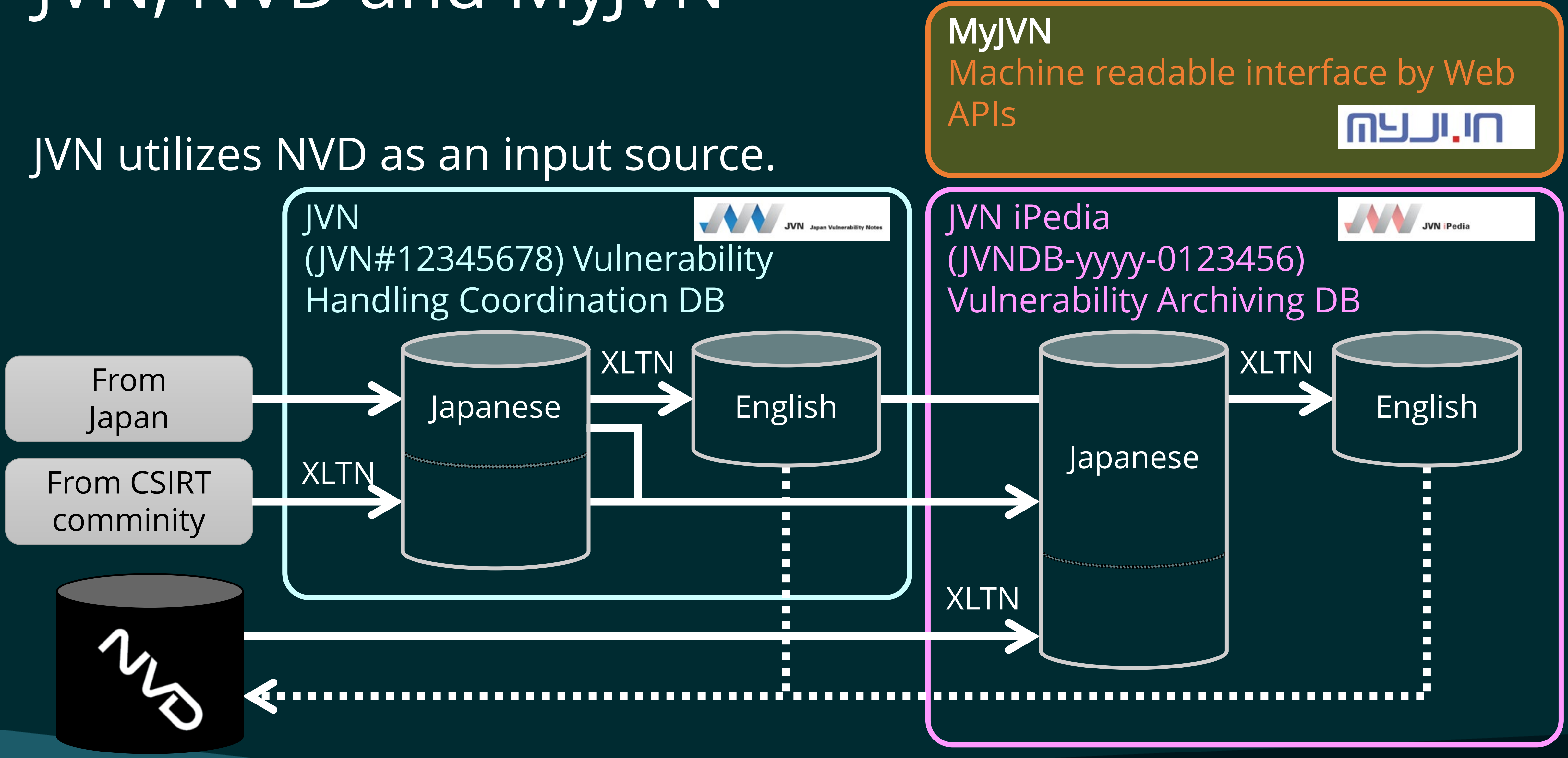
The Japan Vulnerability Notes (JVN) is
a comprehensive and widely-used public vulnerability database consisting of JVN, JVN iPedia, and MyJVN, operated by IPA and JPCERT/CC in Japan.

My Contributions:

- 2002: Launched a research site that served as a predecessor to JVN.
- 2008: Launched MyJVN, a security automation platform.
- Current: Leading the development of extensions for MyJVN.

JVN, NVD and MyJVN

JVN utilizes NVD as an input source.



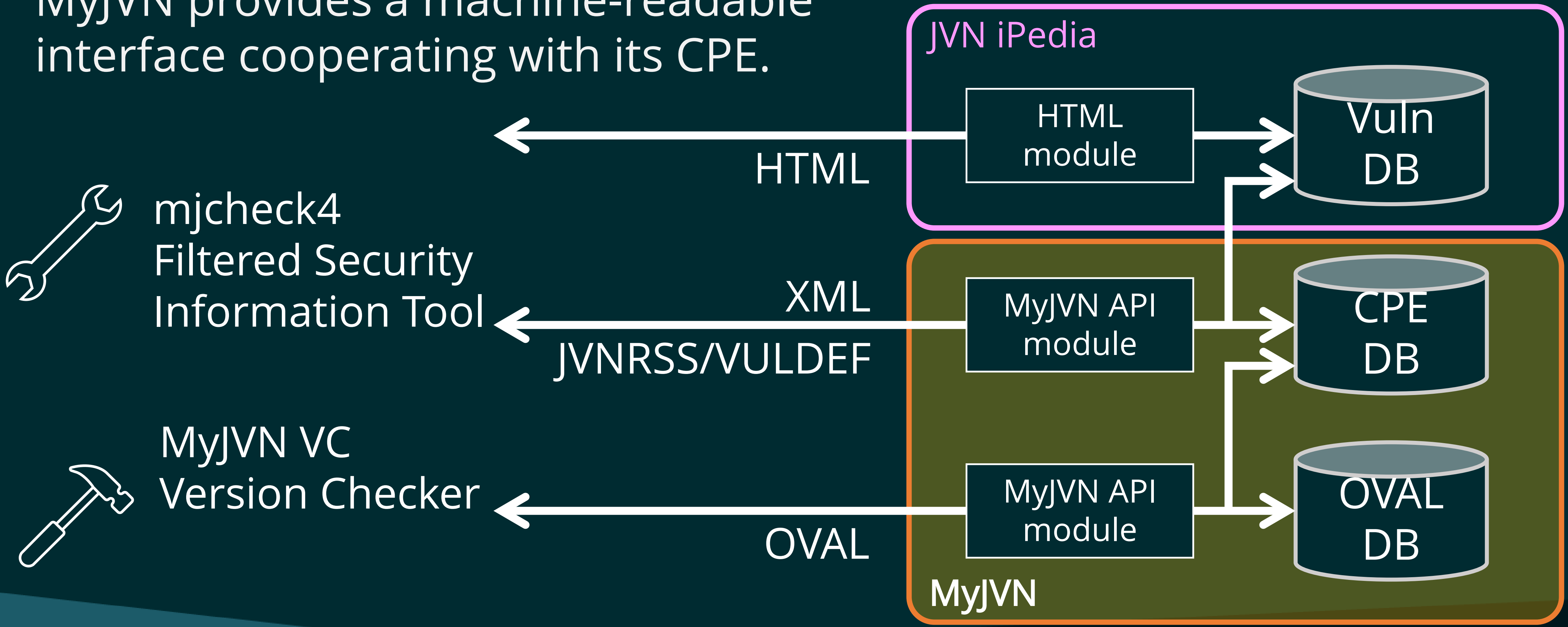
MyJVN
Machine readable interface by Web APIs

JVN
(JVN#12345678) Vulnerability Handling Coordination DB

JVN iPedia
(JVNDB-yyyy-0123456)
Vulnerability Archiving DB

MyJVN and CPE

MyJVN provides a machine-readable interface cooperating with its CPE.



mjcheck4
Filtered Security Information Tool

MyJVN VC
Version Checker

HTML

XML
JVNRSS/VULDEF

OVAL

JVN iPedia

HTML module

Vuln DB

MyJVN API module

CPE DB

MyJVN API module

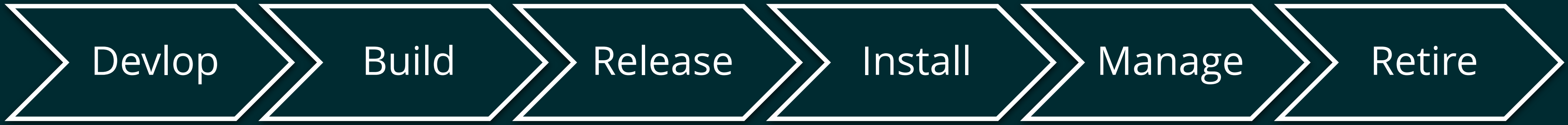
OVAL DB

MyJVN

Motivation

- Enable collaboration with Vulnerability Databases (MyJVN) and asset management systems by utilizing Software Product Identification
- Specifically, address the challenges associated with Software Product Identification in the areas of:
  - Software Lifecycle
  - SBOM (Software Bill of Materials)
  - and Vulnerability Alert

Issues in Software Product Identification for the Software Lifecycle



Devlop → Build → Release → Install → Manage → Retire

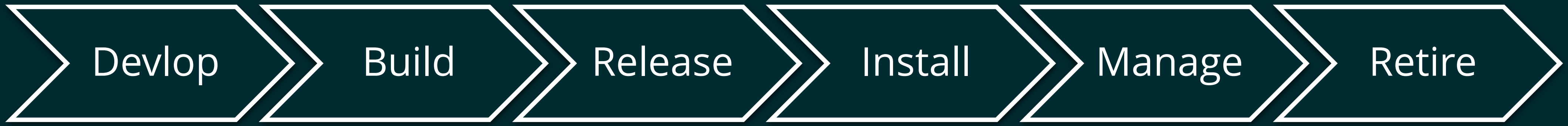
SCAPv2 April Developer Days 2019 presentation highlights.

Need to identify:

- A specific software release as built
- Any applicable patches for a specific software release

Ideally, most software should be identified based on information generated during build and be released with the software.

Issues in Software Product Identification for the Software Lifecycle



Devlop

Build

Release

Install

Manage

Retire

SCAPv2 April Developer Days 2019 presentation highlights.

- ~5% of CPE Names are provided by software providers around the point of software “Release”
- ~95% of CPE Names are created by NVD analysts during the “Manage” phase
  - Produced during the vulnerability analysis process
  - Software is identified after a known vulnerability is found
- Identifying software after a vulnerability is discovered is way too late!

Issues in Software Product Identification for SBOM

- Various ID specifications

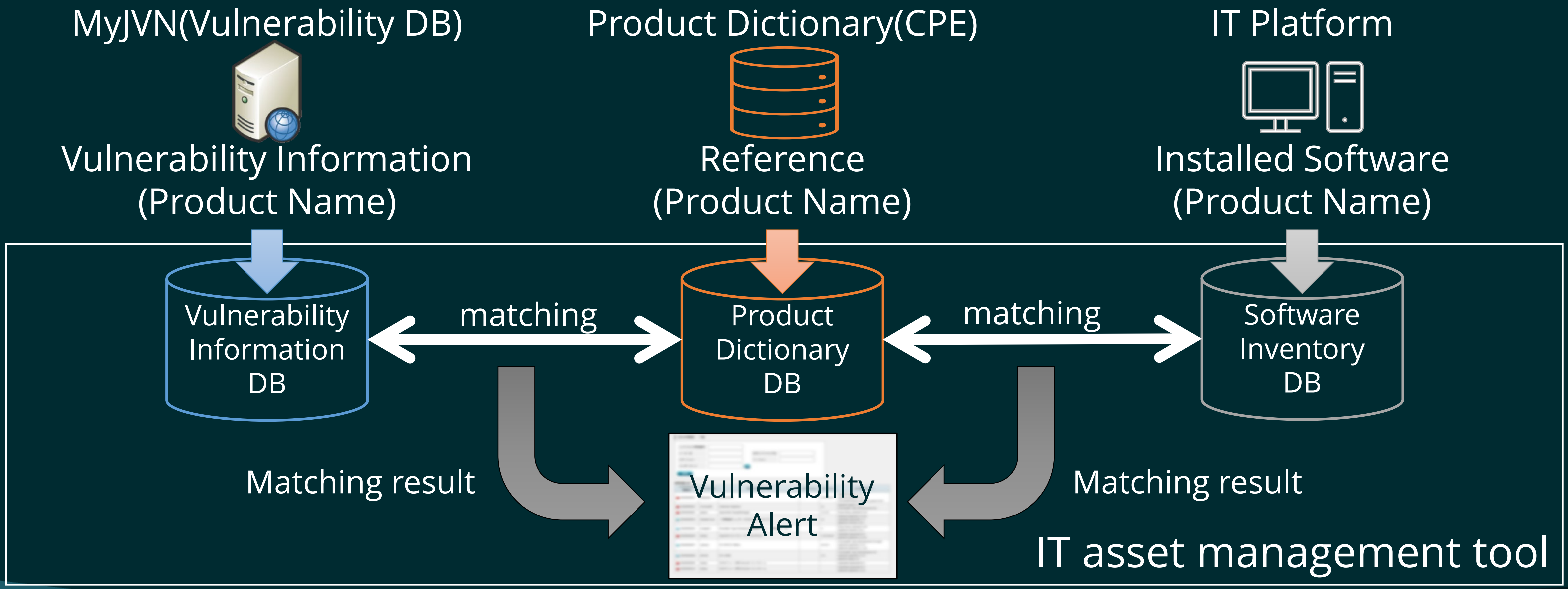
ID name	ID specification
CPE v2.3	cpe:2.3:{type}:{vendor}:{product}:{version}:{update}:{edition}:{lang}:{sw_edition}:{target_sw}:{target_hw}:{other}
purl	pkg:{type}/{name space}/{package name}@{vesion}?{qualifiers}#{subpath}
SWHIDs	swh:{schema version}:{object type}:{object ID}
SWID	globally unique value that shall be globally unique for every SWID tag created (Globally unique values may use a 16 byte GUID, or other globally unique value as defined by the tag creator)

Issues in Software Product Identification for SBOM

- Various combinations with Software Product Identifications and primary formats

ID format	CPE	Package-Manager	SWHIDs	Hash	SWID	
					UUID	Unique ID
SPDX	CPE field (CPE2.2, CPE2.3)	Package-Manager field (maven-central, npm, nuget, bower, purl)	swh field	Other field		
CycloneDX		purl field	SWID field	Hash field	SWID field	
SWID	tagid field					

Issues in Software Product Identification for the Vulnerability Alert



MyJVN(Vulnerability DB)

Vulnerability Information
(Product Name)

Product Dictionary(CPE)

Reference
(Product Name)

IT Platform

Installed Software
(Product Name)

Vulnerability Information DB

matching

Product Dictionary DB

matching

Software Inventory DB

Matching result

Vulnerability Alert

Matching result

IT asset management tool

Issues in Software Product Identification for the Vulnerability Alert

Matching between Vulnerability Information (Product Name) and Installed Software (Product Name) using Product Dictionary (CPE) as a reference to notify Vulnerability Alert.

- To challenge this approach, need to resolve the following issues:
    - Variations in notation between CPE and product names
    - Variations in version notation

Requirements for Software Product Identification Scheme

Considering the current state of product identification, it is necessary to satisfy the following three requirements.

1. Assigning procedure for PID (software Product IDentifier) to products that are not assigned PID
2. PID dissemination procedure of product that has been assigned PID
3. Minimize identifier spelling variations

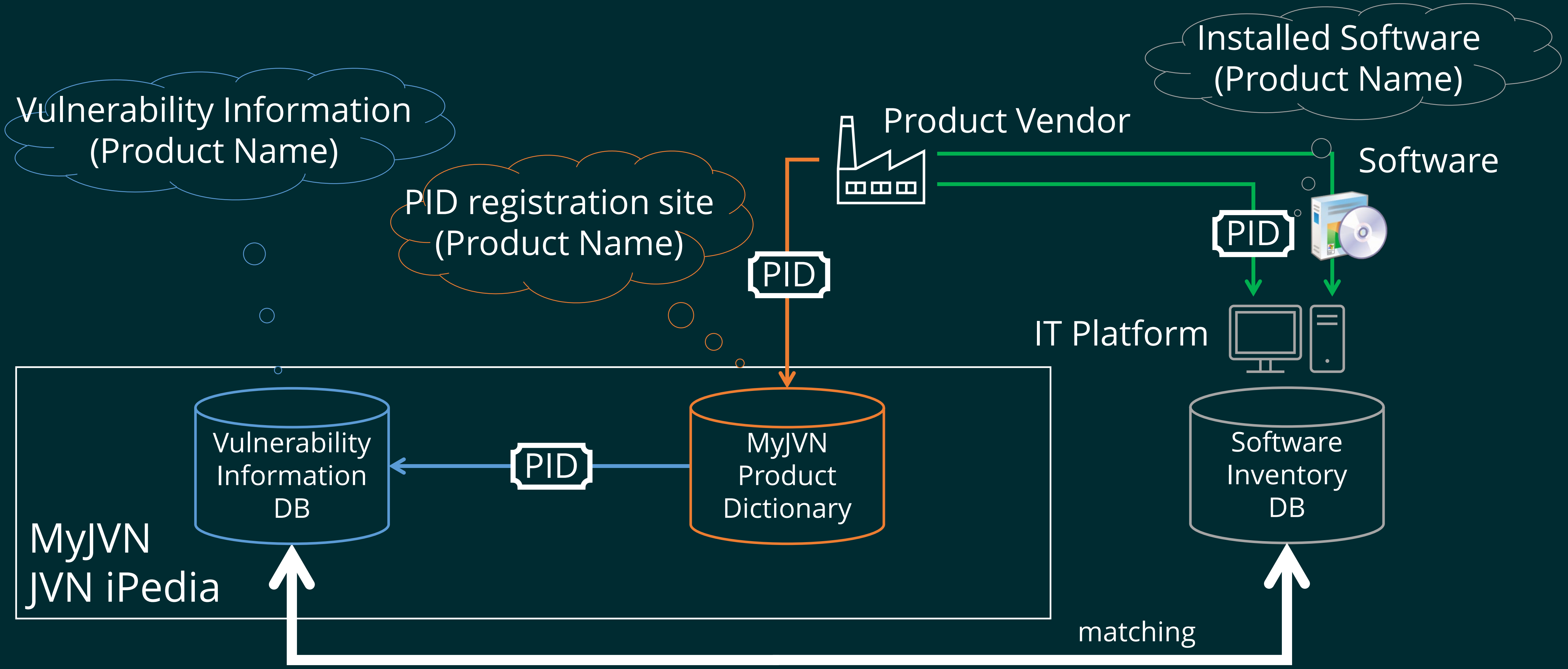
Let’s construct MyJVN Product Dictionary!!

Proposal of Software Product Identification scheme for Collaboration with Vulnerability Database and Asset Management

- Software Product Identification scheme
  - Product Vendors register PID to MyJVN Product Dictionary
  - Provide the same PID to the installed Software (Product Name) and the data on the Vulnerability Database (Product Name)

Let’s construct MyJVN Product Dictionary!!

Software Product Identification scheme



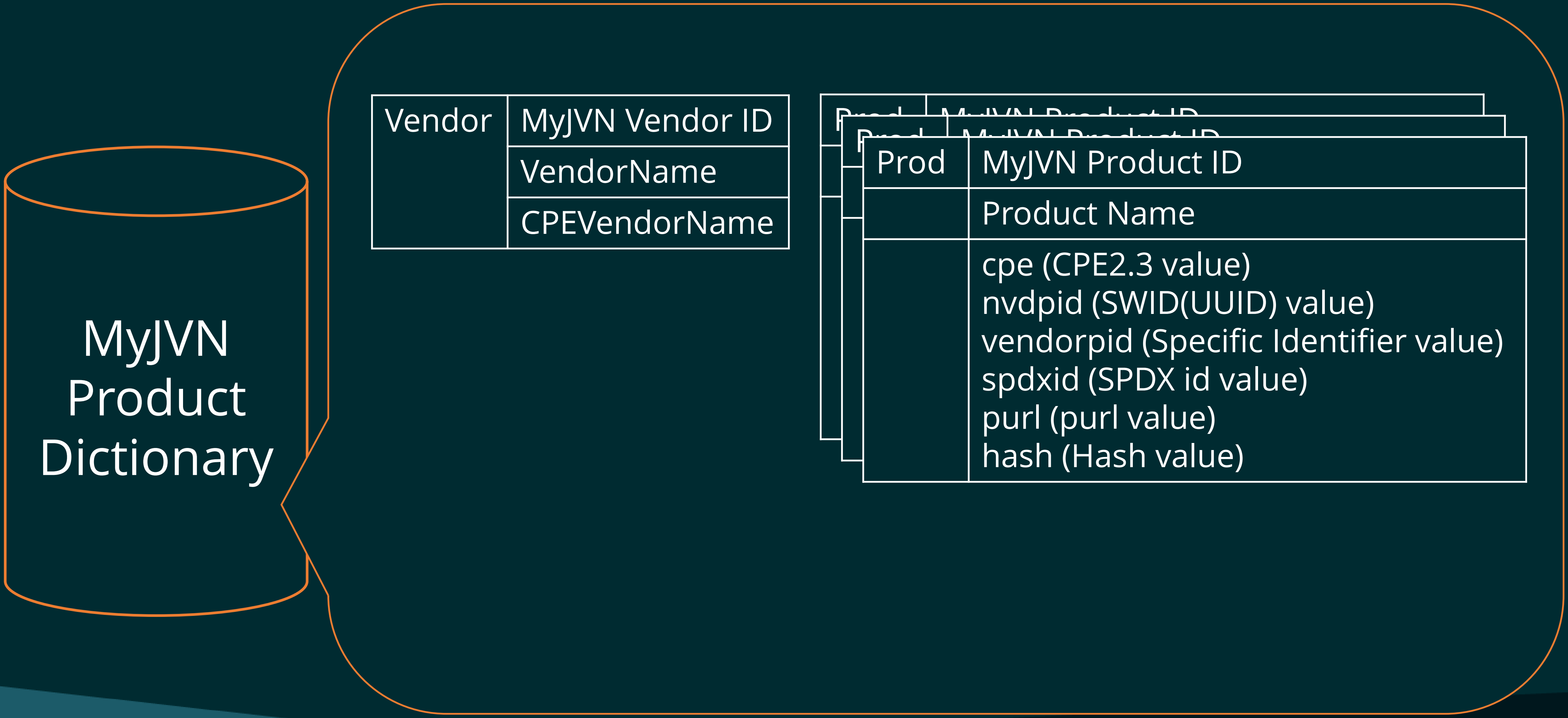
Let’s construct MyJVN Product Dictionary!!

Proposal of Software Product Identification scheme for Collaboration with Vulnerability Database and Asset Management

- MyJVN Product Dictionary entry
  - Associate many PIDs that are CPE v2, Package-Manager, SWHIDs, Hash and SWID
  - Assign identifiers to products that do not have PIDs, and distribute those PIDs, while enabling global collaboration

Let’s construct MyJVN Product Dictionary!!

MyJVN Product Dictionary entry



Vendor	MyJVN Vendor ID
	VendorName
	CPEVendorName

Prod	MyJVN Product ID
	Product Name
	cpe (CPE2.3 value) nvdpid (SWID(UUID) value) vendorpid (Specific Identifier value) spdxid (SPDX id value) purl (purl value) hash (Hash value)

Let’s construct MyJVN Product Dictionary!!

MyJVN Product Dictionary entry

```
{
 "vendors": [
   {
     "vendor_id": "MyJVN Vendor ID",
     "vname": "Vendor Name",
     "cpe": "CPE Vendor Name",
     "products": [
       {
         "product_id": "MyJVN Product ID",
         "pname": "Product Name",
         "product_ids": [
           {"cpe": "CPE2.3 value"},
           {"nvdpid": "SWID(UUID) value"},
           {"vendorpid": "Vendor Specific Identifier value"},
           {"spdxid": "SPDX id value"},
           {"purl": "purl value"},
           {"sha256": "Hash value"}
         ]
       },{Product2},{ ... }] }]
}
```

Using MyJVN Product ID associates various PIDs

Let’s construct MyJVN Product Dictionary!!

MyJVN Product Dictionary entry

```
{
 "vendors": [
   {
     "vendor_id": "jvnpid:1.0:systembom",
     "vname": "システムボム (systembom)",
     "products": [
       {
         "product_id": "jvnpid:1.0:bomviewer:3.2.1.0.0",
         "pname": "ボムビューア (bomviewer)",
         "product_ids": [
          {"cpe": "cpe:2.3:a:systembom:bomviewer:3.2.1"},
          {"nvdpid": "65699569-EA51-4346-8BDC-4076FA5C0E72"},
          {"vendorpid": "a4b2c1910774e07e3d254efca790e562"},
          {"spdxid": "SPDXRef-systembom-bomviewer-3_2_1"},
          {"purl”: "pkg:rpm/systembom/bomviewer@3.2.1"},
          {"sha256": "4BF460C97817ACE6418B49C4586C585955
                      E0D9D4B6DD80CB7484398056631860"}
         ]
       },{Product2},{ ... }] }]
}
```

Let’s construct MyJVN Product Dictionary!!

Proposal of Software Product Identification scheme for Collaboration with Vulnerability Database and Asset Management

- jvnpid (MyJVN Product ID)
  - Administrative PID of MyJVN Product Dictionary to associate many PIDs
  - Consider compatibility with CPE
  - Support stylizing the version (fixed to 5 digits) format to achieve version comparison easily

Let’s construct MyJVN Product Dictionary!!

jvnpid

- Format

  jvnpid:1.0:{vendor}:{product}:{version}:{update}:{edition}:{language}:{sw_edition}:{target_sw}:{target_hw}:{other}

- Sample

  jvnpid:1.0:sysbom.sample.jp:bomgen:0.46.3.0.0

Let’s construct MyJVN Product Dictionary!!

jvnpid

- Specifying a range of affected versions using jvnpid

```
{
 "product_status": {
  "known_affected": [
    {
     "product_id": "jvnpid:1.0:systembom:bom",
     "cpe": "cpe:2.3:a:systembom:bom",
     "versions": [
      { "at": "1.1.1.0.0" },
      { "greaterThanOrEqual": "1.33.2.0.0", "lessThan": "2.7.8.0.0" },
      { "greaterThan": "3.33.2.0.0", "lessThanOrEqual": "5.7.8.0.0" },
      { "lessThanOrEqual": "0.9.34.0.0" }
     ]
    }] }
}
```

Let’s operate MyJVN Product Dictionary!!

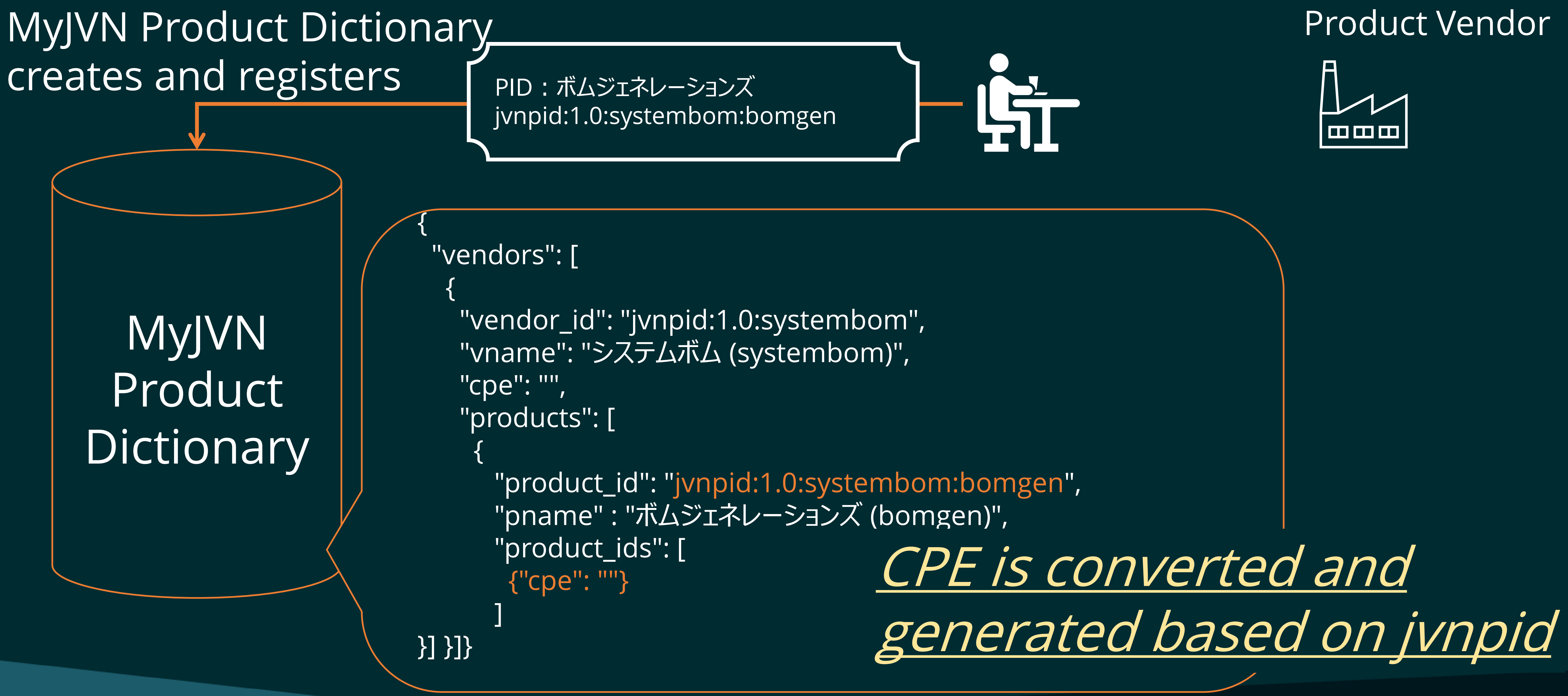
Proposal of Software Product Identification scheme for Collaboration with Vulnerability Database and Asset Management

- Product not assigned PID
  - Acts as a tag generator and registration site
- Product assigned PID
  - Acts as a registration site

Let’s operate MyJVN Product Dictionary!!

Product not assigned PID

Creates, registers and disseminates PID



MyJVN Product Dictionary creates and registers

PID：ボムジェネレーションズ
jvnpid:1.0:systembom:bomgen

Product Vendor

MyJVN Product Dictionary

```
{
 "vendors": [
  {
   "vendor_id": "jvnpid:1.0:systembom",
   "vname": "システムボム (systembom)",
   "cpe": "",
   "products": [
    {
     "product_id": "jvnpid:1.0:systembom:bomgen",
     "pname" : "ボムジェネレーションズ (bomgen)",
     "product_ids": [
      {"cpe": ""}
     ]
}] }]}
```

CPE is converted and generated based on jvnpid

Let’s operate MyJVN Product Dictionary!!

Proposal of Software Product Identification scheme for Collaboration with Vulnerability Database and Asset Management

- Product not assigned PID
  - Acts as a tag generator and registration site
- Product assigned PID
  - Acts as a registration site

Let’s operate MyJVN Product Dictionary!!

Product assigned PID

Registers and disseminates PID given by Product Vendor

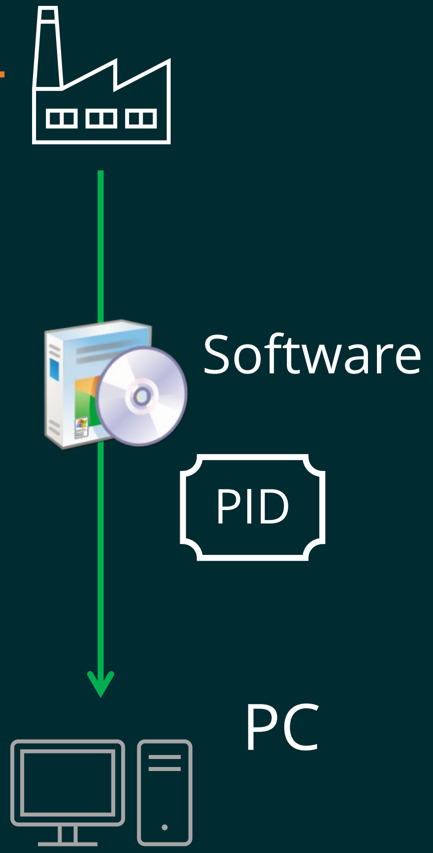
Product Vendor creates and registers

PID：ボムビューア 3.2.1
65699569-EA51-4346-8BDC-4076FA5C0E72

MyJVN Product Dictionary

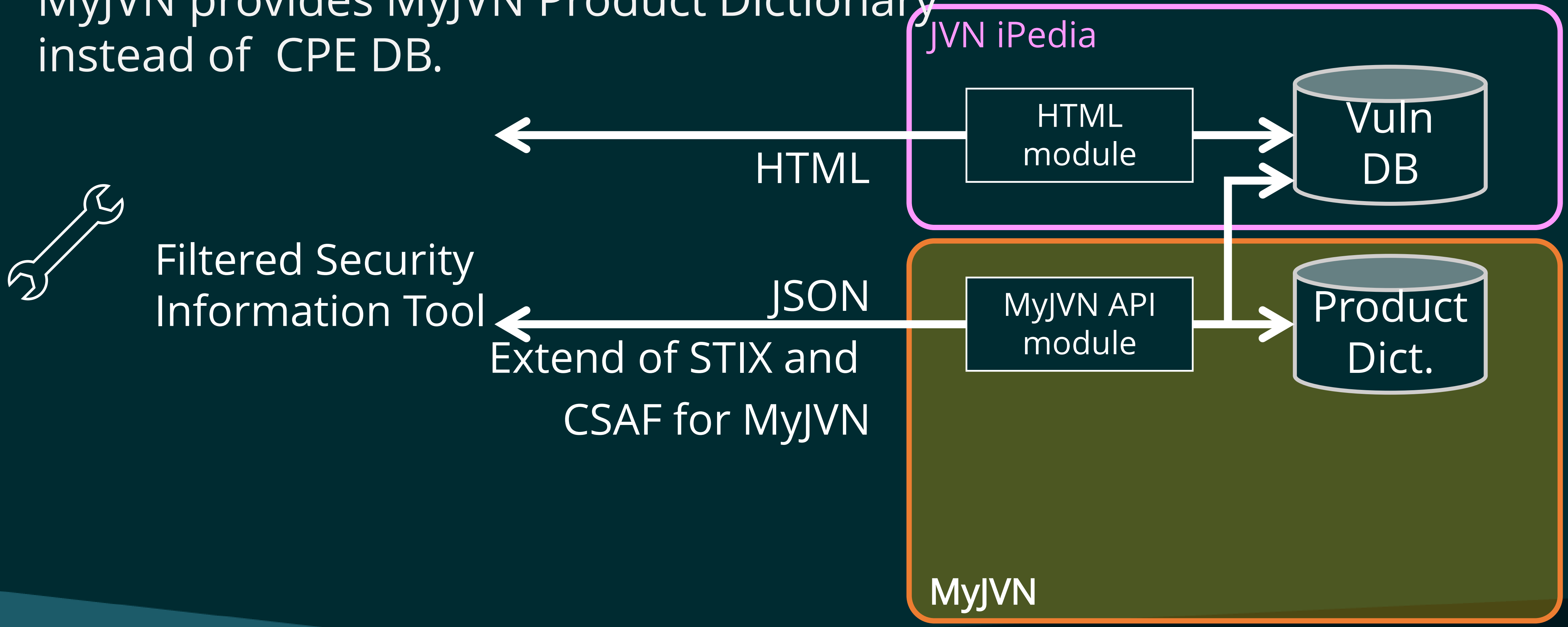
```
{
 "vendors": [
  {
   "vendor_id": "jvnpid:1.0:systembom",
   "vname": "システムボム (systembom)",
   "cpe": "",
   "products": [
    {
     "product_id": "jvnpid:1.0:systembom:bomviewer:3.2.1.0.0",
     "pname": "ボムビューア (bomviewer)",
     "product_ids": [
      {"cpe": "cpe:2.3:a:systembom:bomviewer:3.2.1"},
      {"vendorpid": "65699569-EA51-4346-8BDC-4076FA5C0E72"}
     ]
}] }]}
```

Product Vendor



MyJVN and MyJVN Product Dictionary

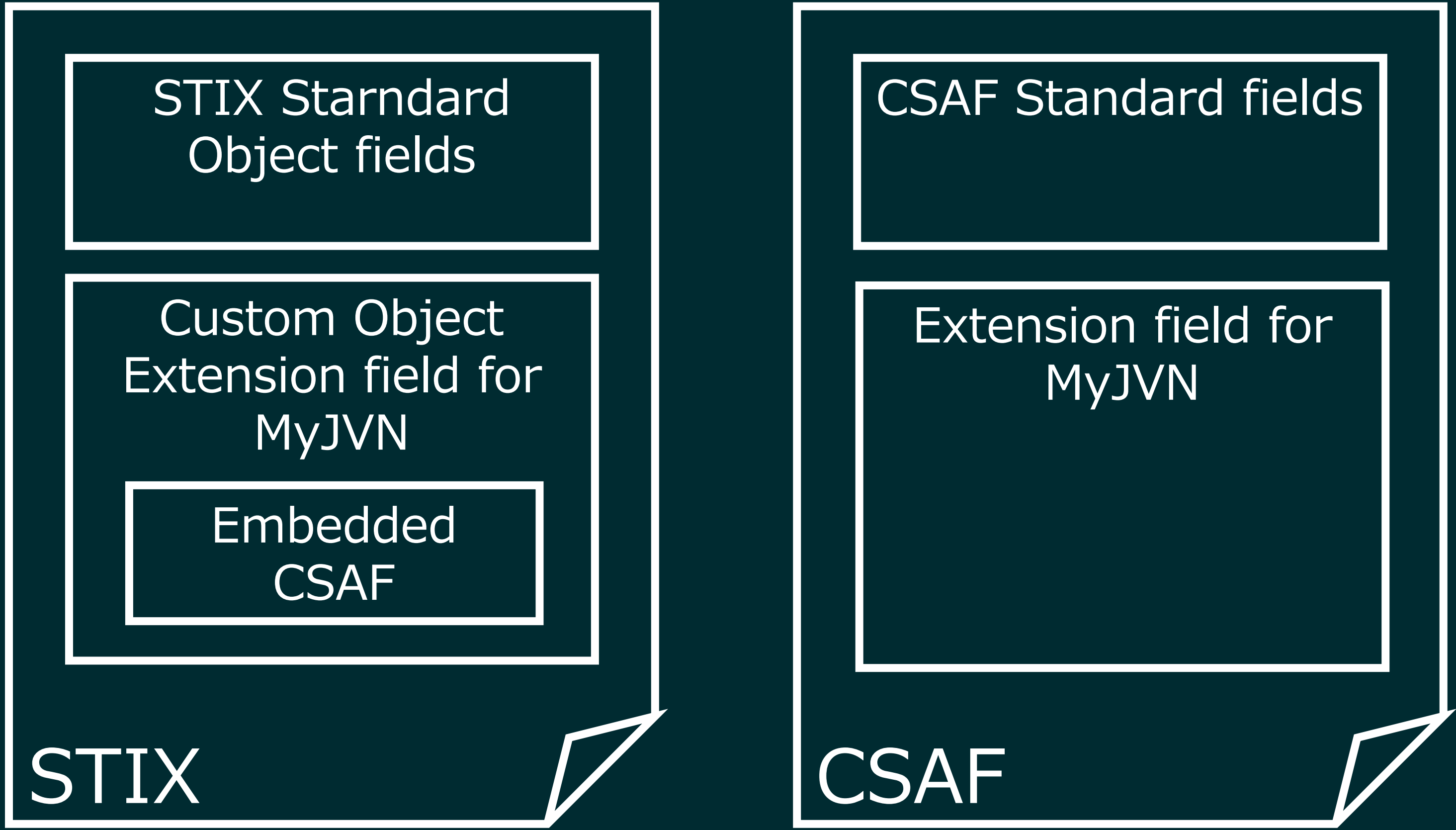
MyJVN provides MyJVN Product Dictionary instead of CPE DB.



Let’s operate MyJVN Product Dictionary!!

Extend of STIX/CSAF for MyJVN

MyJVN offers an extended JSON format of STIX and CSAF to facilitate collaboration.


STIX Starndard Object fields
Custom Object Extension field for MyJVN
Embedded CSAF
STIX
CSAF Standard fields
Extension field for MyJVN
CSAF

Conclusion

We are currently reviewing the specifications of the MyJVN Product Dictionary for MyJVN and plan to develop it in 2023, with trial operation starting in 2024.

Our aim is to provide a solution hint for the global issues of Software Product Identification. We also look forward to your ideas for better collaboration.

#FIRSTCON23

35TH ANNUAL FIRST CONFERENCE
MONTRÉAL
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Thank you!

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