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# CVE, CME … CMSI?

## Standardizing System Information

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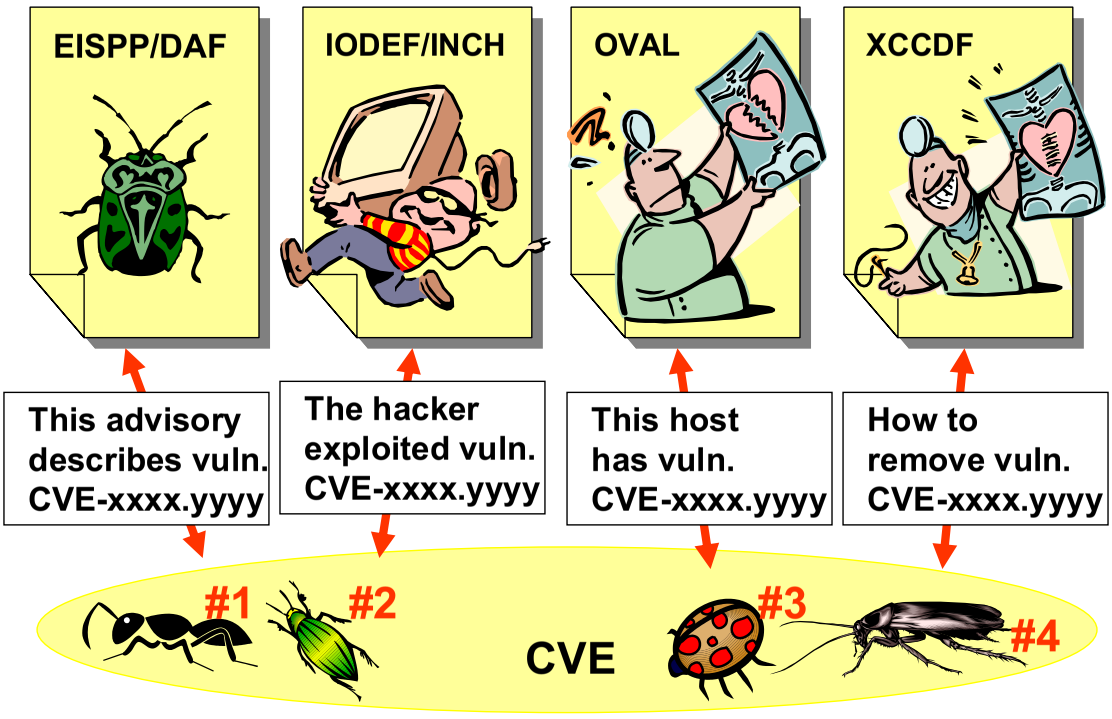
## Standardization Efforts in Computer Security (I)
## CVE is orthogonal to other standards

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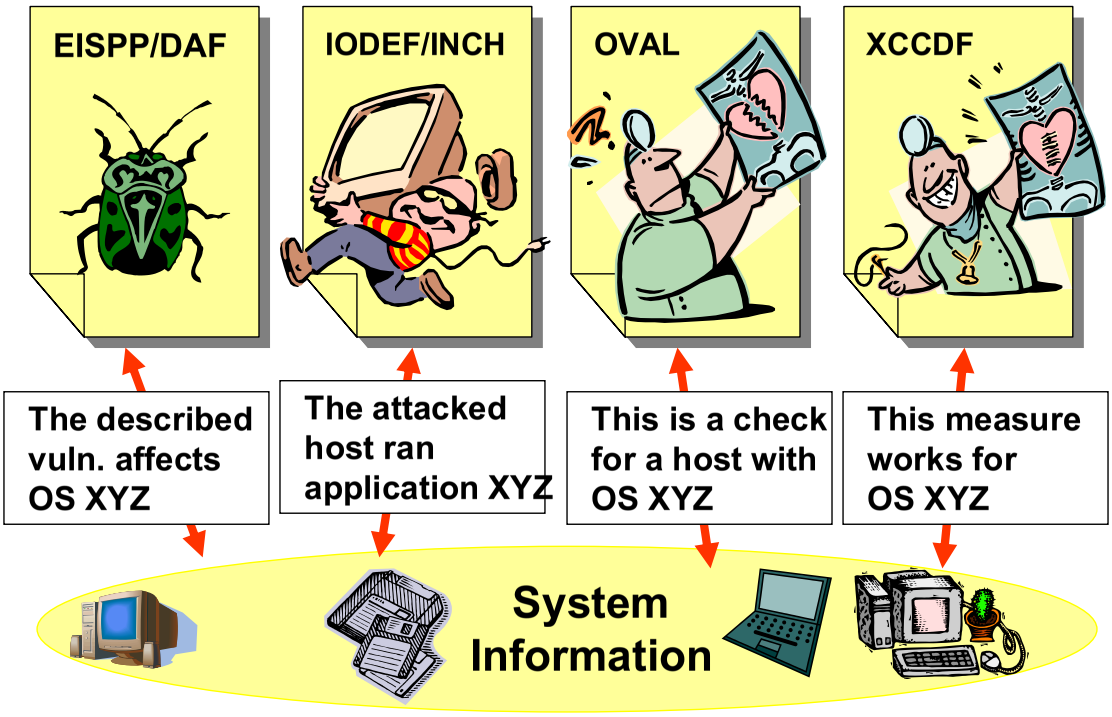
# Standardization Efforts in Computer Security (II)
# System Information is orthogonal as well

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# How System Information is treated in exisiting standards. Example: EISPP/DAF (I)

For internal use only!

Siemens CERT Security Telegram PC 005/04

ASN.1 Vulnerabilities

Date: 2004-02-11 | Priority: 1 | SCCS_ADFR

**PLATFORM:** Microsoft Windows Server 2003
Microsoft Windows XP Professional
Microsoft Windows 2000
Microsoft Windows NT 4.0
Microsoft Windows NT 4.0 Terminal Server Edition

**SOFTWARE:** Microsoft ASN.1 Library

**DESCRIPTION:**

Multiple integer overflow vulnerabilities in the Microsoft Windows ASN.1 parser library (msasn1.dll) could allow a remote attacker to execute arbitrary code with SYSTEM privileges.

**PATCHES/WORKAROUNDS:**

- **Patch for Microsoft Server 2003 (32bit Version, English)**
  Intranet ↓ EN32_PC00504_Q828028_MS04007_DS.EXE
  Internet ↓ WindowsServer2003-KB828028-x86-ENU.exe

**STANDARD VULN-IDs:**

- CVE Number: CAN-2003-0818 →

| | |
|---|---|
| **Title:** | ASN.1 Vulnerabilities |
| **Risk:** | ☒ very high ☐ high ☐ medium ☐ low ☐ very low |
| **System:** | |
| | ? |
| **Description:** | |
| **Content Type:** | ☒ description ☐ diagnostic … ☐ ____ |
| | Multiple integer overflow vulnerabilities in the Microsoft ASN.1 Library … |
| **Solution:** | |
| | … |
| **Reference:** | |
| **Ref. Type:** | ☒ vuln. id. ☐ advisory … |
| **Issuer ID:** | ☒ CVE ☐ BID … ☐ ____ |
| **Ref. Num:** | CAN-2003-0818 |

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## How System Information is treated in exisiting standards. Example: EISPP/DAF (II)

- EISPP/DAF treats system information as a list of free-text fields, each associated with a tag describing the content:

| System: | |
|---|---|
| | Content Type: ☒ platform ☐ software … ☐ ____ |
| | Microsoft Windows Server 2003<br>Microsoft Windows XP Professional<br>Microsoft Windows 2000 (…) |
| | Content Type: ☐ platform ☒ software … ☐ ____ |
| | Microsoft ASN.1 Library |

- As a result, no automated handling of system info. is possible
- What is needed is a model of system information that describes how to specify *machine-readable* system information
- Furthermore, a common model of system information is needed





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## This talk

This talk presents the results achieved by a working group of German CERTs (CERT-Bund, DFN-CERT, PreCERT, Siemens CERT) under the auspices of the "Deutscher CERT Verbund"

Structure of the talk:

- Definition of a Common Model of System Information (CMSI)
- Constraints on a CMSI
- Using the CMSI: process and examples
- Structure of the CMSI
- Closing remarks

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## Model of System Information -- A Definition

- **System Information must be provided *consistently:***

  What is called "**`Microsoft Explorer v6.0`**" in yesterday's advisory should not be called "**`MS Internet Explorer (version 6.000)`**" in today's advisory

- **A "Model of System Information" specifies, how system information is provided.**
  **Examples:**
  - **Tacit Knowledge**: "Unwritten rules" (maybe supported by *copy and paste* from older advisories) regulate how affected systems are called
  - **Tool support**: An authoring system for advisories constrains the way in which affected systems are specified, e.g., by providing a list to chose from
- **Definition: A *model of system information* consists of a dictionary of identifiers and (syntactic) rules for expressing information about computer systems (usually a combination of OS and application software).**





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## Constraints on a CMSI

- **Machine readable vs. human readable information**

  Should the common model deal with machine-readble information, human-readable information, or both?

- **Relationship to exisiting models**

  How should the common model relate to already existing, proprietary models?

- **Maintenance**

  What are the dynamics of system information and how much effort is necessary to keep a common model up-to-date?

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# Constraints (I)
# Machine-readable vs. Human-readable Information

- **Often, two models of system information are maintained:**
  - Human-readable information
  - Machine-readable information
- **Filtering and Correlation require machine-readable information**
- **Form and shape of human-readable information is highly constituency-dependent**

⇒ **Common model should include machine-readable information**

```
Microsoft Internet Explorer 5.0
- Microsoft Windows 2000 Workstation
- Microsoft Windows 2000 Workstation
 SP1
- Microsoft Windows 2000 Workstation
 SP2
- Microsoft Windows 95
- Microsoft Windows 98
+ Microsoft Windows 98SE
- Microsoft Windows NT 4.0 SP3
- Microsoft Windows NT 4.0 SP4
- Microsoft Windows NT 4.0 SP5
- Microsoft Windows NT 4.0 SP6
- Microsoft Windows NT 4.0 SP6a
Microsoft Internet Explorer 5.0.1 SP3
Microsoft Internet Explorer 5.0.1 SP2
- Microsoft Windows 2000 Advanced
 Server
- Microsoft Windows 2000 Advanced
 Server SP1
- Microsoft Windows 2000 Advanced
 Server SP2
- Microsoft Windows 2000 Datacenter
 Server
(...)
```

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# Constraints (II)
# Relationship to Existing Models

- **Models of system information exist (in some form) with any provider of system information**
- **A common model will not be able to satifsy all possible demands**

⇒ **Proprietary models will continue to exist**

⇒ **Use of common model requires mappings from/to proprietary models**

**Mappings are, by nature, proprietary, but structure and contents of model must facilitate mappings!**

- Must be possible to give very "coarse" information (e.g., "*Windows is affected*")
  - *some organizations do not keep much more precise information*
  - *some organizations may not want to put much effort into mapping a detailed proprietary model into the CMSI*
- *Must be possible to give very detailed information (e.g., "Apache 1.3.27 on Windows 2000 SP2 is affected") to allow more sophisticated applications*

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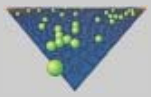
## Constraints (III)
## Maintenance Issues

- **New products / new versions are issued on a daily basis**
- **Changes in the product landscape must be mirrored by the common model**
- **Effort necessary of maintaining a common model depends on**
  - level of detail contained in model
  - requirements on accuracy of data contained in model
  - processes/actors defined for maintaining the model
  - tool support provided for maintaining the model

⇒ **Maintenance issues must be considered as one of the prime design criteria for a common model**







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## Using CMSI (I)
## The process of using CMSI

- **CMSI is maintained at a central location**
  - a maintainer/group of maintainers handles change requests, additions, ...
  - the model's contents can be viewed online for reference
- **Organizations that want to use CMSI**
  - regularly download the most recent version (XML-based exchange format for communicating the model contents)
  - adapt their proprietary model:
    - either define mappings from proprietary model into CMSI and vice versa
    - or switch to the CMSI also for internal use
- **Organizations uses CMSI by communicating system information by filling in an XML-template with CMSI-compliant data**
  - XML-template already part of EISPP/DAF and could be easily integrated into other standards, as well.

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# Using CMSI (II)
## A very simple example

```
<system_list>
  <system>
   <system_part
       type="platform">
    <instance tag="os"/>
   </system_part>
   <system_part
       type="software">
    <instance
       tag="apache">
   </system_part>
  </system>
 </system_list>
```

- **Message:**
  **"Apache (on all platforms) is affected"**
- **CMSI provides identifiers "os" and "apache"**

**Snippet from DAF-advisory**









# Using CMSI (III)
## A not so simple example

```
<system_list>
  <system>
   <system_part type="platform">
    <instance tag="w2k"/>
    <instance tag="wxp"/>
   </system_part>
   <system_part type="software">
    <instance tag="apache">
     <attribute_value tag="version">
      <value>1.3.x</value>
      <value>2.x</value>
     </attribute_value>
    </instance>
   </system_part>
  </system>
  <system>
   <system_part type="platform">
    <instance tag="unix"/>
   </system_part>
   <system_part type="software">
    <instance tag="apache">
     <attribute_value tag="version">
      <value>2.x</value>
     </attribute_value>
    </instance>
   </system_part>
  </system>
  </system_list>
```

- **Message:**
  **"Apache 1.3.x and 2.x on Windows 2000 and Windows XP, and Apache 2.x on Unix are affected."**
- **CMSI provides**
  - identifiers "w2k", "wxp", "unix", and "apache"
  - identifier "version" and syntax rules to give version information such as "1.3.x", "2.x"

**Snippet from DAF-advisory**

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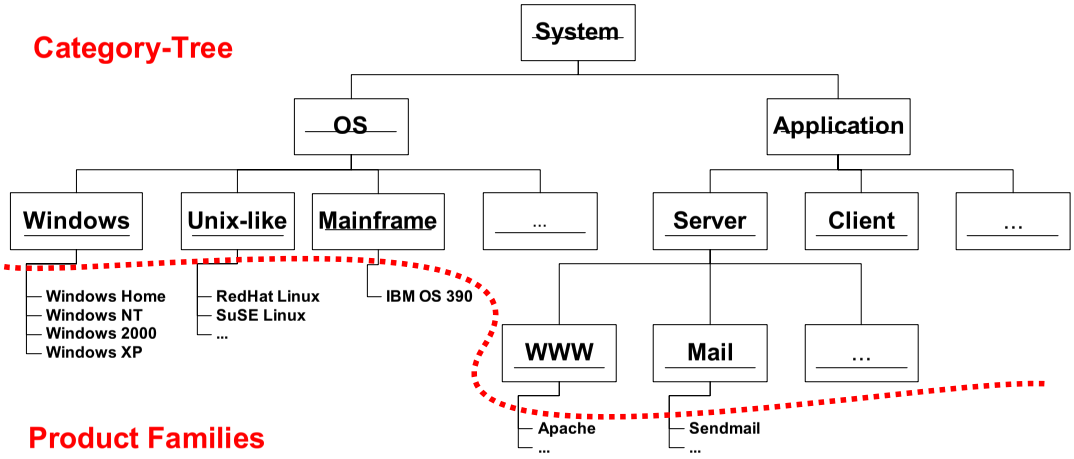
# Structure of CMSI (I)
# Overview

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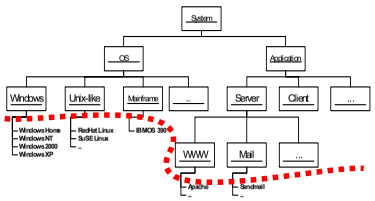
# Structure of CMSI (II)
# Category Tree



- **Category Tree serves several purposes:**
  - Users of the model should be facilitated in finding their way around
    ⇔ Tree should not be nested to deeply!
  - Category nodes can be used for (very) coarse system information
  - Category nodes such as "Server" and "Client" can be used for creating user profiles (e.g.: "Tell me about about vulnerabilities in server products only")
- **Implementing and using the category tree is not much effort but already brings benefits: it allows expressing and filtering with respect to information such as**
  - "Windows is affected"
  - "Unix is affected"
  - "A web-server product on Windows is affected"

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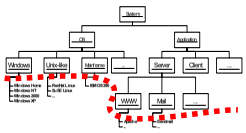
# Structure of CMSI (III)
# Product Families



**Think of a product family as a flashcard:**

**Unique identifier**

```
MS Windows 2000 (w2k)
Products:
MS Windows 2000 Workstation (w2k:ws)
MS Windows 2000 Server (w2k:server)
MS Windows 2000 Advanced Server (w2k:aserver)
MS Windows 2000 Datacenter Server (w2k:data)
(...)

Attributes for this family:
patchlevel: SP[0-9]+
Language: [A-Z][A-Z] (ISO-649 lang. codes)
```

**Regular expressions**

**Explanation how to use attribute / attr. semantics**

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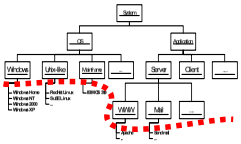
# Structure of CMSI (IV)
# Product Families



- **Product family comprises one or more closely related products. Consequently,**
  - the same vulnerability will often affect all members of a product family
  - Version information (version number, patch level, etc.) is given in a similar fashion for all members of a product family

**⇒ "Product family" is the right level of abstraction for a common model of system information:**

  - In many cases, information of type "*product family X is affected*" will be precise enough
  - Syntactic rules for providing, e.g., version information, can be given on a per-family basis

- **One product family can be the child of several category node**

  ⇒ Ambiguities in the tree can be worked around

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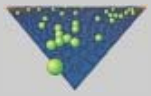
## Constraints on a CMSI -- revisited

- **Common model should include machine-readable information**
  - Unique identifiers and syntactic rules provide for machine-readable information
  - Changes concerning human-readable names are no problem: computer-readable identifier stays the same
  - More than one human-readable name can be given to assure that users of the model find products under the name they are used to
- **Mappings are, by nature, proprietary, but structure and contents of model must facilitate mappings!**
  - Coarse mappings possible by mapping to categories or product families
  - Very fine-grained mappings possible by mapping to products & significant attribute information (version info., etc.)
- **Maintenance issues must be considered as one of the prime design criteria for a common model**
  - Because model treats version information "only" by supplying rules for specifying version information, maintenance effort seems manageable: release of new version usually will not trigger any changes in model.



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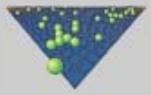
## Status of CMSI

- **Structure of CMSI**
  - An XML schema for describing the contents of the common model (category tree and product families) has been defined. It is described in a FIRST 2005 paper and available from the CMSI home page (http://www.cert-verbund.de/cmsi).
  - An XML schema for including system information based on CMSI has been defined and is already part of the EISPP/DAF advisory exchange formats (see http://www.cert-verbund.de/daf/daf_description.html)
  - CMSI has been tightly integrated into the open-source development of the incident handling system SIRIOS, a project of CERT Bund (see http://www.cert-verbund.de/sirios). SIRIOS also supports IODEF and EISPP/DAF.
- **Contents of CMSI**
  - Category tree agreed upon within CMSI-working group of the German CERT association (modulo some cleaning up...)
  - At the moment, the category tree is being filled with the most important product families



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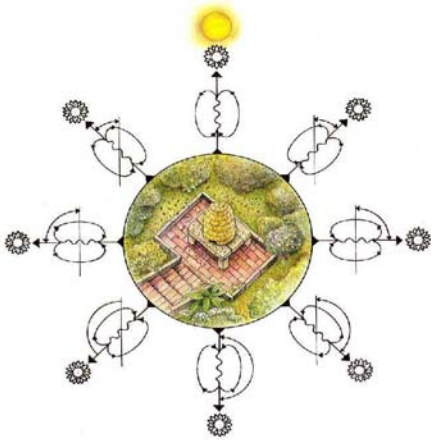
## Before I forget: What's the story behind the logo?


**Like bees, we want to communicate useful information with means that are as simple as possible and yet effective...**



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## Closing Remarks: What to remember from this talk?

- **Like CVE, system information is orthogonal to all standardization efforts in computer security (and other fields, as well)**
- **If you need to build a model for providing machine-readable system information in a consistent way: check, whether CMSI meets your demands**
- **If you do not want to start from scratch with filling your model, check the status of the model being built by the German CERT working group**
- **If you agree that a truly *common* model of system information in the fashion of CVE should exist, talk to us and let's join forces.**
- **Further information:**
  - **http://www.cert-verbund.de/cmsi**
  - **bgrobauer@cert.siemens.de**

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