Penny Chase

Ivan Kirillov – Desiree Beck – Robert Martin

Software Assurance Forum Malware Working Group

21 June 2010

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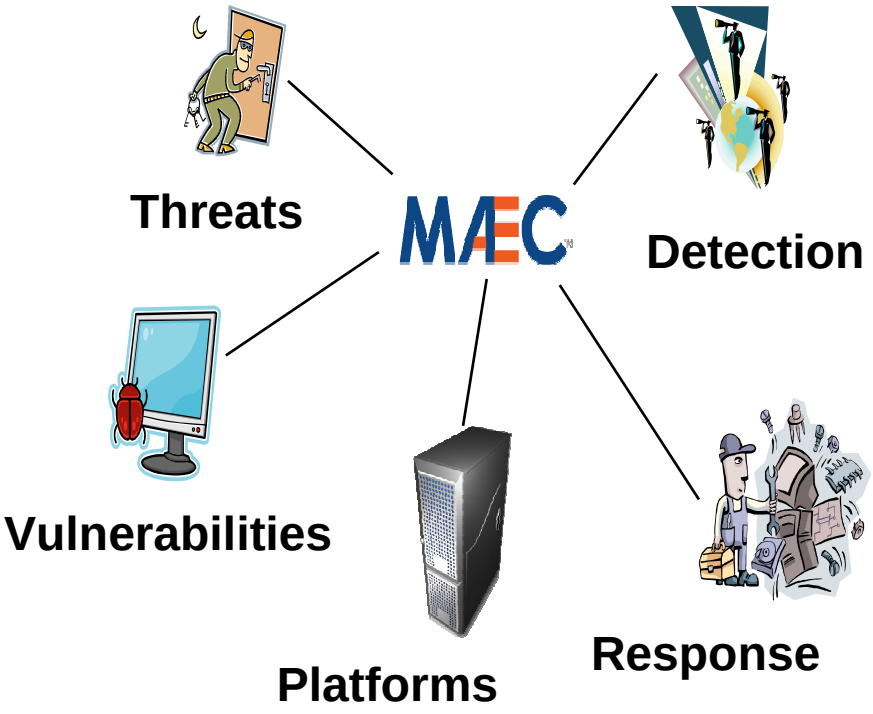
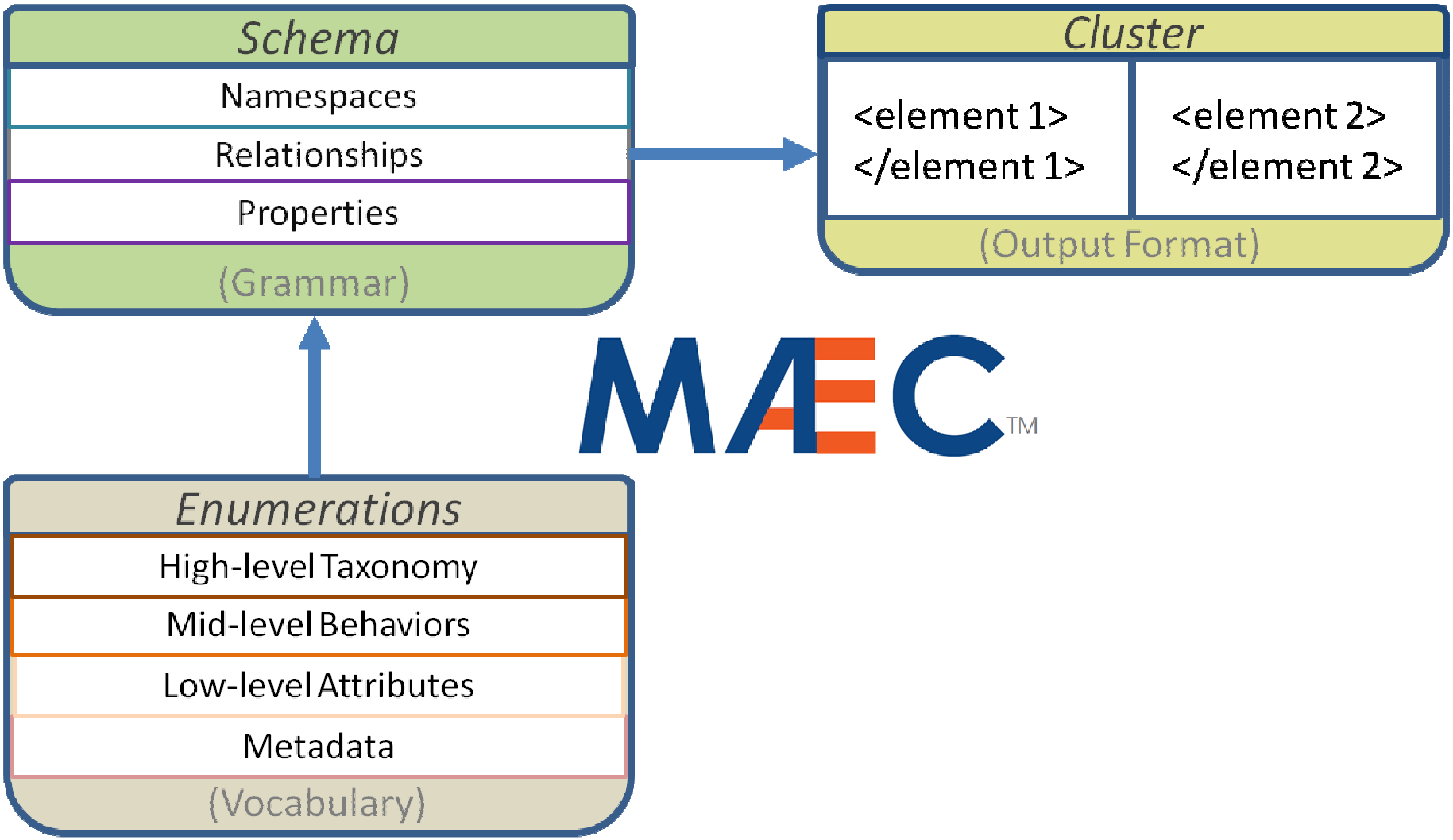
Malware Working Group Goals

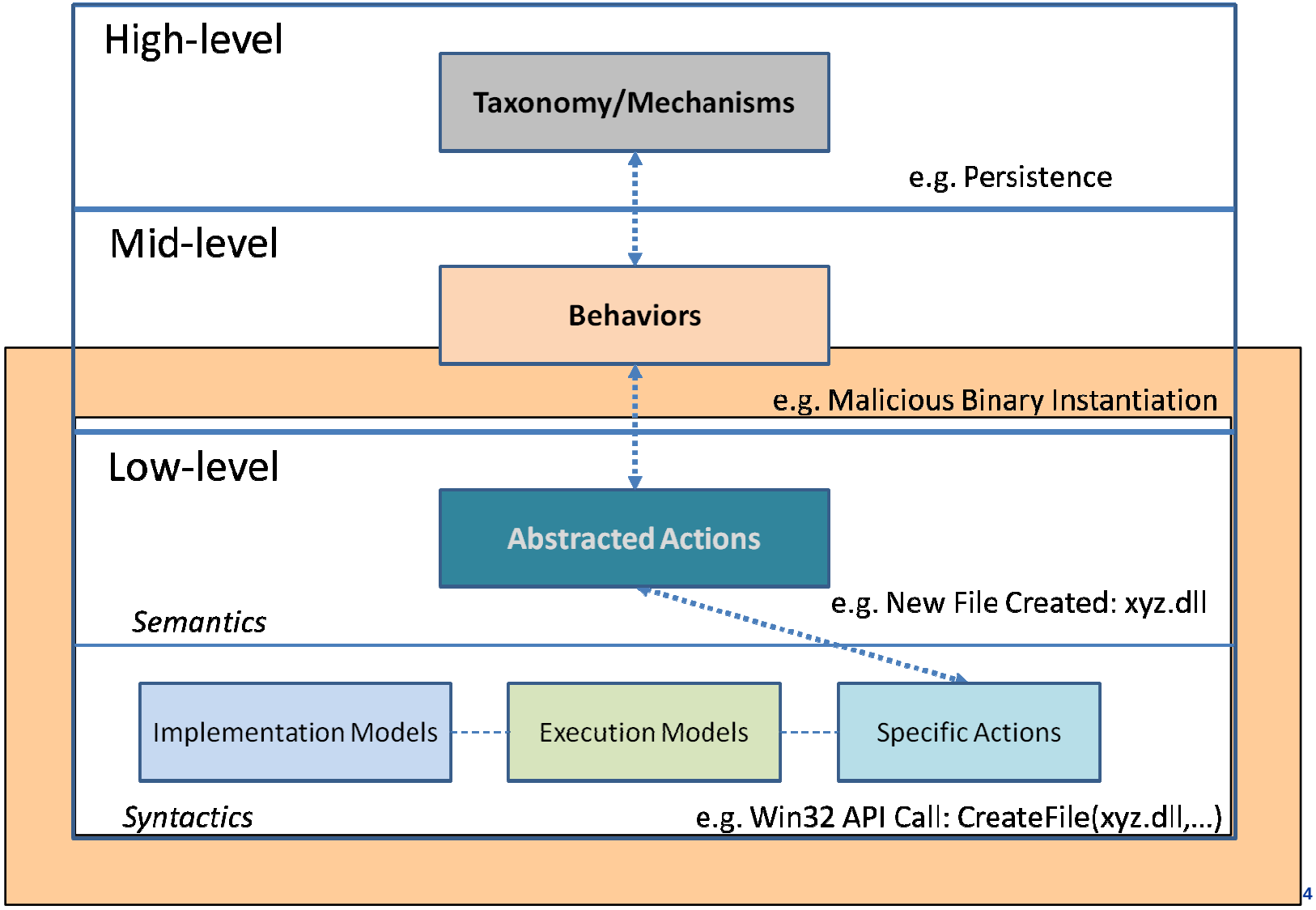
- Address concerns of potentially malicious code throughout the system lifecycle
- Develop a consensus on software that behaves in potentially malicious ways, to
  - Facilitate detection, analysis, response
  - Incorporate understanding of malware in threat and vulnerability analysis and risk assessment for system development and operational deployment
  - Enable users to make informed decisions about software



Malware Attribute Enumeration and Characterization (MAEC)



Current MAEC Overview



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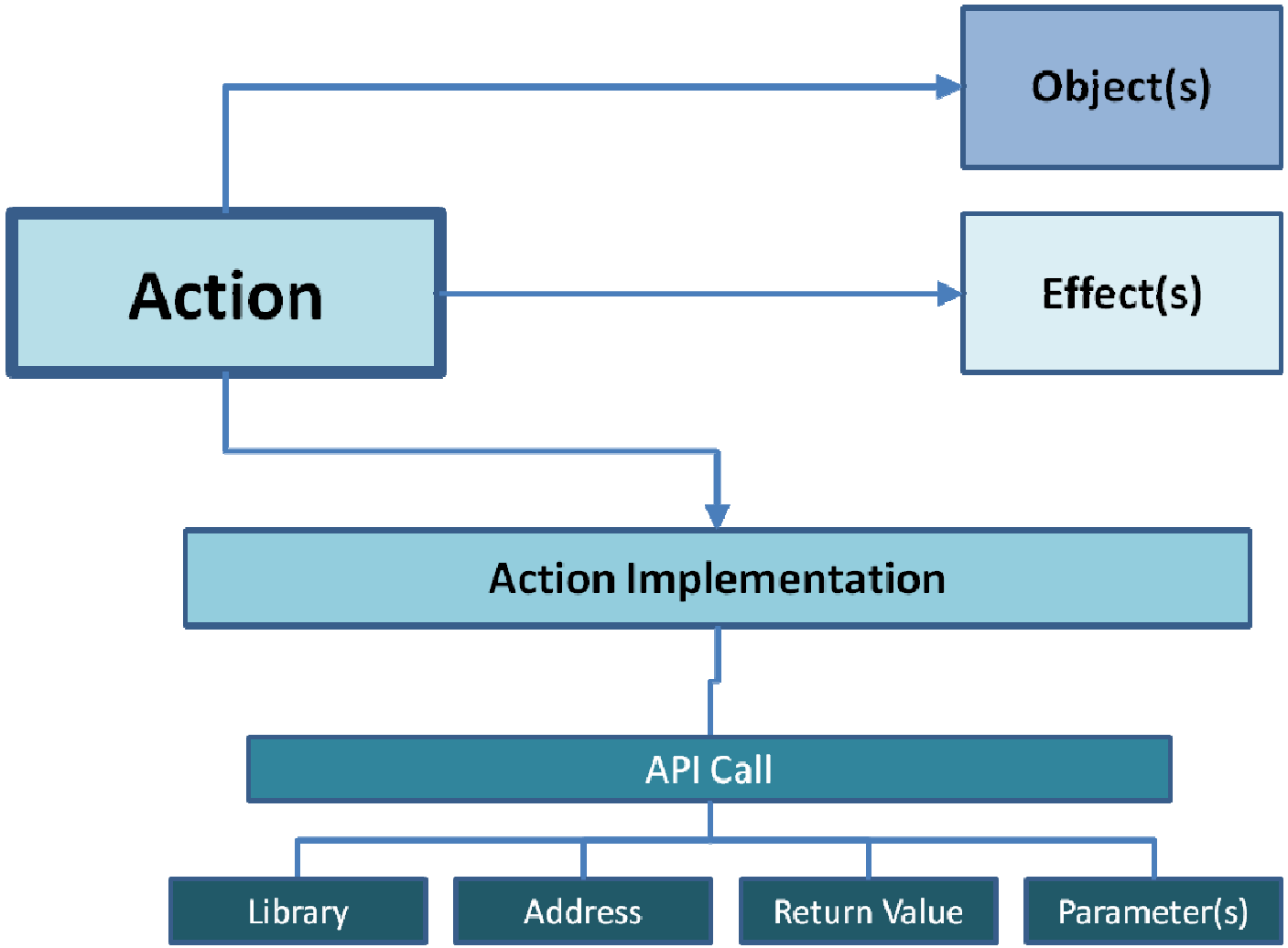
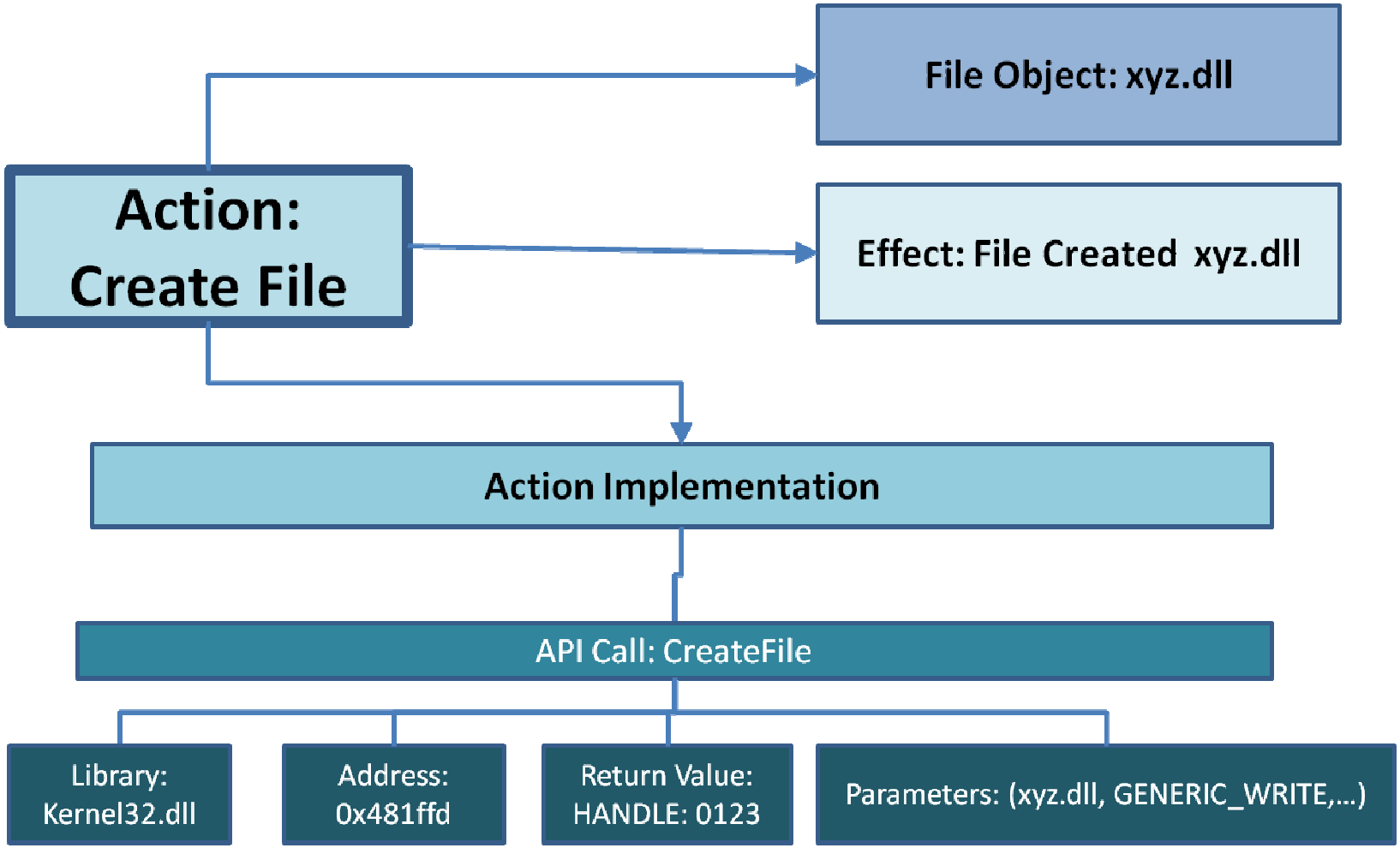
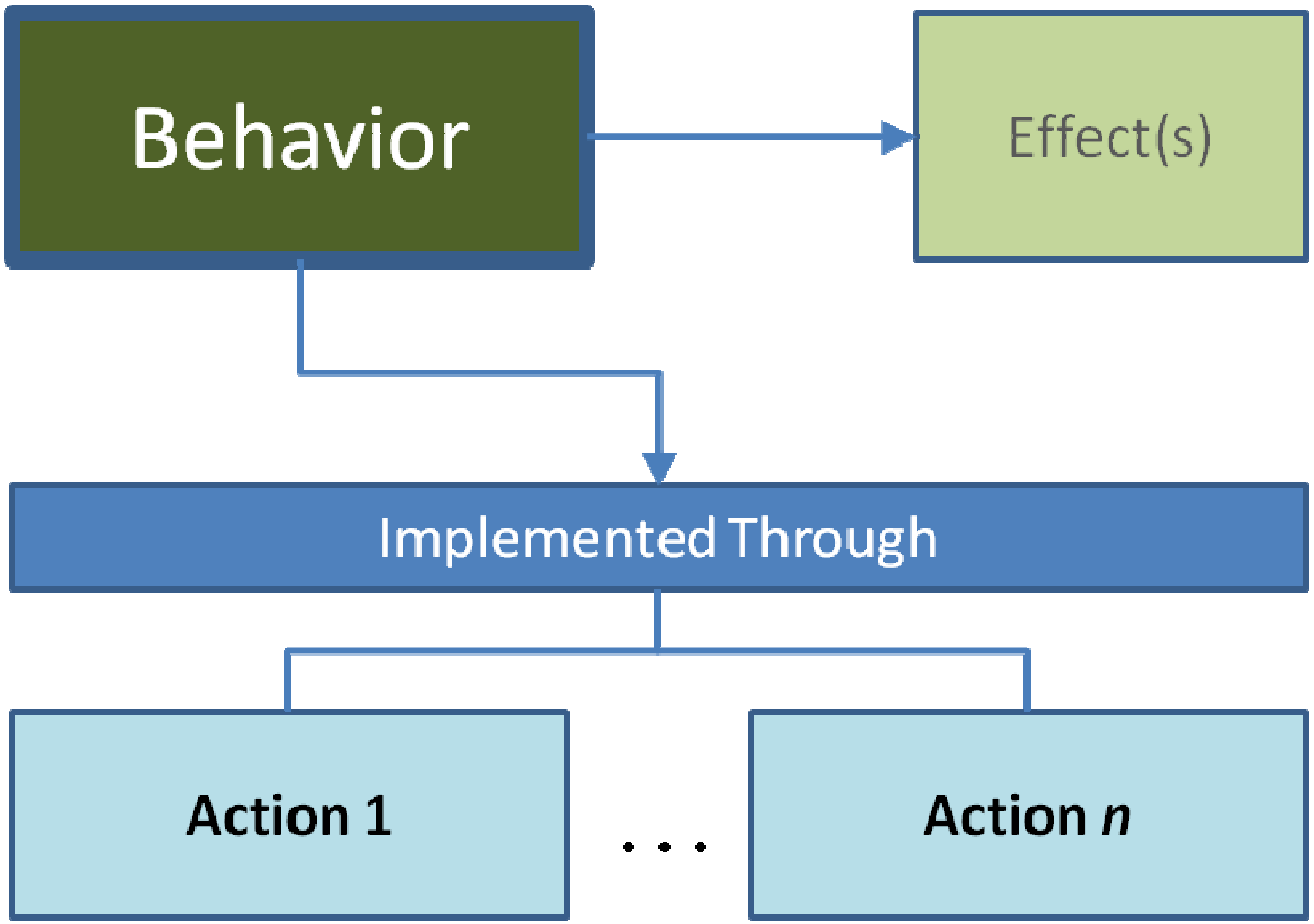
MAEC Action Model



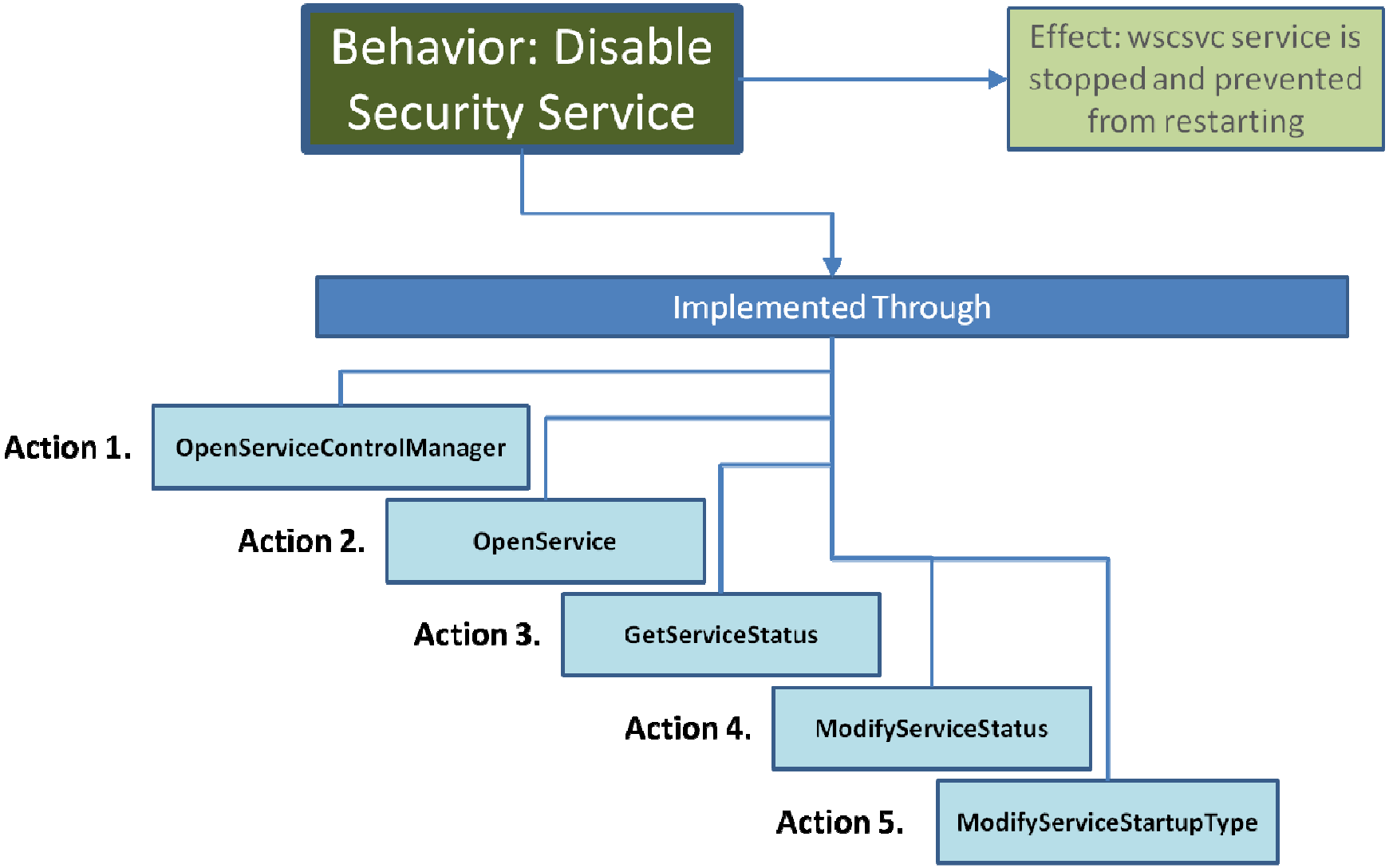
Action Example



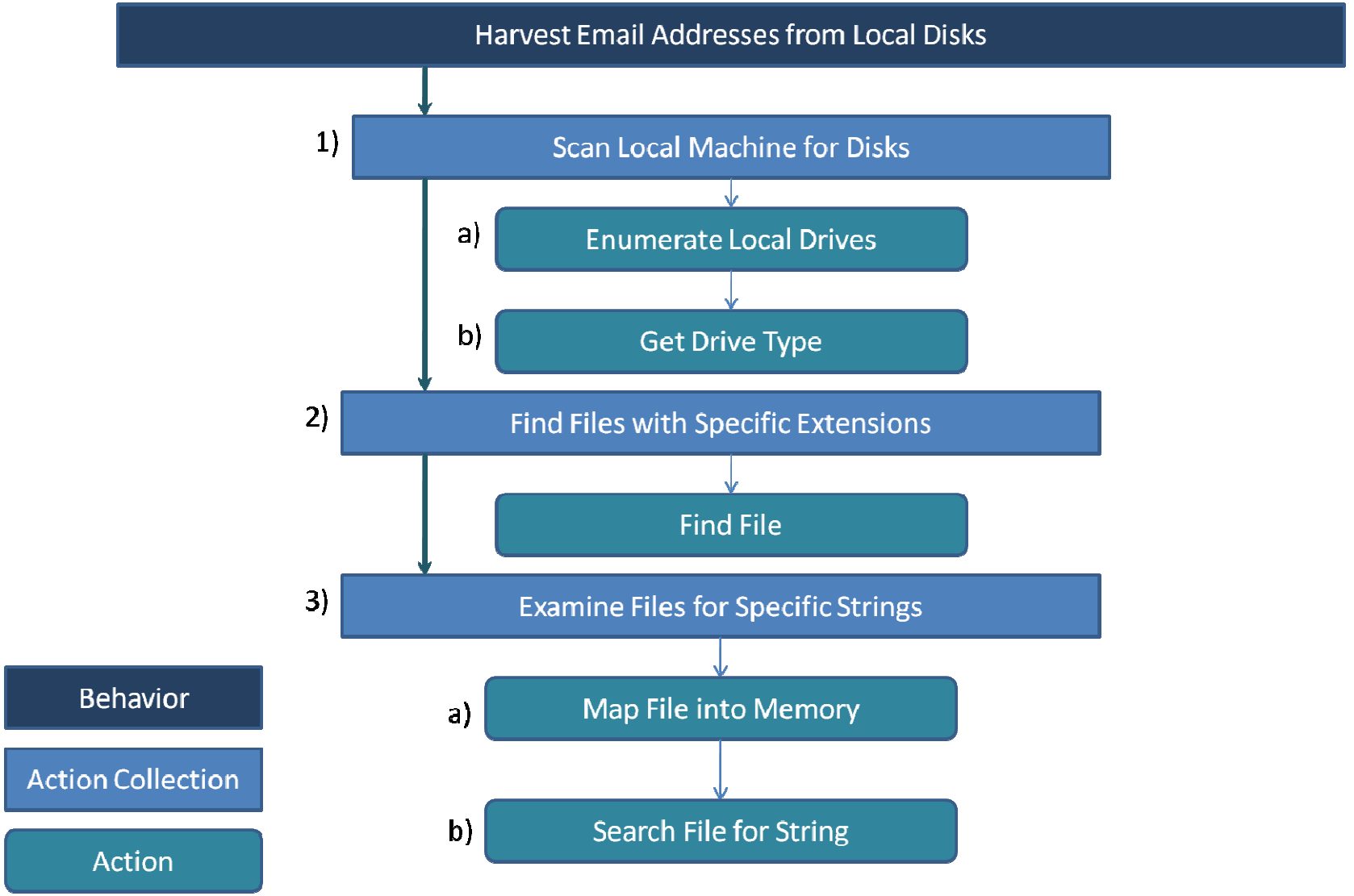
MAEC Behavior Model



Basic Behavior Example



More Complex Behavior Example



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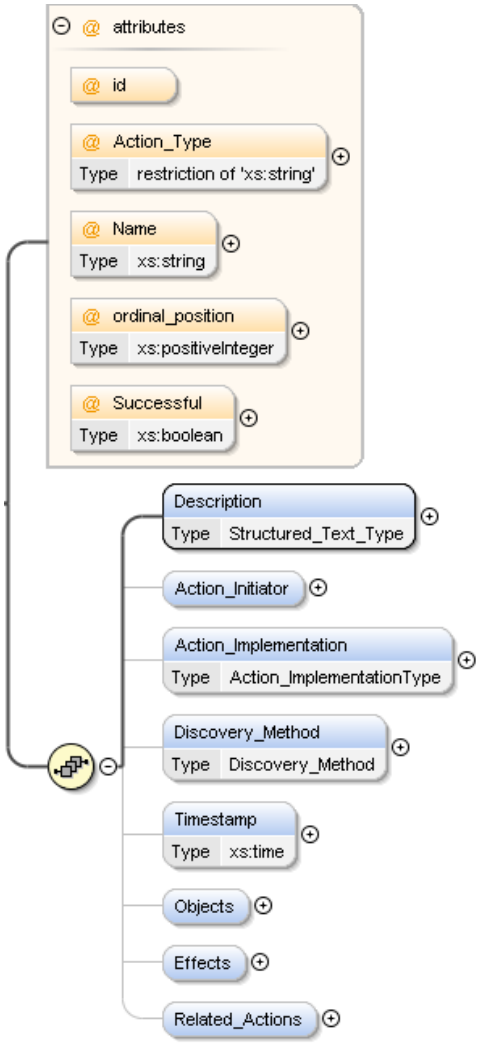
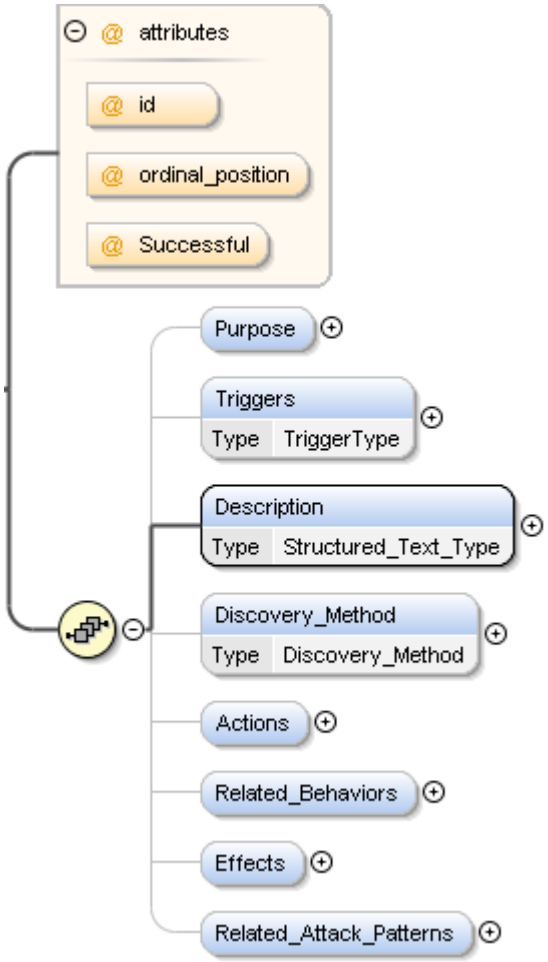
MAEC Schema Overview – Initial Release

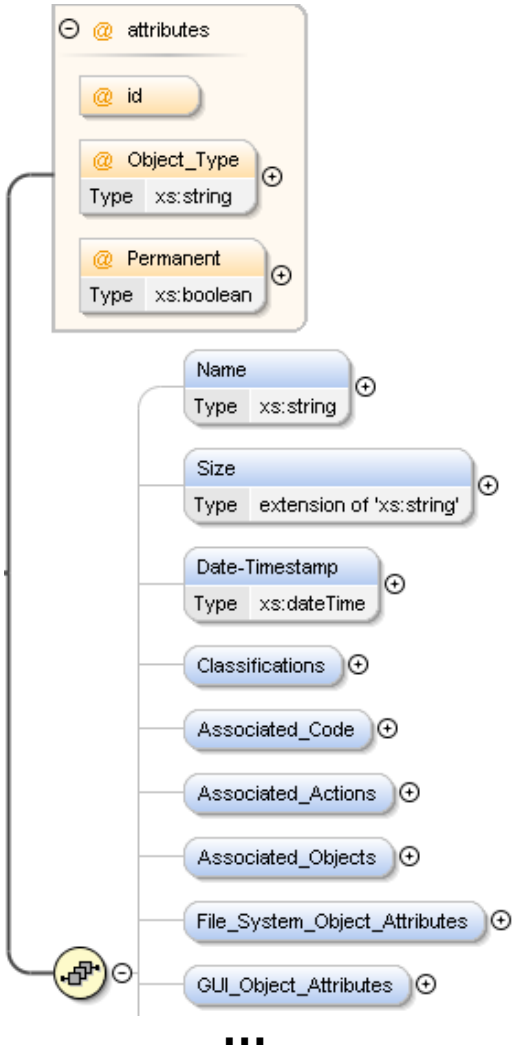
ActionType



BehaviorType



ObjectType



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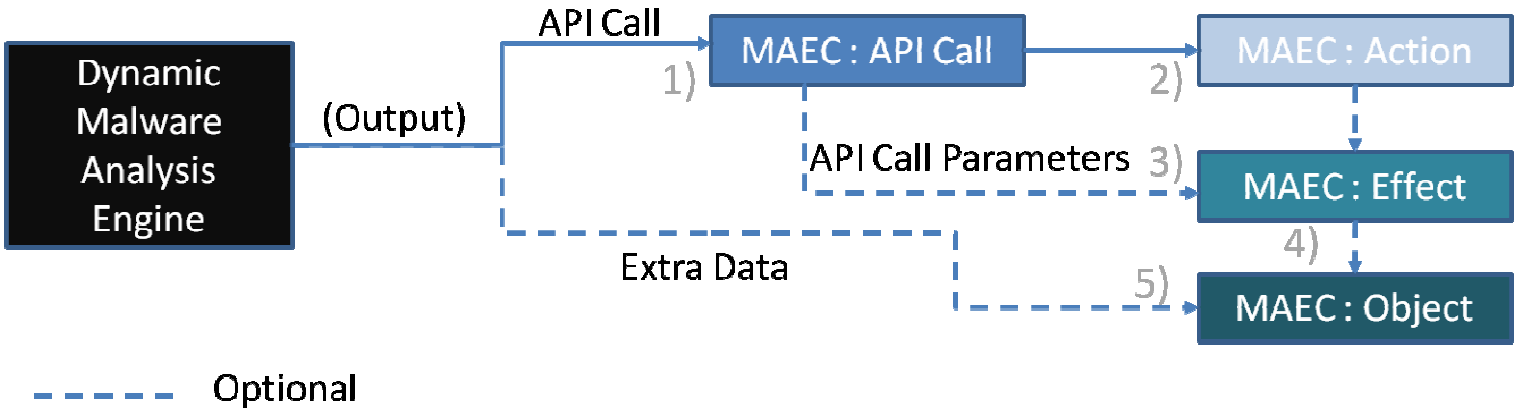
Dynamic Malware Analysis <-> MAEC



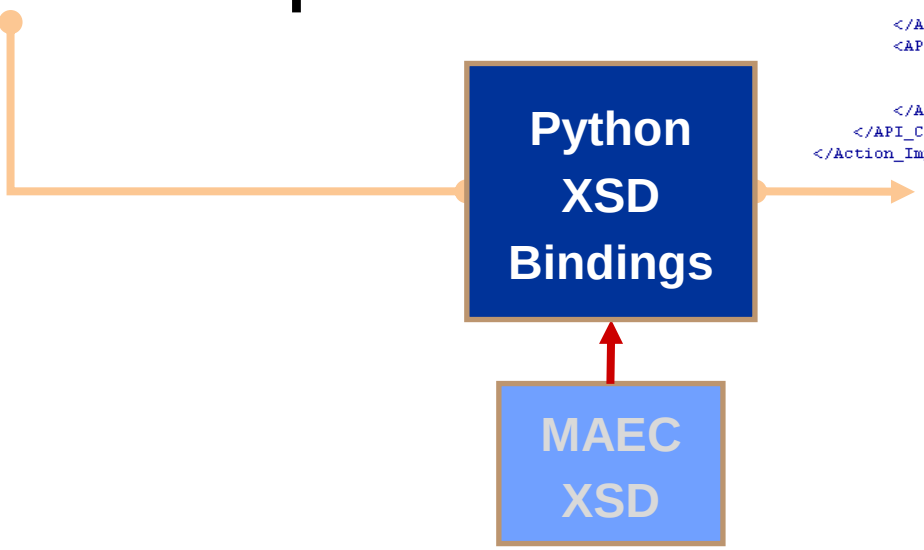
Process

1) An API call is captured by the analysis engine and mapped to MAEC's enumeration of API calls.
2) The MAEC enumerated call is mapped to its corresponding action.
3) The MAEC defined action is mapped to a corresponding MAEC effect (as necessary), which is populated by the parameters of the call.
4) The MAEC effect is linked to a MAEC object (as necessary).
5) Any extra data output (e.g. file attributes, network capture, etc.) from the analysis engine is mapped to its corresponding object (as necessary).

Test Case: CWSandbox Output -> MAEC

```
PID:1080,TID:1812,Caller:$00400000("KB823988.exe"),BEFORE,typFileSystem."FindFirstFileW" -
PID:1080,TID:1812,Caller:$00400000("KB823988.exe"),BEFORE,typFileSystem."SetFileAttributesW" -
PID:1080,TID:1812,Caller:$00400000("KB823988.exe"),BEFORE,typFileSystem."DeleteFileW" -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegEnumKeyA" - <en
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegEnumKeyA" - <en
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegEnumValueW" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegEnumValueW" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExA" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExW" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExW" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegOpenKeyExW" - -
PID:1080,TID:1812,Caller:$77A80000("CRYPT32.dll"),AFTER,typRegistry."RegCreateKeyExW" -
```

Raw CWSandbox Output




```
<Action Successful="true" id="10" Action_Type="copy" Name="copy_file">
    <Description/>
    <Action_Initiator type="Process">
        <Initiator_Name>KB823988.exe</Initiator_Name>
        <Process_ID>1080</Process_ID>
        <Thread_ID>1812</Thread_ID>
    </Action_Initiator>
    <Action_Implementation>
        <API_Call>
            <Name>CopyFileW</Name>
            <API_Call_Parameter ordinal_position="1">
                <Name>filetype</Name>
                <Value>file</Value>
            </API_Call_Parameter>
            <API_Call_Parameter ordinal_position="2">
                <Name>srcfile</Name>
                <Value>c:\\KB823988.exe</Value>
            </API_Call_Parameter>
            <API_Call_Parameter ordinal_position="3">
                <Name>dstfile</Name>
                <Value>C:\\WINDOWS\\system32\\ntos.exe</Value>
            </API_Call_Parameter>
            <API_Call_Parameter ordinal_position="4">
                <Name>creationdistribution</Name>
                <Value>CREATE_ALWAYS</Value>
            </API_Call_Parameter>
            <API_Call_Parameter ordinal_position="5">
                <Name>desiredaccess</Name>
                <Value>FILE_ANY_ACCESS</Value>
            </API_Call_Parameter>
            <API_Call_Parameter ordinal_position="6">
                <Name>flags</Name>
                <Value>SECURITY_ANONYMOUS</Value>
            </API_Call_Parameter>
        </API_Call>
    </Action_Implementation>
```

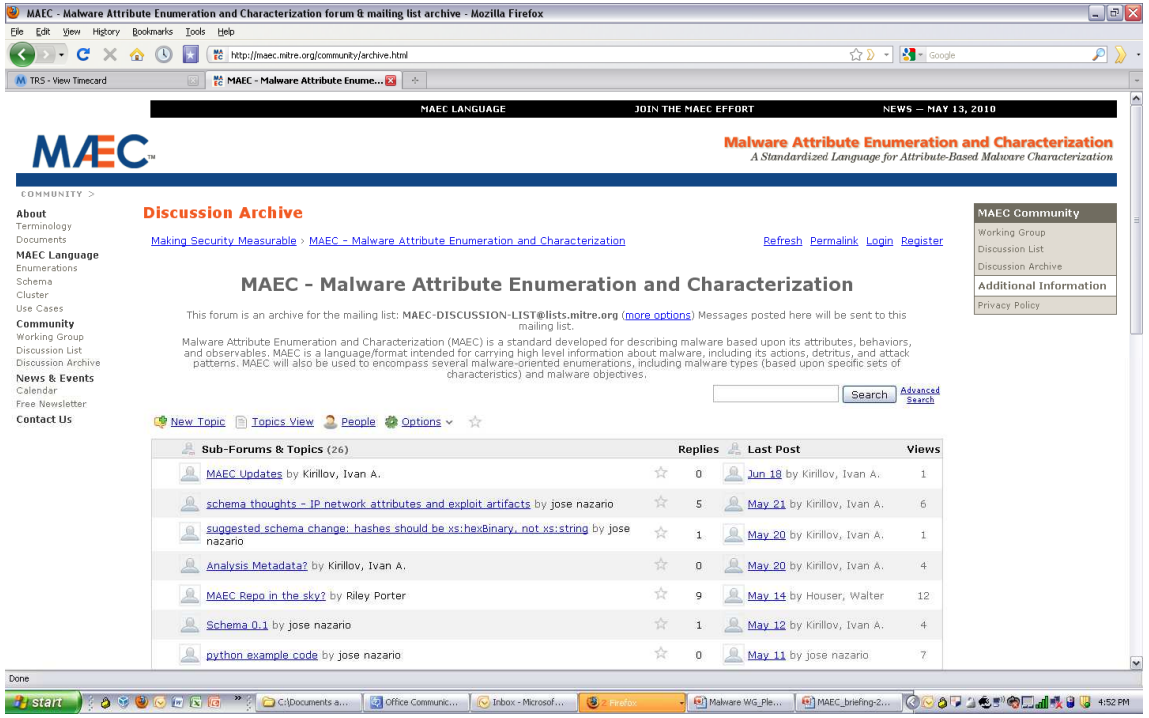
MAEC XML

Collaboration and Outreach

- **Engaged with IEEE Industry Connections Security Group (ICSG) Malware Group**
  - **MAEC team invited to be "guest" members**
  - **IEEE ICSG Malware Group Developed a Malware Metadata Exchange Schema**
    - **Oriented towards providing a mechanism for the sharing of sample data between AV product vendors**
    - **Current version: http://grouper.ieee.org/groups/malware/malwg/Schema1.1/**
    - **MAEC imports portions of this schema, particularly with regards to sample prevalence and AV classification**

MAEC Community: Discussion List

- **Request to join: http://maec.mitre.org/community/discussionlist.html**
- **Archives available**



MAEC Community: MAEC Development Group on Handshake

- MITRE hosts a social networking collaboration environment: https://handshake.mitre.org
- Supplement to mailing list to facilitate collaborative schema development

Future Plans

- Develop additional translators for dynamic analysis tools into MAEC XML
- Begin creation of process for cataloguing malware behaviors
- Expand and revise schema, particularly with regards to action attributes
- Collaborate with CAPEC & CWE teams in order to develop consensus approach on object/observable development
- Encourage and invite more participation in the development process
  - MAEC Website: http://maec.mitre.org (contains MAEC Discussion list sign-up)
  - MAEC Handshake Group