## 

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Related work:

This document is related to:

* *Collaborative Automated Course of Action Operations (CACAO) for Cyber Security*. Edited by Bret Jordan, Allan Thomson, and Jyoti Verma. <https://tools.ietf.org/html/draft-jordan-cacao-introduction-01>.

Abstract:

To defend against threat actors and their tactics, techniques, and procedures, organizations need to identify, create, document and test investigative, preventive, mitigative, and remediative steps. These steps, when grouped together, form a cyber security playbook that can be used to protect organizational systems, networks, data, and users.

This document defines the core requirements for how cyber security playbooks can be created, documented, and shared in a structured and standardized way across organizational boundaries and technological solutions.

Status:

This is a Non-Standards Track Work Product.

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1 Introduction

To defend against threat actors and their tactics, techniques, and procedures, organizations need to identify, create, document and test investigative, preventive, mitigative, and remediative steps. These steps, when grouped together, form a cyber security playbook that can be used to protect organizational systems, networks, data, and users.

To enable organizations to respond to threats in cyber relevant time, security teams need to be able to automate the creation, sharing, parsing, and execution of cyber security playbooks.

Each type of cyber security playbook, such as investigation, prevention, mitigation and remediation will consist of a sequence of actions that can be executed by the various technological solutions that can act on those actions whether those actions are executed by a machine, a human, or a combination of the two. These playbooks need to be referenceable by other shared cyber threat intelligence that provides support for related data such as threat actors, campaigns, intrusion sets, malware, attack patterns, and other adversarial tactics, techniques, and procedures.

This document defines the core requirements for how cyber security playbooks can be created, documented, and shared in a structured and standardized way across organizational boundaries and technological solutions.

## 1.1 IPR Policy

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## 1.2 Non-Normative References

[RFC4122] Leach, P., Mealling, M., and R. Salz, "A Universally Unique IDentifier (UUID) URN Namespace", RFC 4122, DOI 10.17487/RFC4122, July 2005, <http://www.rfc-editor.org/info/rfc4122>.

## 1.3 Overview

The requirements for cyber security playbooks naturally fall into several Playbook Information Domains (PID) as depicted in Figure 1 (below). Requirements in each PID are listed in the indicated section of this requirement document.

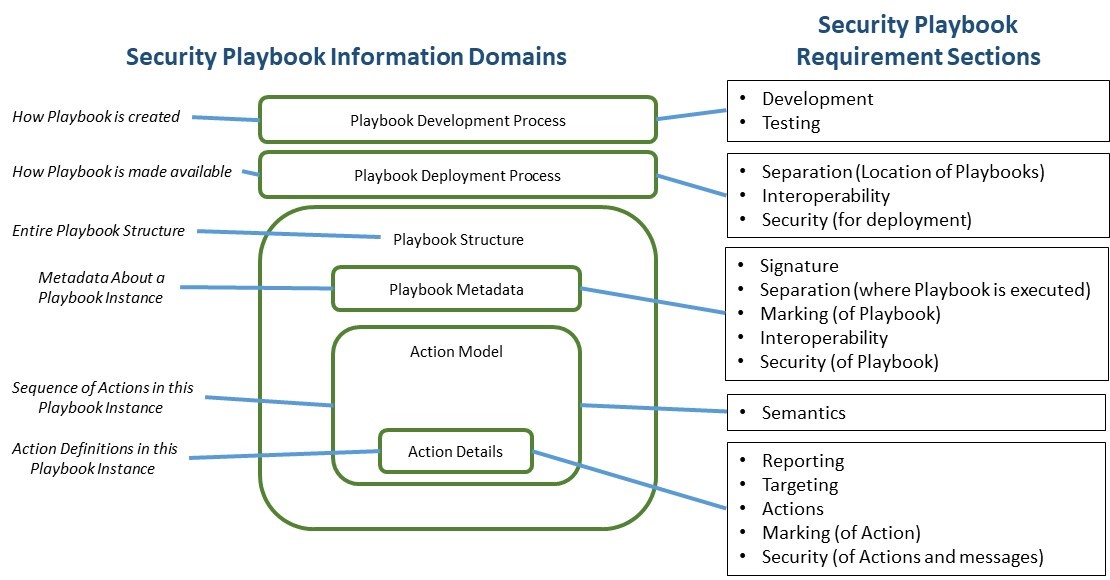


Figure 1 - Playbook Requirements Domains

**Playbook Development Process (PID.Dev) Requirements**

* Provides guidance on the playbook development/testing process such as: acceptable development practices and verification/validation testing necessary for acceptance of new playbooks.

**Playbook Deployment Process (PID.Dep) Requirements**

* Provides guidance on how to make a playbook available to the community where each community have their own defined requirements for acceptance of intelligence including playbooks.

**Playbook Structure (PID.Struct) Requirements**

* Defines the overarching structure of a playbook including mandatory/optional sections and overarching structure and formatting.

**Playbook Metadata (PID.Meta) Requirements**

* Defines the mandatory/optional data that goes with each playbook instance.

**Action Model (PID.ActModel) Requirements**

* Defines the flow of actions within a playbook including the sequence, control flow and logic, temporal requirements, flow decisions, and alternate paths.

**Action Detail (PID.ActDetail) Requirements**

* Defines the mandatory/optional data that goes with each action in the playbook. Note that each unique action is defined only once, even though the action may be referenced multiple times in the action model.

2 Requirements

The following section defines the core requirements that are needed to support the creation, sharing, and deployment of cyber security playbooks.

## 2.1 Development

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| DEV.1 | **Release In Phases**  Break the CACAO playbook work into release phases | PID.Dev |
| DEV.2 | **Minimally Viable Product (MVP)**  Try to get "minimally viable product" out sooner rather than later (i.e., do not wait until a full and "complete" standard done, which will take much more time.) | PID.All |

## 2.2 Interoperability

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| INTEROP.1 | **Vendor and Source Agnostic**  Support deployment and use within an enterprise consisting of different vendors. Allow sharing of playbooks between enterprises with different environments, solutions, and vendors | PID.Dep |
| INTEROP.2 | **Extensions**  Support vendor-specific extensions | PID.Dep |

## 2.3 Actions

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| ACT.1 | **Multiple Actions**  The solution needs to support the ability to document one or more actions that can be processed in a batch manner or as-a-group concept | PID.Struct; PID.ActModel |
| ACT.2 | **Sequencing of Actions**  Actions often have to be done in a very specific order | PID.Struct; PID.ActModel |
| ACT.3 | **Back Out Steps** | PID.Struct; PID.ActModel |
| ACT.4 | **Combination of Actions**  The ability to define an ordered list of atomic actions that must be executed as a combined set rather than as a sequence. For example: deny + log, allow + log, redirect + log. | PID.Struct; PID.ActModel |
| ACT.5 | **Support Different Action Types**  The solution needs to support the following types of actions: Machine automation, Human actions / intervention, High level conceptual actions | PID.Struct; PID.ActModel  PID.ActDetail |
| ACT.6 | **Handle Atomic and Non-Atomic Actions**  Needs ability for systems to have option to support both atomic and non-atomic transactions  Example: 1 sequence of actions provided but a system can be provisioned with option to treat entire sequence as atomic (i.e. one failure causes the entire sequence to be rejected) or non-atomic where the system can continue to operate through the sequence with errors being recorded but not treated as data | PID.Struct;  PID.ActModel  PID.ActDetail |

## 2.4 Control Logic

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| LOGIC.1 | **Temporal Logic**  Sometimes actions can only be performed at certain times or after a certain amount of time has passed after the previous action. (Window of opportunity. Example: Must I act now? If I don’t act now, will the opportunity close? Will the response action be different later?) | PID.Struct; PID.ActModel |
| LOGIC.2 | **Conditional Logic**  Often actions need to be performed based on environmental data or outcomes of previous actions | PID.Struct; PID.ActModel |

## 2.5 Identifiers

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| IDENT.1 | **System Integration**  Needs to integrate with other systems globally. Needs to support a globally unique ID like a UUIDv4 [[RFC4122](#kix.onjm3t6qxyap)] for projects and individual actions. | PID.Dep;  PID.Meta |
| IDENT.2 | **Monitoring**  All transactions need to be able to be monitored. This means responses and notifications need a way to be tied back to the original request | PID.Dep;  PID.Meta |

## 2.6 Targeting

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| TARGET.1 | **Versioning**  Allow actions, projects, and templates to be versioned. Support both incremental and semantic versioning. | PID.Meta;  PID.ActModel;  PID.ActDetail |
| TARGET.2 | **System / Group Targeting**  Identify specific machines, devices, software, general classes of systems (e.g., Windows 10), teams (SoC Team / Network Team), and individuals (CISO). | PID.Meta;  PID.ActModel;  PID.ActDetail |

## 2.7 Testing

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| TEST.1 | **Scope**  Machine automation  Human actions / intervention  High level conceptual actions | PID.Dev;  PID.Dep;  PID.Meta;  PID.ActModel;  PID.ActDetail |
| TEST.2 | **Dry-Run Capabilities**  Including what-if deployments | PID.Dev;  PID.Dep;  PID.Meta;  PID.ActModel;  PID.ActDetail |
| TEST.3 | **Playbook Validation Before Deployment**  Ability to validate that a playbook is correctly formed syntactically and semantically would execute without significant failures | PID.Dev;  PID.Dep  PID.Struct  PID.ActModel  PID.ActDetail |

## 2.8 Reporting

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| REPORT.1 | **General Reporting**  Provide full reporting on the processing of each action including supporting the needs for mandatory reporting requirements. | PID.Dep  PID.Meta |
| REPORT.2 | **Auditing**  Must have a timestamp and information regarding the original request or rule that caused the event for full auditing capabilities. | PID.Dep  PID.Meta |
| REPORT.3 | **Report Delivery**  Could be either synchronously requested or an asynchronous event (syslog) with periodic updates | PID.Dep  PID.Struct |

## 2.9 Signatures

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| SIG.1 | **Basic Digital Signatures**  Ability to digitally sign playbooks and their various parts and even sub parts | PID.Meta  PID.Struct  PID.ActModel |
| SIG.2 | **Layered / Multiple Signatures**  Ability to support multiple digital signatures of the same thing | PID.Meta  PID.Struct  PID.ActModel |
| SIG.3 | **Semantic Signatures**  Ability for multiple independent organizations to sign and verify the correctness, accuracy, and validity of the playbook | PID.Meta  PID.Struct  PID.ActModel |

## 2.10 Security

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| SEC.1 | **Integrity and Authentication**  Support full data protection, integrity and authentication | PID.Dep  PID.Struct |
| SEC.2 | **Transport**  All requests and responses must be conveyed over a secure (encrypted and authenticated) transport protocol such as HTTPS (but not limited). | PID.Dep  PID.Struct |
| SEC.3 | **Delivery Options**  Both direct delivery and publish/subscribe solutions | PID.Dep  PID.Struct |

## 2.11 Separation

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| SEP.1 | **Portability**  Playbooks may be defined in one environment and executed or deployed to a different operational environment. Meaning, the security environment executing the playbook will likely be different from where the playbook was defined. | PID.Dep |
| SEP.2 | **Authorization Requirements**  For a playbook to execute correctly it must have authorization in the operational environment where it is executed. | PID.Dep  PID.Meta |

## 2.12 Marking

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Details** | **PID** |
| MARK.1 | **Object Level Markings**  Need ability to support data marking at a Playbook level such as TLP Red for the entire playbook | PID.Dep  PID.Meta  PID.Struct  PID.ActModel  PID.ActDetail |
| MARK.2 | **Granular Markings**  Need ability to support data marking at specific control blocks within a Playbook | PID.Dep  PID.Meta  PID.Struct  PID.ActModel  PID.ActDetail |
| MARK.3 | **Licensing**  Need ability to support and include and/or reference **one** or **more** licenses that apply to the playbook such that its clear what rules apply to the use, distribution and modification (if applicable) to the playbook.  If a playbook license allows modification by another party then the playbook license may require referencing both the original/downstream license as well as any additional license information changes introduced by the downstream party.  The license information should also include what party is asserting the license and what specific content it relates to in the playbook (all, subset...etc). | PID.Dep  PID.Meta  PID.Struct |

1. Acknowledgments

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| 01 | 2020-01-27 | Bret Jordan,  Allan Thomson | Initial version |
| 02 | 2020-02-20 | Bret Jordan,  Allan Thomson | Added licensing to requirements. Moved terminology into a separate document. |