sekoia

OXA

Meshroom
The cybersecurity mesh assistant

#OXA-granted-project #opensource #opencyberalliance

David Bizeul
Jérôme Fellus

All-in-one platform *vs* Cybersecurity Mesh architecture

All-in-one

- Unified operation model
- Unified UI/UX

- Captive Silo
- Expensive non-modular licensing
- Full replacement of existing stack
- Can’t cherry-pick functionalities

- Can’t be good at everything…

CSMA

- Favor interoperability
- Adapt & extend existing stack
- Do one job, do it right
- Focused expertise

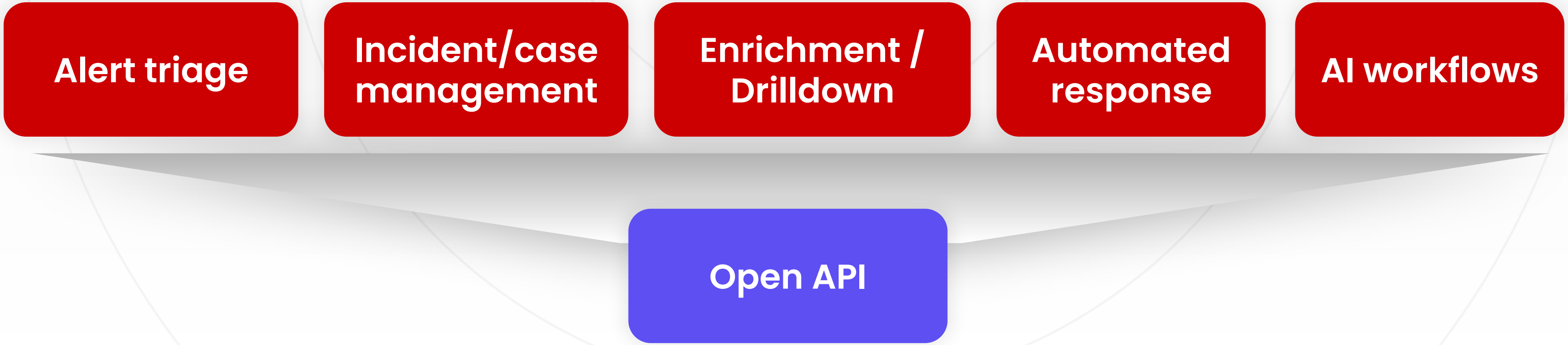
- Need vendors cooperation
- Integration development burden
- Scattered SOC configuration

Challenge : Standards adoption in security operations

Some cybersecurity operations have found their standard

Threat intelligence	STIX
Detection rules	SIGMA
Security events	ECS, OCSF

Others remain mostly vendor-specific



Alert triage

Incident/case management

Enrichment / Drilldown

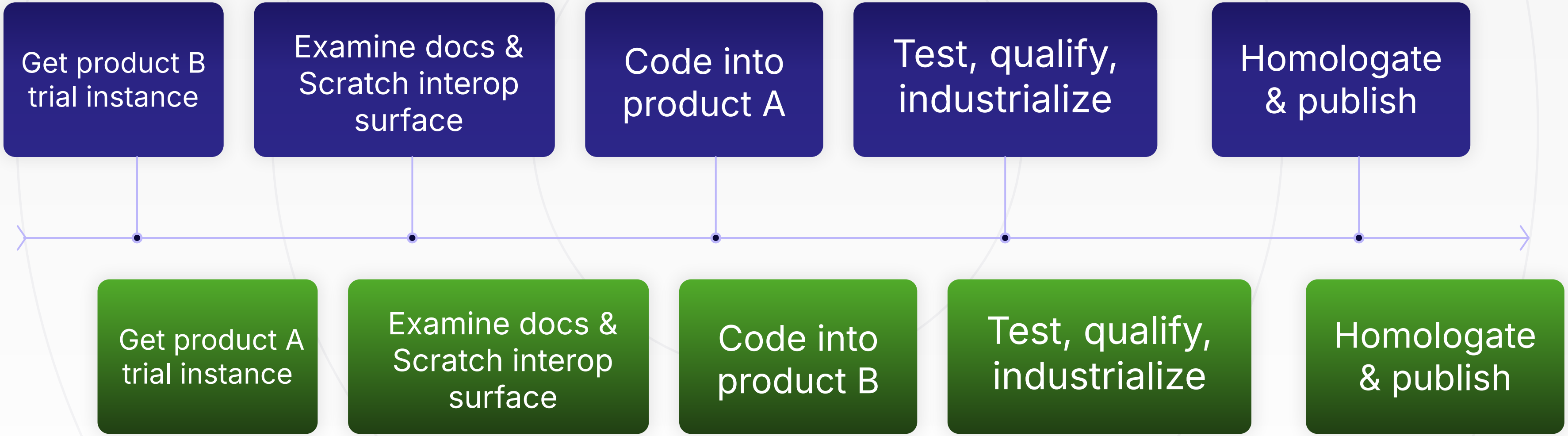
Automated response

AI workflows

Open API

The N-to-N integrations curse

Product A



Get product B trial instance

Examine docs & Scratch interop surface

Code into product A

Test, qualify, industrialize

Homologate & publish

Get product A trial instance

Examine docs & Scratch interop surface

Code into product B

Test, qualify, industrialize

Homologate & publish

Product B

Building a mesh is …

Cumbersome for vendors

Tedious for integrators

Unmanageable for devsec operators

Uncertain for buyers & end users

★ **Our contribution : an opensource assistant to compose cybersecurity meshes**

Compose…

Containerized stacks
docker compose up

Infrastructure-as-a-Service
terraform apply

Provisioning
ansible-playbook

Cybersecurity Mesh
📢 meshroom up !

Scope

❑ Declarative mesh definition

❑ Remotely operate your products via their API

❑ Securely store tenant credentials

❑ Share mesh via git

Out-of-scope

❑ No builtin data store, nor queuing or processing

❑ Unopinionated data/remote call format & protocol

❑ No mesh-level user management

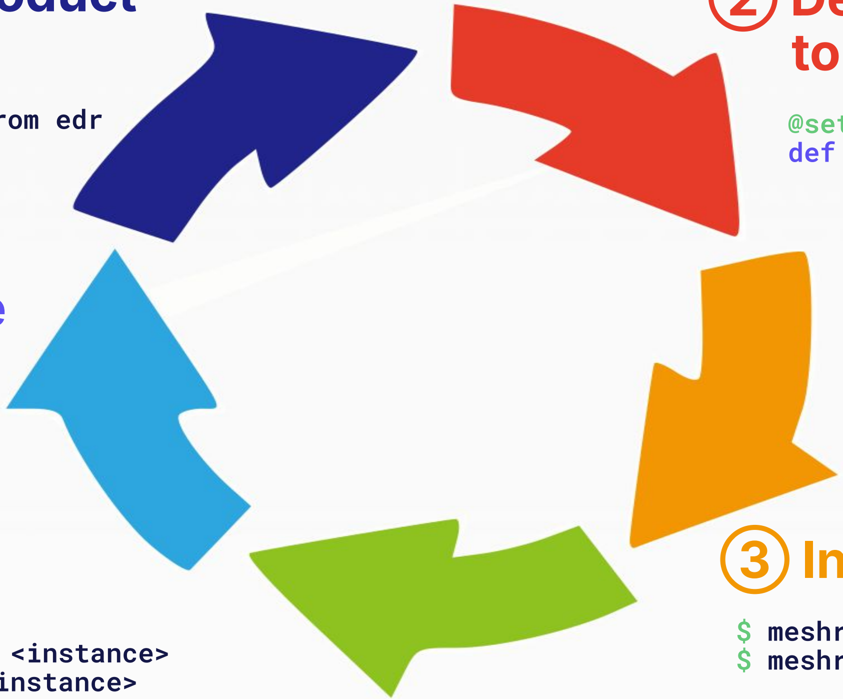
Assisted mesh integration journey

① Declare new product from template

```
$ meshroom create product —from edr
```

② Define python hooks to automate setup

```
@setup_consumer(‘events’)
def my_setup_func(plug: Plug):
    ...
```



③ Instantiate and plug

```
$ meshroom add <product> <name>
$ meshroom plug <instance> <instance>
```

④ meshroom up 🚀

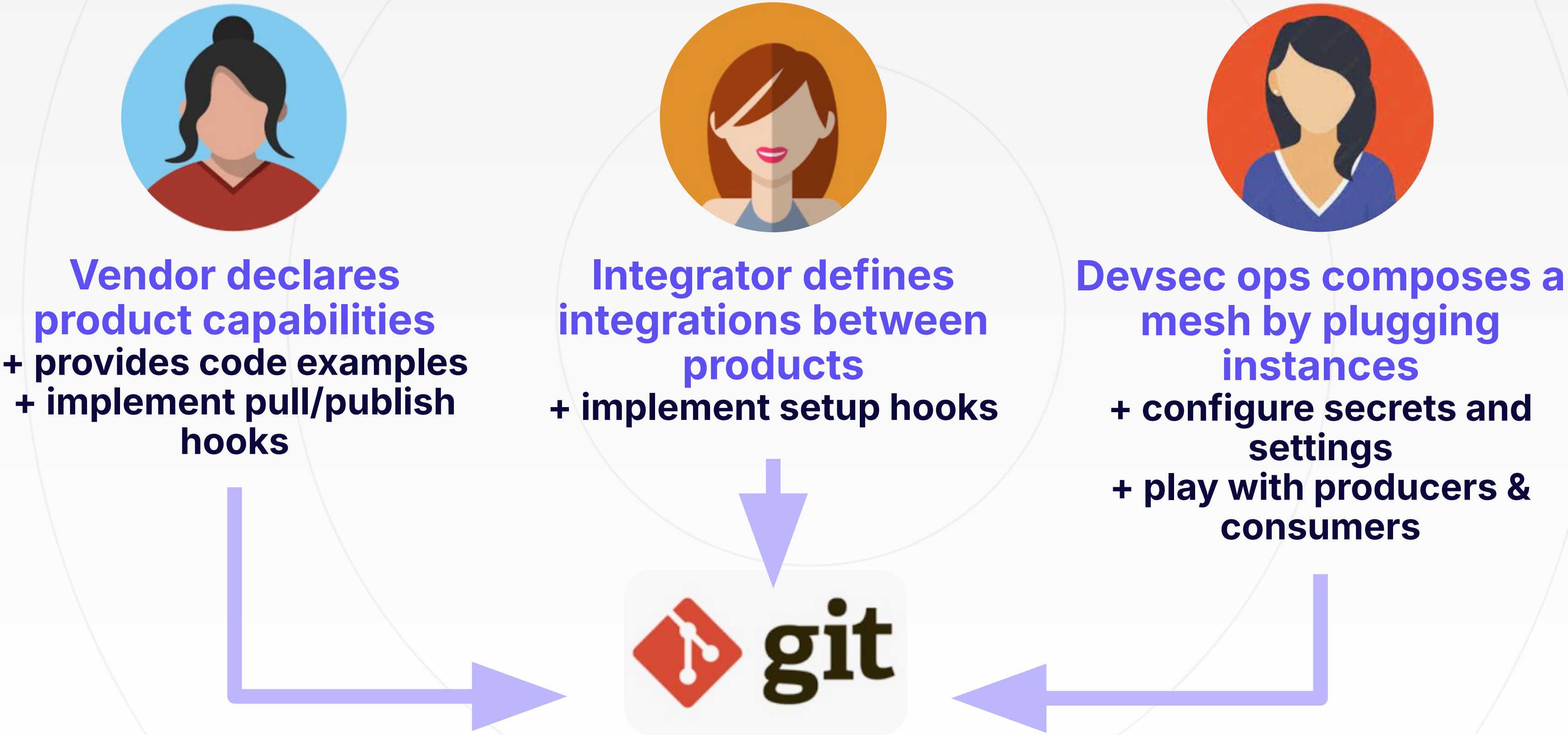
⑤ Play and test

```
$ meshroom produce <topic> <instance>
$ meshroom watch <topic> <instance>
```

⑥ Publish & share via git

```
$ meshroom publish <product>
```

Who ?



Vendor declares product capabilities
+ provides code examples
+ implement pull/publish hooks

Integrator defines integrations between products
+ implement setup hooks

Devsec ops composes a mesh by plugging instances
+ configure secrets and settings
+ play with producers & consumers

Everyone publish 🎉

How ?

- **producer→consumer**

  producer sends data to a topic,
  consumer receives data from the topic

- **trigger→executor**

  trigger submit commands to a topic,
  executor executes commands submitted to the topic

- **operation mode**

  push mode: source is active, destination is passive *(e.g., HTTP API)*
  pull mode: producer is passive, consumer is active *(e.g., syslog forwarding)*

- **plug ownership**

  cooperative: both producer & consumer need configuration to work *(e.g., AWS SQS)*
  unilateral: one end can setup everything without any action on the other end *(e.g., TAXII)*

- **python hooks**

  automate remote setup of real product instances and scaffolding of new integration via vendor-provided python functions executed upon meshroom commands

📢 Full interop definition between two products

⦿ Dataflow
⦿ Setup procedure
⦿ Boilerplate generator

Meshroom model

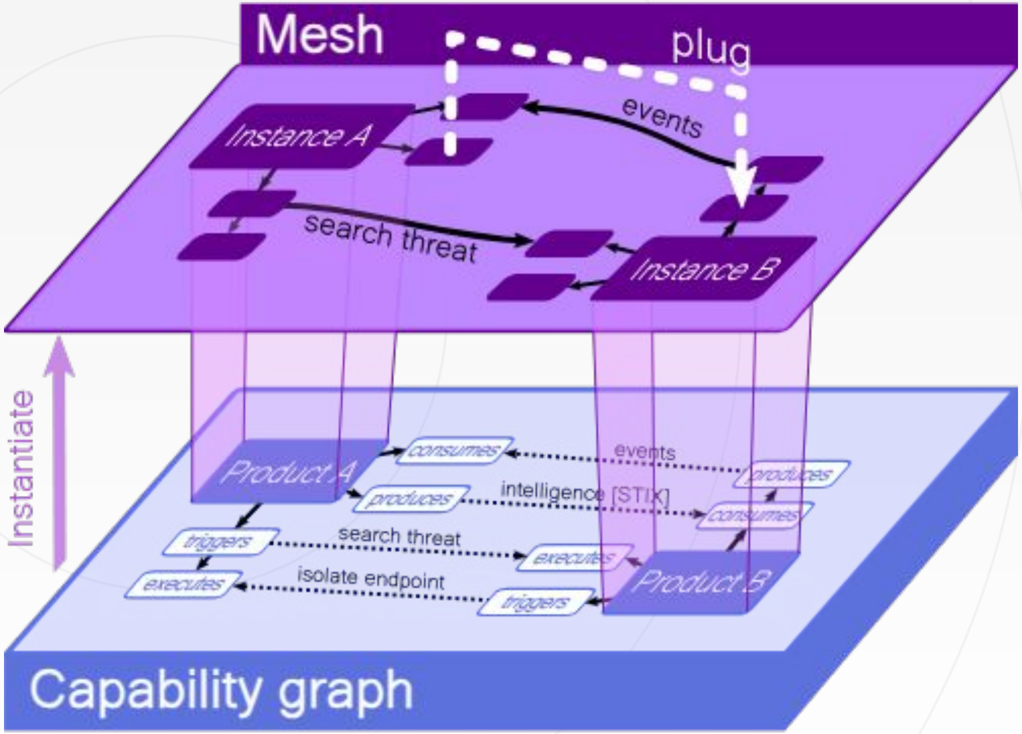
1. Describe product capabilities

2. Scaffold integrations between products

3. Instantiate products

4. Plug instances

5. meshroom up 🚀



Meshroom basic usage

```
meshroom init <path>

cd path

meshroom pull sekoia

meshroom create product

meshroom create integration
```

```
meshroom add

meshroom plug

meshroom up

meshroom produce

meshroom watch

meshroom down

meshroom publish
```

Hooks

hook decorator	called upon	usage	
@setup	$ meshroom up	Define an automated setup step to get a plug up-and-running on a given instance	optional
@teardown	$ meshroom down	Define an automated step to shutdown and cleanup a plug from a given instance	optional
@scaffold	$ meshroom create integration	Generate files for a new integration for a certain topic	optional
@pull	$ meshroom pull	Generate integrations by pulling the vendor's online integration catalog	required
@publish	$ meshroom publish	Submit all defined integrations to the vendor's catalog for public homologation	required
@produce	$ meshroom produce	Send data to the plug's destination for testing	required
@watch	$ meshroom watch	Inspect data flowing through the plug	required

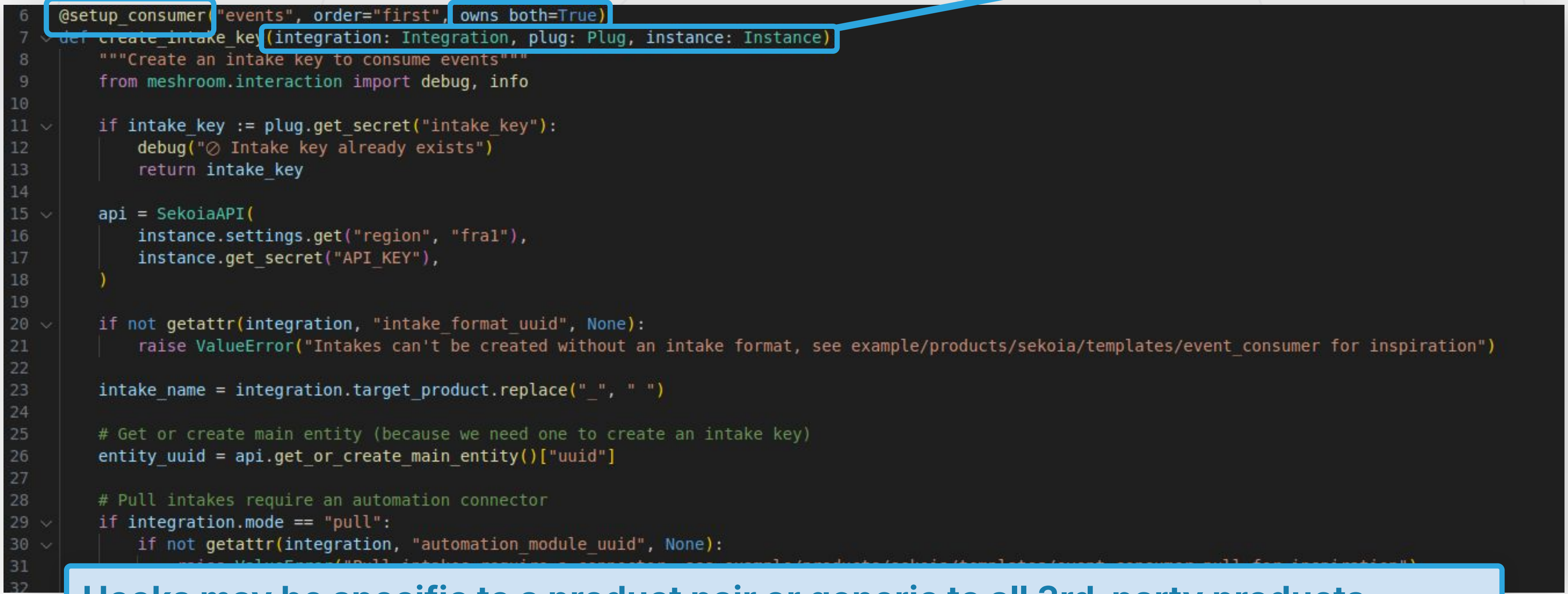
Hooks : example

Setup hook, called upon $ meshroom up

Unilateral setup

No remote configuration on producer side is required

Hooks have access to product instance and plugs



```python
@setup_consumer("events", order="first", owns_both=True)
def create_intake_key(integration: Integration, plug: Plug, instance: Instance)
    """Create an intake key to consume events"""
    from meshroom.interaction import debug, info

    if intake_key := plug.get_secret("intake_key"):
        debug("⊘ Intake key already exists")
        return intake_key

    api = SekoiaAPI(
        instance.settings.get("region", "fra1"),
        instance.get_secret("API_KEY"),
    )

    if not getattr(integration, "intake_format_uuid", None):
        raise ValueError("Intakes can't be created without an intake format, see example/products/sekoia/templates/event_consumer for inspiration")

    intake_name = integration.target_product.replace("_", " ")

    # Get or create main entity (because we need one to create an intake key)
    entity_uuid = api.get_or_create_main_entity()["uuid"]

    # Pull intakes require an automation connector
    if integration.mode == "pull":
        if not getattr(integration, "automation_module_uuid", None):
```

Hooks may be specific to a product pair or generic to all 3rd-party products

DEMO !

Tutorial – 0. Install meshroom

```
$ pip install meshroom
```

- If desired, enable auto-completion for the bash shell (can be appended to .bashrc)

```
$ eval "$(_MESHROOM_COMPLETE=bash_source meshroom)"
```

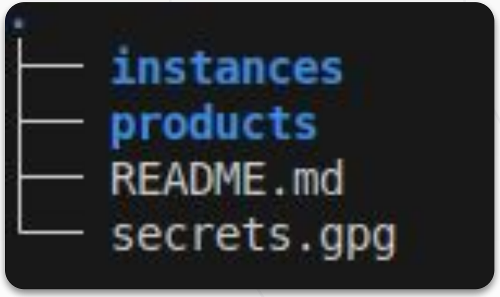
- Checked installed meshroom version and get help

```
$ meshroom –v;   meshroom  -- help
```

Tutorial – 1. Init a mesh

$ meshroom init <*path*>

- Initializes a git-backed meshroom project at <*path*>
- Creates the initial project structure



```
.
├── instances
├── products
├── README.md
└── secrets.gpg
```

- Starts with 0 product, 0 integration, 0 instance and 0 plug…

$ meshroom list *products*

$ meshroom list integrations

Tutorial – 2. Leverage product definitions

- Vendor has declared a product's capabilities and hooks
- Clone product definition, copy to products/ directory

```
$ git clone https://github.com/opencybersecurityalliance/meshroom.git meshroom
$ cp -r meshroom/products/sekoia products/sekoia
$ rm -rf meshroom
$ tree
```

- We now have 1 product, with ready to use hooks. Let's use them !

```
$ meshroom pull sekoia
```

- @pull hook downloads all known integrations from Sekoia's official catalog

```
$ meshroom list products
```

```
$ meshroom list integrations
```

SEKOIA.IO - TLP GREEN

Tutorial – 3. Instantiate products

```
$ meshroom add sekoia
$ meshroom add harfanglab
```

- Instantiate product instances
- Products define settings and secrets : user is prompted for them here
- Nothing is submitted to the real user's tenants yet
- Instances are ready for calling `$ meshroom up`

```
$ meshroom list instances
$ meshroom list integrations sekoia harfanglab
```

Vendors have defined integration potentials between their products, their are eligible for `$ meshroom plug ...`

Tutorial – 4. Plug products

```
$ meshroom plug events harfanglab sekoia
$ meshroom plug endpoint_agent_isolation sekoia harfanglab
```

- Find matching integrations
  - ⦿ If one of the products has a unilateral setup hook [own_both=True], it takes ownership (no need for a defined integration on the other side)
  - ⦿ Otherwise, find a pair of integrations matching the desired operation mode [push/pull] and topic
- Plug instances to each other
- Integrations define settings and secrets: user is prompted for them

```
$ meshroom list plugs
```

Tutorial – 5. Meshroom up !

```
$ meshroom up 🚀
```

- Connect & configure each defined instance
- Execute @setup hooks to configure plugs
- Wait for the whole mesh to be ready

- You’re now ready to use your Cybersecurity Mesh !

Tutorial – 6. Produce/consume data

```
$ meshroom watch events harfanglab sekoia
```

- Runs the @watch hook if defined on consumer side
- Inspects data flowing to the consumer and prints to standard output for debugging purposes

```
$ meshroom produce events harfanglab sekoia
```

- Runs the @produce hook if defined on producer side
- Reads data from standard input and send it to the topic, as if it was produced by the producer itself

Tutorial – 7. Execute/Trigger actions

```
$ meshroom trigger endpoint_agent_isolation sekoia harfanglab
```

- Run the @execute hook if defined on executor side
- Instruct the trigger to submit a command to its executor

```
$ meshroom trigger endpoint_agent_isolation sekoia harfanglab
```

- Run the @trigger hook if defined on trigger side
- Instruct the executor to directly execute the action as if it were sent by the trigger

Tutorial – 8. Meshroom down

```
$ meshroom down
```

- Cleanup all real product instances from what meshroom up had setup
- Leaves the user's tenants in a clean and predictable state

💡 **$ meshroom up/down** commands pair works exactly as
$ docker compose up/down commands pair

Tutorial – 9. Define new products

```
$ meshroom create product cisa_kev
```

- Scaffolds a product definition from a predefined template of product capabilities [see https://github.com/opencybersecurityalliance/meshroom/tree/master/meshroom/templates/products]
- Add your own capabilities to products/myproduct/definition.yaml
- Define python hooks for our new product
  - ⦿ @setup + @teardown hooks for `$ meshroom up/down`
  - ⦿ @pull + @publish to grab and contribute to our product's official integrations catalog via `$ meshroom pull/publish`
  - ⦿ @scaffold hook to provide code generators for `$ meshroom create`
  - ⦿ @produce/@watch hooks for emulation via `$ meshroom produce/watch`

Tutorial – 10. Scaffold new integrations

```
$ meshroom create integration sekoia cisa_kev get_latest_known_exploited_vulnerabilities trigger
```

- Generate integration's boilerplate code using vendor-provided @scaffold hook
- Modify the boilerplate to implement your own action
- Define python hooks for our new product (if needed)
  - @setup + @teardown hooks for `$ meshroom up/down`
  - @pull + @publish to grab and contribute to our product's official integrations catalog via `$ meshroom pull/publish`
  - @scaffold hook to provide code generators for `$ meshroom create`
  - @produce/@watch hooks for emulation via `$ meshroom produce/watch`

Tutorial – 11. Share your mesh

```
$ git commit -a -m “share my mesh” && git push
```

- Meshroom projects are git projects
  - ⦿ Use git to version your mesh
  - ⦿ Use git to share your mesh, privately or publicly
  - ⦿ Integrate contribution from other repos to extend your mesh

```
$ meshroom publish sekoia cisa_kev
```

- Vendors can provide @publish hooks to streamline 3rd-party contributions to their public integrations catalog

Tutorial – 12. Publish your material

```
$ git commit -a -m “share my mesh” && git push
```

- Meshroom projects are git projects
  - ⦿ Use git to version your mesh
  - ⦿ Use git to share your mesh, privately or publicly
  - ⦿ Integrate contribution from other repos to extend your mesh

```
$ git push
```

- Don’t hesitate to contribute to Meshroom’s official products/ directory to make your product definition available to everyone ! 💖

https://github.com/opencybersecurityalliance/meshroom sekoia

- 📣 https://github.com/opencybersecurityalliance/meshroom

- 📣 https://opencybersecurityalliance.github.io/meshroom/tutorial/