

# QAMP 2021 : Ecosystem

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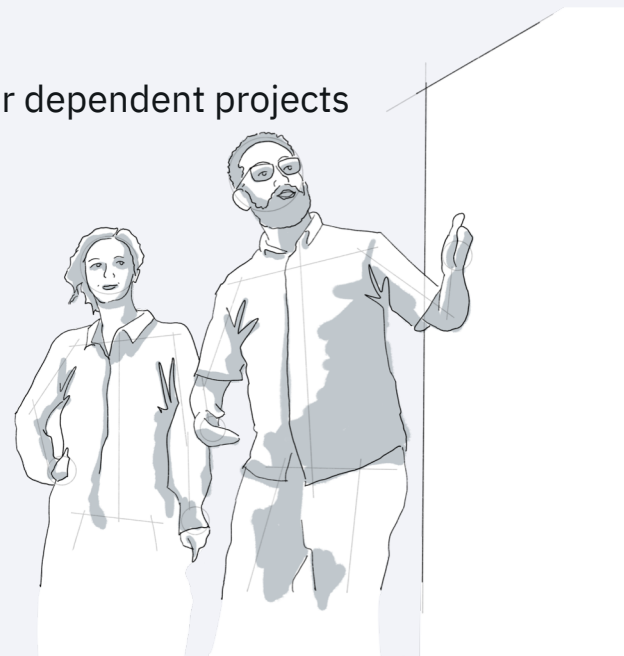
Voice : Neural network cloned voice of Michaël Rollin



# Problem ?



- Community getting bigger and more and more project appear that need to be recognized and supported
  - But not a single list of them
- Constant evolvment of framework may lead to breaking changes for dependent projects



# Solution → Ecosystem !



The Ecosystem consists of projects, tools, utilities, libraries and tutorials from a broad community of developers and researchers. The goal of the Ecosystem is to recognize, support and accelerate development of quantum technologies using Qiskit.

- ❑ Tests check / weekly maintainability reports (runs tests against stable and dev version of Qiskit and notify of any breaking changes)
- ❑ Database to get together every project using qiskit (IBM, community, external, ...)
- ❑ Badging of approval projects by Qiskit
- ❑ Sharing projects everywhere we want

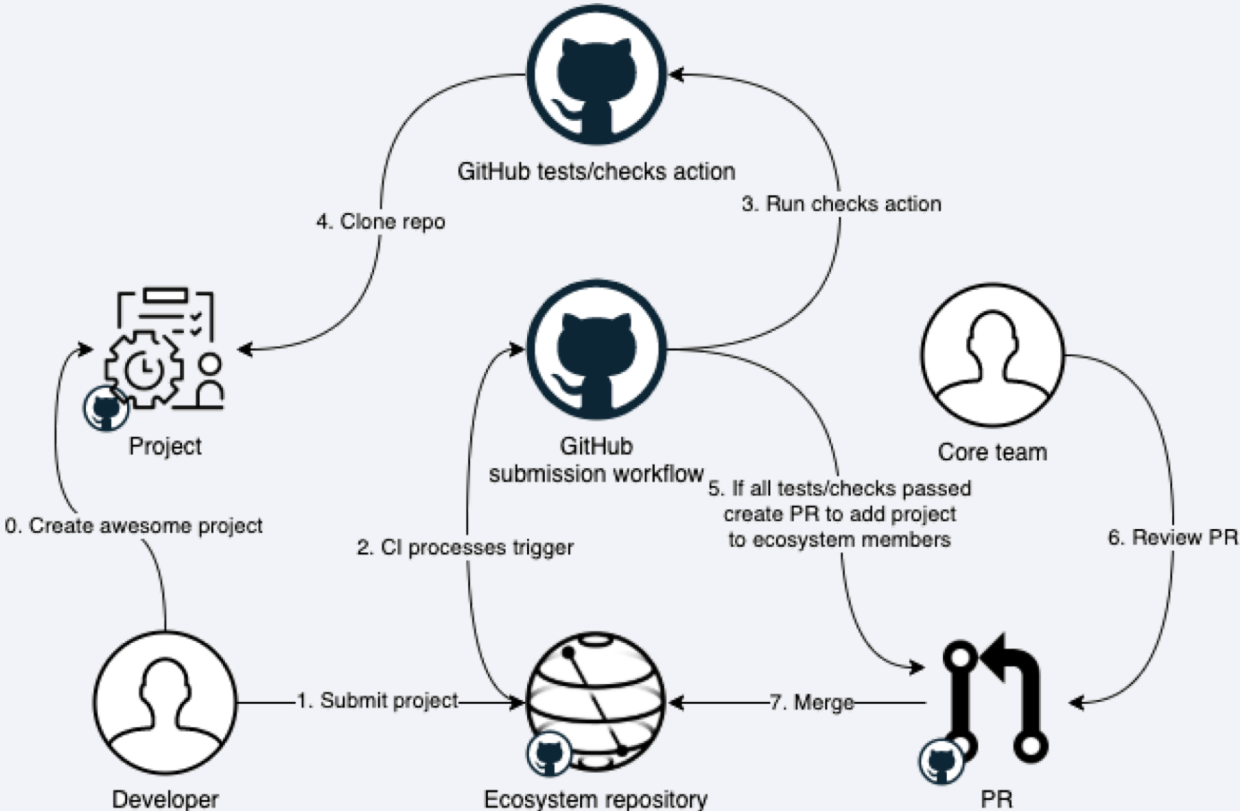
# How does it works ?



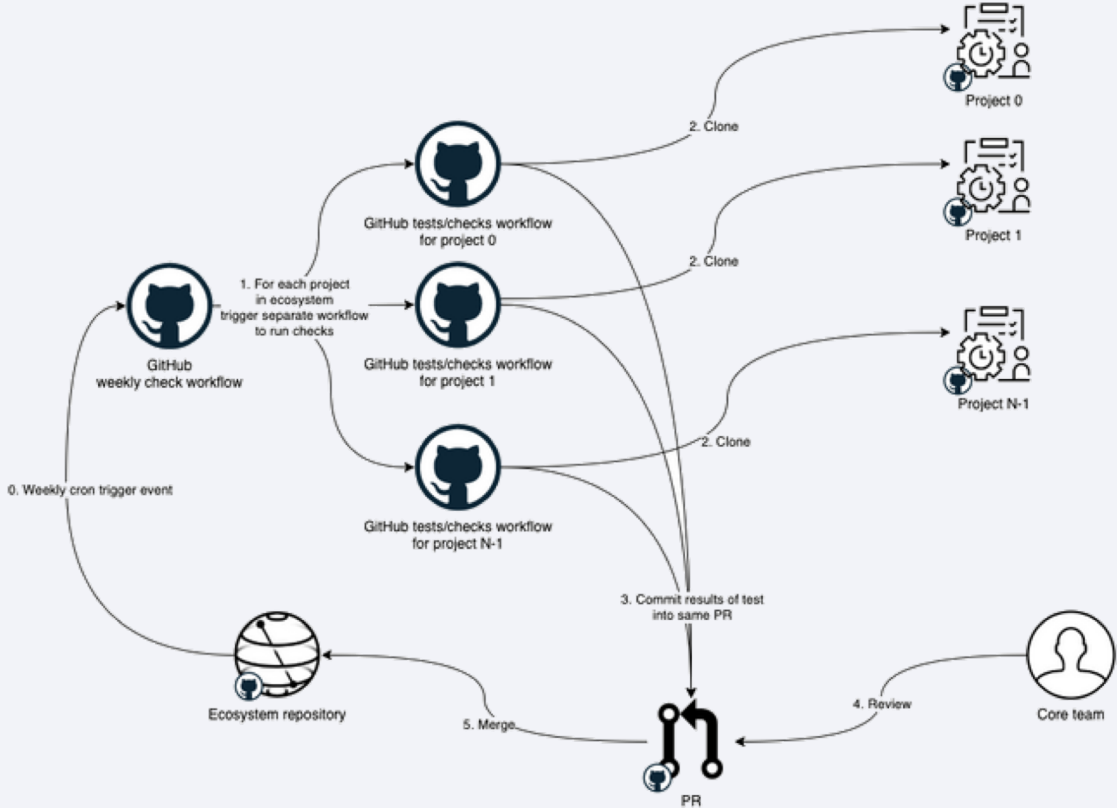
- Pure open-source and handled inside GitHub
- 2 workflows :
  - Submission - is a form to join ecosystem for developers
  - Weekly check - weekly cadence checks that all project in Ecosystem are always in sync with Qiskit



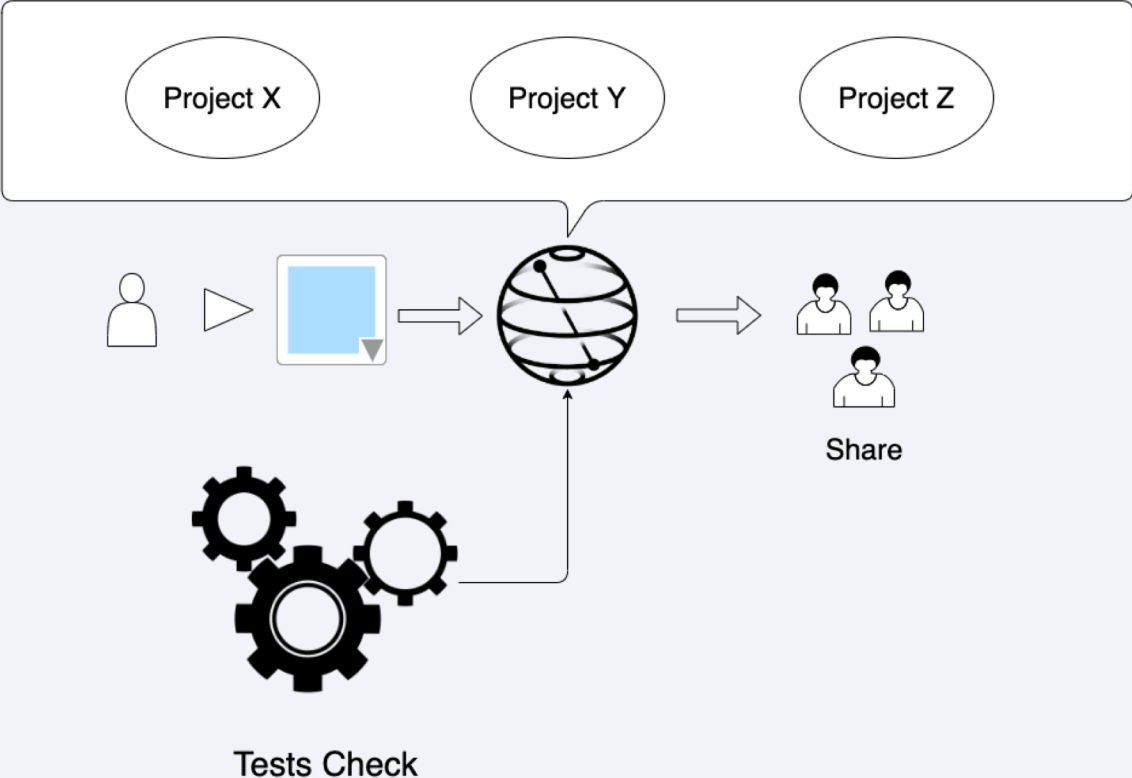
# Submission workflow



# Weekly check workflow



# Functional structure



# Current state



## ❑ Function US

- Most of base scripts
- CI process 🔄

## ❑ No-functional US

- Tests improving 🔄
- Documentation 🔄

## ❑ Quality US

- Templating project ✕

The screenshot displays a GitHub project board with four columns: "To do", "In progress", "QA / Under review", and "Done".

- To do (11 items):**
  - EPIC: QAMP fall 2021 (#9)
  - Docs: readme improvements (#11)
  - CI: Submission handling + submission commands (#15)
  - CI: community members monitoring (#16)
  - Python script: changes monitoring (#17)
  - Badging system (#18)
  - Logger: prettify messages in ecosystem logger (#37)
  - Github: template for python projects (#36)
- In progress (3 items):**
  - Documentation: contribution guide (#26)
  - Python script: test workflow for stable and dev versions of qiskit (#12)
  - Ecosystem configuration refactoring (#19)
- QA / Under review (0 items):**
- Done (14 items):**
  - CI: Github action for tests (#41)
  - Issue #41 | CI: parametric tests action (#43)
  - DB: CRUD for database (#38)
  - Issue 38 | CRUD for json dao (#40)
  - Python script: coverage tests for projects (#13)
  - CI: coverage and black jobs in tests workflow (#33)
  - CI: ecosystem repository tests/checks (#20)



# Roadmap



- Actual goal :
  - Functional 2 workflows for Python projects
  - Documentation ready
  - Optional : add 2 projects in Ecosystem
- Future goal (or if we have time) :
  - Add projects to Ecosystem
  - No-python project → Docker, micro-qiskit, ...

```
from qiskit import QuantumCircuit, execute
from qiskit import Aer, IBMQ
from qiskit.providers.aer.noise import NoiseModel

# Choose a real device to simulate from IBMQ provider
provider = IBMQ.load_account()
backend = provider.get_backend('ibmq_igo')
coupling_map = backend.configuration().coupling_map

# Generate an Aer noise model for device
noise_model = NoiseModel.from_backend(backend)
basis_gates = noise_model.basis_gates

# Generate 3-qubit G2C state
num_qubits = 3
circuit = QuantumCircuit(3, 3)
circuit.h(0)
circuit.cx(0, 1)
circuit.cx(1, 2)
circuit.measure([0, 1, 2], [0, 1, 2])

# Perform noisy simulation
backend = Aer.get_backend('aer_simulator')
job = execute(circuit, backend,
              coupling_map=coupling_map,
              noise_model=noise_model,
              basis_gates=basis_gates)
result = job.result()

print(result.get_counts(0))
```

# Thanks for your attention !



Balaji, Michaël & Iskandar

