R Package Validation at Roche

Coline Zeballos
R Strategy Lead

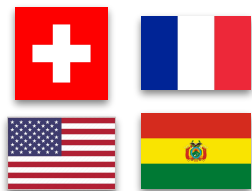November 2nd 2021

Coline Zeballos

Countries I lived in

Education

UNIL | Université de Lausanne
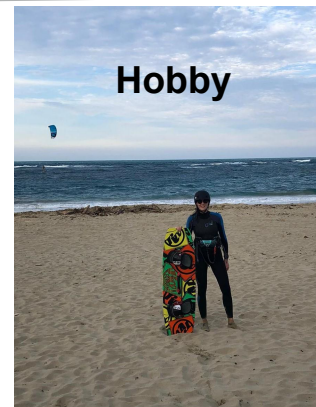
IMD

Professional experience

gsk   Z   Roche

Talks

UPB
UNIVERSIDAD PRIVADA BOLIVIANA

TEDx   Rx Pharma

Co-founder

BAMBOO

Hobby

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What we will cover

Validation
What it is, why it is required

Approach
Roche validation guiding principle

Tool
Roche Internal Validation solution

Documenting
Roche Validation Report content

What's next?
Roche and industry next steps
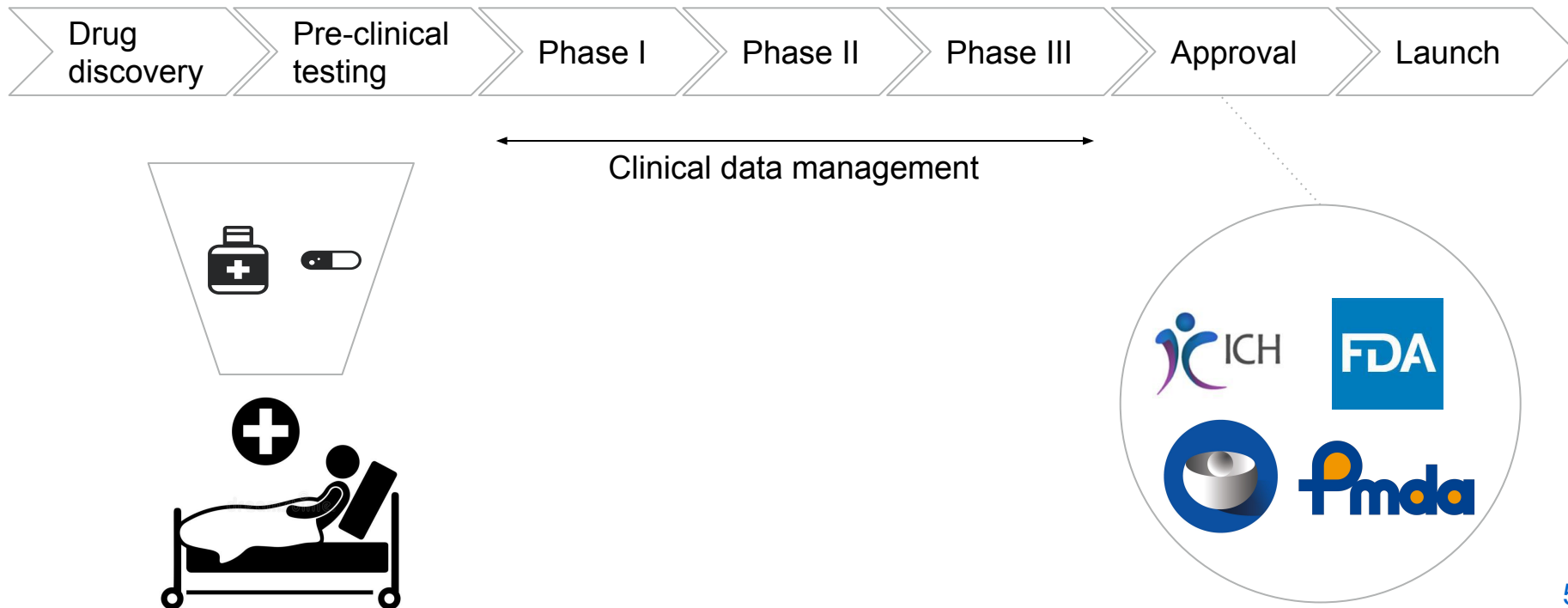
Each time you see this icon, it means there is content you can reuse in your company.

Validation

What it is, why it is required

Rx *Pharma* ◇Roche◇

Validation
What it is, and why is it required

| Drug discovery | Pre-clinical testing | Phase I | Phase II | Phase III | Approval | Launch |

Clinical data management

Validation
What it is, and why is it required

| Drug discovery | Pre-clinical testing | Phase I | Phase II | Phase III | Approval | Launch |

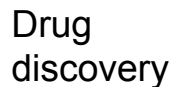"Sponsors should provide the software programs used to create all ADaM datasets and generate tables and figures associated with primary and secondary efficacy analyses. (...) The main purpose of requesting the submission of these programs is to understand the process by which the variables for the respective analyses were created and to confirm the analysis algorithms."
FDA Study Data Technical Conformance Guide, **2018**

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Validation

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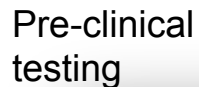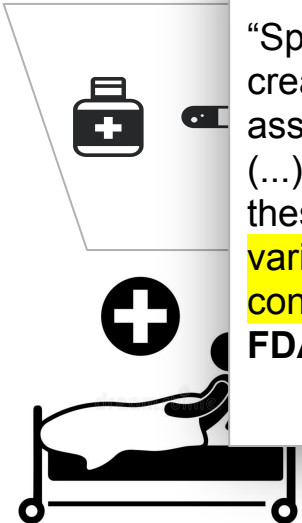"Sponsors should provide the software programs used to create all ADaM datasets and generate tables and figures associated with primary and secondary efficacy analyses. (...) The main purpose of requesting the submission of these programs is to ==understand the process by which the variables for the respective analyses were created and to confirm the analysis algorithms.=="
FDA Study Data Technical Conformance Guide, **2018**

ICH · FDA · pmda

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Validation
What it is, and why is it required

| Drug discovery | Pre-clinical testing | Phase I | Phase II | Phase III | Approval | Launch |

"The computer software used for data management and statistical analysis should be <mark>reliable</mark>, and <mark>documentation of appropriate software testing procedures should be available.</mark>"

ICH E9 Statistical Principles for Clinical Trials
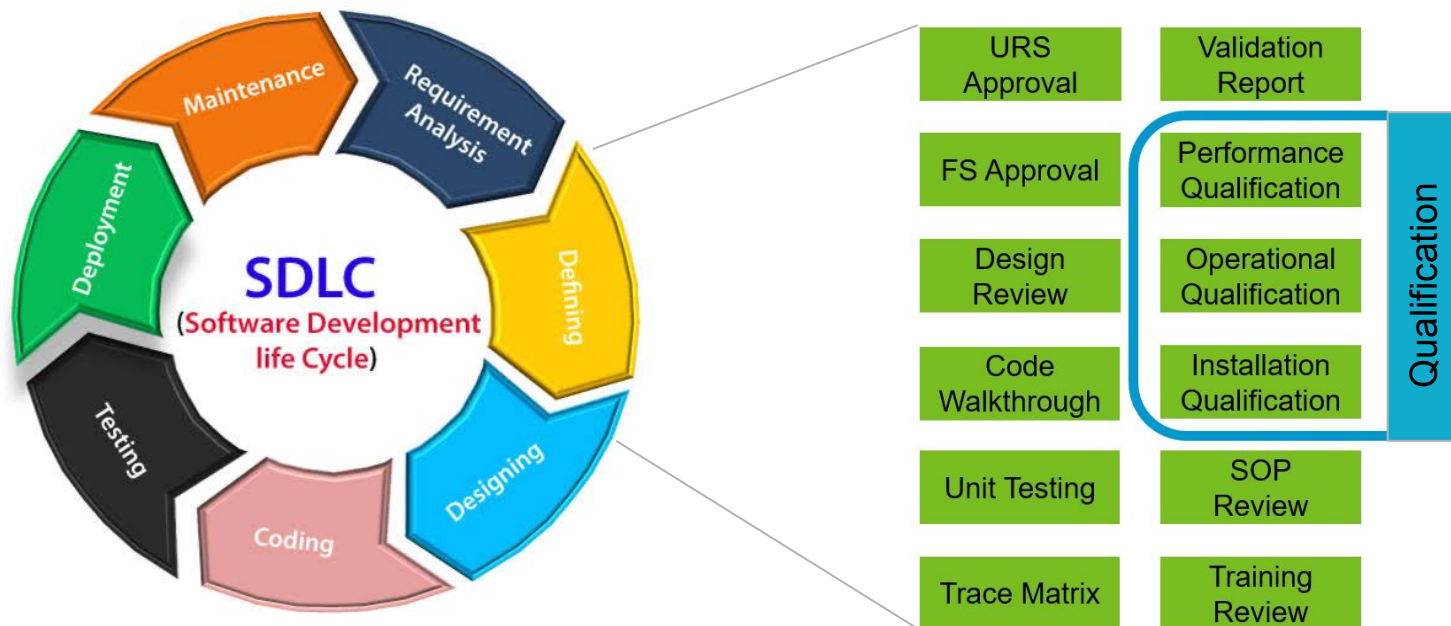
Approach

Roche validation guiding principles

Approach

Software development and validation Lifecycle

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Approach
Roche Validation Guiding Principles

- Bring validation **close** to developers

- **Automate** wherever possible

- Continuously **integrated** validation process

- Lean on public **best practices** wherever possible

- Value **direct**, **open-source** contribution over internal remediation

- Give users freedom to **mix** and **match** (validated) packages at will

- Outside of packages distributed with the R language, **no package gets a free pass** (enabled by extensive automation)

Tool

Roche Internal Validation Solution
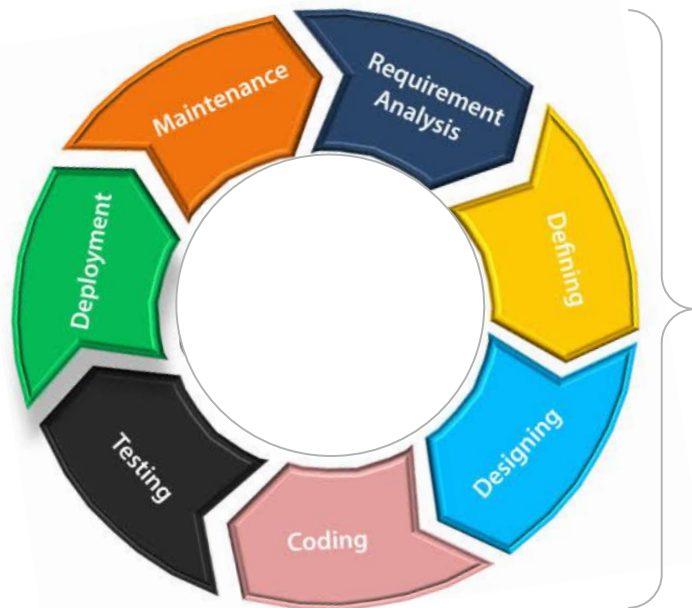
R✗ *Pharma* ⟨Roche⟩

Tool
Roche Internal Validation Solution

①

- R CMD check

- Runs package-specific tests

- Assess test coverage requirements

- Provide developers with immediate constructive feedback

github.com/genentech/covtracer
check out our booth in the expo!

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Tool
Roche Internal Validation Solution

1

- R CMD check

- Runs package-specific tests

- Assess test coverage requirements

- Provide developers with immediate constructive feedback

2

- Compile package metadata into markdown report

- Perform final checks unspecific to R language

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Tool

Roche Internal Validation Solution

3

- Render markdown reports as .pdf outputs with Roche branding

2

- Compile package metadata into markdown report

- Perform final checks unspecific to R language

Maintenance • Requirement Analysis • Defining • Designing • Coding • Testing • Deployment

1

- R CMD check

- Runs package-specific tests

- Assess test coverage requirements

- Provide developers with immediate constructive feedback

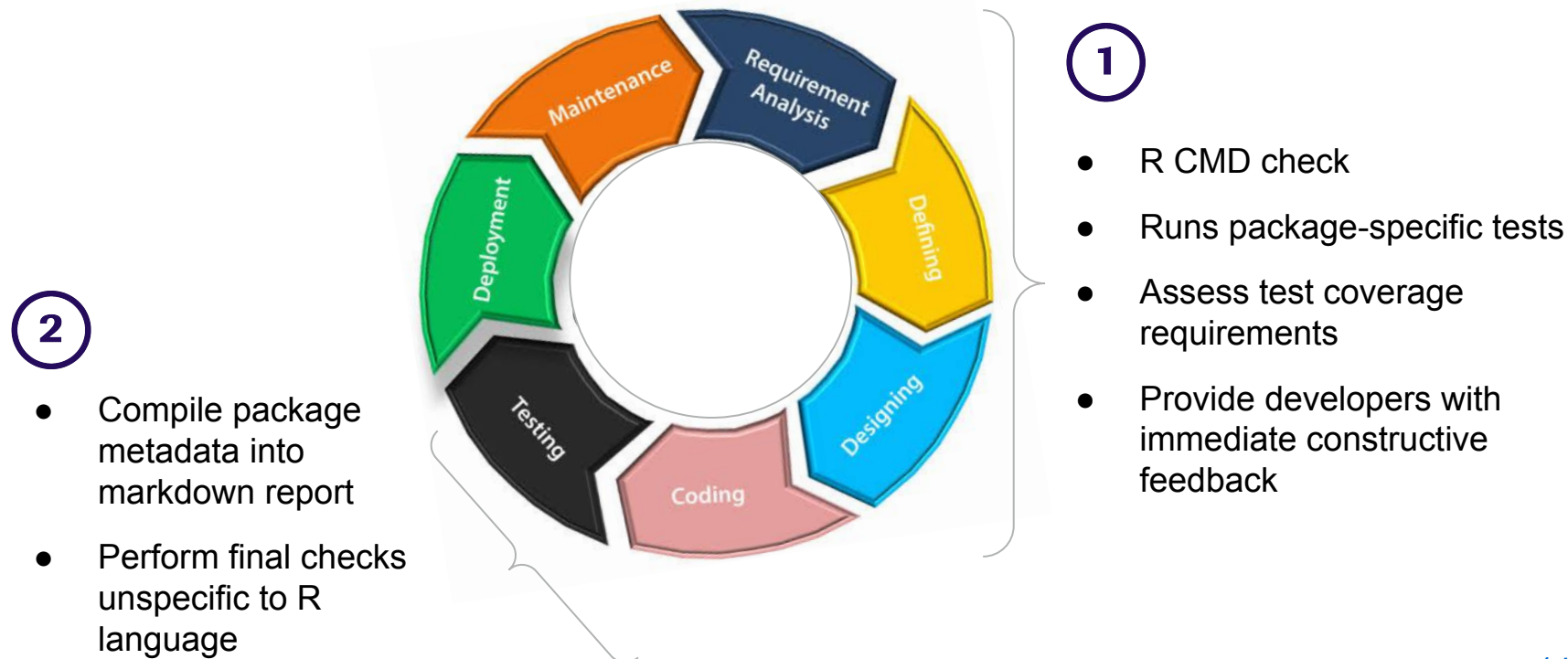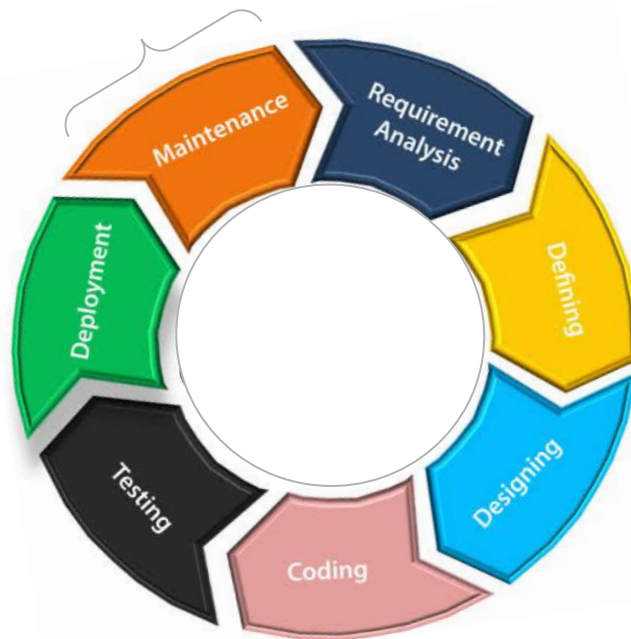RX *Pharma*   Roche

Tool
Roche Internal Validation Solution

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- Validate R packages against a **controlled environment** (container image, server, virtual machine)
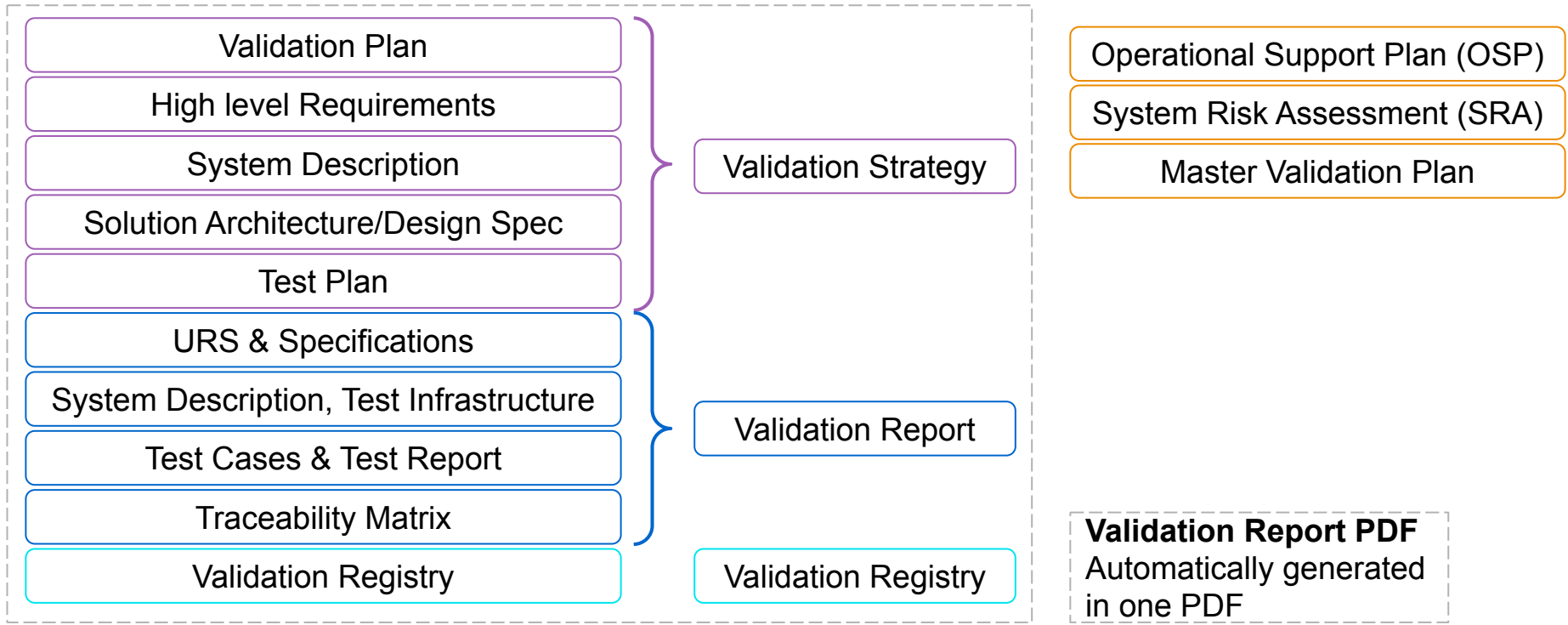- Continuous deployment

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- Support team
- Package Manager
- Versions
- Dependencies

Documenting

Roche Validation Report content

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Validation Plan

High level Requirements

System Description

Solution Architecture/Design Spec

Test Plan

} Validation Strategy

URS & Specifications

System Description, Test Infrastructure

Test Cases & Test Report

Traceability Matrix

} Validation Report

Validation Registry

Validation Registry

Operational Support Plan (OSP)

System Risk Assessment (SRA)

Master Validation Plan

Validation Report PDF
Automatically generated
in one PDF

Work-in-progress GitHub Action Validation Report:
github.com/insightsengineering/thevalidatoR

What's next?

Roche and industry next steps

What's next?
Building a simple ecosystem for users

Package Manager

User

Container

Non validated packages

Validated packages

Internal validation tool

CI/CD
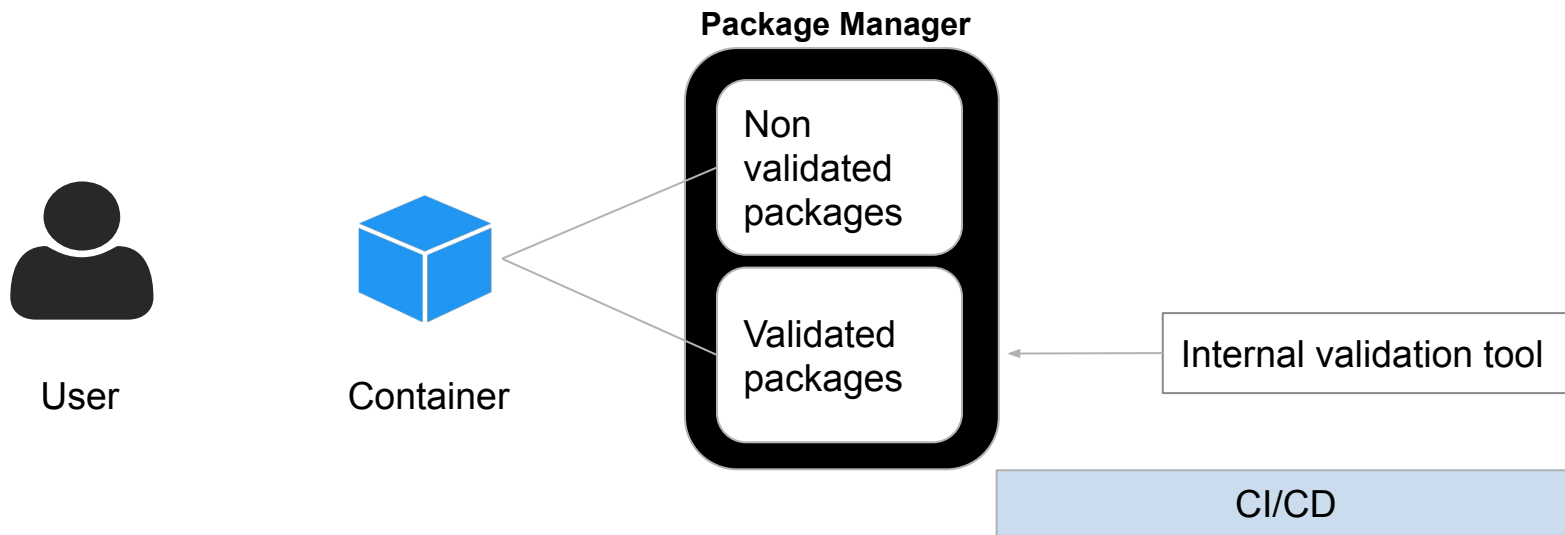
One central place for **non** validated and **validated** R packages, easily accessible to users..

R Pharma

Roche

What's next?
Where we want to be
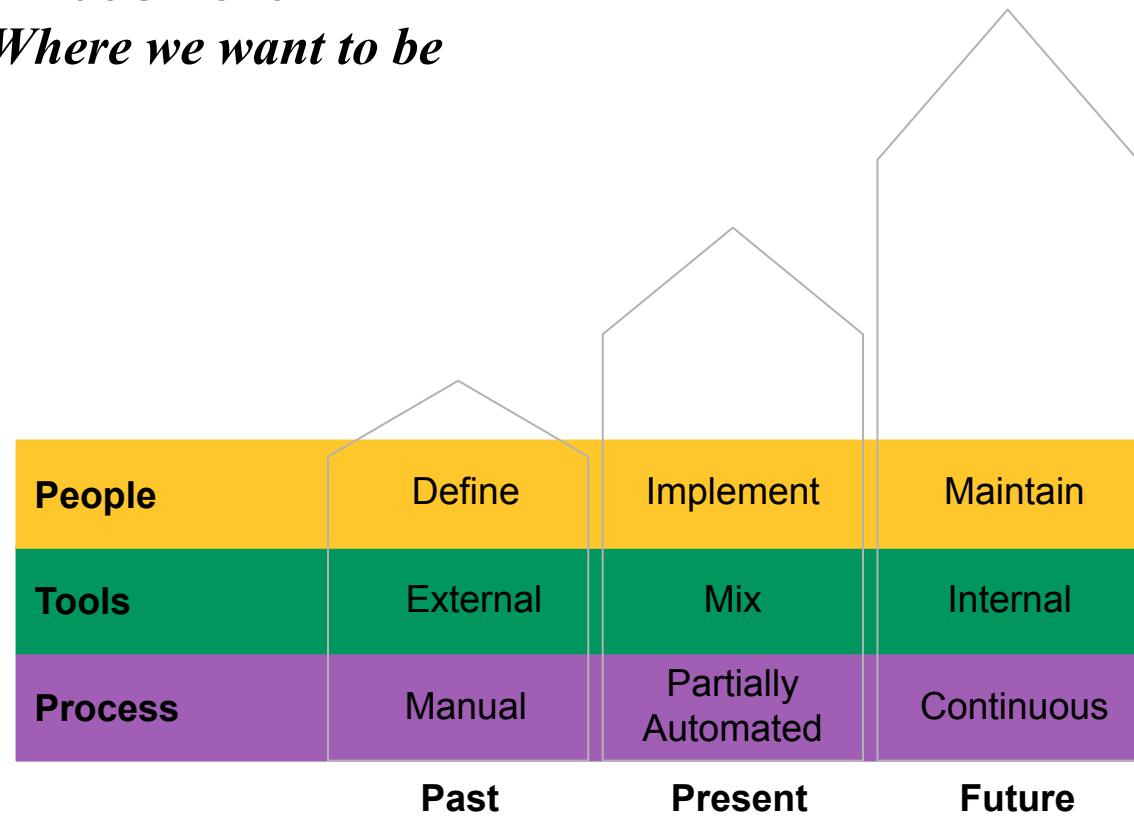
Join the panel discussion around validation & reproducibility today!

Roche, GSK, Novartis, R Validation Hub, Merck Serono

	Past	Present	Future
People	Define	Implement	Maintain
Tools	External	Mix	Internal
Process	Manual	Partially Automated	Continuous

Acknowledgements

Acknowledgments

- **Roche Internal Validation Team**: Doug Kelkhoff, Lorenzo Braschi, Andrew McNeil, Mariabeth Silkey, Krzysztof Klawikowski

- **Roche Smarter Validation Lead**: Anoop Dhillon

- **Roche Diagnostics colleague**: Benjamin Fassbind

- **R/Pharma Organizing Committee**

THANK YOU
Questions?

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