

Software Testing AMPlification for the DevOps Team

## WP2: Configuration Tests Amplification

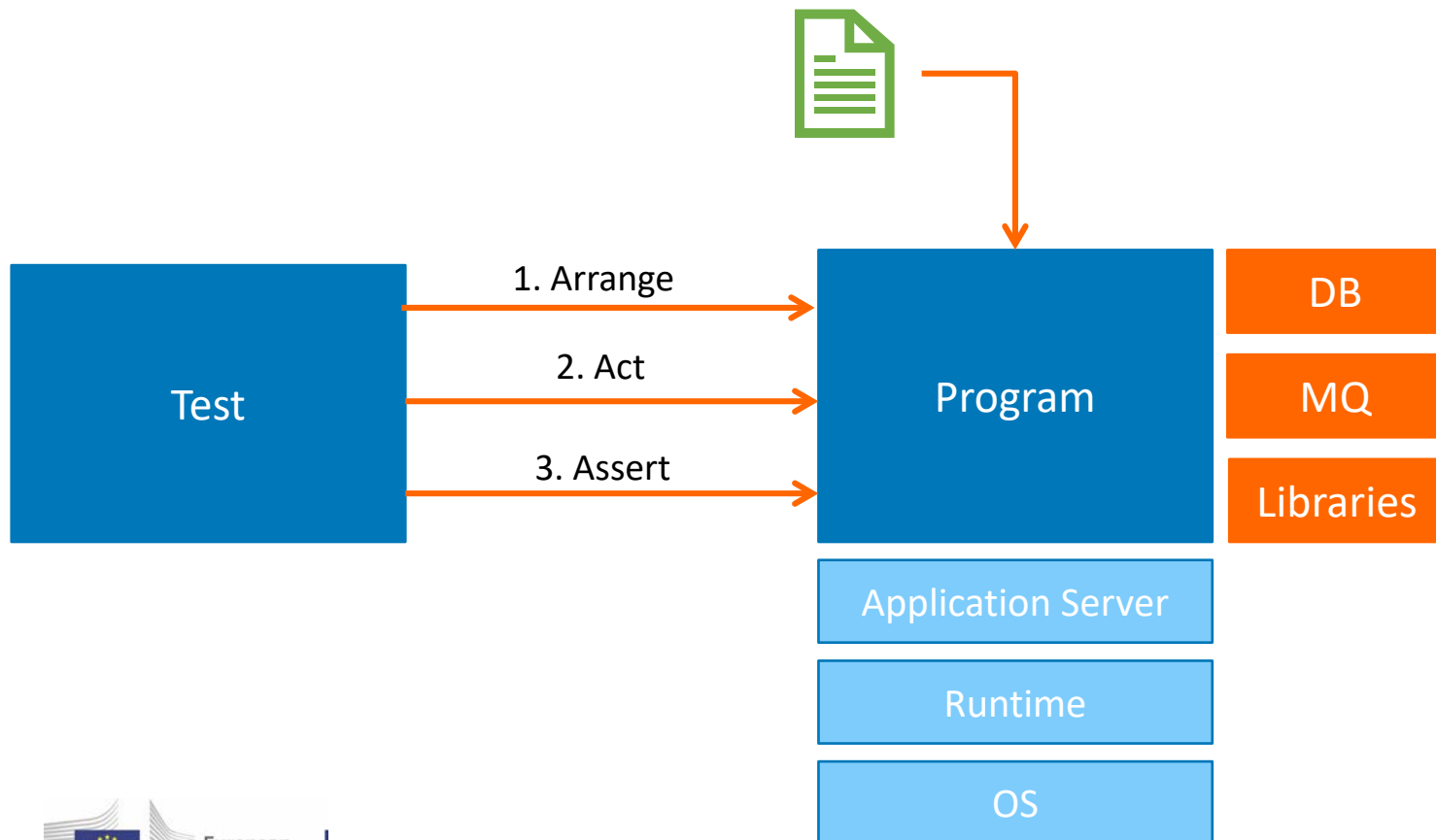
Franck Chauvel (SINTEF)

STAMP Project Final Review  
Brussels, 6 February, 2020



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# Recalling Configuration Testing



# WP2 Overview

ID Task	Leader	Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
T 2.1 Survey state of practice for configuration specification and automatic configuration planning	SINTEF												
T 2.2 Abstract configuration model	SINTEF												
T 2.3 Automatic configuration generation	SINTEF												
T 2.4 Configuration assessment and selection	TellU												
T 2.5 Configuration execution and instrumentation	AEON												
		D2.1		D2.2		D2.3						D2.4	D2.5
		M6		M12		M20						M34	M36



2019



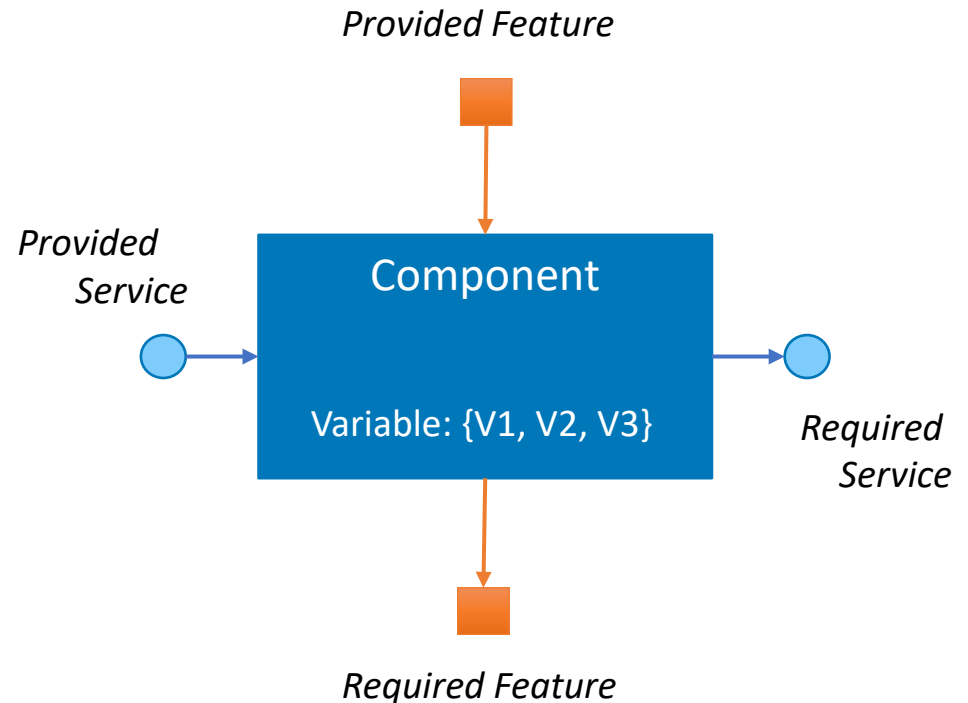
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# Task 2.1: State-of-the-Practice

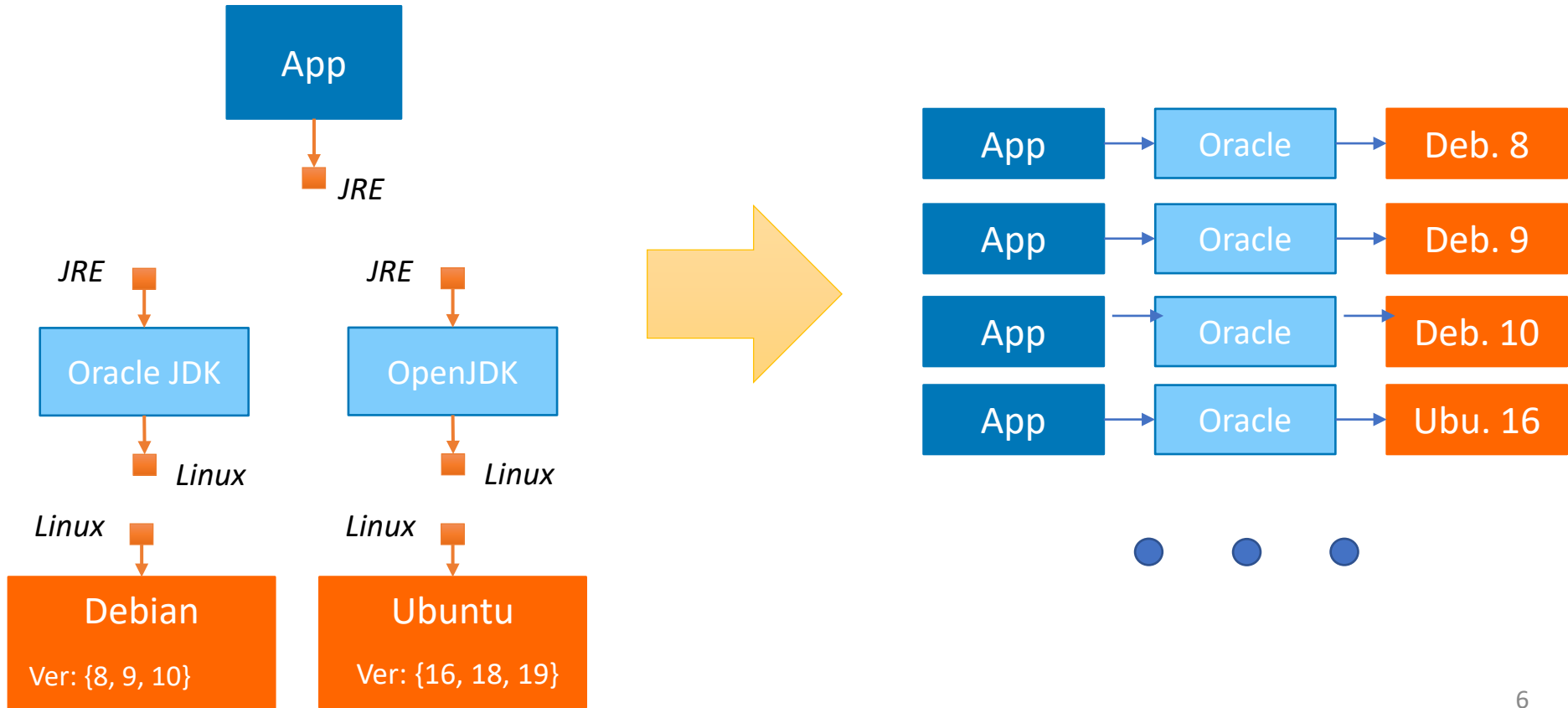
- Survey, documented in D2.1
- Multiple Understanding
  - Libraries / Configuration Files
  - Products / Environments
  - SaaS / Architecture & Scaling
- Conclusions
  - No standard process
  - No tool support
  - Coupled to other type of testing

# Task 2.2 Abstract Configuration Model

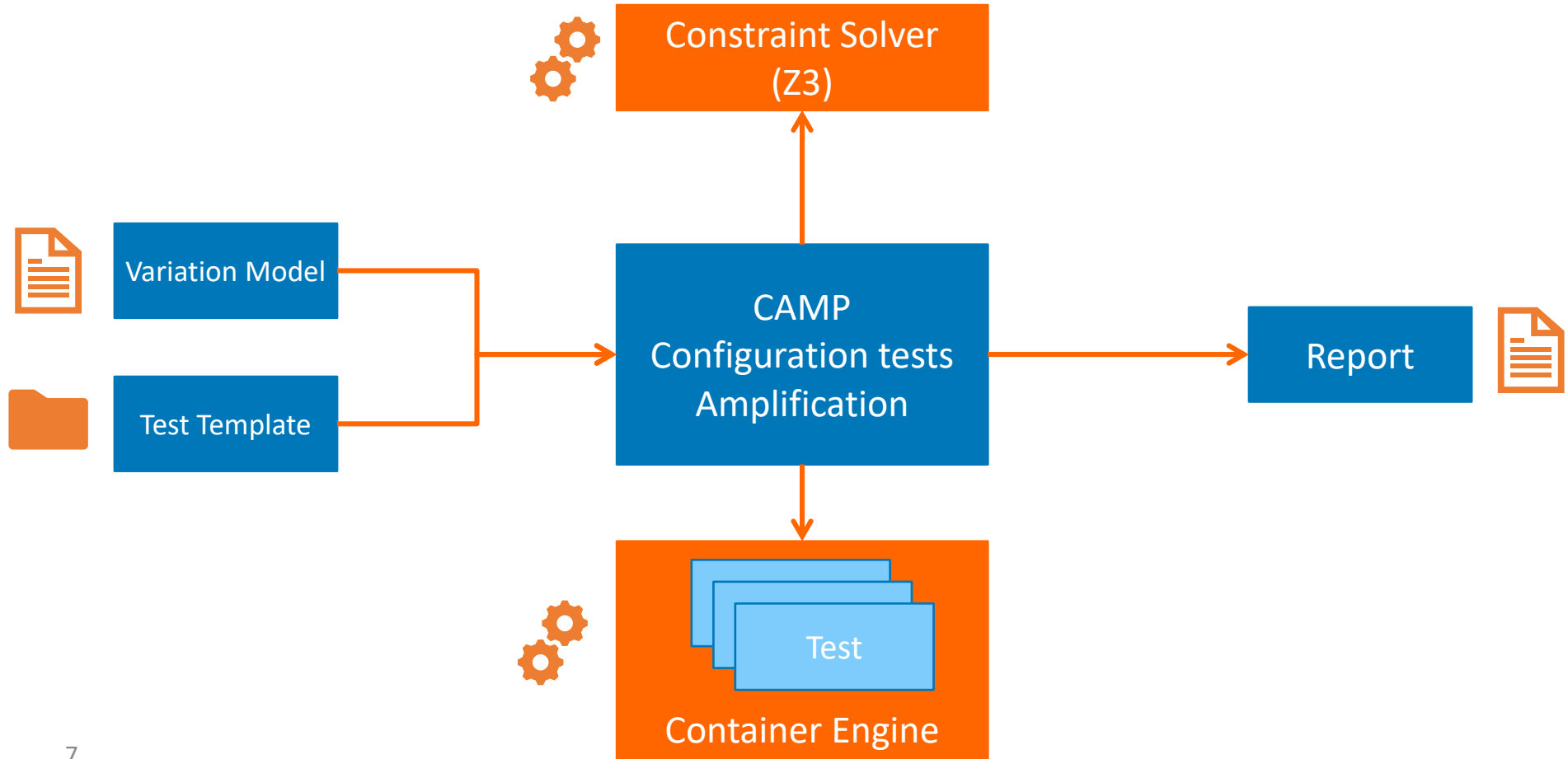
- Documented in D2.2, D2.3 & D2.4
- Services
  - Connections outside the "container"
  - Remote services, DB, etc.
- Features
  - Connections within the container
  - Libraries, OS, frameworks etc.
- Variables



## Task 2.3 Automatic Configuration Generation



# CAMP Overview

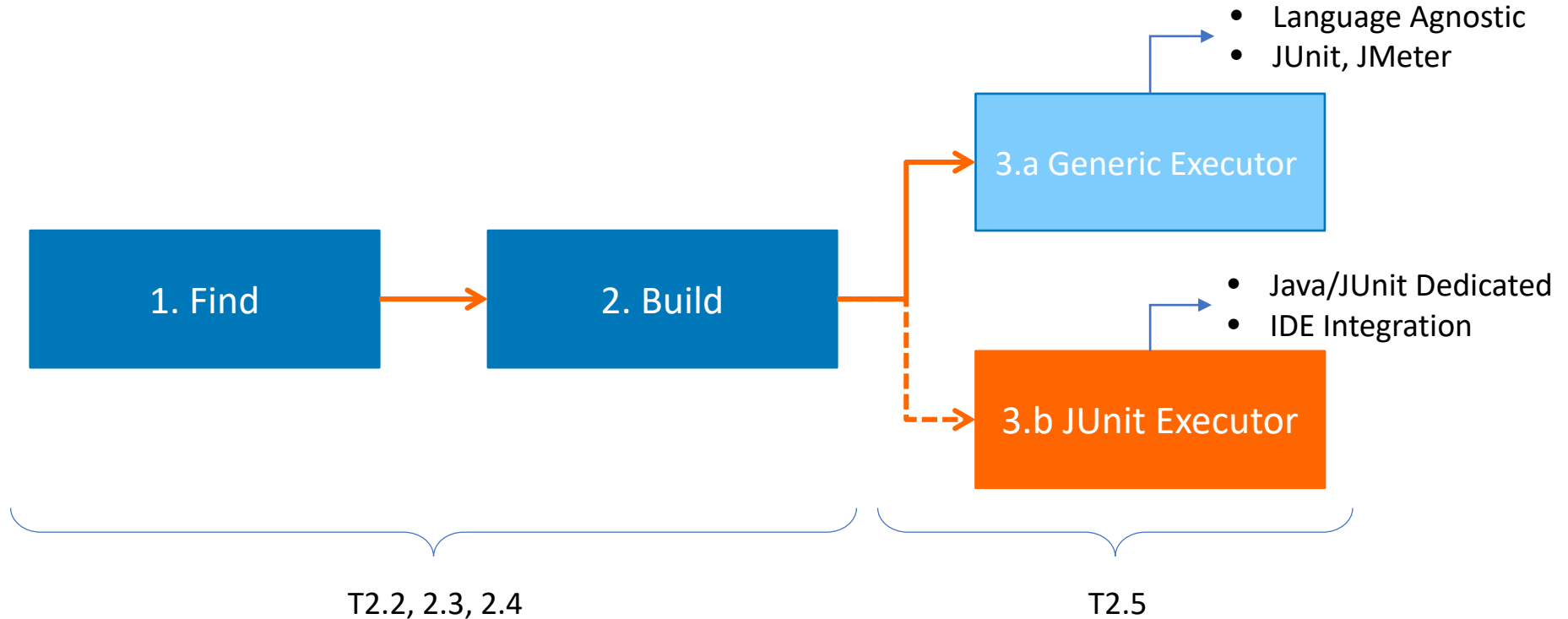


## Task 2.4: Configuration Assessment & Selection

Configuration	JRE		Linux					
	Oracle	OpenJDK	Debian			Ubuntu		
			v8	v9	v10	v16	v18	v19
C1	X		X					
C2		X		X				
C3	X				X			
C4		X				X		
C5	X						X	
C6		X						X

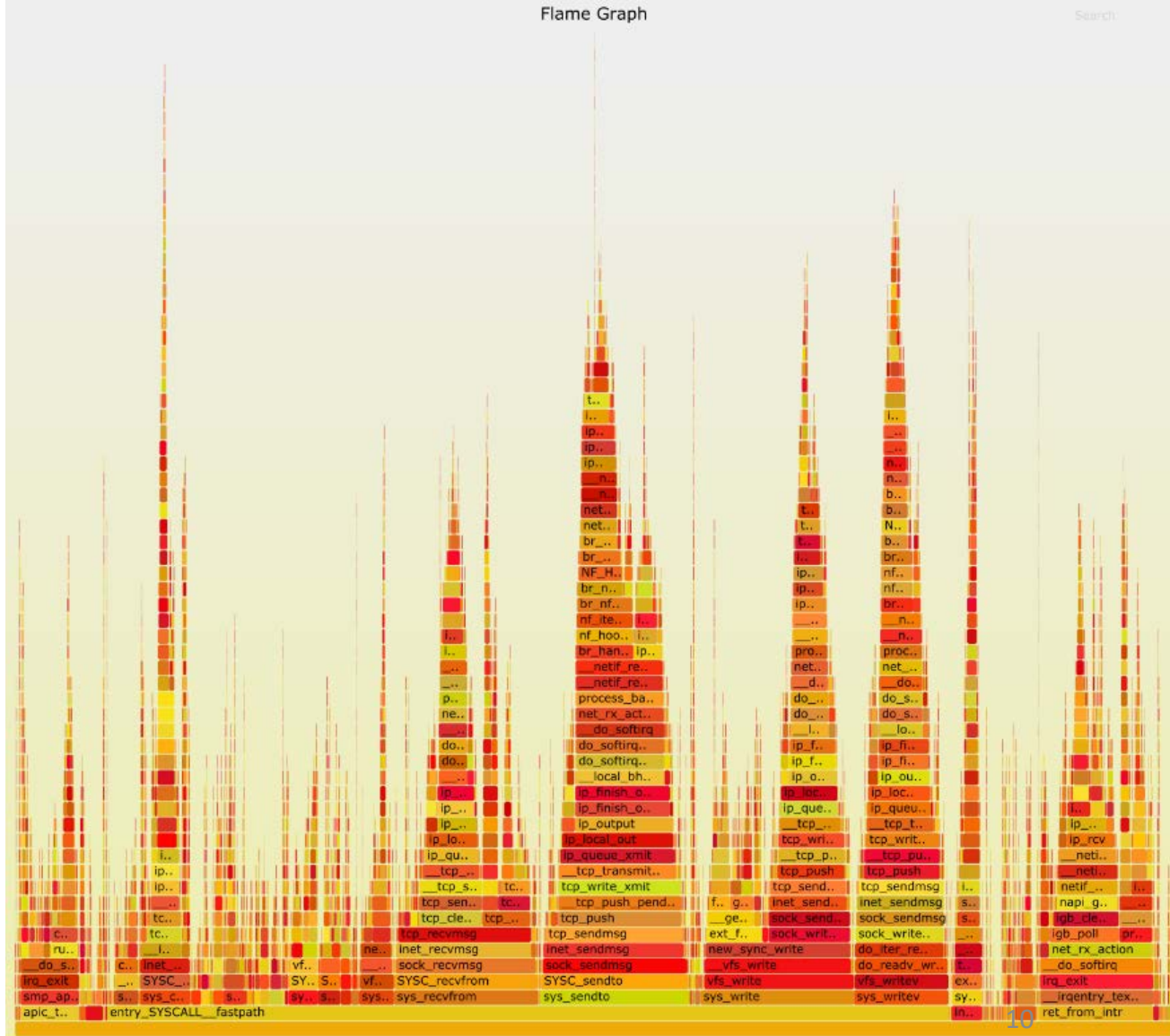


# Task 2.5 Configuration Execution & Instrumentation



# Configuration Instrumentation

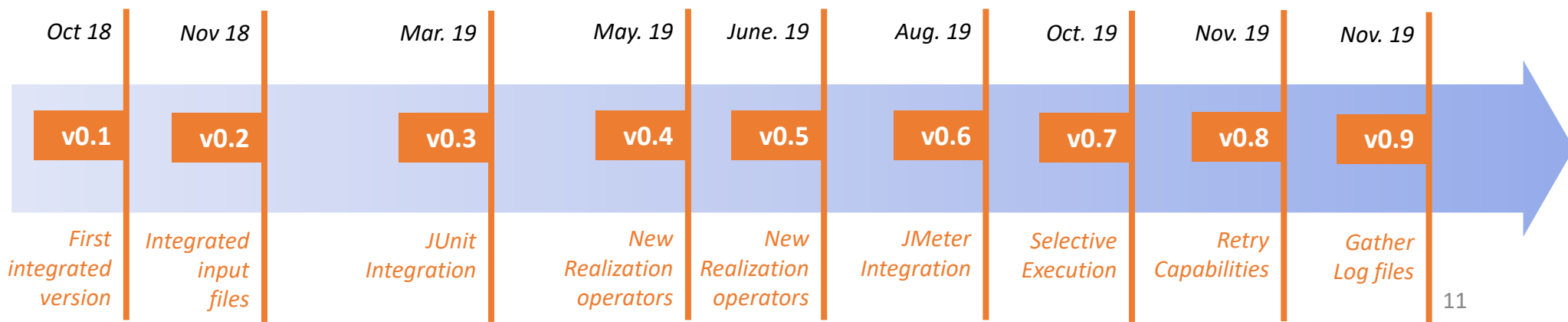
- Observe how alternative configuration exercise the SUT
- 2 Approaches
  - Generic approach: Monitoring System calls.
  - Java-based agent capturing Java Stacks



# CAMP Roadmap

- Open source (MIT License)
- Python + Z3 + Docker

- ~ 7 500 LoC Python
- ~ 250 tests
- 11 contributors
- 30 releases
- 45/65 issues closed
- Online documentation



# Configuration Testing on OSS

## Sphinx v2.0.1

- Python
  - 2k downloads / month
- 7 open-ended dependencies
  - 402 300 configurations
- Covering arrays
  - 22 configurations
  - 3 pass all tests

## Atom v1.36.1

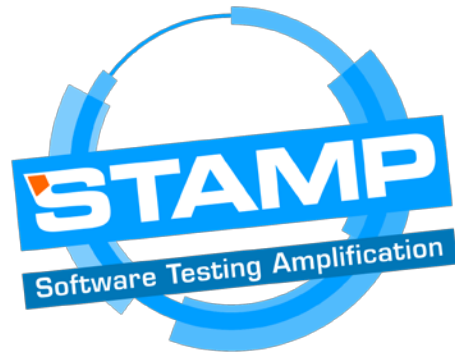
- JavaScript
- 35 open-ended dependencies
  - 150 000 000 configurations
- Covering arrays
  - 21 configurations
  - 12 failed some tests

# WP2 Key Contributions

- SINTEF: CAMP Development
- ENG: CAMP Integration with JMeter
- XWiki: CAMP integration with TestContainer Execution engine
- Activeon: CAMP instrumentation to obtain FlameGraphs

# Conclusions

- All tasks completed
- Tool: CAMP
  - Configuration testing
  - Platform Agnostics
  - Orchestration, stacks, and local configuration
- Multiple Type of Testing
  - Functional
  - Performance
- Dissemination:
  - 1 Journal (4 p. / tool) + 2 conferences
  - 1 Keynote
  - 4 tutorials
  - 1 videos
- Further research on Configuration Testing SINTEF



Thank you!  
Questions, Comments & Discussion



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# Dissemination

- 1 Journal (4-page / tool)
  - Franck Chauvel, Brice Morin, Enrique Garcia-Ceja, CAMP: A tool to amplify software configuration tests, Software Impacts, 2019, 100013, ISSN 2665-9638
- 2 International Conferences
  - Vasilevskiy, Anatoly; Song, Hui; Morin, Brice, "TECOR: Automate the Testing of One Product on Many Configurations", 11th IEEE Conference on Software Testing, Validation and Verification (ICST 2018), IEEE.
  - Franck Chauvel, Brice Morin, Enrique Garcia-Ceja, Amplifying Integration Tests with CAMP in Proceedings of the 30th International Symposium on Software Reliability Engineering (ISSRE 2019), IEEE, to be published.
- 1 Keynote
  - Brice Morin, Configuration testing of Docker-based Microservices, Keynote at A-MOST workshop at ICST 2018
- 4 Live Tutorials:
  - Tutorial at the STAMP workshop, Sophia Antipolis, France, Jan. 2019, by Franck Chauvel
  - Tutorial at Station-F, Paris, France, February 2019, by Enrique Garcia-Ceja
  - Tutorial at OW2Con 2019, Paris, France by Franck Chauvel
  - Tutorial at the A-Test workshop at ESFEC Aug. 2019, Germany, by Franck Chauvel
- 1 video tutorial available at:  
[https://youtu.be/81\\_2H7GOQwg](https://youtu.be/81_2H7GOQwg)