Eiffel@Nasdaq

Claes Richárd, October 2022

COMPANY VISION AND PURPOSE

Leading the Way

We are a company of firsts.

- The world's first electronic stock market.
- The first exchange to support Silicon Valley innovators.
- The first exchange to sell its technology to power exchanges around the world.
- The first major U.S. stock exchange to have a female President and CEO.
- The first exchange to adopt a board diversity rule.
- The first market operator to move its infrastructure to the Cloud.
- The first exchange to open the market in the Metaverse.

At Nasdaq, we don't see the world for what it is, we see it for what it could be. We disrupt. We innovate and We Lead.

COMPANY VISION AND PURPOSE

Mission Critical

We deliver world-leading solutions that improve the liquidity, transparency, and integrity of the global economy.

Market Platforms

We are advancing the modernization of markets to create more sustainable, inclusive and trusted financial networks.

- We operate 30+ exchanges for stocks, bonds, options & derivatives in North America and the Nordics
- We develop and deliver technology on which 130+ other global markets are based, including financial instruments, real estate and carbon removal.
- Introducing two new growth areas: Digital Assets and Carbon Markets.

Capital Access Platforms

We fuel economic growth through transparency and access to capital. We help our clients navigate the capital markets, accelerate their sustainability goals and drive governance excellence.

- We identify unique insights to help all investors grow and preserve wealth.
- We design governance solutions that enable companies to thrive in the public markets.
- We create more equitable opportunities to raising and accessing capital.

Anti-Financial Crime

We help protect the integrity of the financial system and root out financial crime, combatting an ever-increasing threat to the integrity of the global financial system.

- We identify and prevent fraud and money laundering, including drug money and human trafficking.
- We offer market and trade surveillance software, which detects and prevents financial fraud and theft.

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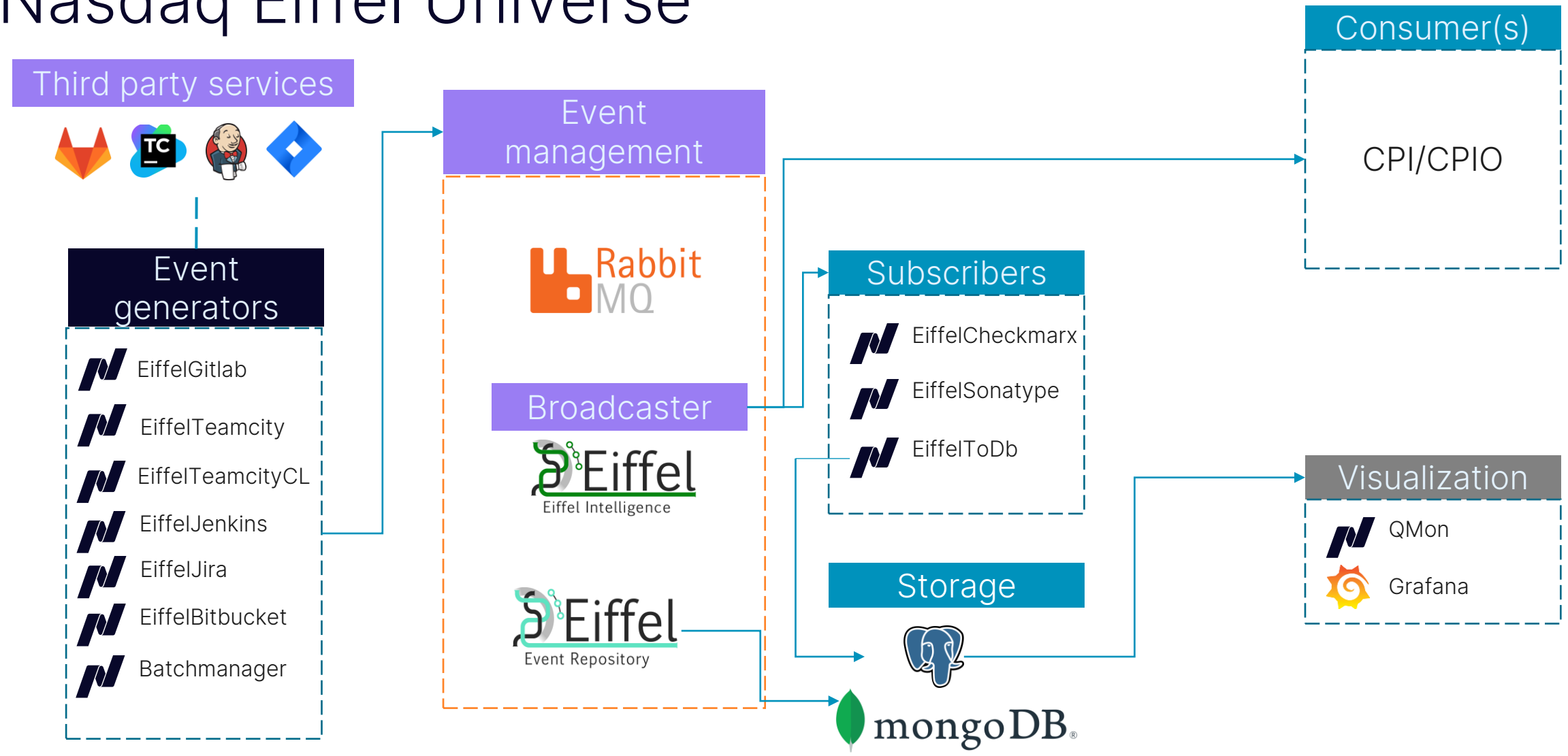
Nasdaq Eiffel Universe



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Services/plugins used

- eiffel-core application
- eiffel-event-repository
- eiffel-teamcity application
- eiffel-teamcity-cl application
- eiffel-gitlab application
- eiffel-jenkins application
- eiffel-to-db application
- eiffel-rabbitmq
- eiffel-postgresdb
- eiffel-mongodb
- eiffel-jira application
- eiffel-intelligence application
- eiffel-grafana
- eiffel-cl-tracker application
- eiffel-bitbucket application
- eiffel-sonatype
- eiffel-checkmarx

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Qmon – The Quality Monitor

ProjectName	Automation Code Coverage	Defect Density	Defect Point Trend	Code Stability	Feedback Loop	Security Score	Code Score	Setup Score	Quality Risk	Defect Leakage	Production Defect Points	Quality Gate
[redacted]	81 %	1	0 %	5,6	0	1	1	4	5 %	0 %	1	1
[redacted]	83 %	24	1 %	6,0	0	1	2	4	13 %	32 %	73	1
[redacted]	87 %	3	-76 %	2,8	0	1	1	4	16 %	0 %		1
[redacted]	50 %	5	0 %	6,0	0	2	3	4	17 %	73 %	297	1
[redacted]	87 %	194	-1 %	6,0	0	1	1	3	17 %			5
[redacted]	66 %	8	0 %	4,2	0	1	2	3	17 %			2
[redacted]	54 %	14	-4 %	3,8	1	1	1	4	21 %	18 %		1
[redacted]	81 %	49	0 %	5,0	0	1	1	4	22 %	13 %	264	1
[redacted]	29 %	2	-9 %	4,5	0	2	3	4	25 %	86 %	320	5
[redacted]	34 %	18	0 %	6,0	0	2	4	4	25 %	78 %	586	1
[redacted]	36 %	2	-2 %	2,4	1	1	1	4	26 %	89 %	64	5
[redacted]	35 %	6	5 %	4,5	0	2	3	4	26 %	65 %	811	5
[redacted]	53 %	19	0 %	5,3	0	2	5	4	28 %	47 %	218	1
[redacted]	7 %	26	0 %	5,7	0	2	3	4	30 %	0 %	1	5

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Qmon – Defect report

Market Technology MIO - Quality Report

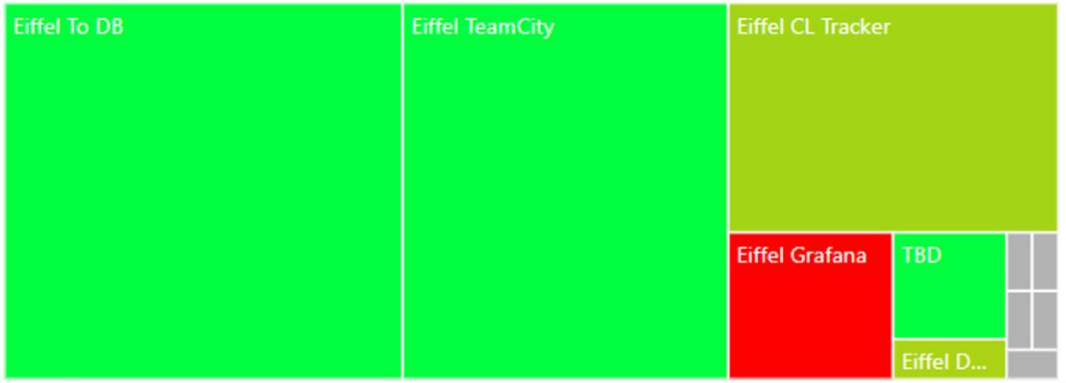
ProjectName	Automation Code Coverage	Open Defect Points	Code Size (kNCLOC)	Defect Point Trend	Code Stability	Feedback Loop	Security Score	Code Score	Setup Score	Quality Risk	Defect Leakage	Code Complexity	Open Defect Points Compare Period
[redacted]	81 %	6	6	0 %	5,6	0	1	1	4	5 %	0 %	0,12	8
[redacted]	87 %	1016	378	-54 %	2,8	0	1	1	4	16 %	0 %	0,14	2216
[redacted]	50 %	1101	214	0 %	6,0	0	2	3	4	17 %	73 %	0,19	1101
[redacted]	87 %	680	3	-1 %	6,0	0	1	1	3	17 %	[redacted]	0,17	688
[redacted]	66 %	120	16	0 %	4,2	0	1	2	3	17 %	[redacted]	0,13	120
[redacted]	38 %	240	307	0 %	6,0	0	2	4	4	20 %	52 %	0,20	240
Eiffel	81 %	864	18	0 %	5,0	0	1	1	4	22 %	13 %	0,13	864
[redacted]	36 %	2661	[redacted]	0 %	3,0	0	1	1	4	23 %	[redacted]	0,16	2653
[redacted]	54 %	6196	422	0 %	3,8	1	1	2	4	23 %	18 %	0,17	6181
[redacted]	29 %	644	410	-9 %	4,5	0	2	3	4	25 %	[redacted]	0,19	708
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Totalt	43 %	271302	6409	2 %	3,5	0	2	3	4	38 %	30 %	0,17	266832

Fix Version

[redacted]

Defect Leakage and Total Defect Points by Project

Defect Leakage and Total Defect Points by Component



Detailed Bug Data

KeyId	Summary	CreateDate	Severity	Status	Resolution	TestLevel	Customer_defect_point	Internal_defect_point	ResolutionD
EIF-171	eiffel-to-db uses a hardcoded artifactory repo which does not contain all snapshots	2021-11-04	Medium	Backlog		Other Activities than testing	0,00	8,00	
EIF-173	The Eiffel CL tracker shows 'unauthorized' for all users	2021-11-08	Very High	Reopened		Integration Test Internal	0,00	128,00	
EIF-182	Not all BitBucket repos are displayed in the CL tracker mapping page	2021-11-15	High	Backlog		Integration Test Internal	0,00	64,00	
EIF-236	Resolve artifact repository connection for eiffel maven components	2022-02-23	Medium	Verification Done		Functional Test - Manual	0,00	8,00	
EIF-320	Code stability refers to a broken/wrong link	2022-06-27	Medium	Backlog		Functional Test - Manual	0,00	8,00	
EIF-322	Feedback loop frozen value	2022-07-18	Medium	Development Done		Functional Test - Manual	0,00	8,00	
EIF-336	Eiffel TeamCity plugin slows down build start-up drastically (>15 min.)	2022-09-29	Critical	Development		Functional Test - Manual	0,00	640,00	
Totalt							720,00	2 089,00	

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Qmon – InfoSec Tollgates

InfoSec Tollgate Report

Project Name	Project Key	Branch	Commit
Alla	Flera val	Alla	Alla

InfoSec Tollgate	Timestamp	Project Name	Commit	Branch	Checkmarx High Vulnerabilities	Sonatype Critical Policy Violations	Checkmarx Medium Vulnerabilities	Sonatype Severe Policy Violations
Fail	10-05-2022 04:07:13	eiffel-teamcity	e9fe4300dd844c5bca9a93f2759763b9700f5fd4	refs/heads/master		0		
Fail	10-05-2022 03:22:04	eiffel-teamcity	11566400da0e37b32ea27407c8a303748ce3803f	refs/heads/master		0		
Fail	10-05-2022 08:58:46	eiffel-teamcity	d6d26afe0a5cf46160e2495845aead8b2d10d528	refs/heads/bugfix/EIF-336		0		
Fail	10-03-2022 03:43:59	eiffel-teamcity	4bf28c913fdcd05d98a78f547afe407ad4c66380	refs/heads/master		0		
Fail	10-03-2022 03:17:45	eiffel-teamcity	4837c07c55db7af2b53c7602087f5a9b6569eb2b	refs/heads/bugfix/EIF-336		0		
Fail	09-20-2022 11:51:01	eiffel-core	70a0d689f3a6433044738a15e75017cb15036699	refs/heads/feature/NV-2203	0	21	1	3
Fail	09-14-2022 09:36:35	eiffel-snyk	0317e4bb39678af33e38dc97ae685e6a43d8914c	refs/heads/master		1		1
Fail	08-18-2022 09:57:41	eiffel-bitbucket	199778b1e13b6a37098a12e41dcb574d65a3e490	refs/heads/feature/TOOL-5089		0		
Pass	07-25-2022 11:02:42	eiffel-bitbucket	7c8c7ea0bf7e62e56d62cca841599a5a382d56ce	refs/heads/master	0	0	9	
Pass	07-25-2022 10:57:01	eiffel-bitbucket	e5d2673942c4b59985ddca7c288b2bfb6cd8b9dd	refs/heads/master	0	0	9	
Pass	07-20-2022 09:23:19	eiffel-gitlab	e2968168121e5878ead8f806364d5e76c2cb7ece	refs/heads/EIF-321	0	0	1	1
Pass	07-20-2022 07:41:14	eiffel-bitbucket	bd7161bf8160b1e33d98fcc8ff4a76b03d1bc994	refs/heads/master	0	0	9	
Pass	07-19-2022 12:22:51	eiffel-bitbucket	c17a1b88d960ac876fb9b57065efa90a022fc831	refs/heads/EIF-321	0	0	9	

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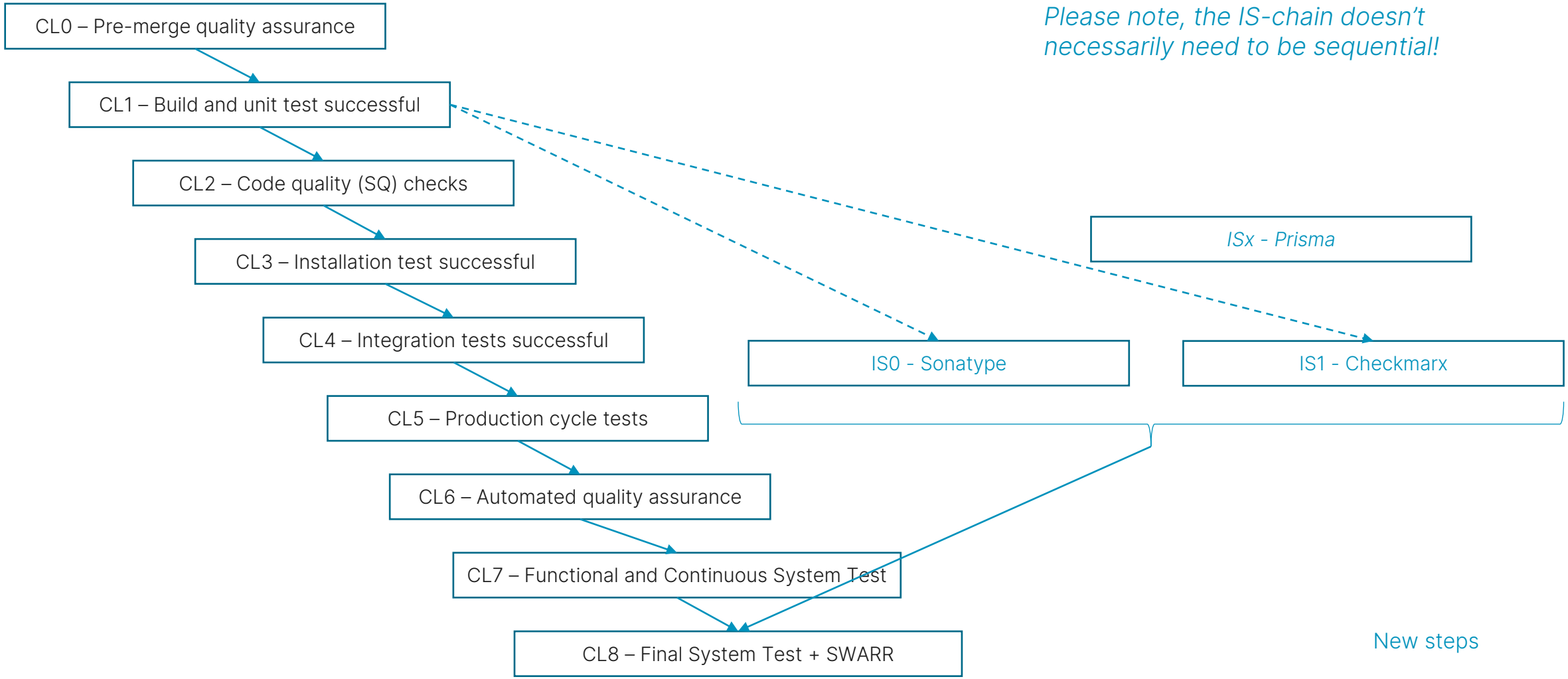
CL- and InfoSec chain



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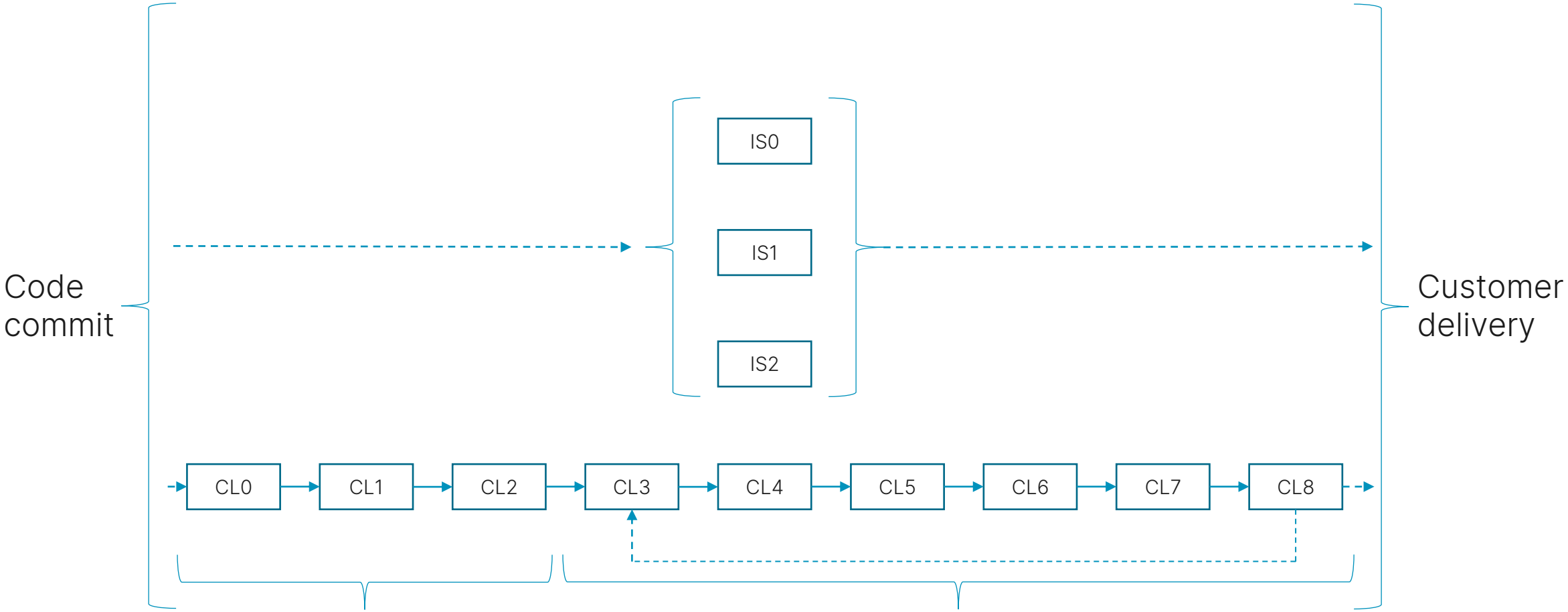
CL/IS flow of events



Build, unit test, static code analysis and package. Done ***once (Product context)***

Installation tests through to final system tests. ***Repeated*** in several different contexts/environments ***(CPI context))***

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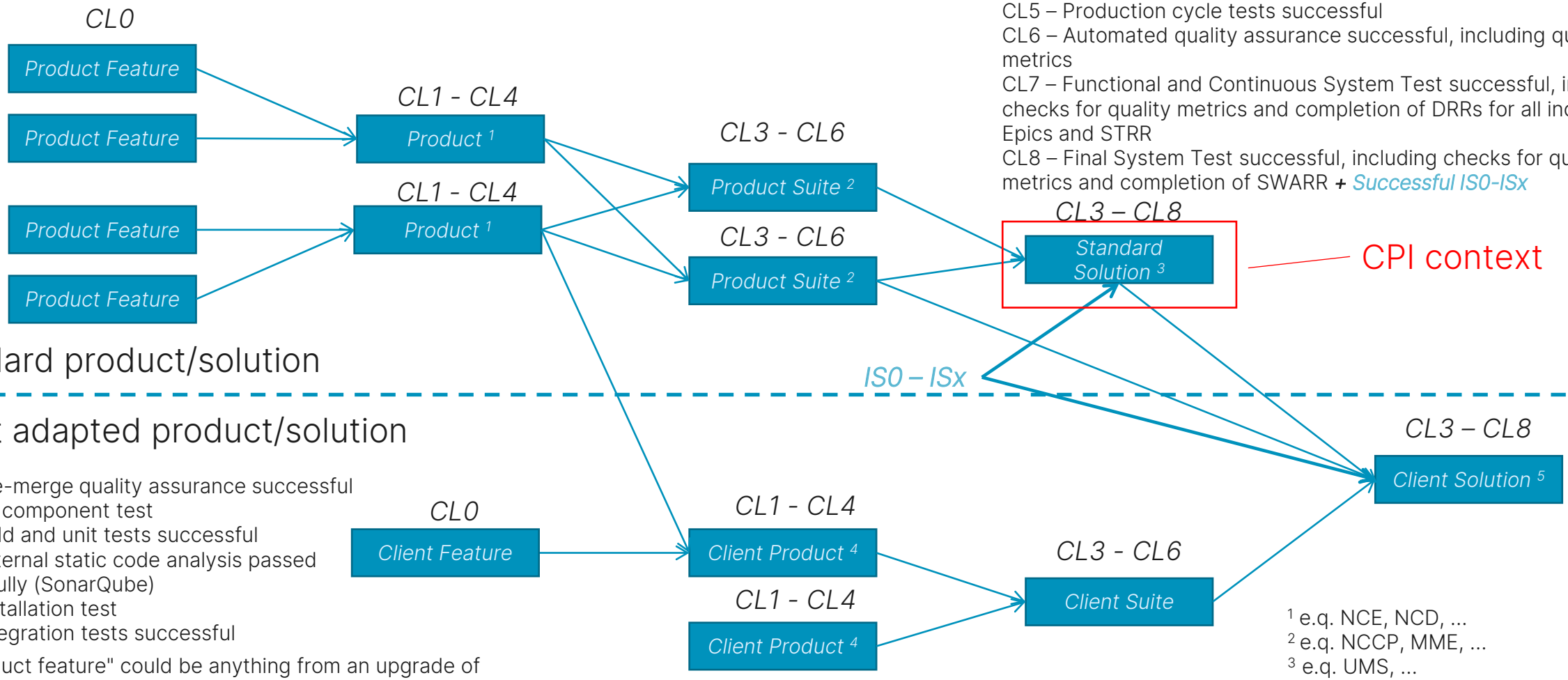
CICD & CPI process & flow



CL0 – Pre-merge quality assurance successful including component test
CL1 – Build and unit tests successful
CL2 – External static code analysis passed successfully (SonarQube)
CL3 – Installation test
CL4 – Integration tests successful

A "Product feature" could be anything from an upgrade of underlying software to work with a new FD

CL5 – Production cycle tests successful
CL6 – Automated quality assurance successful, including quality metrics
CL7 – Functional and Continuous System Test successful, including checks for quality metrics and completion of DRRs for all included Epics and STRR
CL8 – Final System Test successful, including checks for quality metrics and completion of SWARR + *Successful IS0-ISx*

[1] e.q. NCE, NCD, ...
[2] e.q. NCCP, MME, ...
[3] e.q. UMS, ...
[4] e.q. NCE with customer extensions, purpose built gateway, ...
[5] e.q. Customer solutions

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Continuous Product Integration - CPI

Increase the quality and confidence level of our NFF-based product suite integration, for standardized APIs and integration flows, by establishing a continuous product integration test pipeline and defining the cross-product API strategy.

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CPI – Upgrade Product

= PIE

Artifacts

MME 1.0.0.2-SNAPSHOT

Product team(s)
CL0 – CL6

CPIO

Stop & Upgrade (CL3)

Customer A

PIE

Customer buckets

Customer B

PIE

Stop

Upgrade

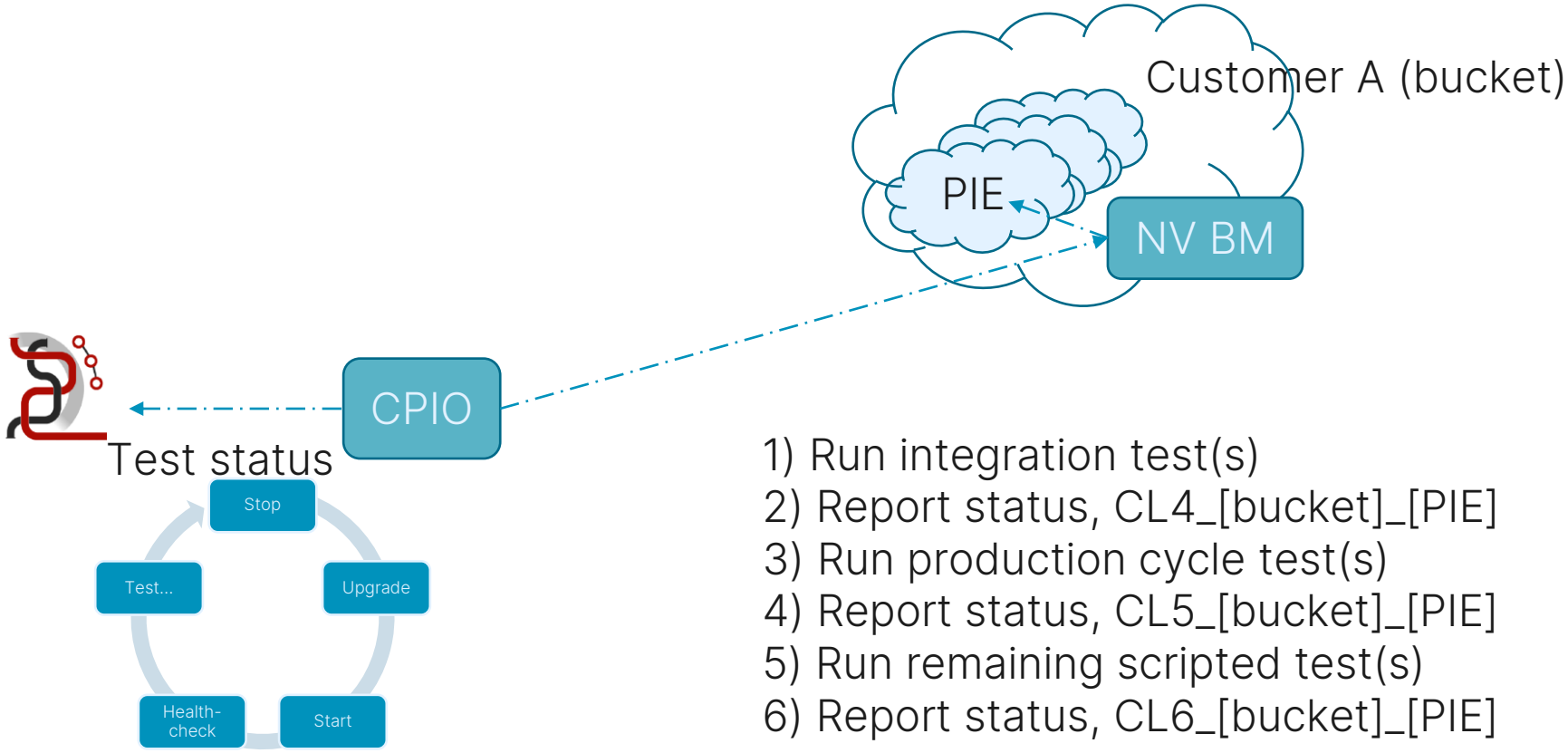
Start

Health-check

Test...

PIE – Product Integration Environment (the test environment)

CPI – Run test(s)



1) Run integration test(s)
2) Report status, CL4_[bucket]_[PIE]
3) Run production cycle test(s)
4) Report status, CL5_[bucket]_[PIE]
5) Run remaining scripted test(s)
6) Report status, CL6_[bucket]_[PIE]

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Next steps...

CICD/DORA metrics

Infrastructure/operational tune-up

Nasdaq
Q&A
Thanks for joining!