

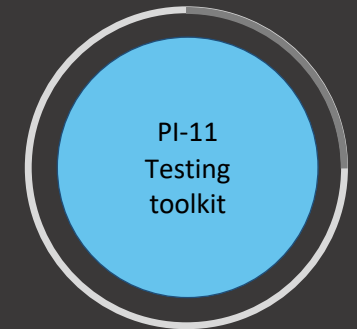
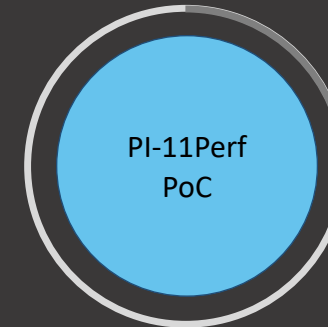
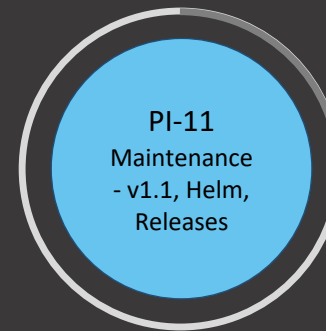
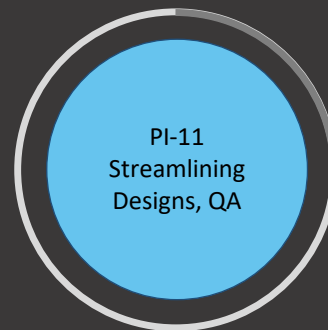
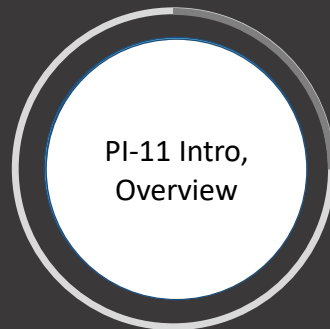
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Mojaloop PI-12

Phase-4 Going live!

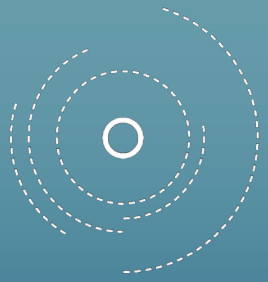
Mojaloop PI-12

Phase-4 Going Live!



PI-11 Core Report-out: Agenda

1. PI-11 Overview of changes and progress
2. OSS Community, Collaboration Updates
3. PI-11 Focus Areas



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ML Overview PI-11

Features, Improvements & Community Support

Mojaloop PIs Overview

Timeline	Summary
Phase-1 (2016 - 17)	Level One Project <ul style="list-style-type: none"> Reference Implementation 6 Program Increments (PIs)
Phase-2 (2018)	Road To Productionization <ul style="list-style-type: none"> 1 – 4 Program Increments
Phase-3 (2019 Jan - Dec)	Supporting Adoption & Deployment <ul style="list-style-type: none"> PI-5 (Feb – April): Account lookup, QA Framework, Streamlined CI, Release process, Error endpoints, Documentation, Node Upgrade, Bug Fixes & Community support, Bulk Transfers Design PI-6 Event handling framework, Bulk Transfers PoC, API Gateway, OSS Settlements API, Quoting Service, ALS PI-7 Event & Error Handling framework, Packaging, OSS Settlements, Performance testing capabilities, QA PI-8 Consolidation, Performance, Community Support
Phase-4 (2020 Jan - Dec)	Going Live <ul style="list-style-type: none"> PI-9: Performance Testing & Improvements, Merchant Request to Pay, Operational Monitoring, Testing toolkit, Settlement v2 PI-10: Performance PoC, Standardizing Bulk Transfers, Testing toolkit, Settlement v2, Adopting FSPIOP API v1.1, Versioning PI-11: Performance PoC, Standardizing designs, code & QA, Adopting FSPIOP API v1.1, Versioning, PISP support, Code quality PI-12: <i>Hardening, Packaging, Releases and prep for Phase-5 (October'2020 – January'2021)</i>

Switch Functionality – Mojaloop (Phase-4 PI-11)

Mojaloop: Focus Use-cases

1. P2P
2. Merchant 'Request to Pay'
3. Bulk Payments
4. PISP payments

Payer-Initiated Transaction*

- [●] P2P Transfers
- [●] Prepares, Fulfils, Query
- [●] Rejections, Timeouts
- [●] Error Endpoints

Payee-Initiated Transaction

- [●] MIMP Transfers
- [●] Transaction Requests
- [●] Prepares, Fulfils, Query
- [●] Rejections, Timeouts
- [●] Error Endpoints

Bulk Payments*

- [●] Bulk Transfers
- [●] Prepares, Fulfils, Query
- [●] Rejections, Timeouts
- [●] Error Endpoints

PISP Payments*

- [●] PISP
- [●] Transfers
- [●] Account Linking
- [●] Un-linking
- [●] Error scenarios

Key

- [●] Fully implemented
- [●] PoC / Initial Version
- [●] Partially implemented
- [●] Not implemented
- [○] Out of Scope

Mojaloop FSPIOP API v1.0 – Use-cases

Payer-Initiated Transaction

- [●] P2P Transfers
 - [●] Prepares, Fulfills
 - [●] Rejections, Timeouts
 - [●] Error Endpoints
- [●] Customer-Initiated Merchant Payment
- [●] Customer-Initiated Cash-out - Receive Amount
- [●] Customer-Initiated Cash-out - Send Amount
- [●] ATM-Initiated Cash-out
- [●] Refund

Bulk Transactions

- [●] Bulk Payments

Payee-Initiated Transaction

- [●] Merchant-Initiated Merchant Payment
- [●] Agent-Initiated Cash-out
- [●] Agent-Initiated Cash-In – Send Amount
- [●] Agent-Initiated Cash-In – Receive Amount

Payee-Initiated Transaction using OTP

- [●] Merchant-Initiated Merchant Payment Authorized on POS
- [●] Agent-Initiated Cash-out Authorized on POS

Key

- [●] Fully implemented
- [●] Supported, not tested
- [●] Proof of Concept
- [●] Not implemented
- [o] Out of Scope

Switch Functionality: Mojaloop End-points (PI-10 → PI-11)

Mojaloop v1.0, v1.1 – FSPIOP API Specification

Transfers*#

- [●] POST - Prepare
- [●→●] PUT - Response
- [●→●] PUT - Error
- [●→●] *PATCH - Notification*
- [●] GET - Query

Parties#

- [●] GET - Request
- [●] PUT - Response
- [●] PUT - Error

Quotes

- [●] POST - Request
- [●] PUT - Response
- [●] PUT - Error
- [●] GET - Query

Participants*#

- [●→●] POST - Create
- [●] PUT - Response
- [●] POST - Bulk Create
- [●] PUT - Error
- [○] DEL - Delete

Transactions

- [○] PUT - Response
- [○] GET - Query

TransactionRequests

- [●] POST - Request
- [●] PUT - Response
- [●] PUT - Error
- [●] GET - Query

Authorizations*

- [●→●] GET - Request
- [●→●] PUT - Response
- [●→●] PUT - Error

BulkTransfers*

- [●] POST - Request
- [●] PUT - Response
- [●] PUT - Error
- [●] GET - Query

BulkQuotes*

- [●] POST - Request
- [●] PUT - Response
- [●] PUT - Error
- [●] GET - Query

Key

- [●] FSPIOP API v1.1 changes
- [●] Fully implemented
- [●] PoC / Initial Version
- [●] Partially implemented
- [●] Not implemented
- [○] Future Roadmap

* Enhancements in PI-11

FSPIOP API v1.1 changes implemented

PI-11 Switch Functionality – Operations

Operational – Use Cases

Participants

- [●] Manage Participants
 - [●] Create Initial Value
 - [●] Query
 - [●] Update
- [●] Manage Participant Limits
 - [●] Create Initial Value
 - [●] Query
 - [●] Update
- [●] Manage Callback URLs
 - [●] Create Initial Value
 - [●] Query
 - [●] Update

Oracles (ALS)

- [● -> ●] Manage Oracles
 - [●] Create
 - [● -> ●] Query
 - [● -> ●] Update
 - [● -> ●] Delete

Monitoring, Tracing

Tracing

- [●] Transfers
- [●] Quotes
- [●] ALS

Metrics

- [●] Transfers
- [●] Quotes
- [●] ALS

Key

- [●] Fully implemented
- [●] PoC / Initial Version
- [●] Partially implemented
- [●] Not implemented
- [○] Roadmap

PI-11 Switch Functionality – Settlement

Settlements v1.0 [Supports some forms]

- [●] Open, close Settlement Windows
- [●] Query Settlement Windows
- [●] Query Settlement Report
- [●] Create/Trigger Settlement with Windows
- [●] Process successful Settlement Acknowledgements
- [●] Reconcile Positions based on successful Settlements
- [●] Process failed Settlement Acknowledgements

Positions

- [●] Query Positions
- [●] Manage Positions
 - [●] Create Initial Value
 - [●] Query
 - [●] Update

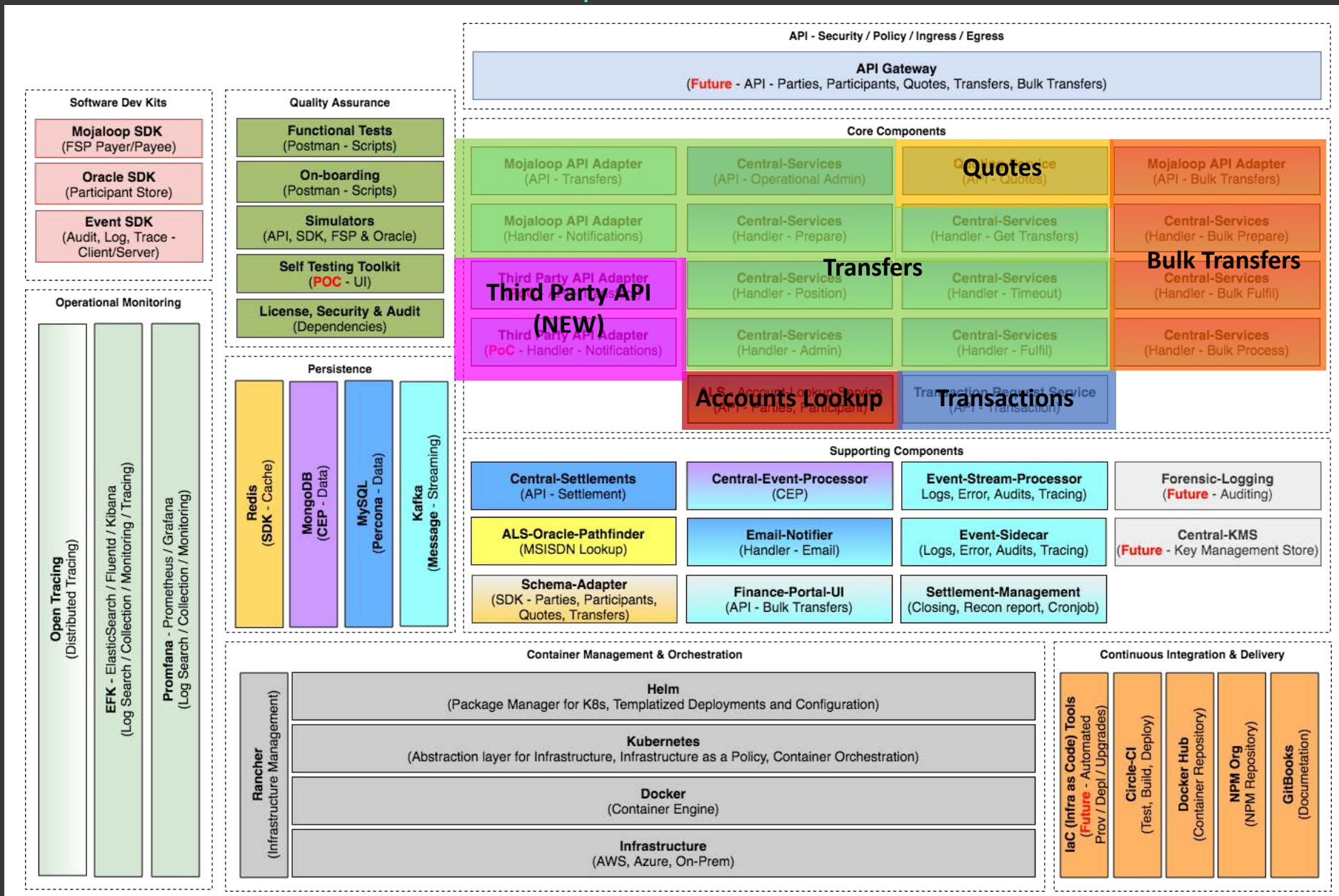
Settlements v2

- [●] Settlement models
- [●] Designs
- [●] Settlement by Currency
- [●] Interchange Fees
- [●] Continuous Gross Settlement

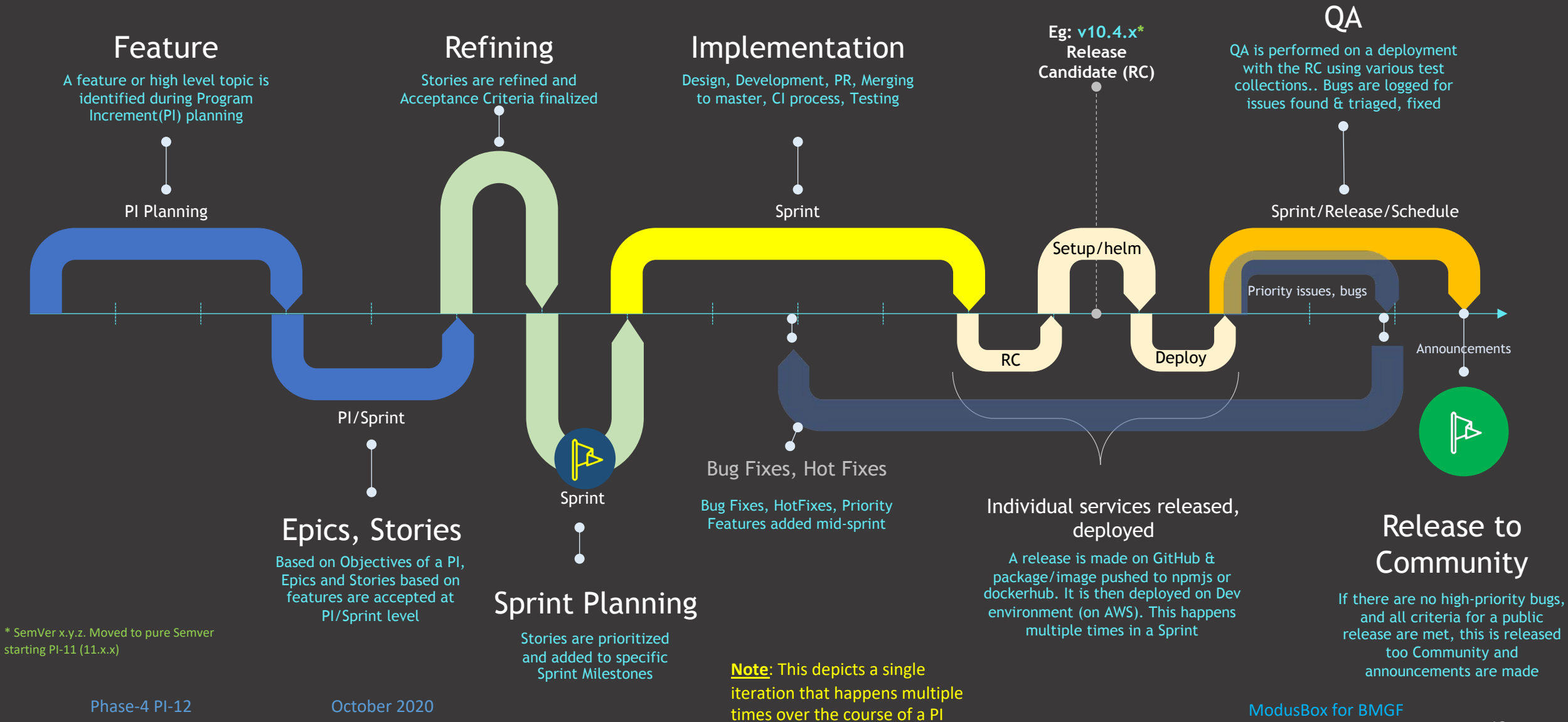
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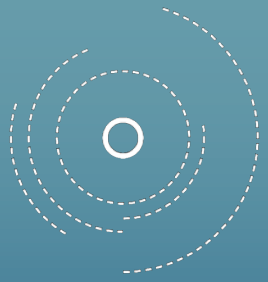
- [●] Fully implemented
- [●] PoC / Initial Version
- [●] Partially implemented
- [●] Not implemented
- [○] Roadmap

PI-11: Component Architecture



ML OSS: (Helm) Release Mechanism





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ML Community Updates

Features, Improvements & Community Support

PI-11 Overview: Mojaloop OSS Community

Contributions, Collaboration

1. PISP Solution
2. Code quality and Security improvements
3. Versioning Standards
4. ISO Integration
5. Cross network/currency
6. Quality Assurance (bugs, test coverage)
7. Settlement v2
8. Aggregator functionality

Mojaloop OSS PI-11: Community

1. Change Control Board (CCB)
2. Design Authority (DA)
3. Weekly/bi-weekly scrum-of-scrums
4. Slack channels: *#general*, *#announcements* , *#help-mojaloop*, *#design-authority* , *#ml-oss-devs*, *#market_focus*, *#ml-oss-bug-triage*

ML OSS Community: Design Authority (DA) Overview

1. Responsibilities

Ensure cohesion and agreement in the broader context of API Design and Implementation by enforcing design best practices and uniform Architecture (Design Methodologies, Technical Strategies and Design/Verification of Architectural Standards)

2. DA Committee Membership

The Design Committee currently consists of around 15 members and the membership is driven by participation and contribution to the Core Open Source System (OSS). *Restructuring process is underway and new members/chairman will be elected-in by end of Nov 2020*

3. DA Functioning

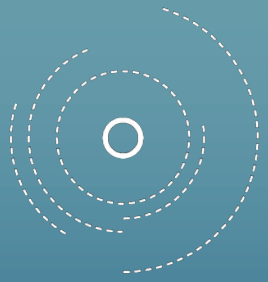
- a. Open to all to propose design related changes – any topic for DA related topic can be submitted either verbally, by email, slack etc..
- b. Weekly Scheduled meeting every Wednesday and ad-hoc meetings on a need to have basis.
- c. Decisions made and progress reports are available anytime on the DA ZenHub Board

ML OSS Community: DA issues overview

mojaloop / design-authority = / DA-Issue-Log

2 Issues - 0 Story Points Identified	9 Issues - 0 Story Points Assigned	1 Issue - 0 Story Points Deferred	5 Issues - 0 Story Points Decision Made
<p>design-authority #57 Investigate solution to avoid recompiling node-rkafka at each npm install both in docker and in host PI-11</p>	<p>design-authority #66 Decide on accepting Mojawallet PI-11</p> <p>design-authority #58 central-settlement merge into central-ledger PI-11</p> <p>design-authority #55 Contingency Plan discussion (Generic) for Open-Source Library Support changes PI-11</p> <p>design-authority #45 Mojaloop Post Transfer Processor PI-11</p> <p>design-authority #68 Clarity on a few topics PI-11</p>	<p>design-authority #65 Should the response to a GET /parties contain a correlation ID PI-11</p> <p>design-authority #59 Cryptographic Processing Module PI-11</p> <p>design-authority #53 Placement of Rules modules PI-11</p> <p>design-authority #43 Design a mechanism for informing a PISP on the progress on a transfer that it initiated. PI-11</p>	<p>design-authority #51 Should the PISP implementation live in the `sdk-scheme-adapter`, or should we make a new `thirdparty-scheme-adapter`? PI-11</p> <p>design-authority #64 Exclude models folder from unit test coverage checks for all repositories PI-11</p> <p>design-authority #63 Mojaloop Issue Logging Mechanism and process PI-11</p> <p>design-authority #62 Discuss the design approach of a standalone HSM capability for Mojaloop PI-11</p> <p>design-authority #54 zero down-time deployment proposal PI-11</p> <p>design-authority #52 Deprecation of Helm2 support PI-11</p>

PI-11 – Key Issues : 1. Testing enhancements 2. Versioning Standard Adjustments 3. Coordinating time-outs (On-going)



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PI-11 Core team "Focus Areas"

Features, Improvements & Community Support

PI-11 Core Report-out: Team

1. Amar Ramachandran
2. Georgi Logodazhki
3. Miguel de Barros
4. Rajiv Mothilal
5. Roman Pietrzak

6. Sam Kummary
7. Sankar Ramakrishnan
8. Steven Oderayi
9. Valentin Genev
10. Vijay Guthi

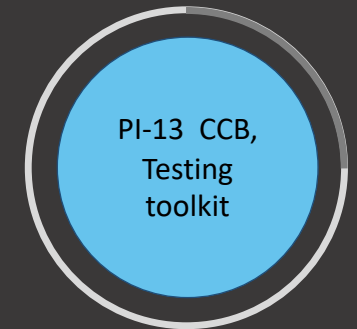
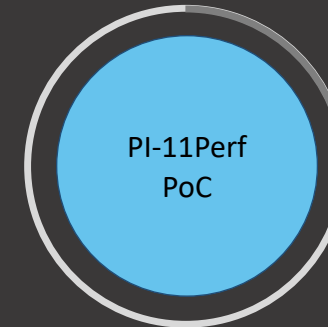
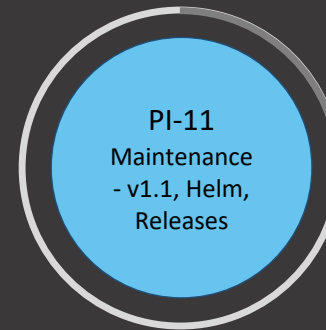


PI-11 Overview: Focus Areas

1. Streamlining Designs, Code & QA: Core services
2. Maintenance, Quality:
 - a. Helm updates
 - b. Release candidate preparation
 - c. Headers changes, SDK for v1.1
 - d. QA updates
 - e. Bug Fixes
3. Testing toolkit: Support for – FSP, Hub testing and Onboarding FSPs
4. Performance: Performance / Scalability PoC

Mojaloop PI-12

Phase-4 Going Live!



PI-11 Streamlining designs, QA: Objectives

1. Correlate and align tests/assertions with AS-IS documentation in the form of PlantUML sequence diagrams for the Core services
2. Run GP regression tests using TTK on demand or as scheduled using Helm
3. Improve test coverage (include new features) - 1.5k to 3k tests [Stretch]
4. Support and general maintenance of ML OSS by making Helm releases, reviewing PRs, fixing priority bugs

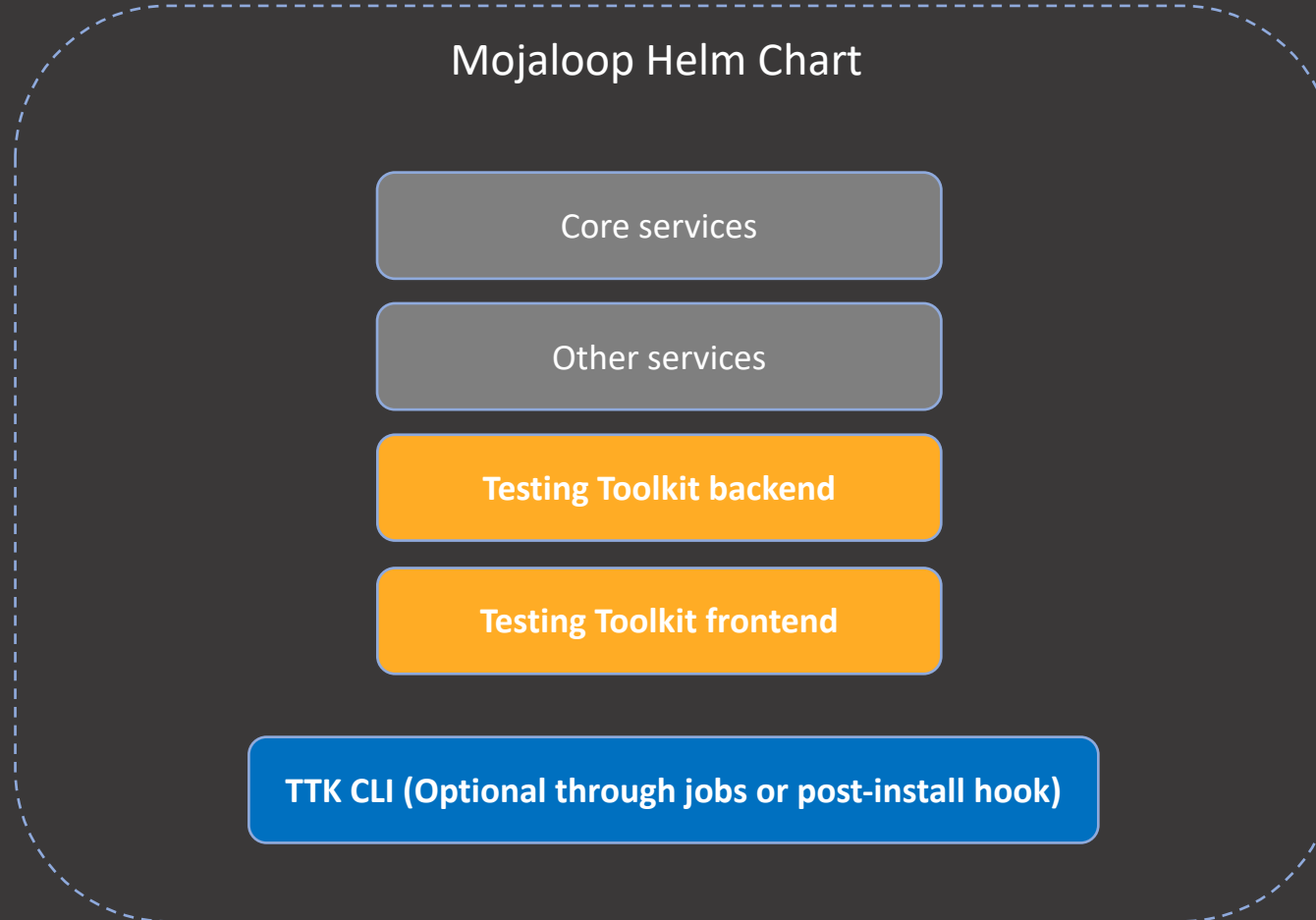


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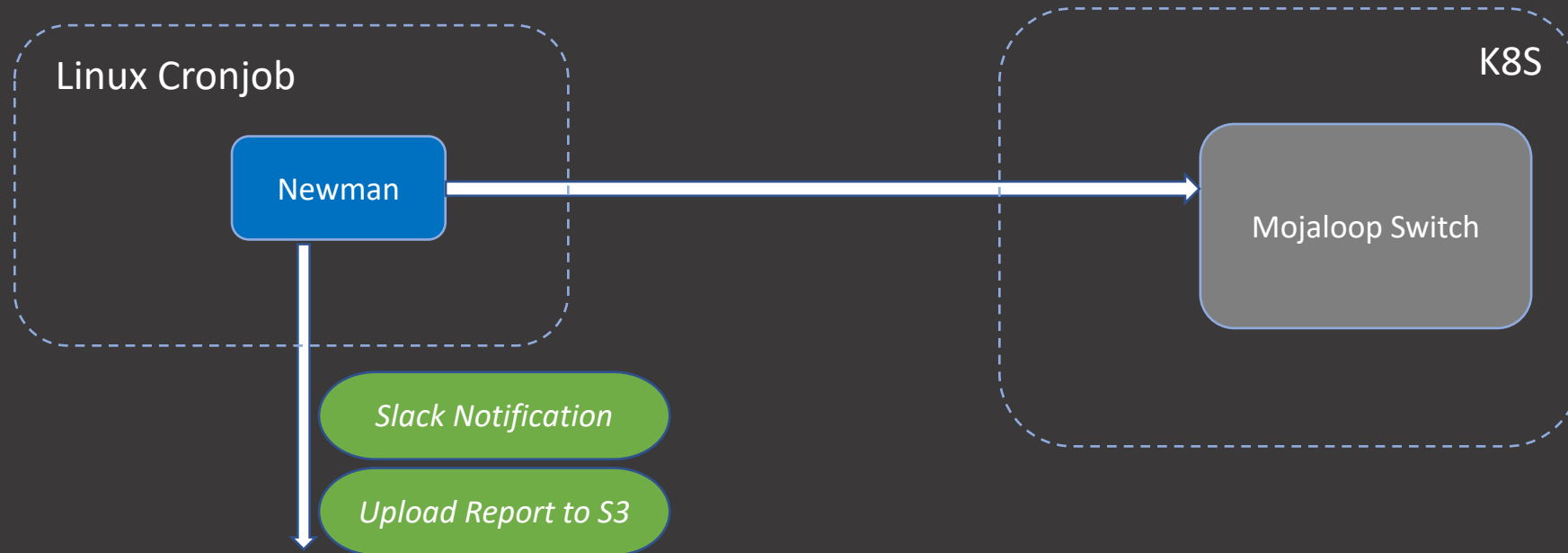
Running automated regression tests

Features, Improvements & Community Support

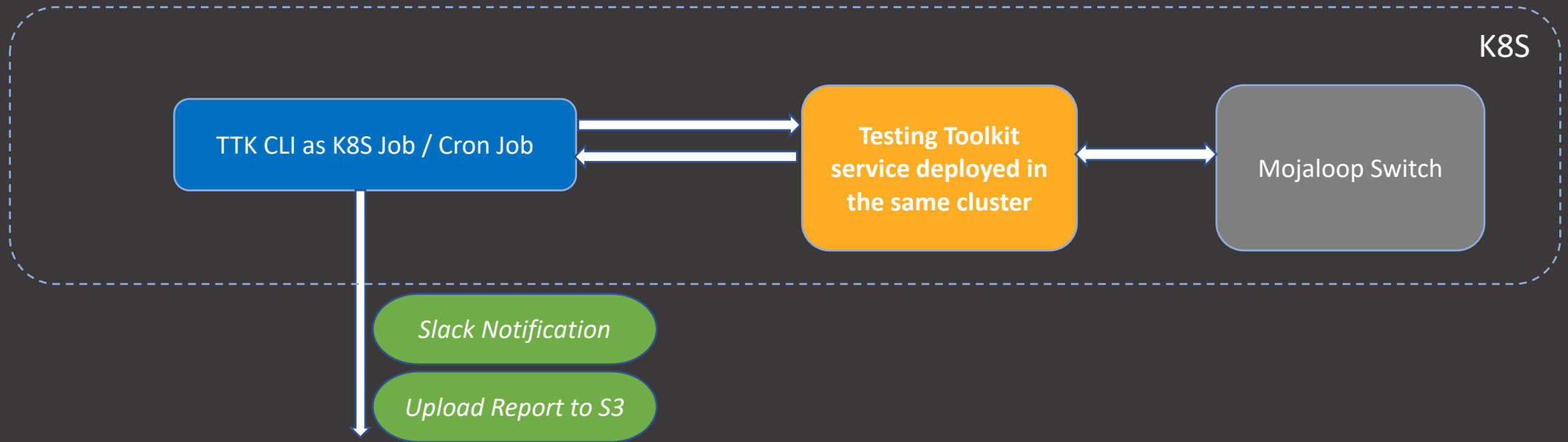
Testing Toolkit is enabled in Mojaloop Helm by default



Scheduled Regression tests using Postman (PI-10)



Scheduled Regression tests using Testing Toolkit (PI-11)



```
helm install <name> -n <namespace> <chart_name> --wait --timeout 10m
--set ml-ttk-posthook-setup.postInstallHook.enabled=true,
ml-ttk-posthook-tests.postInstallHook.enabled=true
```

Helm Chart

K8S Cron Job

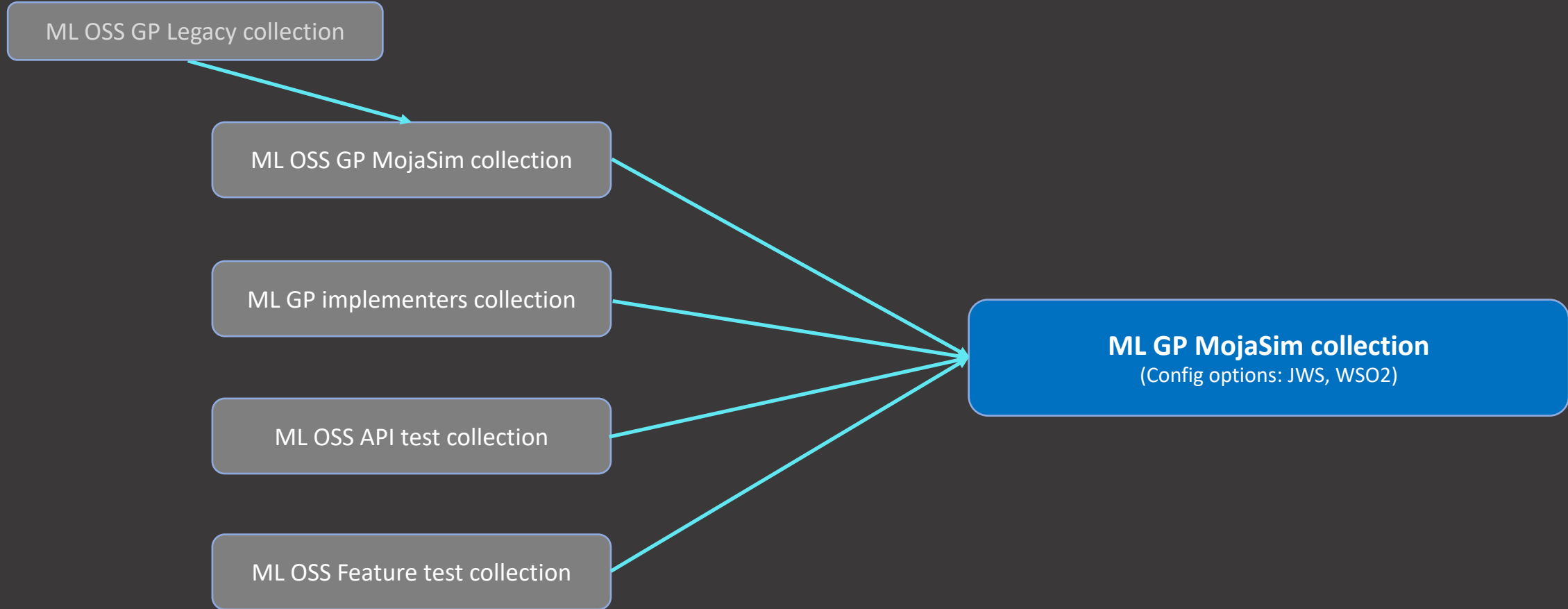
Post-install
hook

PI-11 Streamlining designs, QA: Single test Collection

1. Gaps – [MojaSim](#) OSS, implementers' collections
2. Address [delta](#) from bug fixes, new features
3. [Parameterization](#)
4. Options to run
 - a. With [JWS](#) signing
 - b. With (WSO2) [Gateway](#)
 - c. With on-us enabled, pass-through mode for quotes, etc.
5. Current status – **[A single collection !](#)**

Note: Legacy simulator test collection to be deprecated in PI-12; recommended to use TTK or MojaSim collections

PI-11 Streamlining designs, QA: Single test Collection



PI-11 Streamlining designs, QA: process

For each core service

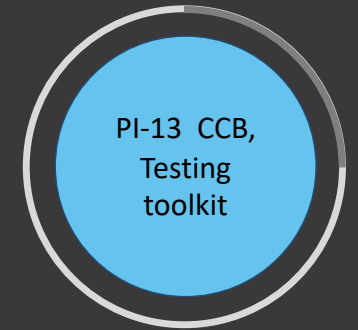
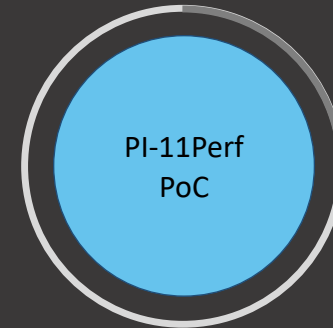
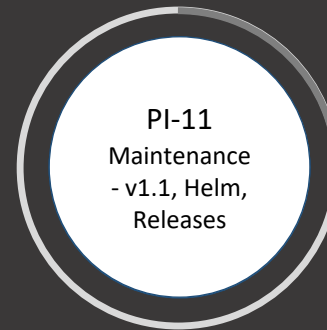
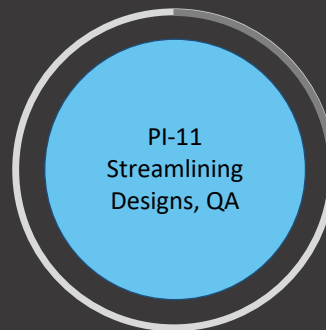
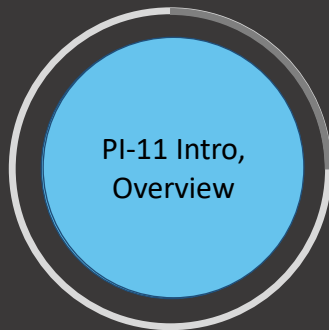
1. Validate all existing sequence diagrams (SDs)
2. Identify gaps and create new sequence diagrams
3. Ensure code is in sync with designs (SDs)
4. Fix issues, discrepancies between code and designs
5. TTK tests based on sequence diagrams

PI-11 Streamlining designs, QA: Core services

1. TTK support for features
 - a. File-based collection management
 - b. Collection management capabilities for support
2. Quoting service
3. Account lookup service
4. Fix issues, discrepancies between code and designs
5. TTK tests based on sequence diagrams

Mojaloop PI-12

Phase-4 Going Live!



PI-11: Maintenance Updates

1. [Helm](#) maintenance, release candidate
2. [v1.1 changes](#) – headers support, update Swagger files in core services
3. [SDK](#) support for v1.1 changes
4. [SDK](#) support for accented characters, bulk payment functionality
5. Bug Fixes
6. [PR](#) Reviews, documentation changes

PI-11 Maintenance: Helm

1. **Helm Charts** updated to support Kubernetes v1.13 – 1.17+ (*previously supported v1.13-1.15 only - <https://github.com/mojaloop/helm/issues/219>*)
2. **Mojaloop Deployment Guide** Documentation updated for Helm v3, and Helm v2 (*deprecated - legacy + migration guide - <https://github.com/mojaloop/documentation/pull/236>*)
3. **Helm Repo** documentation update for Helm v3 (<https://github.com/mojaloop/helm/issues/219>)
4. **Helm Development Builds** auto-published to Helm Repo on merges to master branch

Development release Chart version format: `<major>.<minor>.<patch>-<circleci-build-id>.<git-commit-sha1>`

```
> helm search mojaloop/mojaloop
NAME                CHART VERSION  APP VERSION
mojaloop/mojaloop    10.6.0         ml-api-adapter: v10.5.0; central-ledger: v10.6.1; account...
mojaloop/mojaloop-bulk 10.6.0         bulk-api-adapter: v10.6.0; central-ledger: v10.6.0
mojaloop/mojaloop-simulator 11.0.0         11.0.0
> helm search mojaloop/mojaloop --devel
NAME                CHART VERSION  APP VERSION
mojaloop/mojaloop    11.0.0-4469.ad9e0b13a62bdb0465dbb6cd86a01372c1e34258 ml-api-adapter: v11.0.3; central-ledger: v10.6.1; account...
mojaloop/mojaloop-bulk 11.0.0-4469.ad9e0b13a62bdb0465dbb6cd86a01372c1e34258 bulk-api-adapter: v10.6.0; central-ledger: v10.6.0
```

PI-11 Maintenance: Helm

5. New Helm charts included:
 - A. **Mojaloop Self-testing Toolkit Front-end**
 - B. **Mojaloop Self-testing Toolkit Back-end**
 - C. **Mojaloop Self-testing Toolkit Jobs** ← Publish reports to S3 + Notification to slack
 - I. On-demand
 - II. Scheduled
 - III. Post-hook for Helm deployments ← Easier verifications, & future CI/CD pluggability
6. Helm Release [v11.0.0](#) (coming soon - *release candidate*)

FSPIOP API v1.1 Changes - 1: Support Payee FSP Notification

- [●] Option to notify completion of a transfer to a Payee - [Story#1334](#)

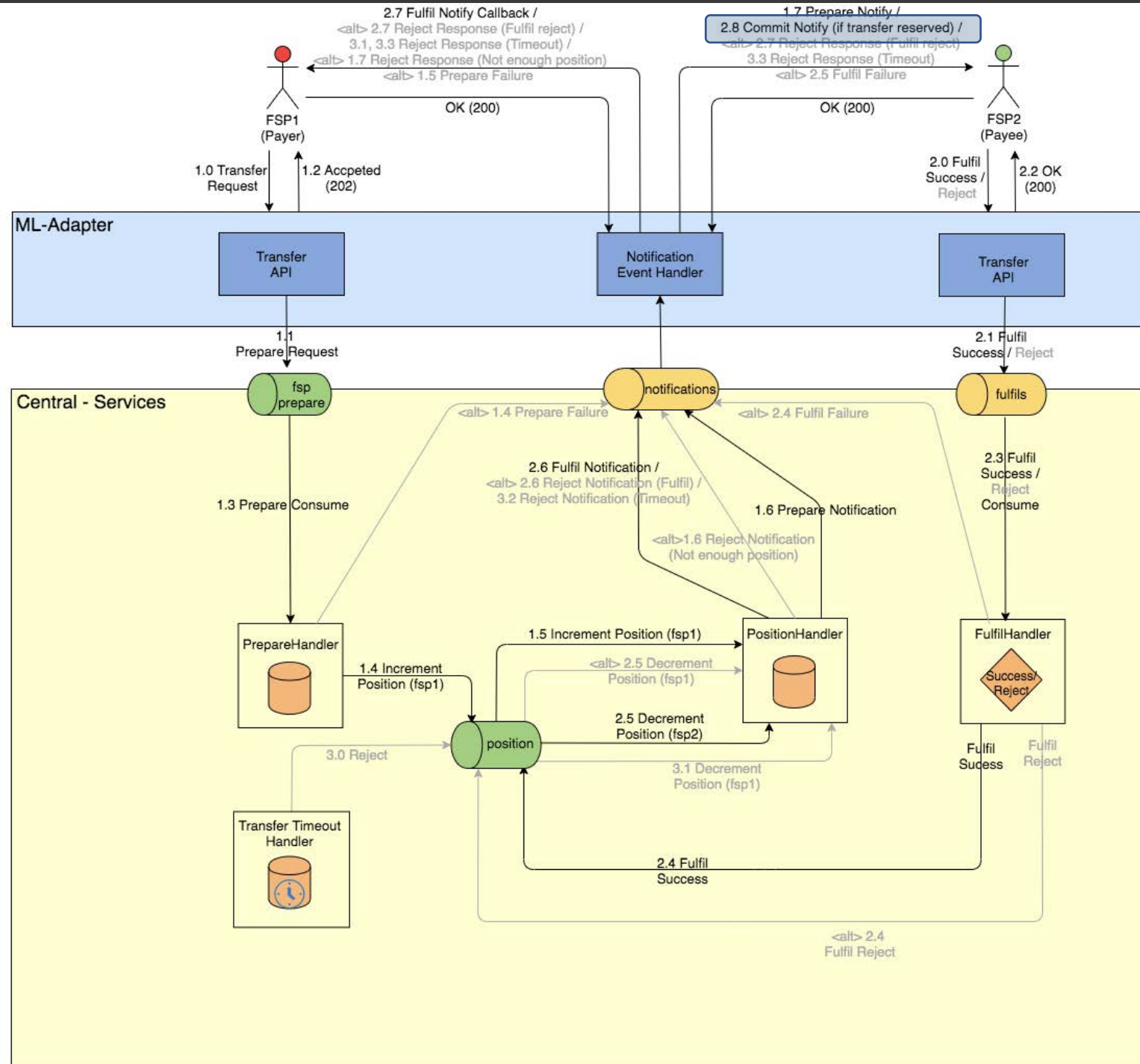
Behaviour in v1.0

The Payee FSP needs to send a *GET /transfers/<ID>* message to the Switch to know the status

Desired behaviour

The Payee FSP can send the *PUT /transfers/<ID>* to the Switch with an option to indicate that it would like to receive a notification when the transfer is finalized in the Switch.

PI-11: Transfers Architecture v1.1.1



FSPIOP API v1.1 Changes - 2: Use error callbacks for rejections

[●] Clarify usage of ABORTED state in the Fulfil step of a transfer - [Story#1335](#)

Behaviour in v1.0

Transfer could be aborted by two ways

1. *PUT /transfers/{ID}* endpoint with 'transferState' as ABORTED.
2. *PUT /transfers/{ID}/error* endpoint with additional error information.

Requested Behavior

FSPs to ONLY use *PUT /transfers/{ID}/error* to abort / reject transfers during a Fulfil step

QA Updates – Bug Fixes

Major Bug Fixes in PI – 11 (*A total of ~14 bugs fixed*)

#1652 – Support test currencies XXX, XTS in ml-api-adapter

#1496 – Issue with GET /bulkTransfers

#1547 - Switch not rejecting an invalid request

#1647 - Valid transactionRequests failing in SDK

#1709 - Date header missing from the Switch signature in timeout scenario

#1710 - ACCEPT header returned in the PUT from switch for the timeout scenario

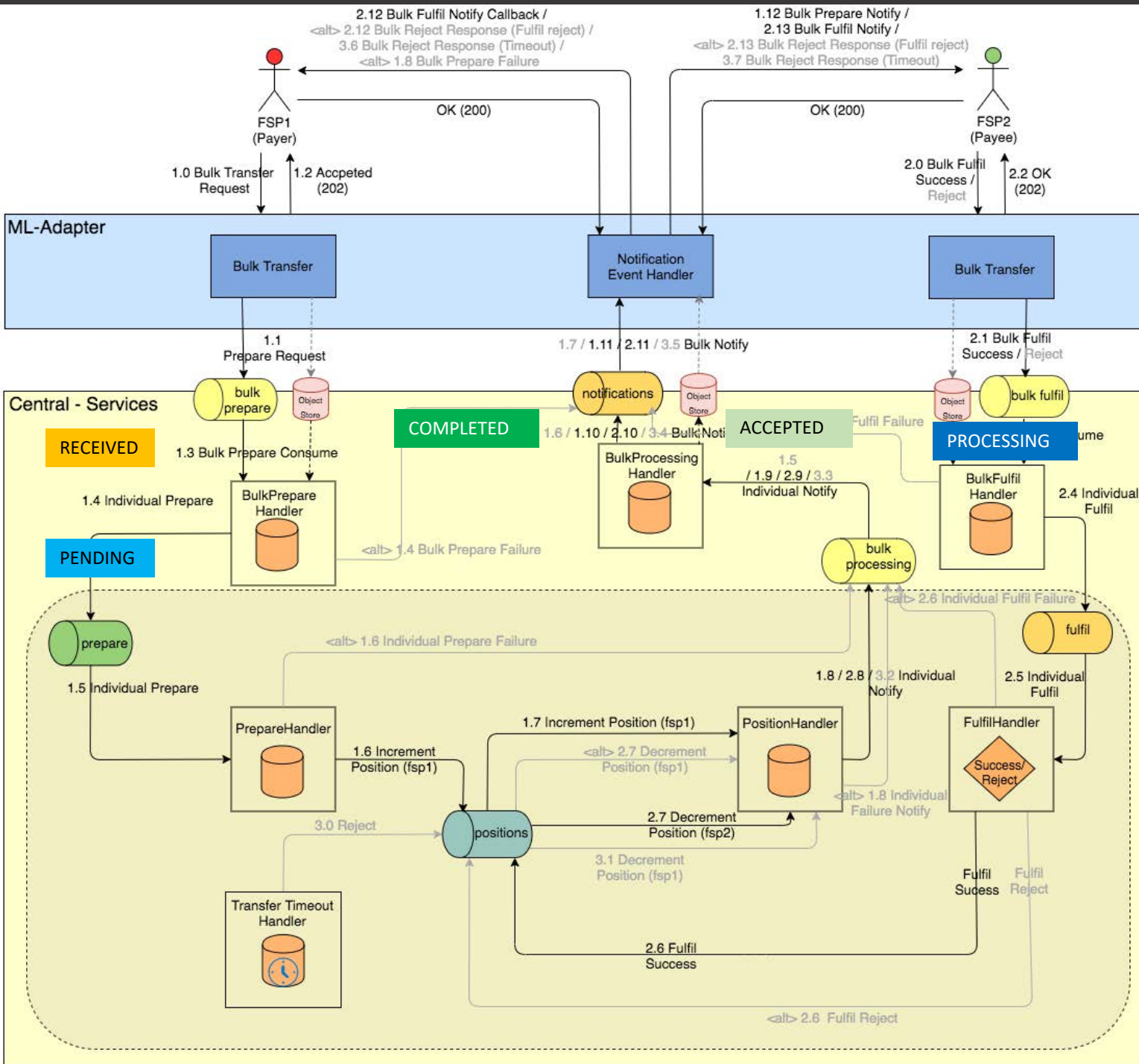
#1708 - Incorrect error behavior on transfer fulfilment with future timestamp

Thank you! Q&A on discourse

Key items for roadmap

1. Decision on the Performance / Scalability PoC – Product readiness, differentiation & NFR
2. Implement Cascaded timeouts – Product readiness, differentiation & Support Live deployments
3. Reliable notification mechanism – Product readiness, differentiation & Support Live deployments
4. Settlement v2 – Product readiness, differentiation & Support Live deployments
5. Business Operations Framework – Product readiness, differentiation & Accelerate Business/Dev onboarding
6. Native ISO 20022 Support – Product readiness, differentiation & Support Live deployments

Bulk Transfers Architecture v1.0



FSPIOP

[●] Option to notify completion of a

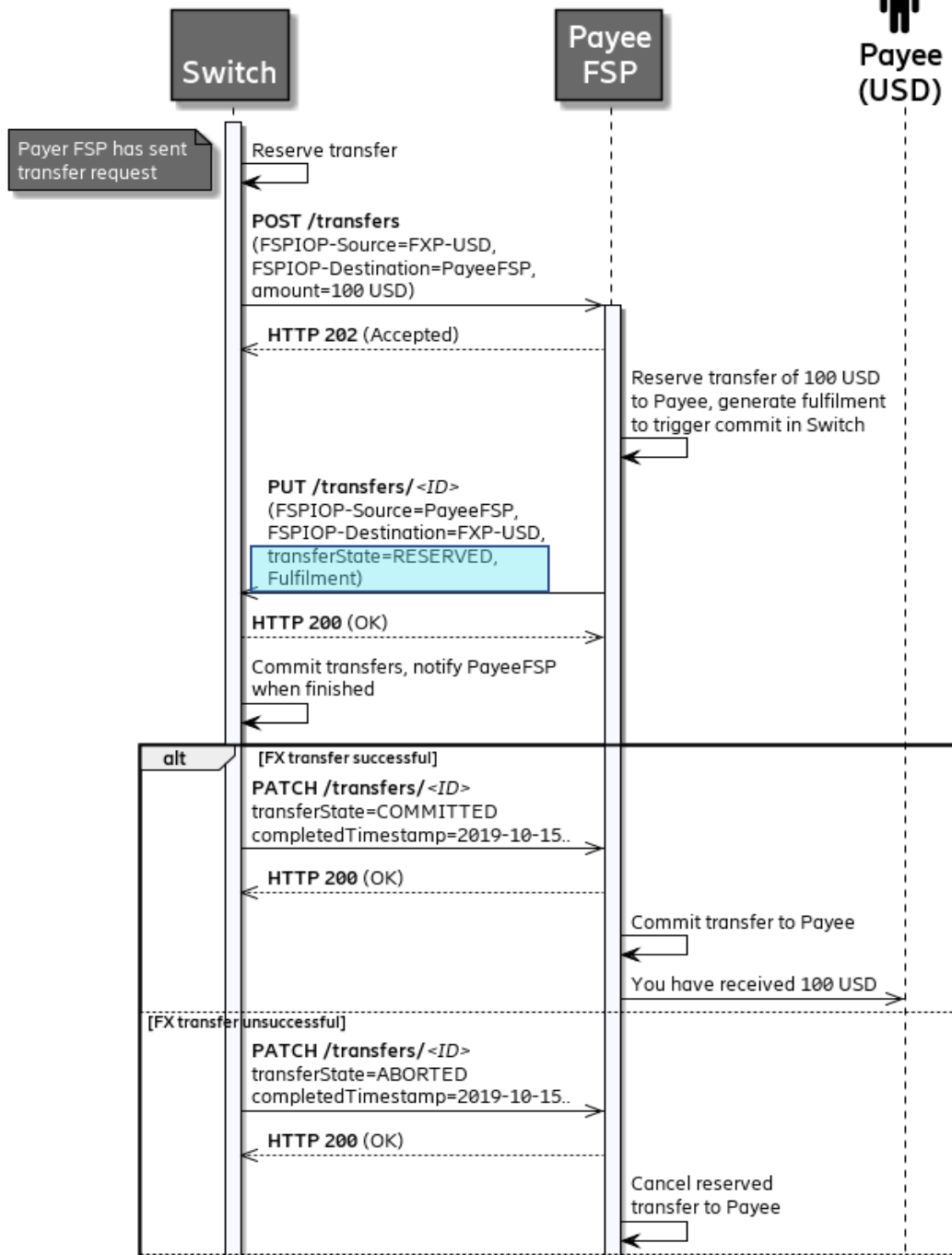
```
PATCH /transfers/85feac2f-39b2-491b-817e-4a03203d4f14 HTTP/1.1
Content-Type: application/vnd.interoperability.transfers+json;version=1.0
Content-Length: 166
```

Needs to be Updated

```
FSPIOP-Signature: {"signature": "YXBwbGlj...JzK2pzb2"}
{
  "completedTimestamp": "2019-10-15T08:14:03.113+01:00",
  "transferState": "COMMITTED",
}
```

Updated central services

1. central-services-shared
2. central-ledger
 1. Fulfil handler
 2. Position handler
3. ml-api-adapter



Notification

```
PUT /transfers/85feac2f-39b2-491b-817e-4a03203d4f14 HTTP/1.1
Content-Type: application/vnd.interoperability.transfers+json;version=1.1
Content-Length: 166
Date: Tue, 15 Oct 2019 08:14:02 GMT
FSPIOP-Source: DFSP2
FSPIOP-Destination: DFSP1
FSPIOP-Signature: {"signature": "YXBwbGlj...JzK2pzb2"}
{
  "fulfilment": "mhPUT9ZAwD-BXLfeSd7-YPh46rBWRNBiTCSWjpku90s",
  "transferState": "RESERVED",
}
```

Supporting updates

1. Simulator(s)
2. sdk-scheme-adapter
3. Postman collections
4. Documentation