# Mojaloop PI-12
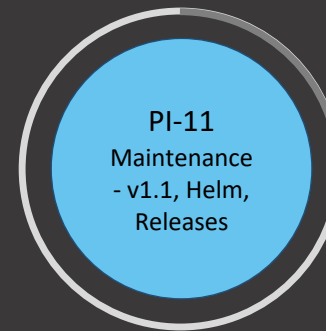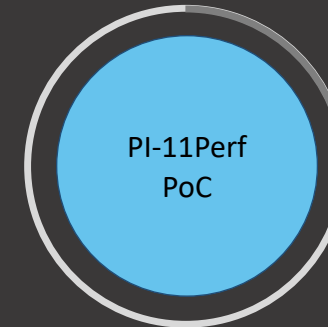
## Phase-4 Going live!

# Mojaloop PI-12

## Phase-4 Going Live!

PI-11Perf PoC

PI-11 Testing toolkit

PI-11 Maintenance - v1.1, Helm, Releases

PI-11 Intro, Overview

PI-11 Streamlining Designs, QA
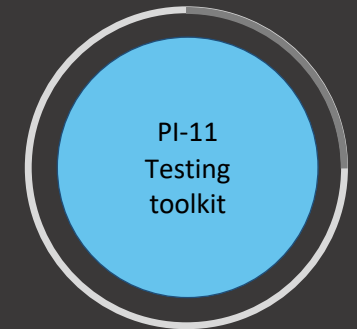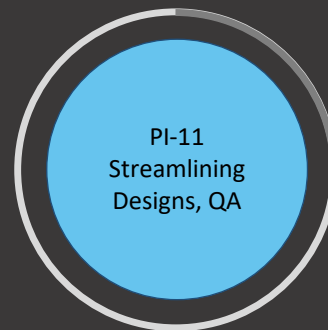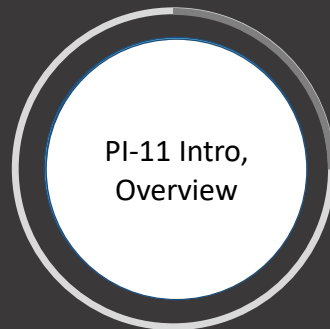
# PI-11 Core Report-out: Agenda

1. PI-11 Overview of changes and progress

2. OSS Community, Collaboration Updates

3. PI-11 Focus Areas

# ML Overview PI-11

## Features, Improvements & Community Support

# Mojaloop PIs Overview

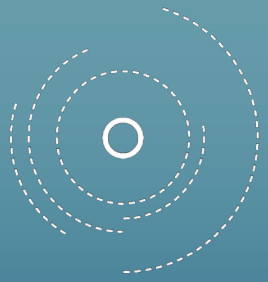| Timeline | Summary |
|---|---|
| **Phase-1**<br>(2016 - 17) | **Level One Project**<br>• Reference Implementation<br>• 6 Program Increments (PIs) |
| **Phase-2**<br>(2018) | **Road To Productionization**<br>• 1 – 4 Program Increments |
| **Phase-3**<br>(2019 Jan - Dec) | **Supporting Adoption & Deployment**<br>• PI-5 (Feb – April): Account lookup, QA Framework, Streamlined CI, Release process, Error endpoints, Documentation, Node Upgrade, Bug Fixes & Community support, Bulk Transfers Design<br>• PI-6 Event handling framework, Bulk Transfers PoC, API Gateway, OSS Settlements API, Quoting Service, ALS<br>• PI-7 Event & Error Handling framework, Packaging, OSS Settlements, Performance testing capabilities, QA<br>• PI-8 Consolidation, Performance, Community Support |
| **Phase-4**<br>(2020 Jan - Dec ) | **Going Live**<br>• PI-9: Performance Testing & Improvements, Merchant Request to Pay, Operational Monitoring, Testing toolkit, Settlement v2<br>• PI-10: Performance PoC, Standardizing Bulk Transfers, Testing toolkit, Settlement v2, Adopting FSPIOP API v1.1, Versioning<br>• **PI-11**: Performance PoC, Standardizing designs, code & QA, Adopting FSPIOP API v1.1, Versioning, PISP support, Code quality<br>• **PI-12:** *Hardening, Packaging, Releases and prep for Phase-5* (October'2020 – January'2021) |

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

## 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

## Mojaloop: Focus Use-cases

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

## 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
[O] Out of Scope

* Enhancements done in PI-11

# Switch Functionality – Mojaloop Use Cases (Phase-4 PI-11)

## Mojaloop FSPIOP API v1.0 – Use-cases

### Payer-Initiated Transaction

[●] P2P Transfers
  [●] Prepares, Fulfils
  [●] 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
- [o] DEL - Delete

### Transactions
- [o] PUT - Response
- [o] 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
- [o] Future Roadmap

Phase-4 PI-12          October 2020

\* 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
[o] Roadmap for PI10

# PI-11 Switch Functionality – Settlement

## Settlements v**1.0** [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

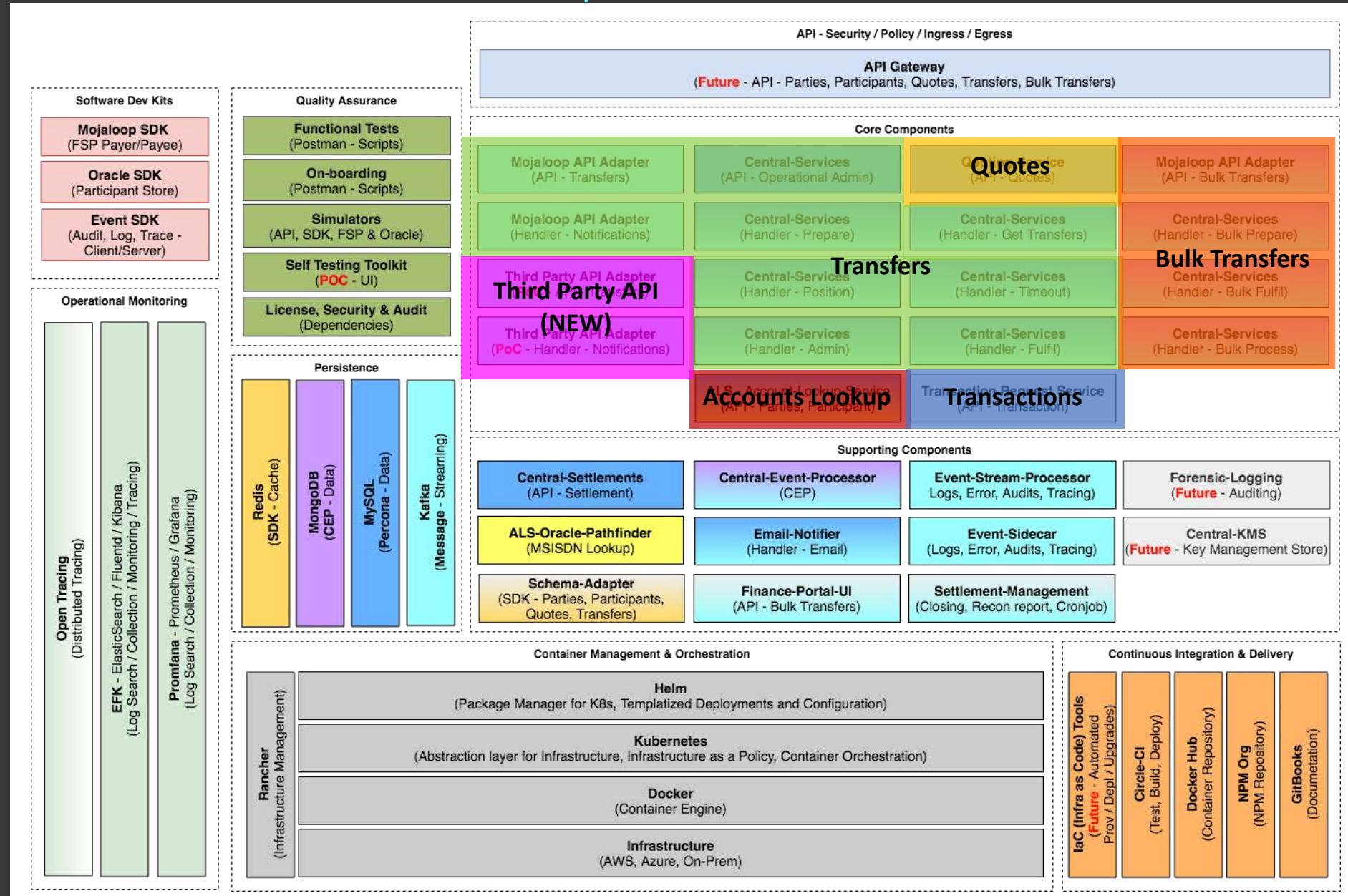## Settlements v**2**
[●] Settlement models
[●] Designs
[●] Settlement by Currency
[●] Interchange Fees
[●] Continuous Gross Settlement
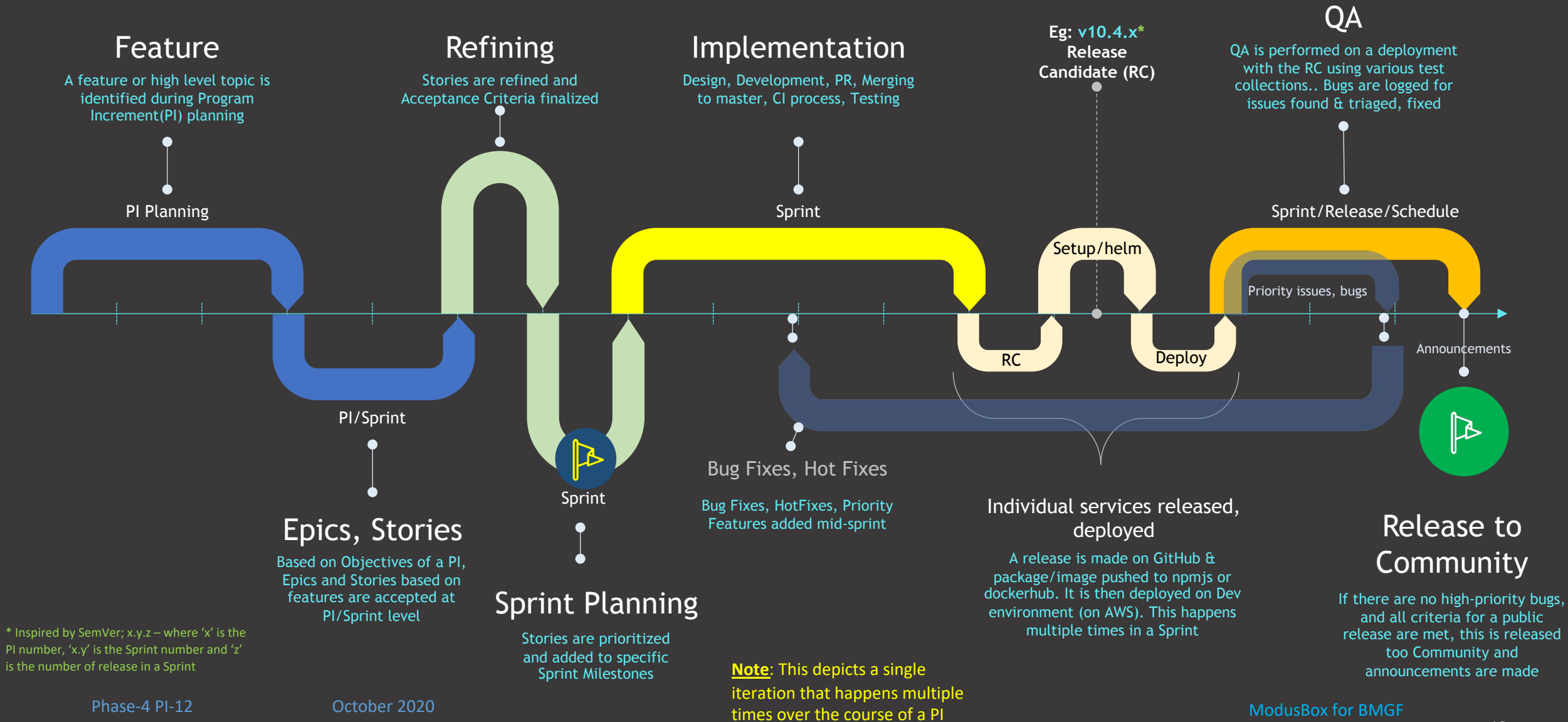
Key
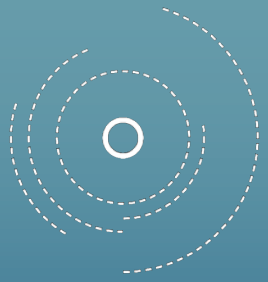[●] Fully implemented
[●] PoC / Initial Version
[●] Partially implemented
[●] Not implemented
[O] Roadmap for PI10

# PI-11: Component Architecture

Phase-4 PI-12          October 2020          * Color-shading of core & supporting components match dependent persistent stores.

11

# ML OSS: (Helm) Release Mechanism

## Feature

A feature or high level topic is identified during Program Increment(PI) planning

PI Planning

PI/Sprint

## Epics, Stories

Based on Objectives of a PI, Epics and Stories based on features are accepted at PI/Sprint level

## Refining

Stories are refined and Acceptance Criteria finalized

Sprint

## Sprint Planning

Stories are prioritized and added to specific Sprint Milestones

## Implementation

Design, Development, PR, Merging to master, CI process, Testing

Sprint

Bug Fixes, Hot Fixes

Bug Fixes, HotFixes, Priority Features added mid-sprint

Eg: **v10.4.x***
**Release Candidate (RC)**

Setup/helm

RC

Deploy

### Individual services released, deployed

A release is made on GitHub & package/image pushed to npmjs or dockerhub. It is then deployed on Dev environment (on AWS). This happens multiple times in a Sprint

## QA

QA is performed on a deployment with the RC using various test collections.. Bugs are logged for issues found & triaged, fixed

Sprint/Release/Schedule

Priority issues, bugs

Announcements

## Release to Community

If there are no high-priority bugs, and all criteria for a public release are met, this is released too Community and announcements are made

* Inspired by SemVer; x.y.z – where 'x' is the PI number, 'x.y' is the Sprint number and 'z' is the number of release in a Sprint

**Note**: This depicts a single iteration that happens multiple times over the course of a PI

Phase-4 PI-12

October 2020

# 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 ◇**

| Identified | Assigned | Deferred | Decision Made |
|---|---|---|---|
| 2 Issues - 0 Story Points | 9 Issues - 0 Story Points | 1 Issue - 0 Story Points | 5 Issues - 0 Story Points |

**Identified**

design-authority #57
Investigate solution to avoid recompiling node-rkafka at each npm install both in docker and in host
PI-11

design-authority #61
Co-ordinating transfer time-outs
PI-11

**Assigned**

design-authority #66
Decide on accepting Mojawallet
PI-11

design-authority #65
Should the response to a GET /parties contain a correlation ID
PI-11

design-authority #58
central-settlement merge into central-ledger
PI-11

design-authority #59
Cryptographic Processing Module
PI-11

design-authority #55
Contingency Plan discussion (Generic) for Open-Source Library Support changes
PI-11

design-authority #53
Placement of Rules modules
PI-11

design-authority #45
Mojaloop Post Transfer Processor
PI-11

design-authority #43
Design a mechanism for informing a PISP on the progress on a transfer that it initiated.
PI-11

design-authority #68
Clarity on a few topics
PI-11

**Deferred**

design-authority #51
Should the PISP implementation live in the `sdk-scheme-adapter`, or should we make a new `thirdparty-scheme-adapter`?
PI-11

**Decision Made**

design-authority #64
Exclude models folder from unit test coverage checks for all repositories
PI-11

design-authority #63
Mojaloop Issue Logging Mechanism and process
PI-11

design-authority #62
Discuss the design approach of a standalone HSM capability for Mojaloop
PI-11

design-authority #54
zero down-time deployment proposal
PI-11

design-authority #52
Deprecation of Helm2 support
PI-11

PI-11 – Key Issues : 1. Testing enhancements  2. Versioning Standard Adjustments 3. Coordinating time-outs (On-going)
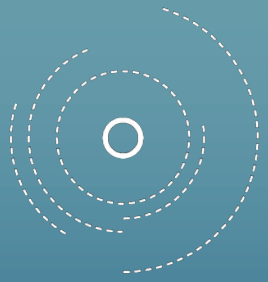
# PI-11 Core team "Focus Areas"

## 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

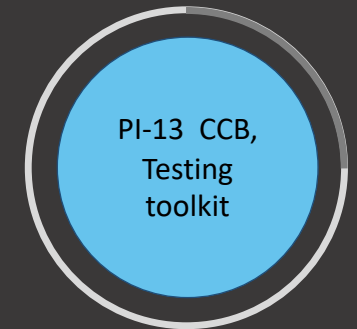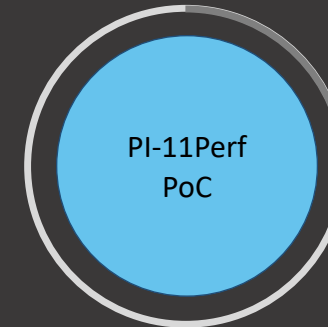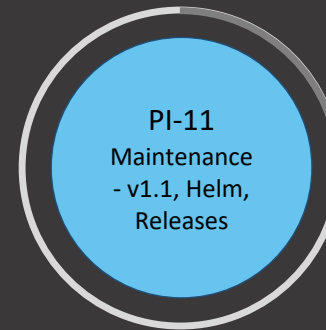8. Steven Oderayi

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-11Perf PoC

PI-13 CCB, Testing toolkit

PI-11 Maintenance - v1.1, Helm, Releases

PI-11 Intro, Overview

PI-11 Streamlining Designs, QA

# 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
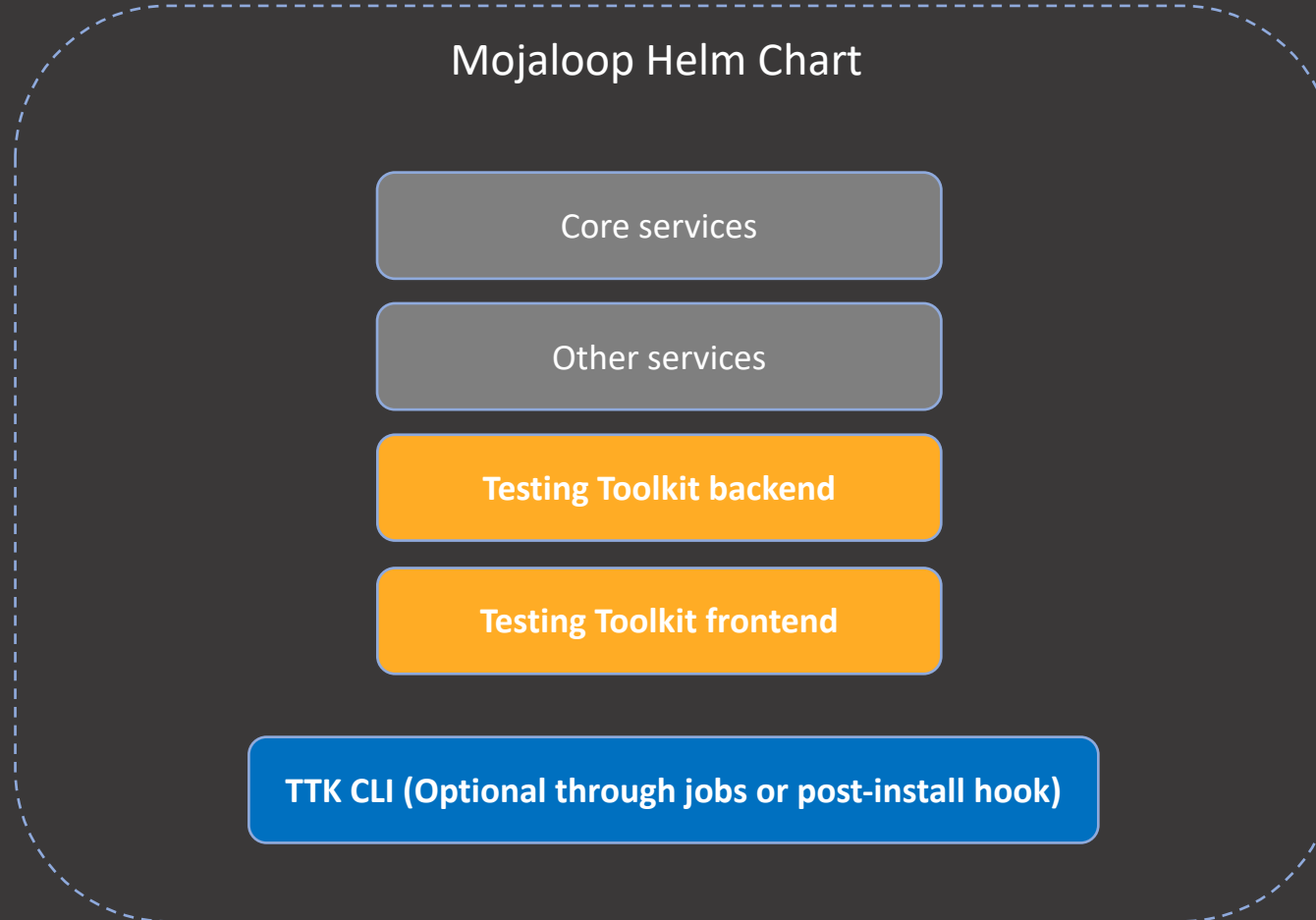
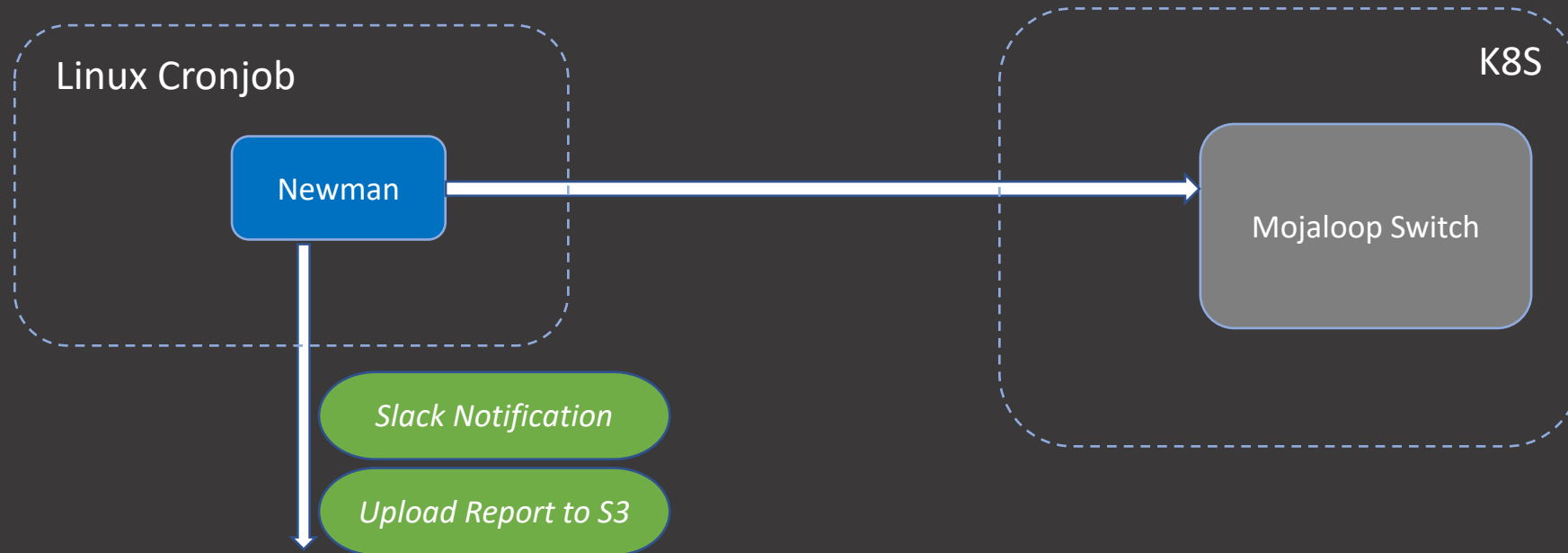# Running automated regression tests
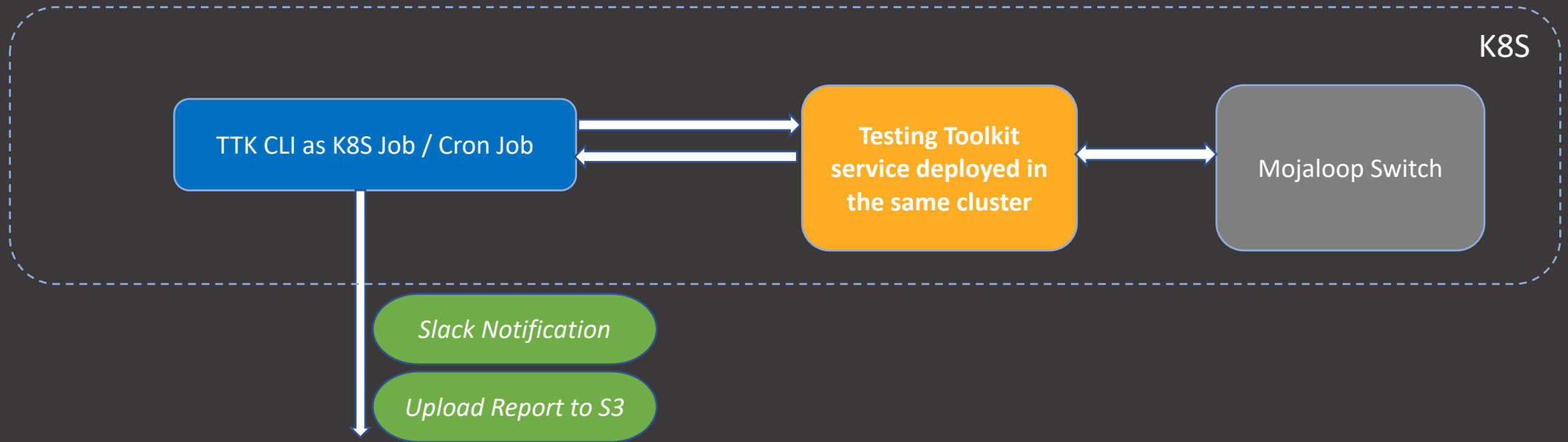
## Features, Improvements & Community Support

# Testing Toolkit is enabled in Mojaloop Helm by default

Mojaloop Helm Chart

Core services

Other services

**Testing Toolkit backend**

**Testing Toolkit frontend**

**TTK CLI (Optional through jobs or post-install hook)**

# Scheduled Regression tests using Postman

Linux Cronjob

Newman

Slack Notification

Upload Report to S3

K8S

Mojaloop Switch

# Scheduled Regression tests using Testing Toolkit

K8S

| | | |
|---|---|---|
| TTK CLI as K8S Job / Cron Job | **Testing Toolkit service deployed in the same cluster** | Mojaloop Switch |

Slack Notification

Upload Report to S3

Helm Chart

K8S Cron Job

Post-install hook

```
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
```
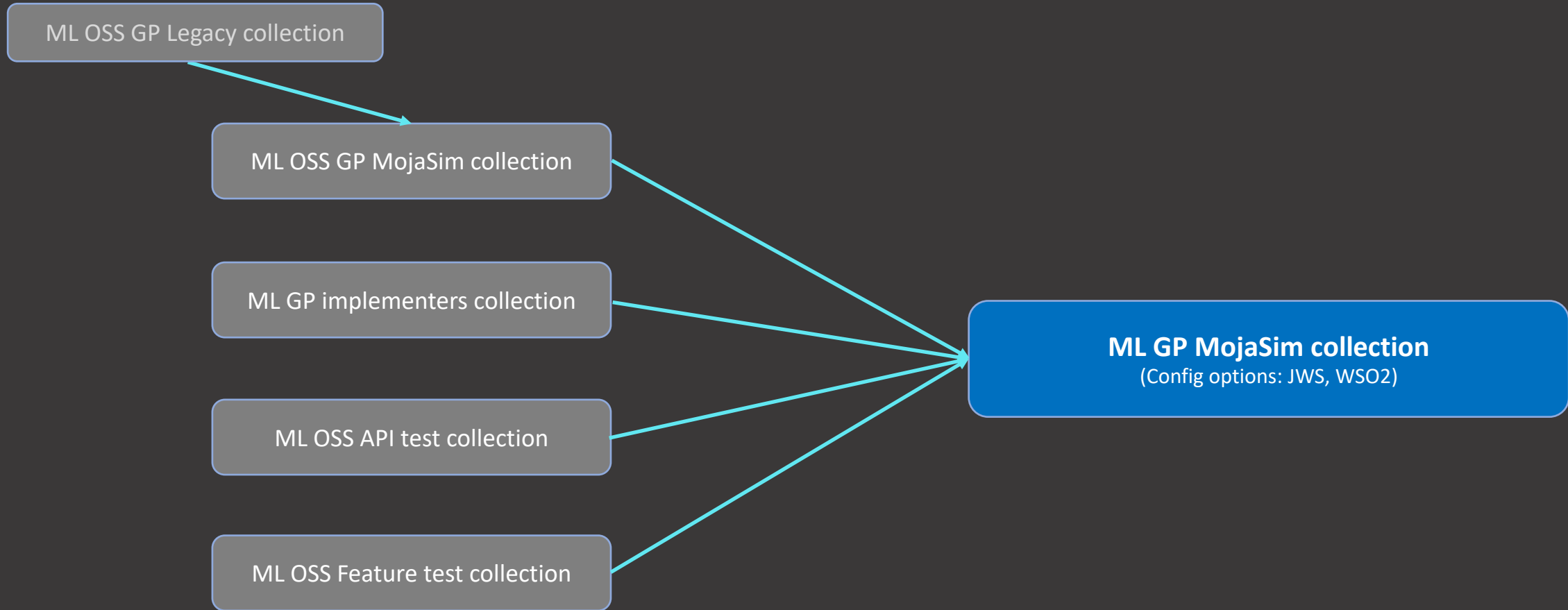
# PI-11 Streamlining designs, QA: Single test Collection

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

ML OSS GP Legacy collection

ML OSS GP MojaSim collection

ML GP implementers collection

**ML GP MojaSim collection**
(Config options: JWS, WSO2)

ML OSS API test collection

ML OSS Feature test collection

# PI-11 Streamlining designs, QA: process
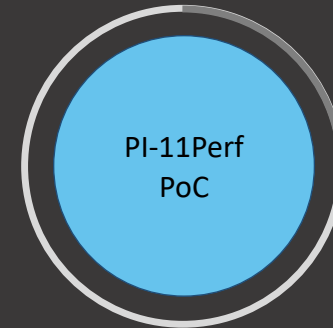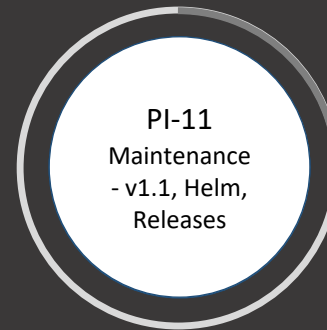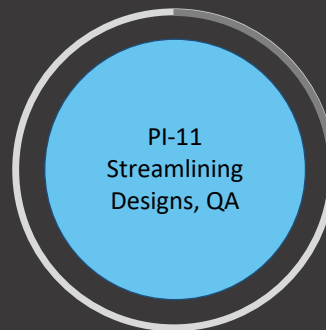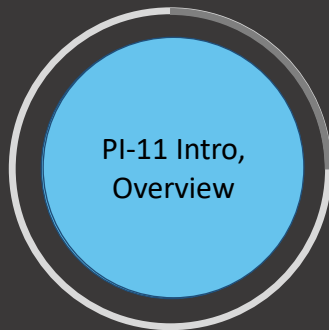
For each core service

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-11Perf PoC

PI-13 CCB, Testing toolkit

PI-11 Maintenance - v1.1, Helm, Releases

PI-11 Intro, Overview

PI-11 Streamlining Designs, QA
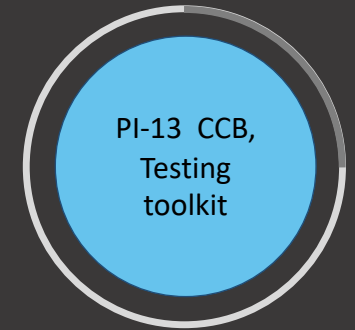
# PI-11: Maintenance Updates

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

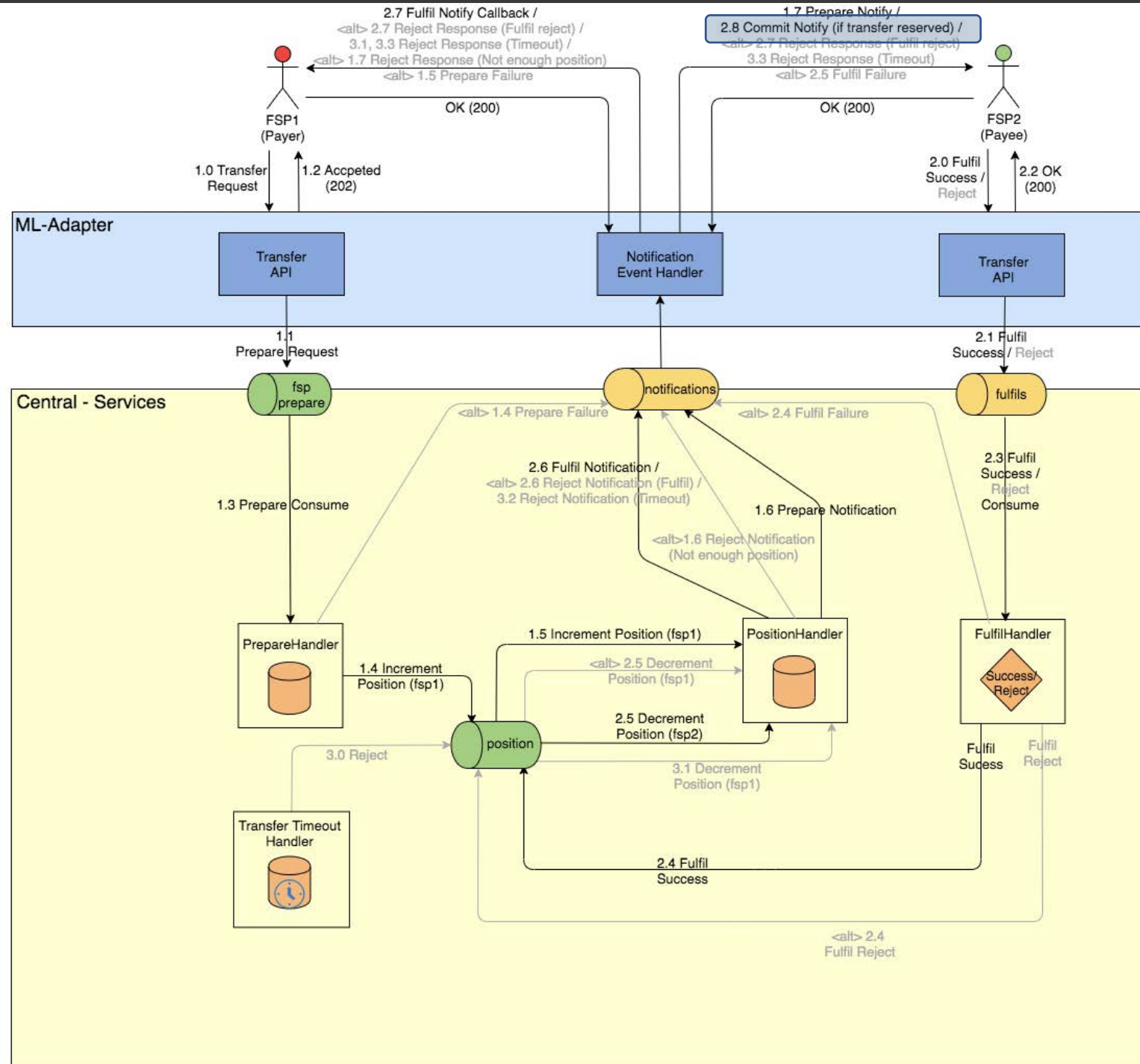[●] Option to notify completion of a  transfer to a Payee - Story#1334

## 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.

# 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

## 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

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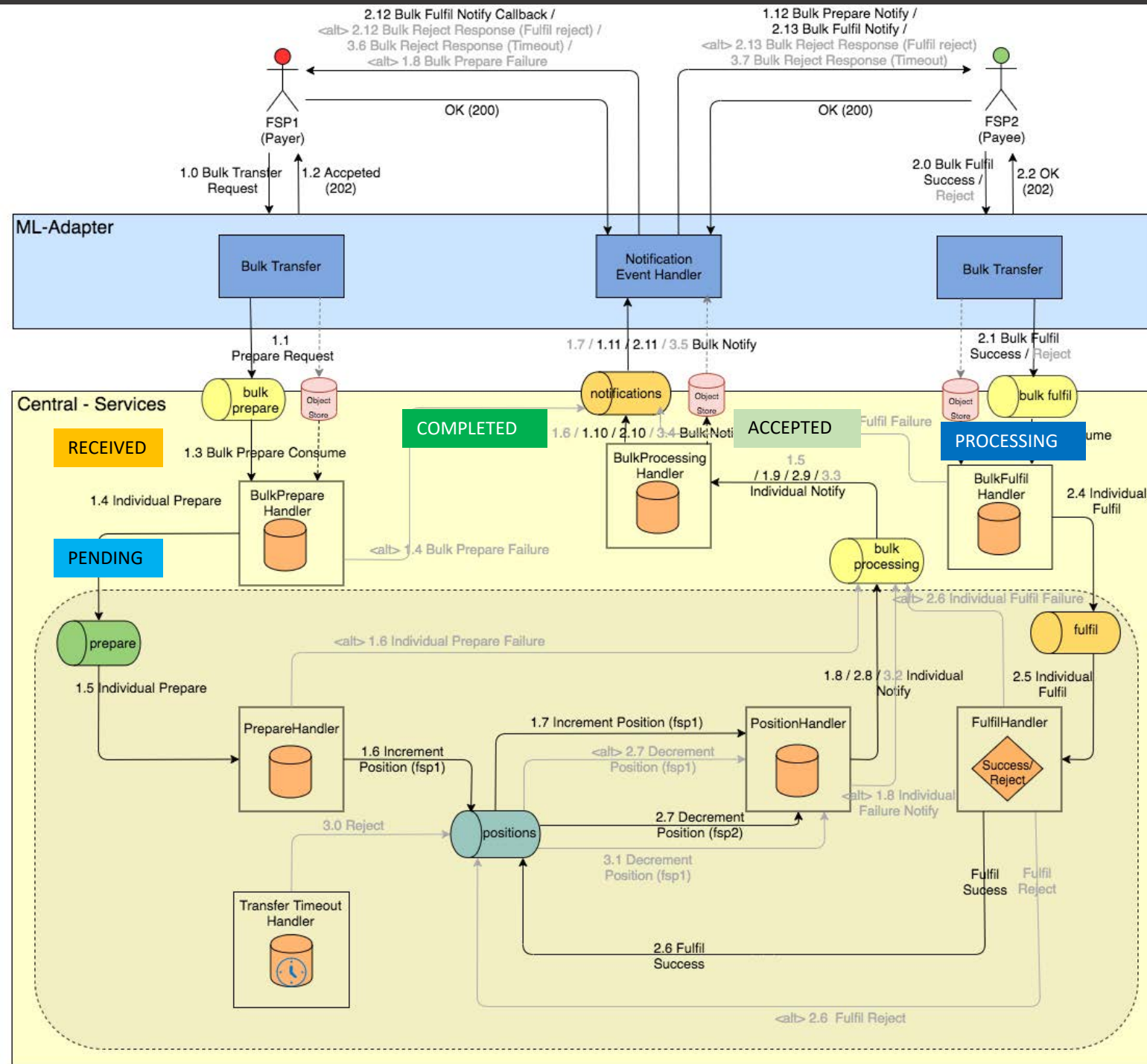
[●] Option to notify completion of a...
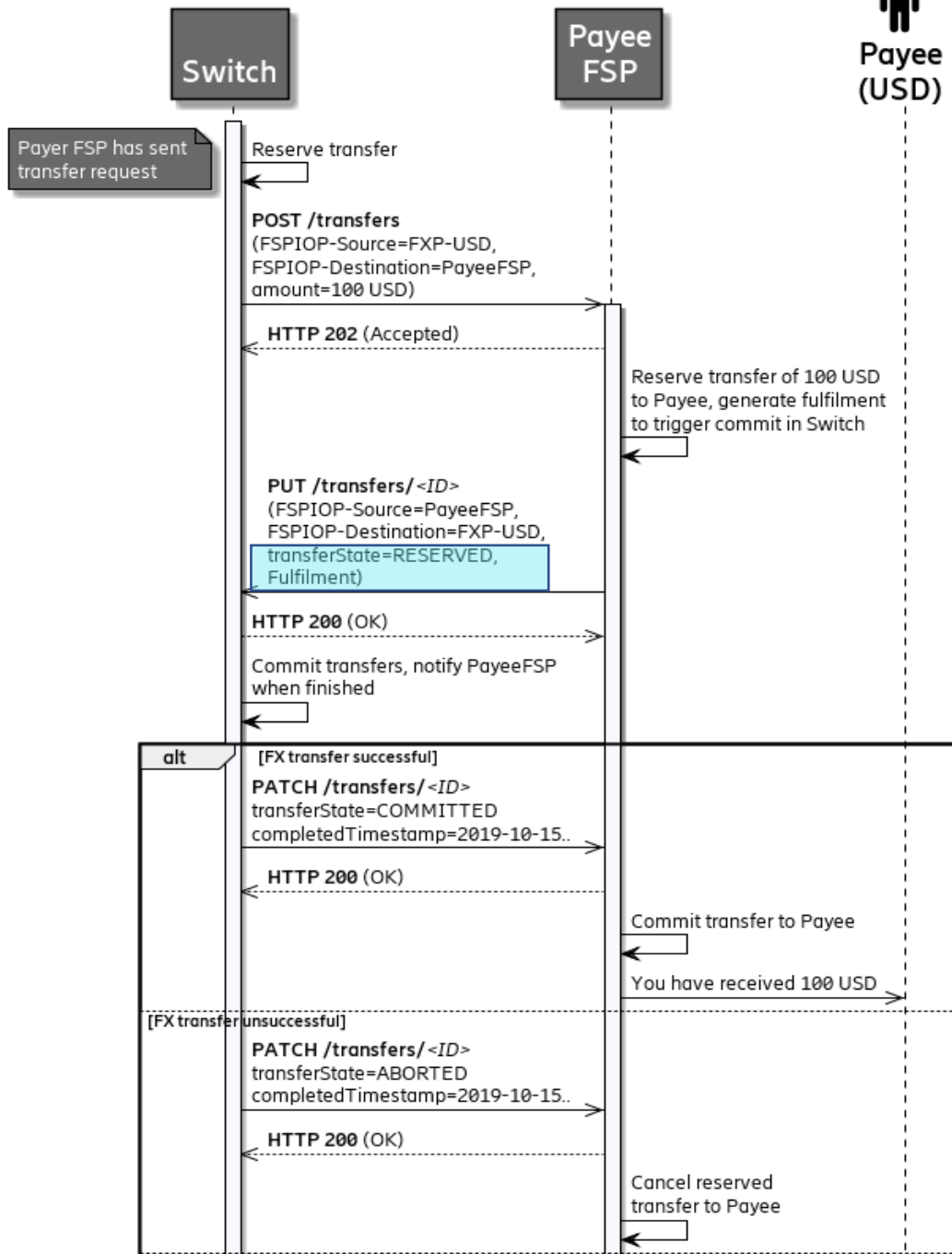


Needs to be Updated

```
PATCH /transfers/85feac2f-39b2-491b-817e-4a03203d4f14 HTTP/1.1
Content-Type: application/vnd.interoperability.transfers+json;version=1.0
Content-Length: 166
FSPIOP-Signature: {"signature": "YXBwbGlj...JzK2pzb2"}
{
  "completedTimestamp": "2019-10-15T08:14:03.113+01:00",
  "transferState": "COMMITTED",
}
```

```
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",
}
```

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

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

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