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TECHNICAL NOTE

Operational use cases for EO Platforms Interoperability

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CHANGE RECORD

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DISTRIBUTION

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1 INTRODUCTION

1.1 Purpose

This document report some use cases to help define the priorities of technical use cases used within the common architecture project.

1.2 Scope

This document has been produced by the EMSS service in support to ESA for the Common Architecture Project

1.3 Document structure

The document is structured as follows:

- Section 1: this introduction
- Section 2: Use cases description

1.4 Terms and Abbreviations

FS-TEP	Food Security TEP
MEP	Mission Exploitation Platform
TEP	Thematic Exploitation Platform

2 USE CASES

This section report the description of 3 use cases selected among real ESA project which involves interaction with digital platform for the processing, analysis and exploitation of Earth Observation data.
The use cases reported are:

- UC1: Remote Service execution, in Oil Spill Response project
- UC2: Cross platform automatic application deployment and execution, between FS-TEP and Proba-V MEP
- UC3: New application deployment, on the Charter Processing Platform

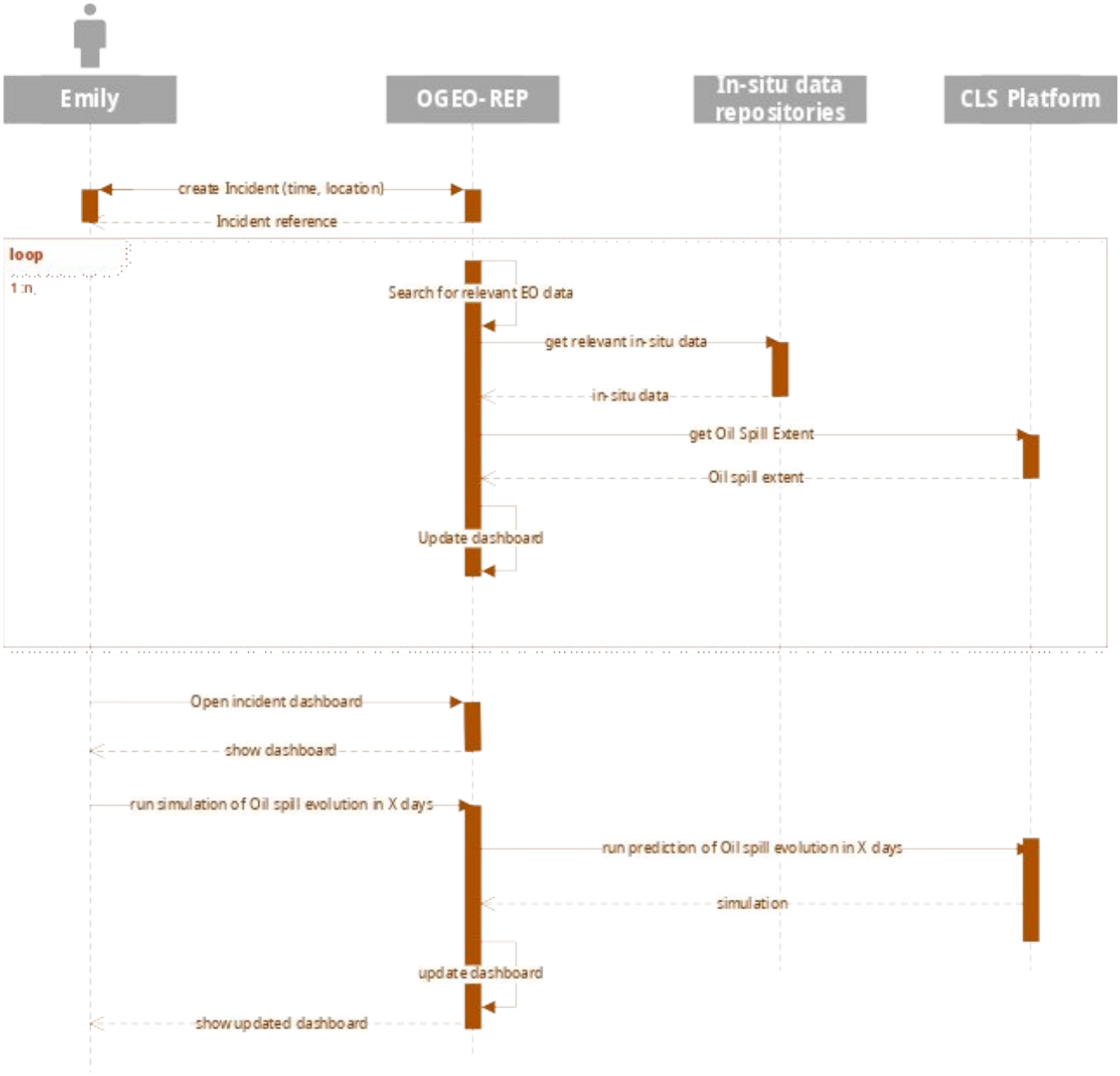
2.1 UC1: Remote Service execution

Context information:
The Oil Spill Response project created a platform, the Oil and Gas Earth Observation Response Portal (OGEO-REP) , for the exploitation of EO data in the context of the response to oil spill incidents. OGEO-REP integrates EO data and services as well as information provided by service providers in the specific oil spill management context. One of these providers is CLS which expose its services hosted on its own platform via a web API. The CLS platforms hosts all the input data necessary to run the algorithms provided. In case of an oil spill, an emergency response team will access OGEO-REP to monitor the evolution of the incident. Emily is a member of the Emergency response team, authorised to access the platform.

Use case Steps:

1. Emily logs in OGEO-REP and creates an item representing a new incident providing the following information:
    a. Location
    b. Date and time
2. OGEO-REP start a systematic gathering of information about the incident in particular retrieving:
    a. EO data: Sentinel-1, Sentinel-2 and other commercial data when available on the incident location from the incident time onward
    b. In-situ data: hourly wind and wave intensity, oil rigs location and ships hourly location in the area of the incident
    c. Service providers data: oil spill extent detection from CLS platform each time a new EO data is available on the area of the incident
3. Emily periodically checks the incident dashboard and looks at the evolution of the oil spill.
4. Emily wants to see in the dashboard the predicted evolution of the oil spill in X days.
5. OGEO-REP invoke the execution of the oil spill prediction algorithm on the CLS platform passing the area to examine (a bounding box centred on the incident location) and the date time in the future to which the prediction should refer.
6. OGEO-REP shows the result of the simulation to Emily within the dashboard

The UML sequence diagram below illustrates this use case.


Emily
OGEO-REP
In-situ data repositories
CLS Platform
create Incident (time, location)
Incident reference
loop
1:n
Search for relevant EO data
get relevant in-situ data
in-situ data
get Oil Spill Extent
Oil spill extent
Update dashboard
Open incident dashboard
show dashboard
run simulation of Oil spill evolution in X days
run prediction of Oil spill evolution in X days
simulation
update dashboard
show updated dashboard

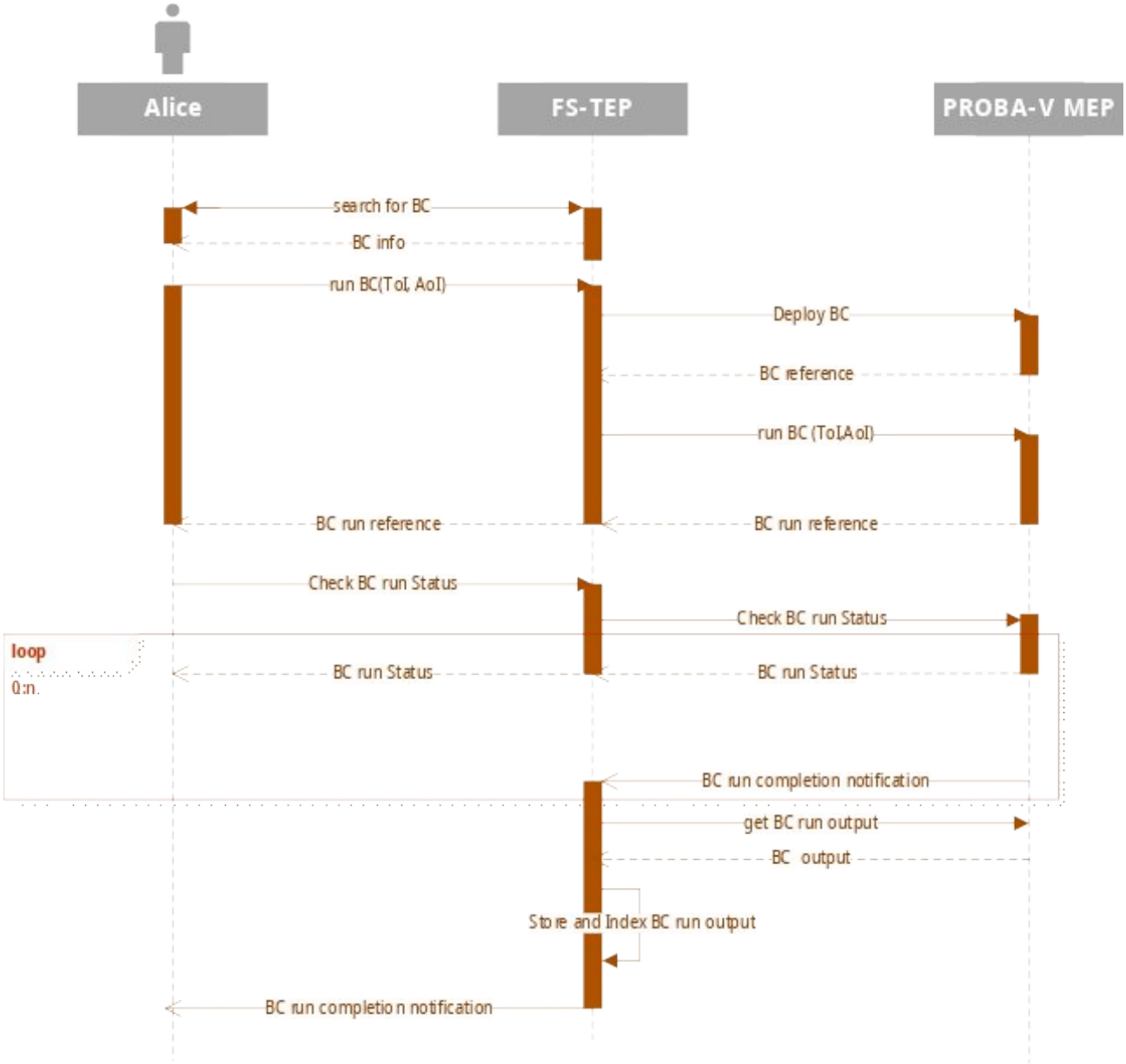
2.2 UC2: Cross platform automatic application deployment and execution

Context information:
The platform FS-TEP and PROBA-V MEP are federated so that users of the TEP can benefit from data and services deployed on the MEP. Alice is an authenticated user of FS-TEP who is authorised to use the algorithm “Biomass Calculator” (BC) which uses PROBA-V data.

Use case steps:

1. Alice search for BC algorithm on FS-TEP and then request its execution specifying a time of interest (ToI) and an Area of Interest (AoI) as input parameter.
2. As BC algorithm process PROBA-V data, FS-TEP, in order to avoid transferring all input data covering the ToI and AoI specified, deploys BC on PROBA-V MEP, using the platform API.
3. After that FS-TEP invoke PROBA-V MEP API to execute BC passing as input the ToI and AoI specified by Alice.
4. In the meanwhile Alice checks regularly the status of the execution of BC using FS-TEP GUI. FS-TEP displays to Alice the information requested, retrieving them using PROBA-V MEP API.
5. Once the execution of BC is completed, the output files are fetched by FS-TEP, stored and indexed in its data repository.
6. Alice access the output files produced by BC which are retrieved by FS-TEP data repository

The UML sequence diagram below illustrates this use case.



This use case can have 2 possible extensions.

EXT-1: Before step 2 FS-TEP checks if BC is already deployed on PROBA-V MEP and if the version deployed is the one currently executed by Alice. In case of positive result, step-2 is skipped. Otherwise the version of BC deployed on PROBA-V is first un-deployed and then step-2 is executed.

EXT-2: After step 5, BC is un-deployed from Proba-V MEP.

2.3 UC3: New application deployment

Context information:
The Charter Processing Platform is an element of the International Charter 'Space and Major Disaster' which allow the online processing and analysis of satellite data provided by the Space Agencies participating to the charter. For each disaster its Project Manager (PM) and the nominated Value Adders (VAs) can use the platform to extract relevant information, depending on the disaster type, from the various satellite data available on the platform. Each space Agency participating in the Charter can propose new algorithms for EO data processing to be made available on the Processing Platform. However such algorithms need to be authorised by the Charter Board before being deployed. To facilitate the on-boarding process, each algorithm needs to be packaged in a common format.
Bob is the provider of an a new Lava Flow Detection (LFD) algorithm which has been authorised to be deployed on the Charter Processing Platform. The Platform Operator is in charge of deploying new algorithms on the Charter Processing Platform.

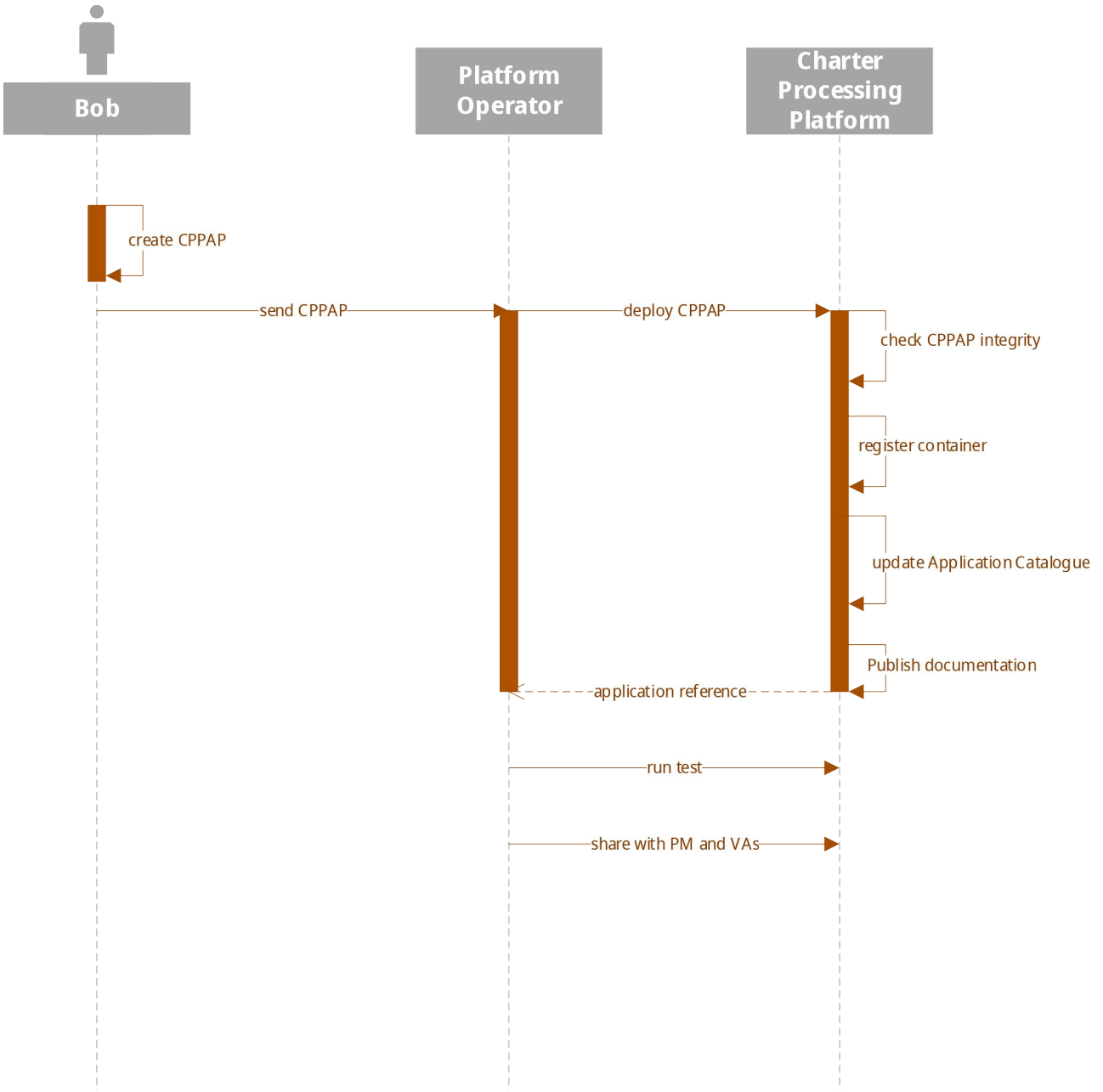
Use case steps:

1. Bob collects all the information required for the LFD algorithm to be executed on the charter platform and creates a Charter Processing Platform Application Package (CPPAP). It contains:
   - Executable, dependencies and the instruction to build a container for them (e.g. dockerfile)
   - Metadata file describing input/output and resources required by the application
   - Manual and tutorial for the algorithm users

   The executable is build according to the Charter Processing Platform defined convention for the management of input, output and logs
2. Bob passes the CPPAP to the Platform Operator
3. The Platform Operator deploys the LDF algorithm on the platform, in particular:
   - Check package integrity
   - Register the container image in the Charter Processing Platform Register
   - Register the LDF in the Charter Processing Platform Application Catalogue
   - Publishes the user manual and tutorial

   These operations are part of a single automated procedure exposed by the Charter Processing Platform by its API.
4. The Platform Operator runs some tests of the LFD to verify correct integration
5. The Platform Operator shares the LDF to all Charter Processing Platform authorised PM and VAs

The UML sequence diagram below illustrates this use case.


Bob
Platform Operator
Charter Processing Platform
create CPPAP
send CPPAP
deploy CPPAP
check CPPAP integrity
register container
update Application Catalogue
Publish documentation
application reference
run test
share with PM and VAs