Simulated FLEXIBAC
System Requirements

TABLE DES MATIÈRES

1. INTRODUCTION

1.1. Purpose

The context of the project is as follows:
The smart manufacturing community wishes to create a suitable, comprehensive, and standardized reference for real-world industrial manufacturing cases (which is useful for comparing and improving academic case study solutions). To create this reference, IMIC is a collaborative effort between the scientific community over time. IMIC is an annual academic competition in which several groups of students/researchers propose a solution to a given production problem. The best solution will be archived as a new reference instance. Within a few years, IMIC should become a reference for the community.
Flexibac is the theme of the first IMIC competition. It presents a production problem resulting from an industrial collaboration between La Poste and the University of Nantes. La Poste de Nantes wanted to integrate a 6-axis robot into its sorting system.
The project aims to implement the following layout: 10 carts, each with a specific destination, are arranged around the robot. The robot picks up each box one by one (each with a specified destination) and loads them onto the cart with the corresponding destination. The boxes can be handled either by the robot or by operators. A routing system sends the boxes to the robot or to the operators. The problem is as follows: define a system for managing boxes and carts throughout the work shift.

To define this management system, a control system must manage the routing of boxes (by sending them either to the robot or to the operators), along with the management of the carts to be placed around the robot. To test its behavior, it will be tested in simulation.

The purpose of this document is to establish all the system requirements that the Flexibac System must meet in response to the needs expressed in the stakeholder requirements definition document.

1.2. Reference documents

- Stakeholder requirements: IMIC.pdf.

1.3. Terminology

In this document, the system studied is referred to interchangeably as the "Simulated FLEXIBAC "

2. SYSTEM SCOPE ANALYSIS

2.1. Purpose and mission

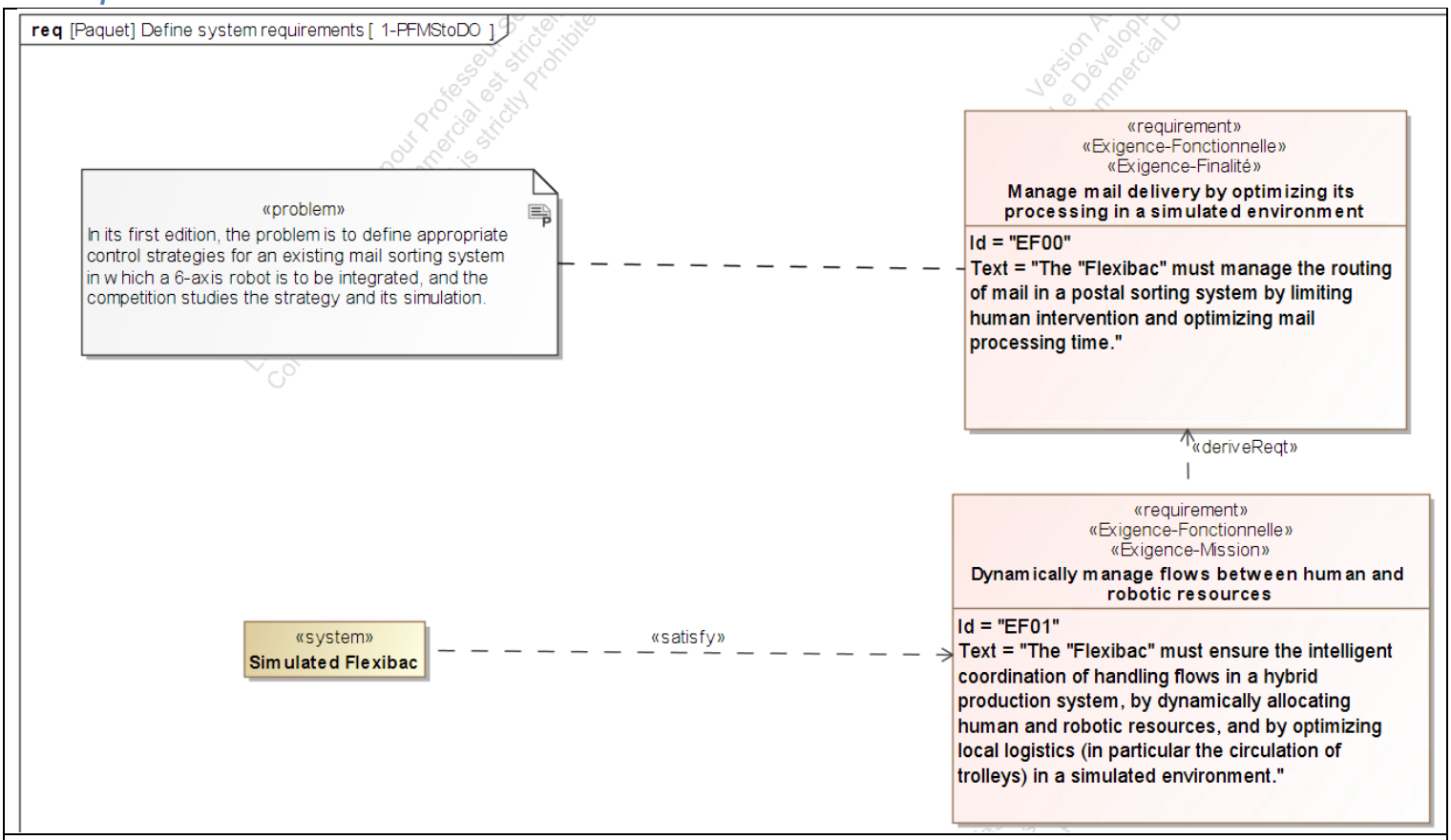

Figure 1: Synthesis: Problem – Purpose – Mission – System

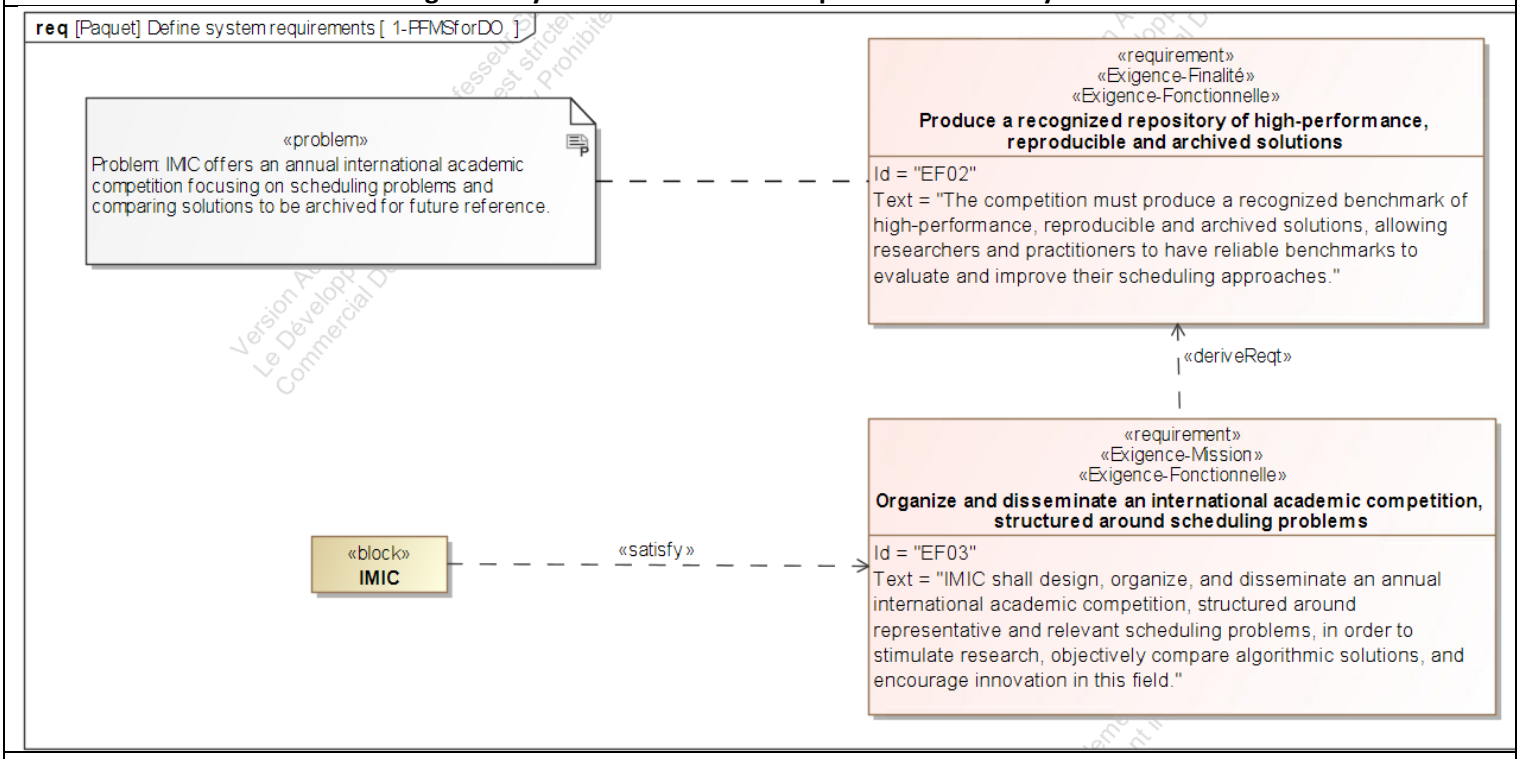

Figure 1: Synthesis: Problem – Purpose – Mission – System

2.2. Life cycle

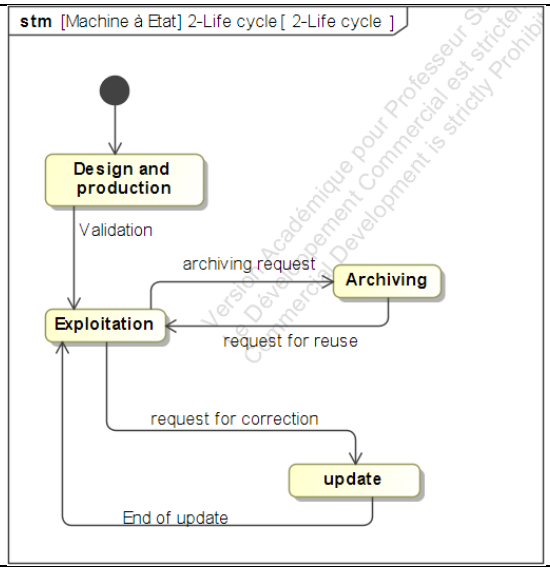

Figure 2 : Life cycle

2.3. Stakeholders involved

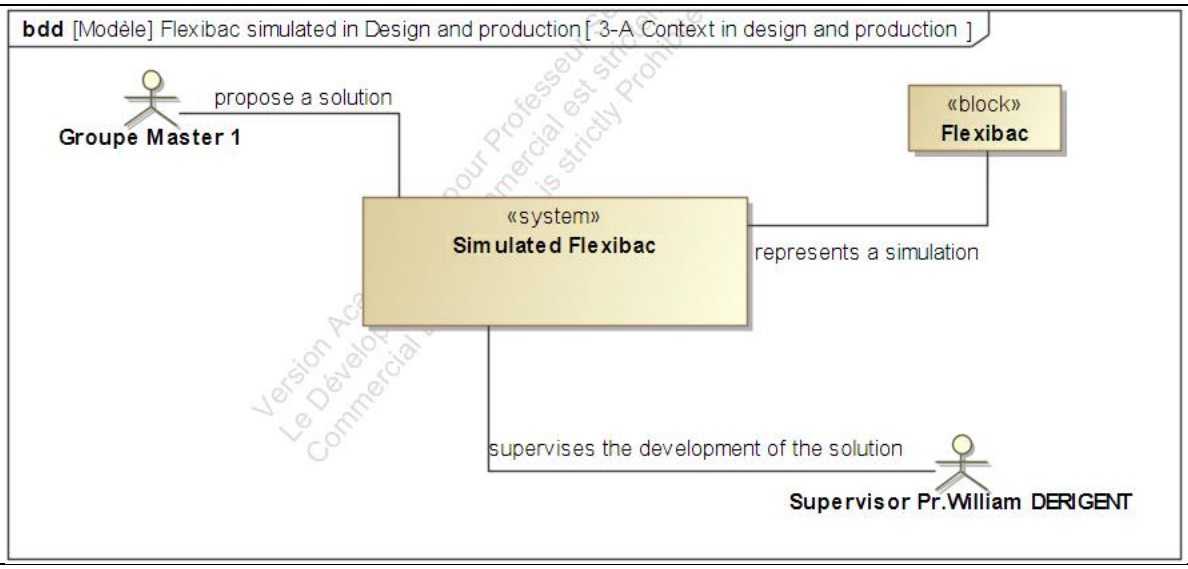

Figure 3 : Context in the design and production life phase

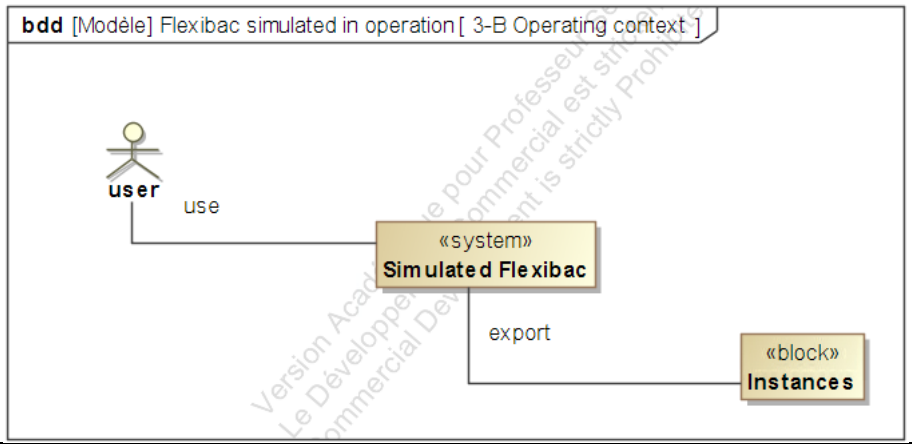

Figure 4 : Context in the operational life phase

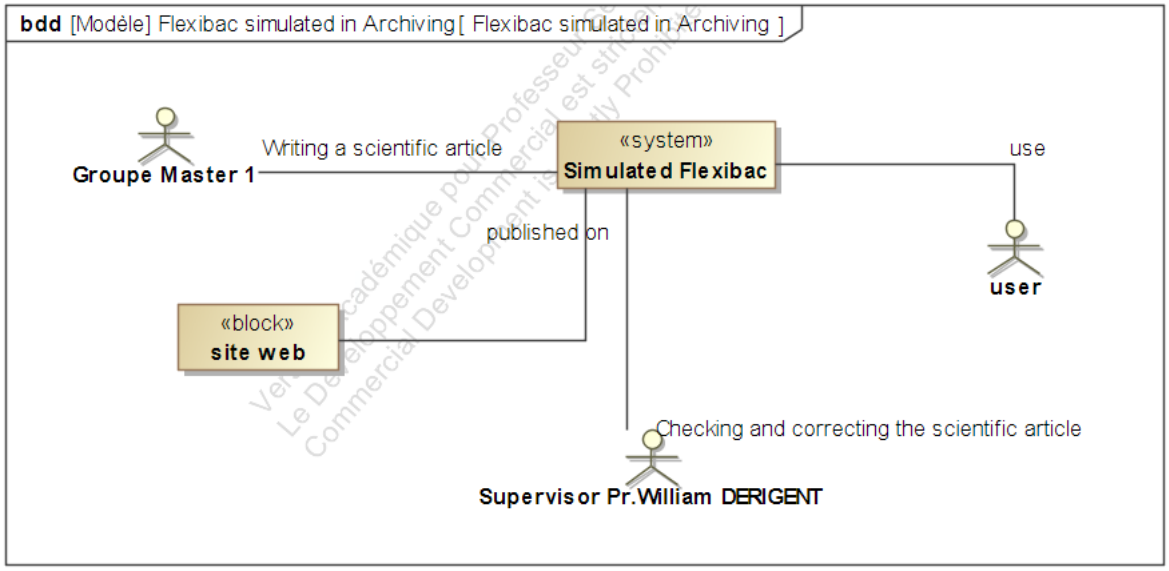

Figure 5 : Life-phase context Archiving

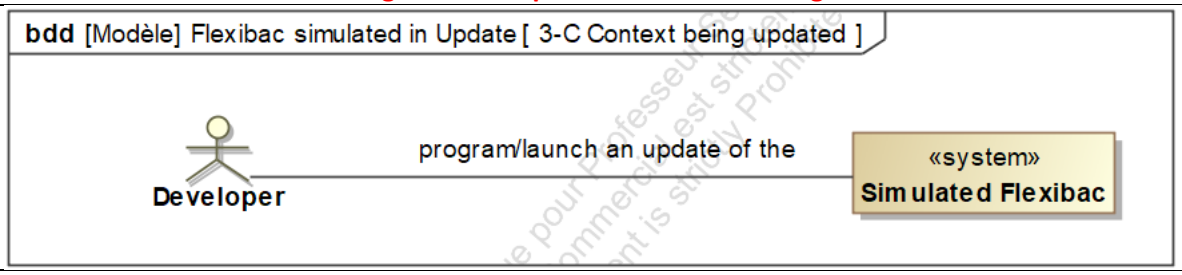

Figure 6 : Updated life phase context

3. SYSTEM USES

3.1. Operational phase

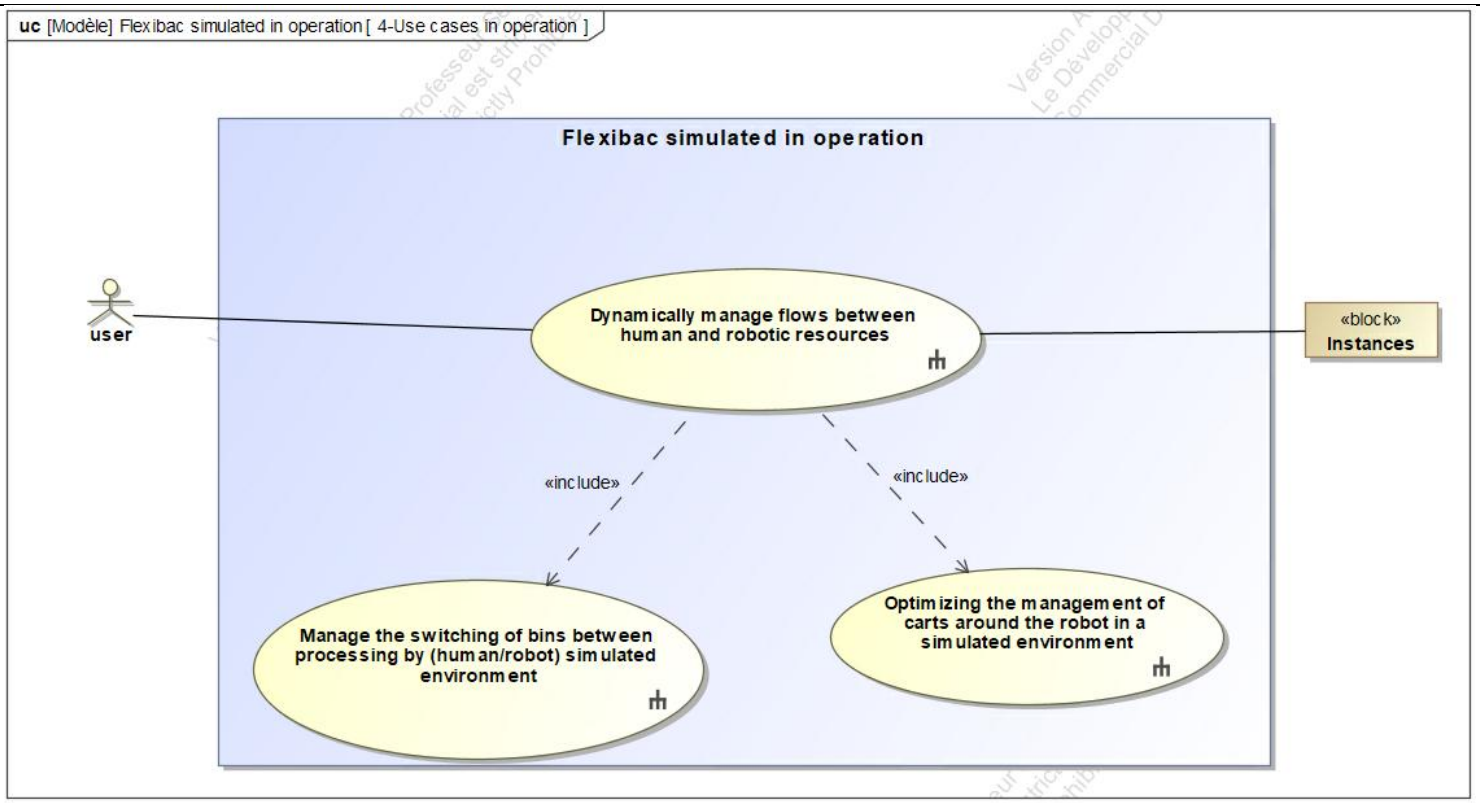

Figure 9 : Use cases in the operational phase

4. SYSTEM REQUIREMENTS

4.1. Functional requirements

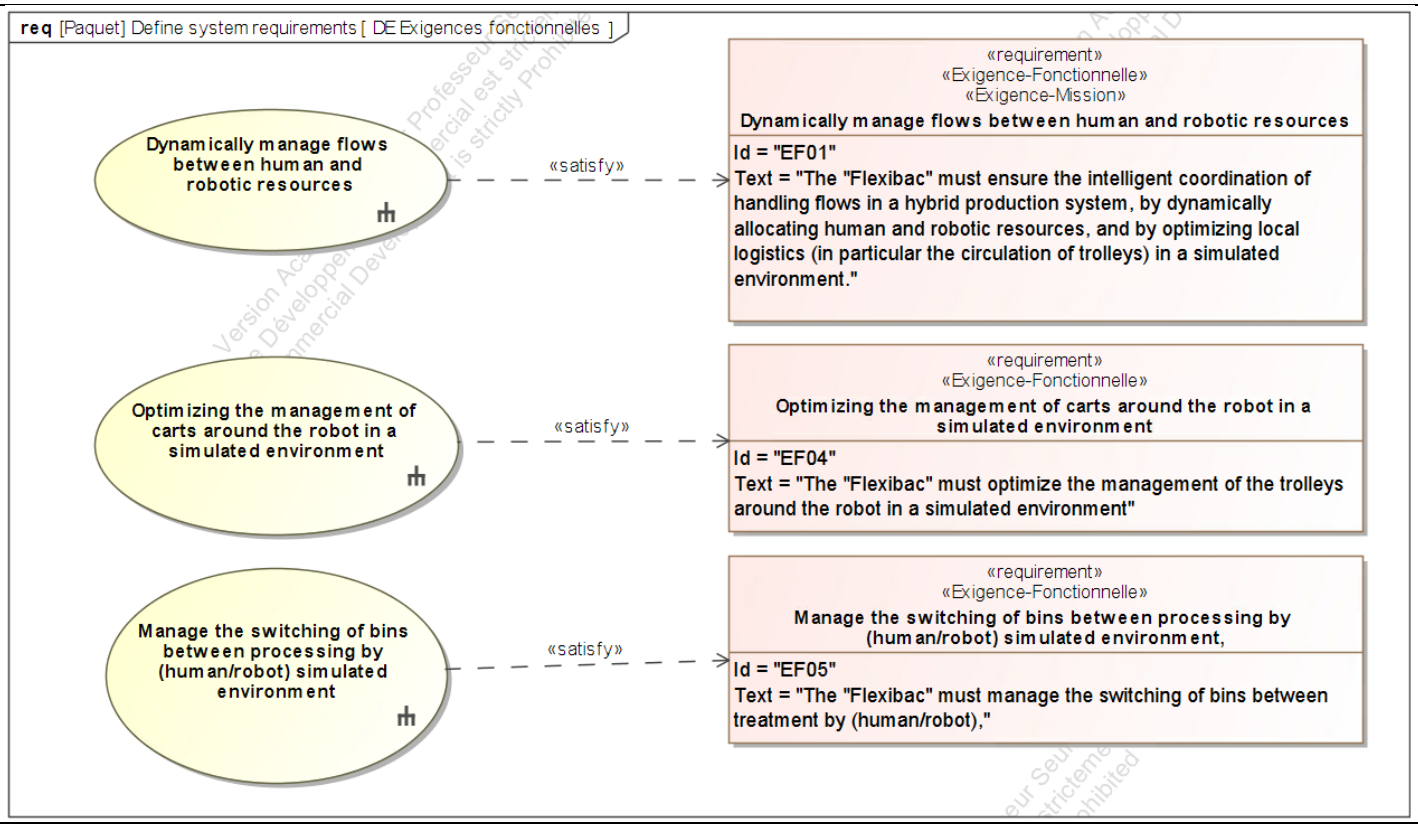

Figure 10 : Functional requirements

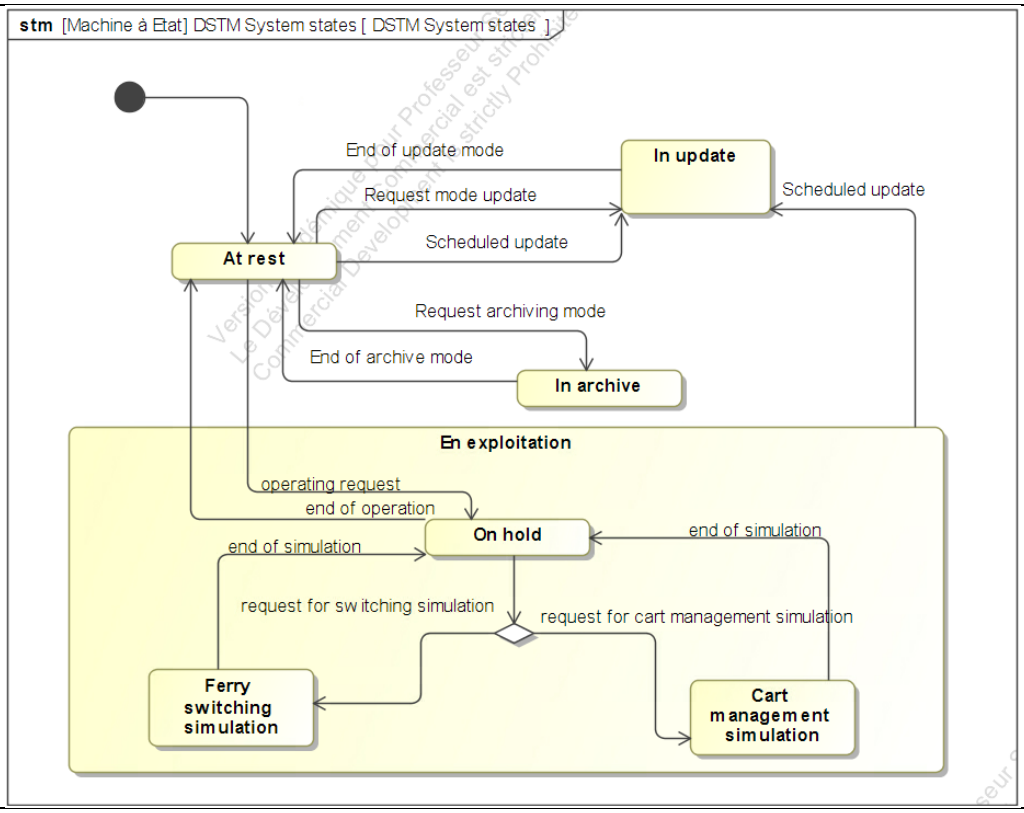

Figure 11 : System states

4.1.1. Operational phase

EF01	EF1	Dynamically manage flows between human and robotic resources

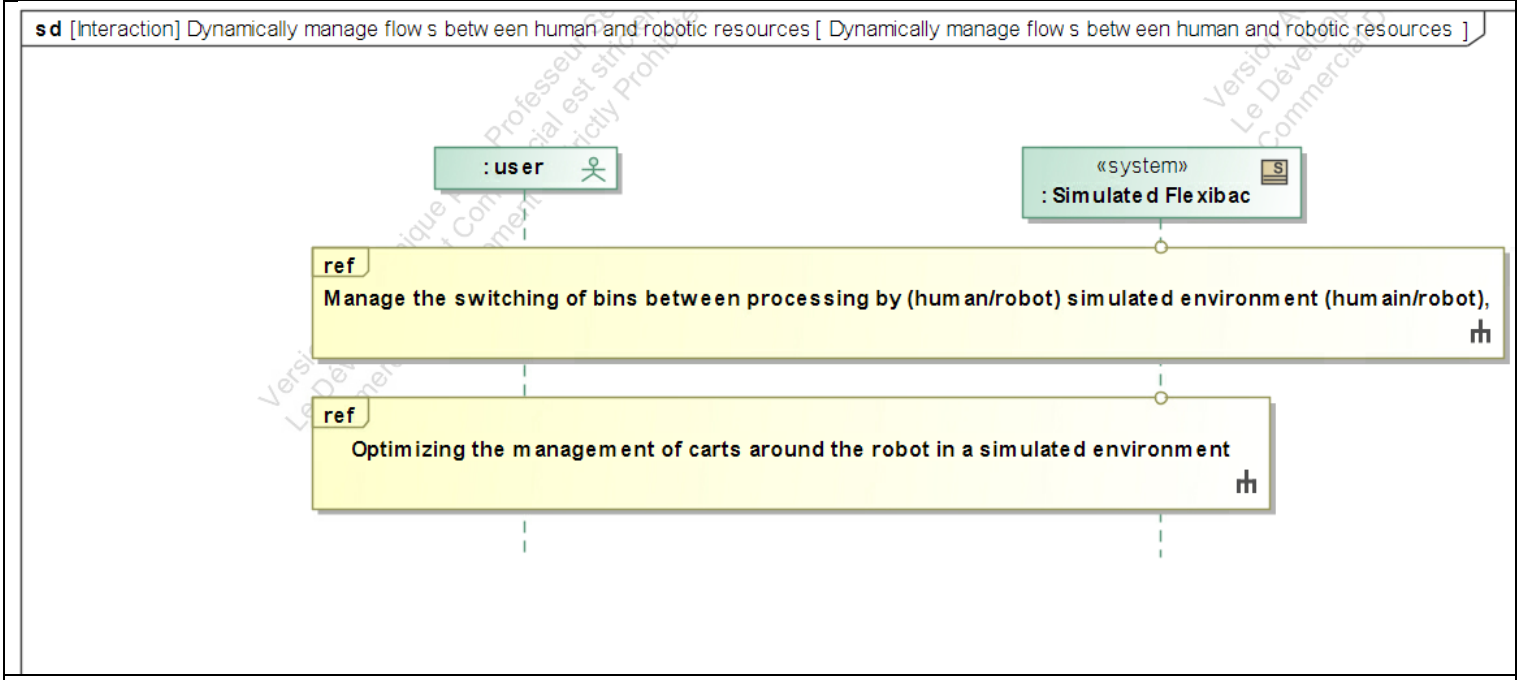

Figure 12 : Interactions EF1

EF01	EF1	Manage the switching of bins between processing by (human/robot) simulated environment

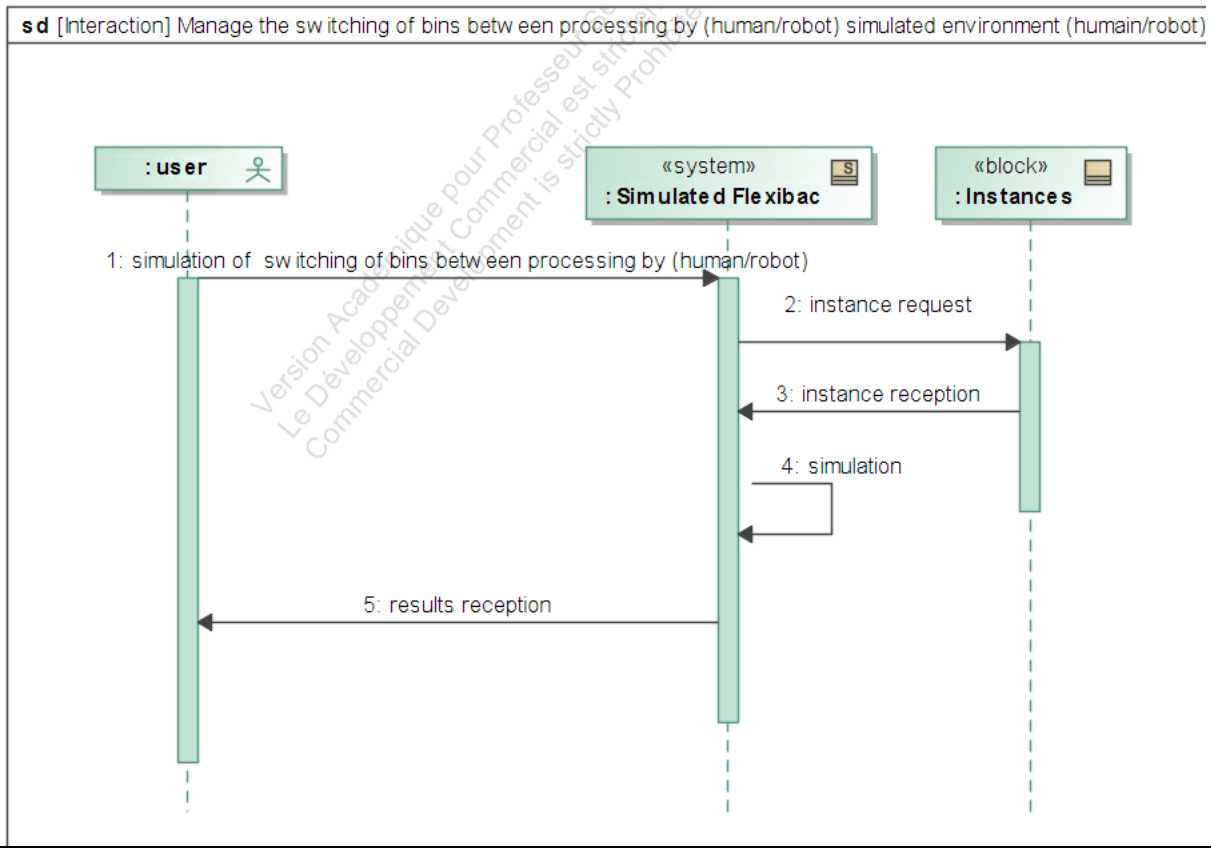

Figure 12 : Interactions EF1

EF0.1	EF1.1	Optimizing the management of carts around the robot in a simulated environment

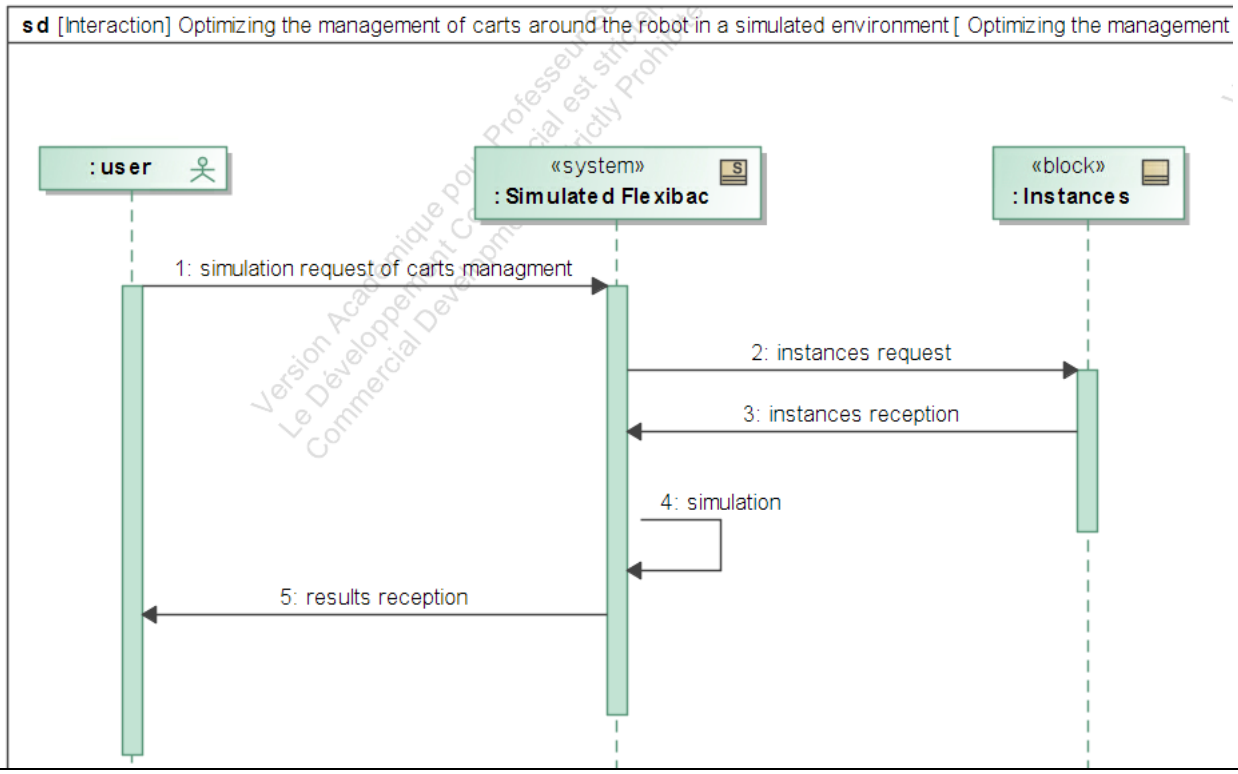

Figure 13 : Interactions EF1.1

4.2. Non-functional requirements

#	△ Id	Stéréotype Appliqué	Nom	Text
1	EC00	Requirement [Class] «» Exigence-Constrainte [Eler	respect all system constraints	The Flexibac must meet all system constraints (storage capacity, cycle time, cart capacity).
2	EC01	Requirement [Class] «» Exigence-Constrainte [Eler	Manage online scenarios	The Flexibac must allow online scenarios to be managed).
3	EP00	Requirement [Class] «» Exigence-Performance [Er	maximize the number of boxes handled by the robot over	The Flexibac should maximize the number of boxes handled by the robot over a 24-hour period.
4	EP01	Requirement [Class] «» Exigence-Performance [Er	minimize the number of trolley changes	The Flexibac should minimize the number of trolley changes required by operators.