Ecole Des Mines
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International Project Management

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1 Abstract:

The project is to built a workshop with software development. The main concept of this project is to develop a software using Scrum Methodologies. Scrum methodology is the most commonly used methodology in IT industries.Our workshop has multiple task to cover. Each of the task are divided into 3 groups of four members.Each group is suppose to collaborate with the other group and make the program or rather the project to work. This project has involvement of both methodologies and programming.We were free to use technologies what one wants to implement in the project.

2 Introduction:

2.1 The Pictorial Overview of Complete Workshop:
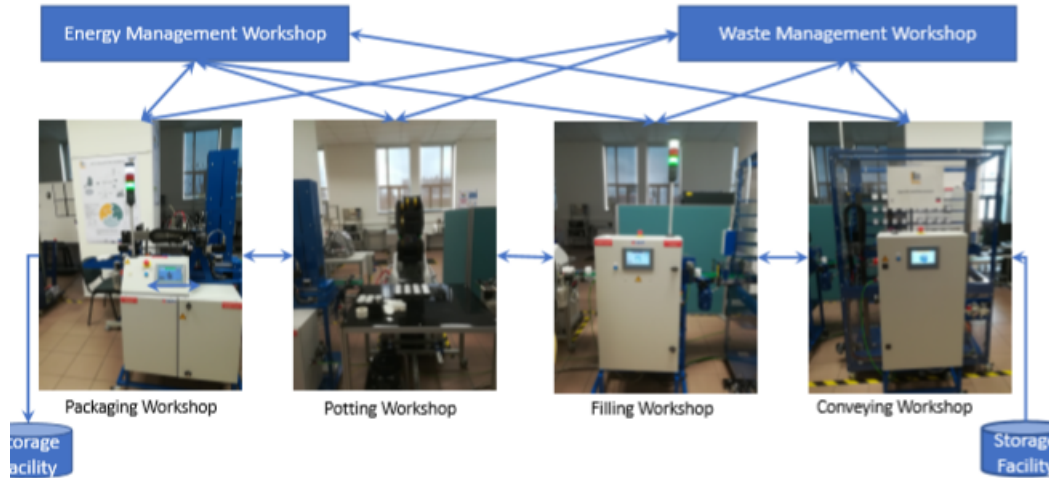
The workshop has been segregated in 6 parts.Each team is obliged to develop their part. We belong to team1 which is **itmworkshop1**. We are suppose to develop conveying workshop and Waste management.We would have communication with itmworkshop2 for posting the conveying status then they would start with the filling part and itmworkshop3 will post us with the energy consumption status.

2.2 The Pictorial Overview of Workshop1:
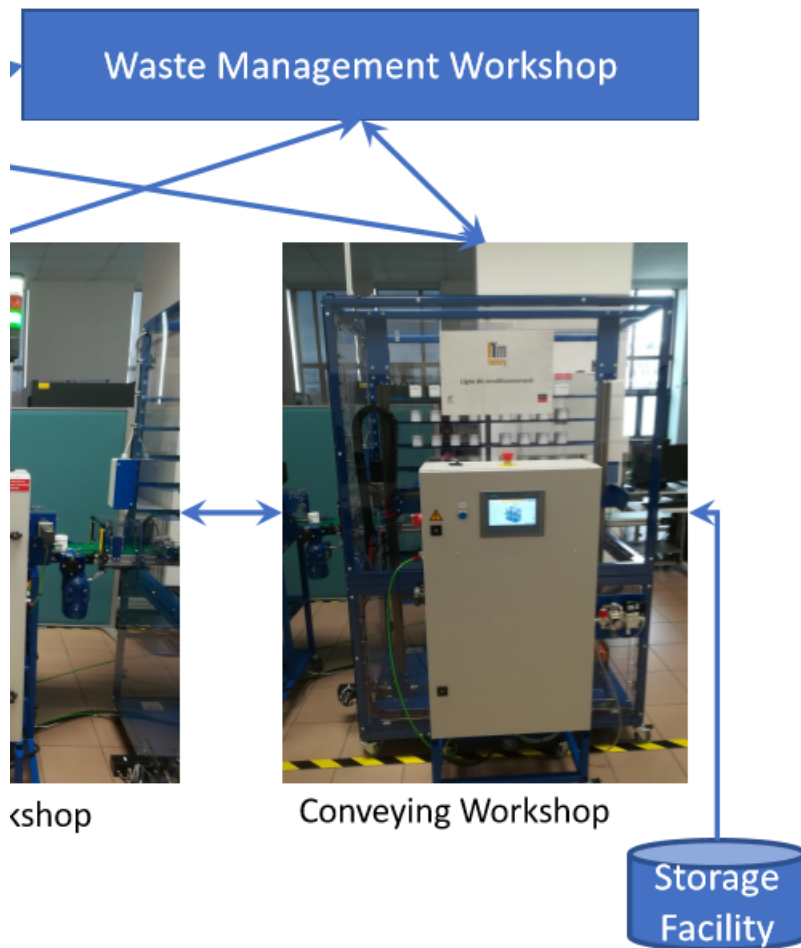
These are the two main parts of the project where we are suppose to develop as Internal process. In the next section we would explain about the architecture.So, if we give a brief about the internal process(Conveying,Waste), workshop1 is suppose to check from the storage facility the number of cups and size of the cups available and then it should start the process of sending proper cups to the filling workshop in order to fill the cups with products. If any broken cups reported by conveying workshop, it should send the information to the waste management.Once the conveying belt will start Energy management team will send the total power consumptions These are the internal codes which will happen in backend. The front end will only see the Graphical interface.

2.3   The Pictorial Overview of Architecture of the Project:
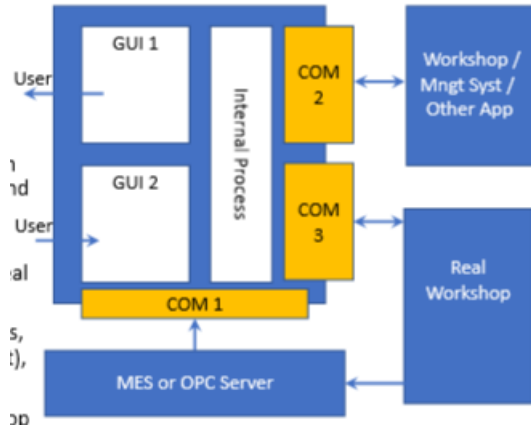
As per the architecture Internal process will have a communication between all the COM 1,COM 2,COM3 and show the result in GUI 1, and take the command from user in GUI 2. COM 2 is suppose to get the interoperability, COM 1 will have the information about the MES or OPC server. COM 3 will have communication with the real workshop.

3   Description of different component of the architecture:

GUI 1: The visualization of the complete workshop.

GUI 2: The user input of the complete workshop.

Internal Process: This process includes Conveying workshop and Waste Management.
Work of Conveying workshop: To start the belt and place the cups with arms,and send the proper cups to next workshop which is filling workshop.
The waste management will show the waste reported by different workshops. It will set the limit by GUI 2 . and show the current waste in GUI1.

COM 2: Communication 2 (COM -2) serves as an interface between the other workshops and our ones. It receives JSON data from our workshops and transfers it to the others and also vice-versa.

COM 3: Communication 3 (COM - 3) serves as a client program that uses the server-client paradigm to form an effective communication standard between the real workshop and the internal process. It is a bidirectional communication process, in the sense that, data is moved back and forth from the real workshop to the internal process

COM 1: Communication 1 (COM - 1) follows an OPC Server-Client paradigm between the internal process and the real workshop. The distinctiveness between COM - 1 and COM - 3 lies in the fact that COM - 3 is birectional while COM - 1 is unidirectional.

4 The Scrum Methodology we followed:

4.1 Definition :

Scrum is one of the implementations of agile methodology to manage a project, usually software development. It is a framework for managing a process.

explain the whole scrum methodology

4.2 Scrum elements:

During this project the team was following the scrum methodology step by step to keep everything in the right place. To manage their tasks and their time which helped to improve the project with time. Next you will discover some explanation about the elements of scrum regarding its use during the project.

Roles:

In projects always there exist some roles for each member engaged. And for scrum roles defines as below:

Owners:

They are the stakeholder of the product which means the people who have the creative vision to build some products regarding their wishes.

Scrum master:
The one who is responsible to other scrum elements which is team members. The master role keeps the relationships among the team and the owners, He/She guided the team to deliver the project as expected. In other word, helps the product group learn and apply Scrum to achieve objective value.

Team members:
A group of members who will be more involved and react with the product by building and improving it due to a specific period of time.

Scrum roles:

Owners	Scrum master	Team members
Prof. Olivier Boissier	Poulomi NANDY	Jonathan MALLET
Prof. Pierre Maret		Jehad Melad
		Aditya DAS

4.3   List:

When the goal is defined and has a clear view then we need to put some lists containing the needs of the product from start point until the end. However, may some other listes come later regarding the developing process.

Product backlog:
This list is the first thing you need which include features and sub-features required to build the product. Also it contains the priority, the effort, and work agenda of the team members. regarding the delivery date, estimated effort, and difficulties.

Sprint backlog:
It is called scrum iteration (a Sprint) which is the list of works that need to be done during a short time approximately between 2-4 weeks, then at the end of this time the team needs to evaluate their work. In this project you will see three events of sprints.

Impediments list:
This is more or less the difficulties or barriers list, it defines the problems facing the team and slows the team work or keeps the team from getting work done.

4.4   Meeting:

The purpose is to keep the team/owners up-to-date about the work by defining the problems and make it clear and visible to the team. This meeting has events,first at the beginning of the sprint to plan for next sprint work to be done and any other issues. Second at the end of spring to define what the things have been done and what are not.

5   Sprint backlogs:

Backlog	Priority	Effort
GUI1	High	3
GUI2	High	2
Creation of the web server: Conveying And waste management workshop	High	5
Definition of the web server: Conveying And waste management workshop	High	3

Backlog of Sprint 1

Backlog	Priority	Effort
GUI1: waste management	Low .	2
GUI2: waste management	Low .	2
Design and implementation of COM 2	High	6
Internal process for conveying workshop	High	5

Backlog of sprint 2

Backlog	Priority	Effort
Design and Implementation of COM 1	High	3
OPC Server-Client Interaction	High	4
Internal Process for Waste Management Workshop	Medium .	5
COM1 - Definition of the JSON Schema	High	6
Interoperability	Medium .	2

Backlog of sprint 3

6 The Progress Report over the sprints:

In order to complete the whole project we first focused on the sprint dates and number of sprints.
Feb 7th- Sprint 1(30percent)
Feb 21st- Sprint 2(30 percent)
Mar 20th- Sprint 3(40percent)

6.1 In Sprint 1 :

This sprint was dedicated towards developing GUIs and understanding the communication part. The task was divided into 2. Two members took the ownership of developing GUIs and the other two members took over creation of the web server and defining of the web server. The parameters were not available when we developed in sprint1. Took arbitary parameters for testing.

Opened issues in the gitlab and assignee was assigned depending on the issues. After Sprint 1 we had worked on the product backlogs.

6.1.1 Technologies Used :

-HTML
-CSS
-Python Flask -socket programming.
Now we are left with 70 percent of the architecture of the workshop to be completed.

6.2   In Sprint 2 in 2 weeks

According to the product backlogs of the first sprint, we are suppose to start with the next iteration. We have included conveying workshop architecture, program and COM 2. Again the group was divided into two parts. One part of the group worked on the communication or rather com 2. The other 2 members worked on the architecture and program.

6.2.1   Technologies Used :

-Python procedure programming
-Flask and socket

6.3   In Sprint 3 after a month

According to the product backlogs of the 2nd sprint,we started our 2nd iteration of 3rd sprint now as this was our final iteration,we invested most of our hours in this delivery.We have included the remaining part of the project in this sprint. Example, COM 1,COM 3, few change in Conveying workshop and Waste Management and also the interoperability with other workshop was done in this sprint.

6.3.1   Technologies Used :

-Python open API program
-JSON File
-Flask -socket programming

7   The communication between Workshop1 and others:

7.1   The JSON file which conveying workshop would send/post to Filling Workshop:

```json
{
    "public": false,
    "axot_under_power": true,
    "cup_size": "medium",
    "downstream_b5_accumulation": false,
    "homing_cam": false,
    "km1": false,
    "presence_pot": true,
    "presence_product": true,
    "product_name": "salt",
    "v90_alarm": false
}
```

We have programmed the internal(i.e conveying workshop) process in such a way that it will produce Json data. Finally COM 2 will post this data in the filling Workshop.

7.2 The JSON file which Waste Management would get from Conveying Workshop:

```
{
    "Pot broke": false,
    "limit": 15,
    "exceeding limit": false
}
```

The workshop 1 team should post this data to the Waste Management. We have programmed waste management and conveying workshop in such a way that, it would generate this data and send to waste management.

7.3 The JSON file which Waste Management would get from filling and Potting Workshop:

```
{
    "containers": "true",
    "salt_spillage": false,
    "limit": 15,
    "exceeding_limit": false
}
```

The workshop 2 team who are suppose to send waste management this data.We have open API in our Internal process waste management code where COM - 2 will get the data from workshop 2 and post it in the internal process.from waste management this information will be shown to GUI1.

7.4 The JSON file which Waste Management would get from Packaging Workshop:

```
{
    "containers": "true",
    "tray_broken": false,
    "limit": 15,
    "exceeding_limit": false
}
```

The Workshop 3, who are responsible for packing are suppose to send this data to waste management. Again COM - 2 will fetch this data and give to waste management,then waste will display the data in GUI 1. The limit is set by GUI2.
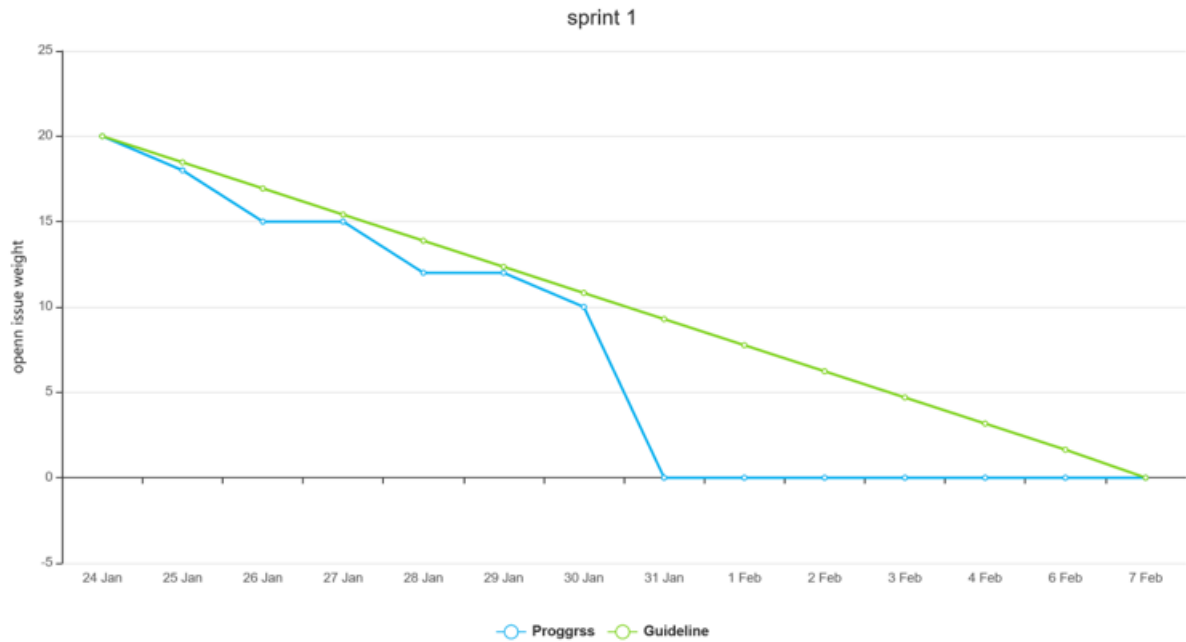
7.5 The JSON file which Energy Management would get from Conveying Workshop:

```
{
    "energy": 2,
    "name": "Conveying"
}
```

The itmworkshop3 is suppose to get this data from conveying workshop.Once the belt starts moving,conveying workshop would post this data to itmworkshop3 for energy management.
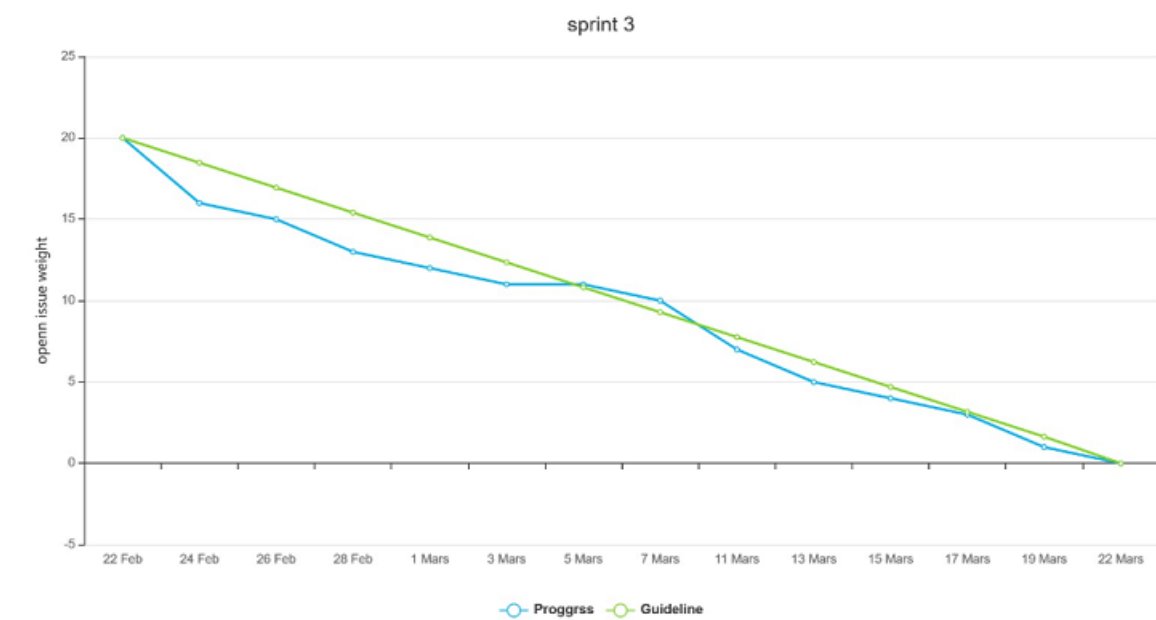
8 The burndown charts:

8.1 Sprint 1:

sprint 1

8.2   Sprint 2:

sprint 2

8.3   Sprint 3:

9   The Product Backlogs:

9.1   Sprint 1:

If we check from the architecture almost all the communication part was remaining:
- COM 1 Design and implementation left.
- COM 3 Designed but unimplemented.
- COM 2 Designed but unimplemented.
- Complete internal process including conveying and waste management.
-GUI 2 communication.

9.2   Sprint 2:

Again if we check from the architecture we have covered certain part in Sprint 2 the remaining were:
-open API for conveying and waste management
-COM 3
-No data from OPC server
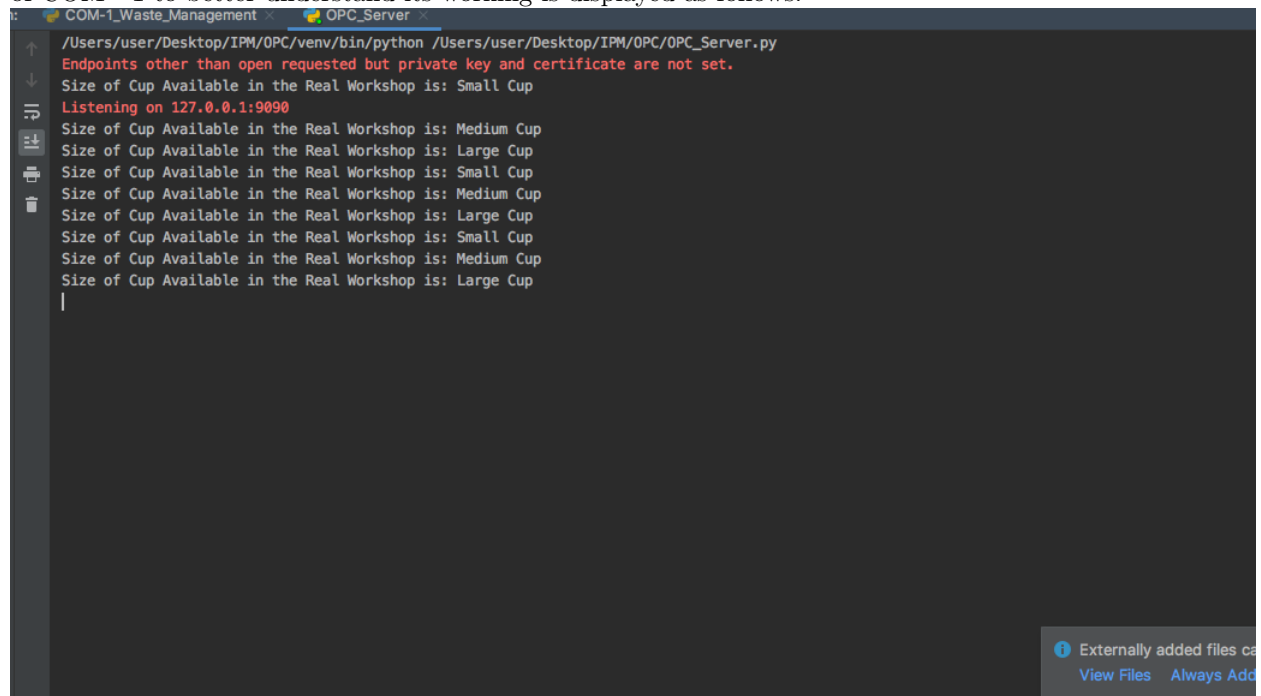
9.3   Sprint 3:

We have successfully achieved almost everything in Sprint 3. Some of which can be summed up in the following subsection:
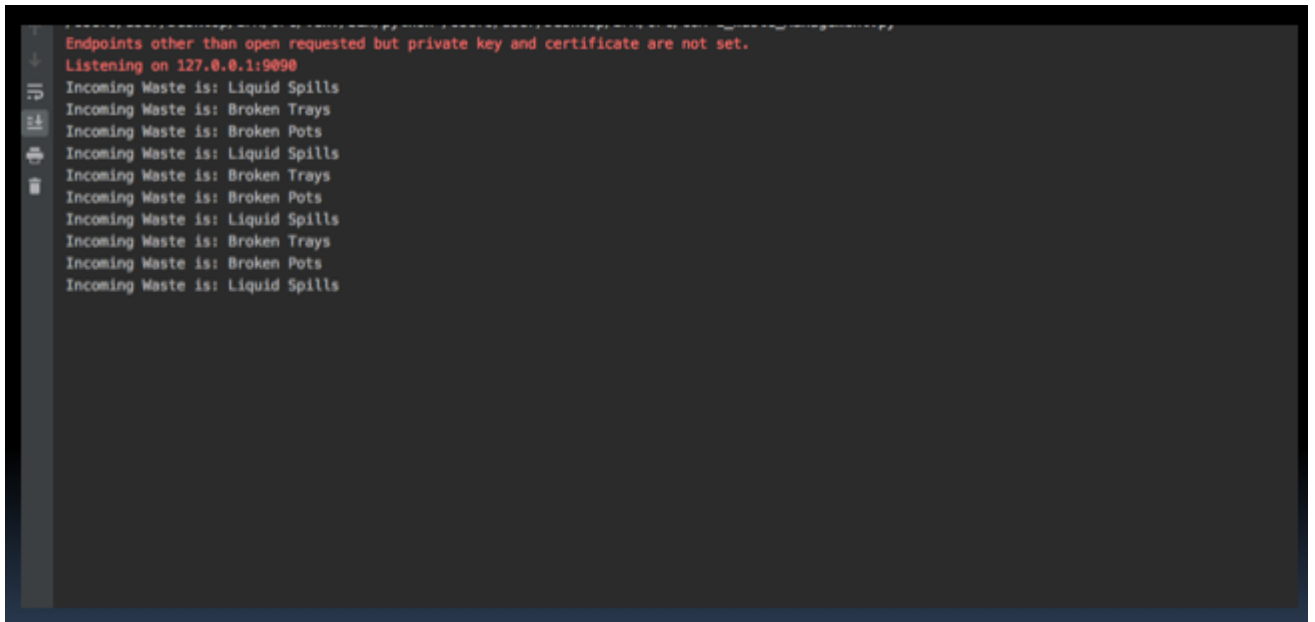
9.3.1 Communication Protocols

The implemented communication protocols and interfaces, the bulk of which was implemented in Sprint - 3 are described in this section of the report.

Note - All implemented and working codes pertaining to the communication systems (COM(s)) of the architectural system are there in the repository. All necessary components have been committed and pushed accordingly. COM - 1 follows the server-client paradigm and the server in this case is a special OPC Server. The OPC server has a special function; it communicates with the actual hardware prototype of the real workshop. Since the actual OPC server present in the workshop laboratory was unavailable, we devised an OPC Server module that represented the real workshop. The OPC server transferred the data necessary from the real workshop to the internal process. The data in this case would be small, medium and large cups in case of the **Conveyor's Belt** and the broken cups, spilled liquid, etc. from the **Waste Management System**. A sample output data of COM - 1 to better understand its working is displayed as follows:

A sample output of COM - 1 for the Conveyor's Belt

Endpoints other than open requested but private key and certificate are not set.
Listening on 127.0.0.1:9090
Incoming Waste is: Liquid Spills
Incoming Waste is: Broken Trays
Incoming Waste is: Broken Pots
Incoming Waste is: Liquid Spills
Incoming Waste is: Broken Trays
Incoming Waste is: Broken Pots
Incoming Waste is: Liquid Spills
Incoming Waste is: Broken Trays
Incoming Waste is: Broken Pots
Incoming Waste is: Liquid Spills

A sample output of COM - 1 for Waste Management System COM - 3 is basically a bidirectional communication system that transfers JSON data from the real workshop to the internal process and vice-versa. The communication methodology of this communication system (COM -3) is almost identical of that of COM - 1, apart from being bidirectional. We have sucessfully implemented COM -3, the working codes of which are in the repository.

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10 The Current Status of the GITLAB:

At this moment all the issues states to be closed.Codes are pushed and merged in the Master branch.
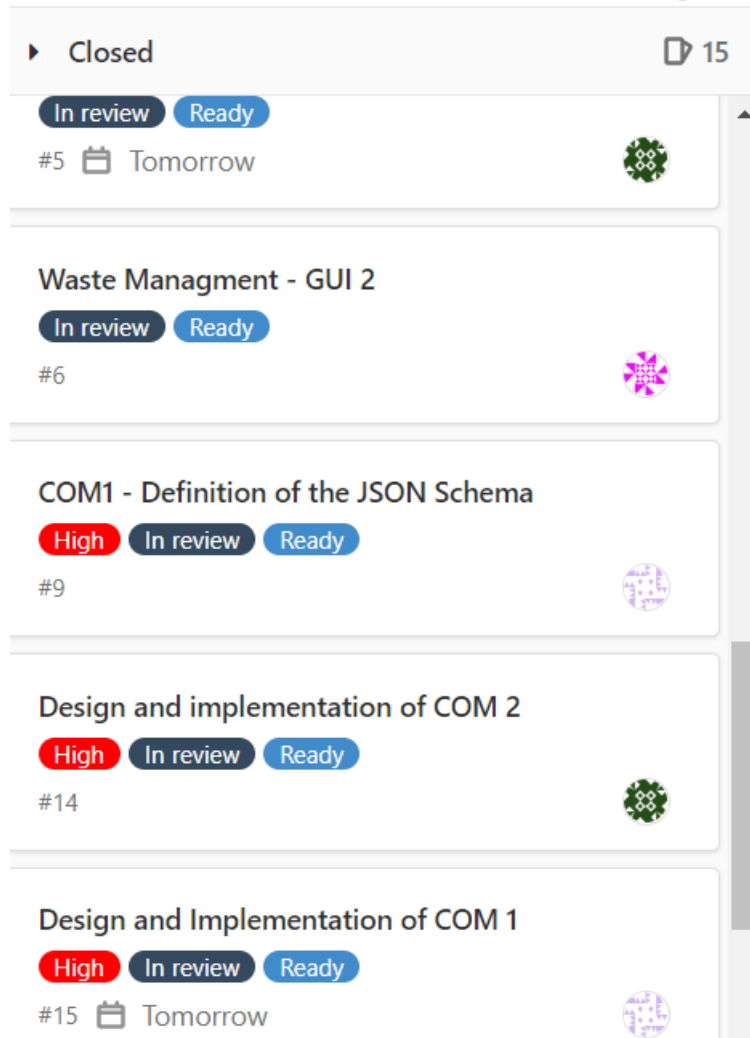

We have created in total 15 issues which we were successful in closing and the product is ready to be delivered.

11 Project timeline:

In the figure below, it illustrates the whole time spending in this project by following scrum methodology. As you notice the time spent becomes bigger at the last sprint due to the project improvement. As well as our poor experience of the scrum and the topic of the project itself. In addition, the time explains the average time spent during each sprint as a whole team. As a result from the timeline we do not be able to make the balance among sprints because of leakage of experience.

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And that is what we will focus on in the future daily life process.

PROJECT TIMELINE
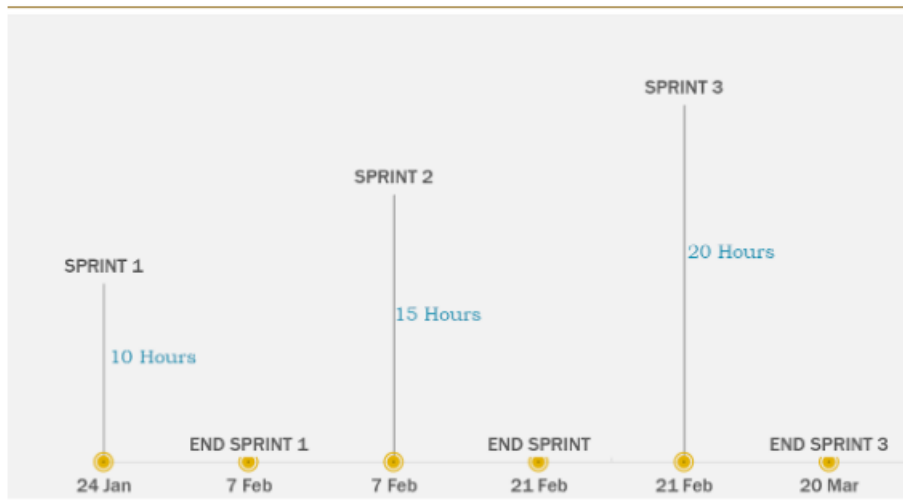
12 The Retrospective:

- We are group of 4 members.This is the first time we are working in one group.
-Initially when the project was assigned to us, we were not sure about the outcome and what we are suppose to do.
- We took lot of time in figuring out what is required to be done in the project.
-The parameters given to show up in the GUIs were translated in english, we took lot of time in figuring out the internal process.
-What we successfully achieved in Sprint 1 was GUI 1 was fetching data from the server.But GUI2 was still left to be done.COM 1 which was suppose to be completed in Sprint 1 was not been excecuted correctly,hence we had to shift COM1 to Sprint 3.
-We first decided with the programming language we wanted to proceed.Two of the members were sticking with Python,and other two was fine with any language.
-So, we decided to go with Python.
-Sprint 2 was not very satisfying as we could not achieve what we had targeted. The time frame was also in 14 days.But we definitely invested more time in sprint 2 than in sprint 1.
- But we knew that in the last sprint we would have time for the interoparability with other workshops. - Unfortunately, there were some unforseen situation which arraived and the classes got cancelled.
- In the last session we had plan to complete our interoparability part which we could not in Sprint 2.
- Somehow, we gathered information via instant messaging app from different team. Still it is not upto the level if we had gathered to gether in class.
- We were not able to work flawless with the other workshop. We just collected the JSON data and made an open API to send or receive data from different workshop.
- Even the communication between our team members was not easy.

- We did struggle for not being together at same place.
-But we focused on the project. The part of the project which was left in product backlog we tried to complete it.
- But the communication with other workshops cannot be demonstrated as we are not in the same place.

13   Conclusion:

The group 1 is considered to develop software for conveying workshop 1 and waste management.We have programmed all the communication part and the GUIs and the internal process which was expected. We also completed our task and closed our issues in Gitlab, as the part of scrum methodologies.We were focused on our deadline and delivered the project and presentation on the due date. We have fairly stood up to the expectation.

14   Acknowledgement:

We would like to sincerely thanks Prof. Maret and Prof Boissier for helping and guiding us in proper way. We have learnt a lot from our mistakes,which we have committed in past days. We have considered the professors as our product owner.