

# Politecnico di Torino

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# Analysis and Optimization of the management system of the Manufacturing Industry 4.0 Laboratory (Mind4lab) at Politecnico di Torino

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To my grandparents For your endless love, wisdom and support Thank you for inspiring and believing in me

# Acknowledgements

Before proceeding through my thesis, I would like to spend a few words to thank everyone who has been close to me during these years. This thesis represents the conclusion of a course of study that allowed me to increase my knowledge.

First of all, I would like to thank the DIGEP Teams for giving me the opportunity to work on this project, in particular to thank my relator Luca Mastrogiacomo for having welcome me into the team.

I would like to thank my parents who inspired and courage me to grow and face difficulties, your support has never missed. To my brother, who pushed me to go always forward and believe in me asking for some help and testing my knowledge.

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# Introduction

The quality of a product or service refers to the degree to which the product or service is able to satisfy needs. These needs can be categorized into two main group: stated needs and implied needs. Stated needs refers to the explicit requirements or specifications of the product, while implied needs are related to implicit needs, customers' expectations.

Quality engineering is fundamental for optimizing process and developing products. Engineering or organizational innovation can be encouraged by a favorable operating environment, such as that of a Lean and Integrated System (LIS).

A Lean and Integrated System implements (at least) two organizational approaches: Concurrent Engineering and Lean Production.

Lean production is an assembly-line manufacturing methodology developed originally for Toyota's automobile manufacturing. This is why it is also known as Toyota Production System. The goal of Lean Production is described as to get the right thing to the right place at the right time, the first time, while minimizing waste and being open to change.

Engineer Taiichi Ohno from Toyota, who is credited with developing the principles of lean production, discovered that in addition to eliminating waste, his methodology led to improve product flow and quality.

This type of System can be extended not only for production industries but also to enhance workflows and processes in other sectors such as service.

The key to this system is the customer centrality. It is very important to collect and analyze customer needs and feedback in order to develop products or service that satisfy their requirements.

After having analyzed the whole process used nowadays into Mind4lab and in the Workshop lab, I endeavored to improve efficiency reducing waste of time.

My aim was to automate manual processes using tools to allow the lab manager to work continuously and manage time efficiently.

As outlined, my thesis is divided into 3 different parts: requirements, solutions and improvements proposal.

# Requirements

The Department of DIGEP at Politecnico di Torino manages different typologies of laboratories, including the Production Workshop, Mind4Lab, Center IAM, Tomograph Laboratory, Center J-Tech, RMLAB, Reverse Engineering, Quality and Metrology Laboratory, and the Economics and Production Laboratory.

The needs exposed by Mind4Lab concern the managing and monitoring of individuals entering the laboratory. Since this Lab is predominantly used by thesis students and doctoral students, but also accessible to others, it is important to keep track of users to ensure the safety of the lab and its machineries.

The primary requirement for all users entering any laboratory, regardless of the subject, is to complete a four-hours safety course. This course concludes with a certificate that is valid indefinitely and it can be included as an additional credential on a curriculum vitae.

In order to access the lab, users also need a signature from the referring professor who has granted them the possibility to enjoy this opportunity. Additionally, a mandatory document has must to be signed by user, the referring professor and the RADL, the main manager responsible for the security of laboratories, who decides the type of personal protective equipment (DPI-PPE) required based on the user's role and responsibilities.

Therefore, these initial requirements are common to all the laboratories and there is need to keep track of all these details. After which, each laboratory has slightly different additional requirements. Since the thesis focuses on Mind4Lab, the specific needs of this lab are detailed here.

The laboratory manager needs to provide users with instructional material specific to each robot station they are going to use for training. Then, users must send the manager an email with documents that guarantee they have studied all the manuals.

Subsequently, the manager checks all the certificates and, if validated, he shares a Teams Calendar where all users must book a time slot for the requested robot station. Afterwards, users are allowed to access Min4Lab and start using the robot.

Another need required for all the laboratories is to keep track of the energy consumption, monitoring the actual use of each machinery.

Finally, all these needs are quite similar to all labs. This is why has been created a standardized process that follows a Lean Service.

For what concern Workshop Laboratory, has been used to analyze the actual process that was created by a previous colleague, who tried to automate some process.

After the analysis I had learn how to use Microsoft tools and every application that could be possible to adopt in order to develop my thesis. I changed the previous work because it was focused only on the workshop, while I tried to standardize a process that can be replicated in different laboratories. I Optimized the initial QR code to track the bureaucratic documents as online courses and required documents.

The Future Proposal explained at the end of the thesis will be useful to optimize the work of the workshop manager, reducing the waste of time to track the use of each machinery.

# Solutions

The solutions for addressing all the identified needs commence with a critical analysis of a previous approach employed to manage the production workshop's workflow.

Initially, a temporary database was established to consolidate all user information, aligning with the requirements delineated in the previous chapter. However, this initiative encountered challenges related to suboptimal data retrieval processes and the time investment required from laboratory managers.

This chapter offers insights into the strategies implemented to streamline the entire workflow process from a lean perspective. The solutions are categorized into two primary areas: General entrance to DIGEP Laboratories and Entrance to Mind4Lab, of another specific laboratory.

### General entrance to DIGEP Laboratories

The first need that has been analyzed was the general entrance since it represents the initial interaction between users and laboratories.

In an effort to reduce time wastage for both parties, the manager and the user, it has been proposed to centralize the initial bureaucratic documents, which are common requests across all laboratories as mentions in the Requirements Chapter.

The Process flow begins when a user arrives to the DIGEP Lab, typically accompanied by their referring professor.

The user is then required to scan the QR-Code at the general entrance, called "Ingresso Laboratori", as shown in the following picture.



Figure 1 – QR code "Ingresso Laboratori Digep"

This QR-Code directs the user to a Microsoft Forms page used for data collection. Unlike the previous process, this method optimizes the time spent filling out forms. The responses are automatically saved into a file excel on google drive using Microsoft's Power Automate application, which allows for the creation of automatic data flows.

The previous form asked to the user personal data such as Name, Surname, Student ID and email. In this case Power Automate is utilized to retrive the user's personal data from Office365, eliminating the need for users to input this information manually. This implementation significantly reduces the time spent of form completion, particularly as subsequent questions mainly involve selcting predefined choices rather than typing responsed. In this way, Lean Service has been reached splitting in half the questions asked into the form. Half questions mean half time, exspecially less than half time since the following questions are just mainly choice answers, as shown in the picture.

### Ingresso Laboratori Digep

A fine modulo verranno inviati i documenti e informazioni per poter accedere presso i laboratori. Devi compilare prima di entrare nuovamente in Lab. Once you submit the form, you will receive all documents and information in order to be able to access to laboratories. You have to compile them before entering again the Lab.

1. Email del referente/docente strutturato in dipartimento | Email of your professor of department \*

Inserisci la risposta

- 2. In qualità di | Acting as \*
  - O Personale dipendente | Polito Staff
  - O Dottorando | PhD student
  - 🔘 Tesista | Thesist
  - Assegnista | grant holder
  - O Borsista/collaboratore | collaborator
  - O Personale esterno | External
  - Visiting
- 3. Dipartimento di appartenenza | Department to which you belong \*
  - O DAD
  - O DAUIN
  - O DET
  - 🔿 diati
  - O DIGEP
  - O DIMEAS
  - O DISEG

  - O DENERG
  - O DIST
  - O DISAT

4.	A Quale/i Laboratorio/i	devi accedere?	Which laborator	y do you need to access? *	
				, ,	

Centro IAM
Laboratorio Tomografi
Officina Meccanica
Centro J-Tech
Mind4Lab
RMLAB
Reverse Engineering
Laboratorio di Qualità e Metrologia
Laboratorio di Economia e Produzione (LEP)

Figure 2 – Module Forms related to the QR code fig.1

The total time spent on completion is "20" seconds, while the previous form was completed in about "40" seconds.

Upon submission of the form, the user receives an automatic email outlining the requirements in order to be able to access the Labs.

This includes links to a four-hours online security course and a OneDrive folder containing necessary PDFs for signing and completion. Subsequently, the user must send all required documents to the general laboratory manager, either by replying to the email or directly sending attachments.

The laboratory manager is responsible for verifying the documents. Once he confirms the validity through a scan of another QR Code, the user will receive an email inviting him again to the general entrance of laboratories, where they can use their student smart card for authorization and gain access to the labs.

It follows the second QR code, used only by the manager of the main entrance of labs.



Figure 3 – QR Code "Verifica moduli sicurezza"

# Verifica moduli sicurezza

1. ID student Ingresso Lab (prima colonna file excel "Ingresso Lab Generico" \*

Il valore deve essere un numero

#### 2. Confermo moduli \*

◯ YES

O NO

Figure 4 – Module Forms related to the QR code fig.3

The manager of DIGEP labs must fill out the form, writing the ID student for the entrance which corresponds to the "ID" column reported on the file excel.

The Process outlined above for the General entrance to DIGEP Laboratories serves as the first step in the overall process, granting students the necessary qualifications to enter the laboratories independently. This meticulous tracking of procedures ensure that all needs are met efficiently.

A sequential flow chart detailing the responsibilities of individuals and the process is provided below.

#### Flow Process analysis

The process explained in the previous chapter follows a Lean Service perspective, allowing the general DIGEP laboratory manager to optimize his time.

Prior to the implementation of the new workflow, the manager had to interrupt his work to go into the office, remove his gloves, and search for the documents needed by users to access the laboratories. With this new system, users can scan the QR code themselves, minimizing interruptions for workers. Although the general manager still needs to stop working to welcome users, but the time spent on bureaucratic tasks is significantly reduced.

This process can help workers save at least five minutes for each user entering the DIGEP laboratories. While this may not seem like a long time, It is sufficient to maintain the continuity of the manager's work without significant disruption.

Another advantage of the new system is improved documentation management. Users send all certificates via email, which can then be stamped or saved in a server or cloud folder. The latter option supports the goal of optimizing paper consumption and reduce waste.

Below are two flowcharts: the first one concerns the new process, while the second one relates to the old process.

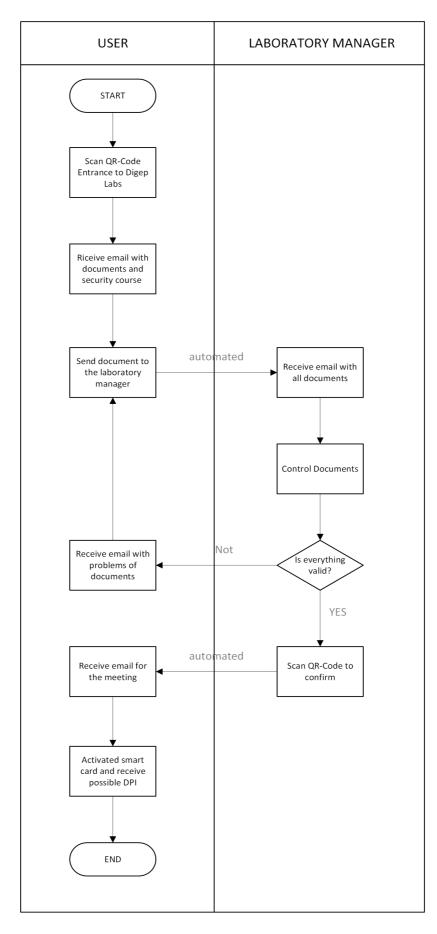


Figure 5 – Flow process of the new management system

As shown, the initial stages of the process do not require the presence of the manager, as it is handled by the automated system.

The manager becomes involved once the user sends an email with all required certificates for verification. After the manager validates the documents, an automated email is sent to the user in order to invite him back to the main entrance of the laboratories. At this point, the user's smart card is activated, granting him access to the labs.

This optimized process exemplifies the principles of Lean Service, enhancing efficiency and reducing unnecessary time expenditure, thereby benefiting both the manager and the users.

As seen, in the next picture related to the old process flow, the presence of the manager was required almost every time.

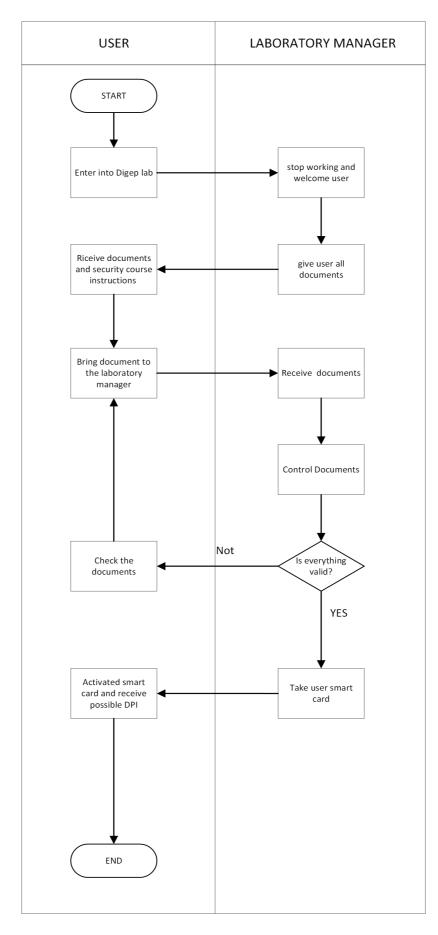


Figure 6 - Flow process of the previous management system

#### The logic beyond the process

For the process of entrance to the general DIGEP laboratories, Microsoft Power automate has been used. It is an app offered by Microsoft that allows users to create automatic flows connecting different applications. In this process, OneDrive Microsoft Excel, Office 365, Microsoft Forms and Outlook have been used.

Firstly, a Microsoft Form module was created, which asks laboratory users a few questions such as the referent professor's email and department. The following picture is a screenshot of the first questions of the module.

### Ingresso Laboratori Digep

A fine modulo verranno inviati i documenti e informazioni per poter accedere presso i laboratori. Devi compilare prima di entrare nuovamente in Lab. Once you submit the form, you will receive all documents and information in order to be able to access to laboratories. You have to compile them before entering again the Lab.

1. Email del referente/docente strutturato in dipartimento | Email of your professor of department \*

Inserisci la risposta

#### 2. In qualità di | Acting as \*

- O Personale dipendente | Polito Staff
- O Dottorando | PhD student
- 🔘 Tesista | Thesist
- O Assegnista | grant holder
- O Borsista/collaboratore | collaborator
- O Personale esterno | External
- Visiting

Figure 7 - The beginning of the module Forms related to the QR code fig.1

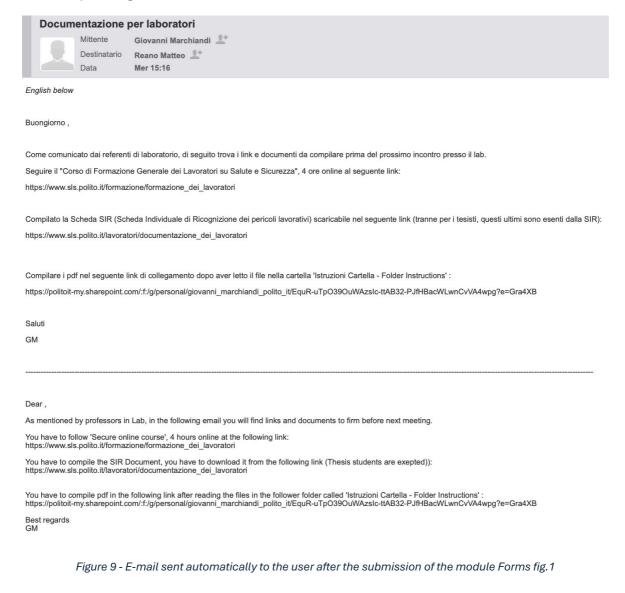
Once the user submits the form, Power Automate saves the data into an Excel file called "General Entrance" on OneDrive, which has already been created.

The following screenshot represents the visualization of the Excel file. It is quick to understand, easy to manage, and can be modified by the owner without any problems.

1	Α	В	С	D	E	F	G	н	E	J	K
1	Id 🖂	Ora di completa	Nome   N	Cognome	Numero di matricola 🛛	Email personale   Your per	Email del referente   Email o	Conferma	In qualità di   Acting as 🖂	Dipartimento 🗠	A Quale Laboratorio 🖙
2	27	5/3/24 9:17:22	Bertem		-00000	seeses @studenti.polito.it	darierenterrette@polito.it	YES	Tesista	DET	Mind4Lab;
3	28	5/7/24 12:25:40	Etomo	Votpm		cton or philod @libero.it	manaonanganan@polito.it	YES	Tesista	DIMEAS	Centro IAM;
4	29	5/15/24 16:50:57	Hanton	Reality		Beezee @studenti.polito.it	Giorandiana Gliandi @polito.it	YES	Tesista	DIGEP	Mind4Lab;
5	30	5/16/24 11:33:22	Rattante			raffacengerme@gmail.com	Lacan Botroglacome@polito.it	YES	Borsista/collaboratore	DIGEP	Mind4Lab;
6	31	5/21/24 14:15:29	Haritan	Betanine	-004000	eldring italig@gmail.com	giasente @polito.it	YES	Tesista   Tesist	DIGEP	Mind4Lab;
7	32	5/23/24 12:32:04	Selected	Vegenete		ealer, ganali@studenti.polito.it	giulianiana @polito.it	YES	Tesista   Tesist	DIGEP	Mind4Lab;
8	33	5/30/24 12:28:02	Autora Conta	Bittere	-OFFOR	soccord@studenti.polito.it	fiorenzelinanecental@polito.it	YES	Borsista/collaboratore   collab	DIGEP	Mind4Lab;
9	34	6/3/24 15:49:26	Vachon	Ferr		yaoinennante polito.it	dariorationetil@polito.it	YES	Dottorando   PhD student	DIGEP	Mind4Lab
10	35	6/3/24 15:51:33	Harrow	Aurano	Hanou	manoantarana @polito.it	puotorentacent@polito.it	YES	Assegnista   grant holder	DIGEP	Mind4Lab
11	36	6/3/24 15:59:35	Hattee	Reamo	-072000	9002000@studenti.polito.it	matteoreane@gmail.com	YES	Tesista   Thesist	DIGEP	Mind4Lab
12	37	6/12/24 13:14:47	Hattoo	Attento		Beccore @studenti.polito.it	matterioune@gmail.com		Tesista   Thesist	DIGEP	["Mind4Lab"]

Figure 8 - Excel File illustrating data collected from the QR code fig.1

In the meanwhile, the data is being written into the file, the user receives the following email explaining what he/she needs to do to be able to enter the labs.



The user needs to fill in all the documents and complete the online safety course. Afterward, he/she must reply to the received email with all signed and completed documents attached.

Once the manager of the entrance of DIGEP lab receives all the documents, he must verify and confirm their validity with a specific QR Code, as shown in the picture below.

Verifica moduli sicurezza	Verifica moduli sicurezza
	<ol> <li>ID student Ingresso Lab (prima colonna file excel "Ingresso Lab Generico" *</li></ol>

Figure 10 - QR code and module related to fig.3

After submission, the user will receive the following email inviting him/her to come to the main entrance of DIGEP labs to activate his/her student smart card.

#### **Conferm Digep Labs**

Mittente Destinatario Data

Giovanni Marchiandi 上 Reano Matteo 💵 Mer 15:17

#### English below

Buongiorno Matteo,

I moduli inviati via email sono stati confermati.

Dunque può ritornare nuovamente presso l'ingresso dei laboratori Digep in modo da attivare la smart card. Si prega di rispondere alla suddetta email con il giorno in cui si vuole presentare.

Cordiali saluti

Giovanni Marchiandi

Dear Matteo,

The certificates you sent by email are confimed.

You are allwod to come again to the entrance of Digep Lab in order to abilitate your smart card.

Please, answer to this email illustrating when you are going to come into the lab.

Best regards

Giovanni Marchiandi

Figure 11 - E-mail sent to user after the validation by the laboratory manager

Meanwhile, the file excel has been updated to the exact row of the user who has been confirmed, as shown in the following picture.

A	4	В	С	D	E	F	G	Н	1	J	K
1 d	v Ora	a di completa	Nome   N	Cognome	🖳 Numero di matricola 📔	Email personale   Your per	Email del referente   Email o	Conferma	In qualità di   Acting as 🖂	Dipartimento 🗠	A Quale Laboratorio d
2 :	27	5/3/24 9:17:22				studenti.polito.it	duna metri@polito.it	YES	Tesista	DET	Mind4Lab;
3 3	28	5/7/24 12:25:40		You wanted		@libero.it	managenet@polito.it	YES	Tesista	DIMEAS	Centro IAM;
4 :	29	5/15/24 16:50:57	-	Touris		security@studenti.polito.it	Gerandian and a goolito.it	YES	Tesista	DIGEP	Mind4Lab;
5 3	30	5/16/24 11:33:22	Rented		-	@gmail.com	@polito.it	YES	Borsista/collaboratore	DIGEP	Mind4Lab;
6 3	31	5/21/24 14:15:29		Detamino		gmail.com	gracementer polito.it	YES	Tesista   Tesist	DIGEP	Mind4Lab;
7 3	32	5/23/24 12:32:04	3	You and the second seco		studenti.polito.it	generative polito.it	YES	Tesista   Tesist	DIGEP	Mind4Lab;
8 3	33	5/30/24 12:28:02	Attention			source@studenti.polito.it	Management and a second s	YES	Borsista/collaboratore   collab	DIGEP	Mind4Lab;
9 3	34	6/3/24 15:49:26	6 Year	Received		polito.it	etalization in the polito.it	YES	Dottorando   PhD student	DIGEP	Mind4Lab
10 3	35	6/3/24 15:51:33		-		polito.it	polito.it	YES	Assegnista   grant holder	DIGEP	Mind4Lab
11 3	36	6/3/24 15:59:35		Reality		essee@studenti.polito.it	man gmail.com	YES	Tesista   Thesist	DIGEP	Mind4Lab
12 :	37	6/12/24 13:14:47				et all and a studenti.polito.it	gmail.com	YES	Tesista   Thesist	DIGEP	["Mind4Lab"]

Figure 12 - Excel file illustrating data updated after the validation.

The cell of the column "Conferma" and of the last row has been updated reporting the answer "YES".

This chapter demonstrates the view of all data and processes saved. As shown, the file that keeps track of the data is easy to understand and manage. The owner can easily modify the file like a normal Excel file.

The only important data that is recommended to do not change is the student ID, which is a progressive number indicating the response ID of the Forms module.

It is recommended to do not modify the columns table of the Excel file since Power Automated is connected to them.

Since all data is moved using Power Automate, which generates the flow, screenshots of the logic behind the process have been included.

The first picture illustrates the flow that connects the first QR code for the entrance to the mail and Excel file to keep track of the data.

Quando viene inviata una nuova risposta	····
Recupera dettagli della risposta	···· (?)
Recupera profilo utente (V2)	····
Aggiungi una riga in una tabella	····
Invia un messaggio di posta elettronica (v2)	····

Figure 13 - Power Automate flow of the first QR Code fig. 1.

The second picture explains the logic for the second QR code used to confirm validity and invite the user to the main entrance of DIGEP lab to activate his/her smart card.

	Quando viene inviata una nuo	va risposta		⑦ …	
	Recupera dettagli della rispost	a .		····	
		$\downarrow$			
	Condizione				
	E ~	è uguale a	VES YES		
🗸 Se sì		$\times$	Se no		
Aggiorna una riga	0			,	iungi un'azione
	$\downarrow$			<u> </u>	ungi un azione
Recupera una riga	⊙ ↓				
Invia un messaggio di posta elettron					
∑ ^0	plungi un'azione				

Figure 14 - Power Automate flow of the first QR Code fig.3

The following screenshot illustrated the use of Office365 to collects personal data such as Name, Surname, Student ID Smart Card.

* Percorso	OneDrive for Business							
*Raccolta documenti	OneDrive	~						
*File	/Ingresso Lab Generico.xlsx	C						
* Tabella	IngressoLabGenerico	~						
ld	🖅 ID risposta ×							
Ora di completamento	🖅 submitDate ×							
Nome   Name	1 Nome ×							
Cognome   Surname	Cognome ×							
Numero di matricola   Student ID smart card	Soprannome ×							
Email personale   Your personal email	responder ×							
Email del referente   Email of your professor	r1f15d5fc4d5e ×							
Conferma   Confirm								
In qualità di   Acting as	🔐 rc808e238d2d ×							
Dipartimento di appartenenza	r0bff95e1fb444 ×							
A Quale Laboratorio devi accedere?   Which	ra5b5a8daff06 ×							

Figure 15 - Power Automate program connecting Forms and Office365 to the Excel file

### Entrance to Mind4Lab

Mind4Lab is one of the DIGEP laboratories that specifically uses robots. At the moment, there are nine robot stations primarily used by thesis students and PhD students.

As a laboratory, the general entrance QR Code must be completed first.

To join Mind4Lab, another form called "Entrance to Mind4Lab" is required. As mentioned before, general questions such as name, surname, and email are not required since these can be obtained from Office365 through Power Automate.

Then only required information are the email of the referent professor, the department, confirmation of the security course, confirmation of DPI -PPE training and allocation, and which robot station will be used.

All the information needs to be saved into a new Excel file specific to this laboratory, created in the same manner as the previous one. The process flow between Forms and Excel has been standardized using Power Automate.

Standards are very important for a lean mindset, and they make it easy to expand to other laboratories or add new machineries.

The last piece of information, regarding which robot station will be used, is needed in order to send a specific email to the user with a folder containing all the manuals for that robot. Users are required to study the manuals and, once they have finished, they have to send the documents, certificates, and the ID number received to the Mibd4Lab Manager.

The process of sending the email with all manuals and the ID number for lab entrance is automated through Power Automate. The following pictures show the questions asked with Microsoft Form for the entrance to this laboratory.



Figure 16 - QR Code "Entrance to Mind4Lab"

# Ingresso | Entrance to Mind4lab

1. email del referente | email of your professor \*

Inserisci la risposta

- 2. Dipartimento | Department
  - O DAD
  - O DAUIN
  - O DET

  - O DIGEP

  - DISEG
  - O DISMA
  - DENERG
  - O DIST
  - O DISAT

3. Hai seguito corsi sulla sicurezza? | Have you done the security course? \*

- 🔿 SI
- O NO

- 4. Hai ricevuto la formazione per i DPI? | Have you been formed about DPI? \*
  - O SI
  - O No
- 5. Quali DPI hai ricevuto? | Which DPI did you receive? \*
  - Mascherina
  - Guanti
  - Scarpe
  - Nessuno
- 6. Quale robot userai? | Which Robot Station are you going to use?
  - O ABB milling Robot cell
  - Automated Warehouse
  - O Dual arm collaborative robot cell
  - O Mobile Robot Arm
  - Omron Collaborative Robot
  - Optitrack desktop computer
  - UR10 cobot cell
  - O Yaskawa Collaborative Robot (20 Kg)
  - O Workstation ML and HoloLens

Figure 17 - Module Forms related to the QR Code fig. 16.

Once the manager receives the certificates by email from the users, they have studied the manuals, he must scan the "Verifica Attestati" QR Code to confirm the validity of the documents by entering the User ID for the entrance to the lab.



Figure 18 - QR Code "Verifica Attestati"

# Verifica attestati

1. ID cliente *
The value must be a number
2. Confermo *
🔿 yes
O No

Figure 19 - Module Forms related to the QR Code fig. 18.

Thereafter, an email will be automatically sent to the user with an invitation to join Microsoft Teams, where the guest can book specific days and time to join Mind4Lab. From this moment, the user can enter the lab independently and start using the assigned robot station.

This process is very important for the laboratory manager as it significantly helps in handling the bureaucracy tasks, thus reducing their workload. This way, the manager is free to organize his time for other tasks. This crucial analysis was conducted to reduce time waste and optimize laboratory management, highlighting the Lean Process.

The next need analyzed is keeping track of the time each robot is used. To solve this, two other QR Codes have been created for each robot station. The first QR code corresponds to the Start of use. It is created with Microsoft Forms, and it asks the ID given for entrance of the lab. It is used to keep track of the current user.

When the form is submitted, the completion time and ID are recorded in the specific sheet of that robot station in the Laboratory's Excel file.

A picture of this first QR code of the robot station called "Mobile Robot Arm" is reported.



Figure 20 - QR Code "Start mobile robot" connected to the specific Mobile Robot Arm.

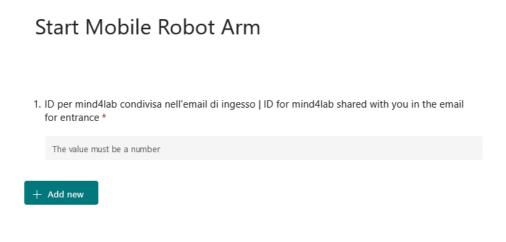


Figure 21 - Module Forms related to the QR Code fig.20.

Once the user finishes using it, he has to scan the final QR code to record the time used. The submission time, recorded as the end of the robot's utilization, is used to calculate the actual time spent on it. End use minus Start Use gives the actual time utilized.



Figure 22 - QR Code "Finish Mobile Robot Arm".



Figure 23 - Module Forms related to the QR Code fig.22.

This two QR Code are the same for each robot station but are named differently to save them into different sheets in the Excel file, keeping track of each robot's usage.

Finally, to have a quick view about the robot usage, another sheet in the Excel file, called "Robot Used", summarizes the total time from all pages of different robots, and a histogram graph is displayed. The graphs always help to highlight the data.

#### Flow Process analysis

The process explained in the previous chapter follows a Lean Service perspective, allowing the Mind4Lab laboratory manager to optimize his time effectively.

Before the implementation of the new flow process, the manager of Mind4Lab had to interrupt his own work to go to the main entrance, welcome the new user, and explain all the requirements necessary before entering the lab. Specifically, the manager had to manually share the link for Microsoft Teams group, write down the user's email, and explain all the required documentation.

With this new system, users can scan the QR code by themselves, significantly reducing the need for the manager to be interrupted for extended periods. It is no longer mandatory for the manager to be present during the user's first entrance to the lab. This allows the manager to optimize his time, avoiding unnecessary delays caused by bureaucratic tasks.

This process can help the manager to save at least 5 minutes for each user entering the Mind4Lab laboratory and especially the presence to the lab when new user arrives.

Another positive aspect is the management of documentation. Through this flow, users receive an email containing a share folder with all manuals for the robot. Then, they must reply to the email, sending the certificates included at the end of the manuals, which attest to their completion of the required study. The manager can choose to either print these documents or save them in a server folder. This option helps Politecnico optimize paper consumption and reduce waste.

Below is a flow chart of this specific process.

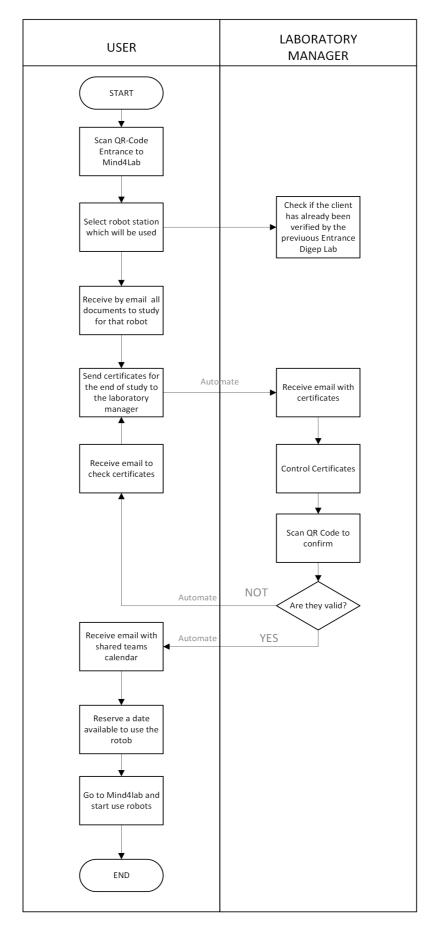


Figure 24 - Process Flow Chart of the new management system.

As shown in the flow chart, the manager's presence is not required at the beginning of the process, only to check if the user has already been verified at the main entrance of the DIGEP Lab. This verification can be done remotely since the manager will receive an email notification providing an affirmative or negative response, without needing to come to the lab. Since all data are reported and saved in a OneDrive Excel file, the manager only needs an electronic device.

Once the user sends to the manager an email with all the certificates, the manager must validate all documents. After validation, an automatic email will be sent to the user, inviting him to a share Teams calendar where he has to book a day and a time slot available for the robot request.

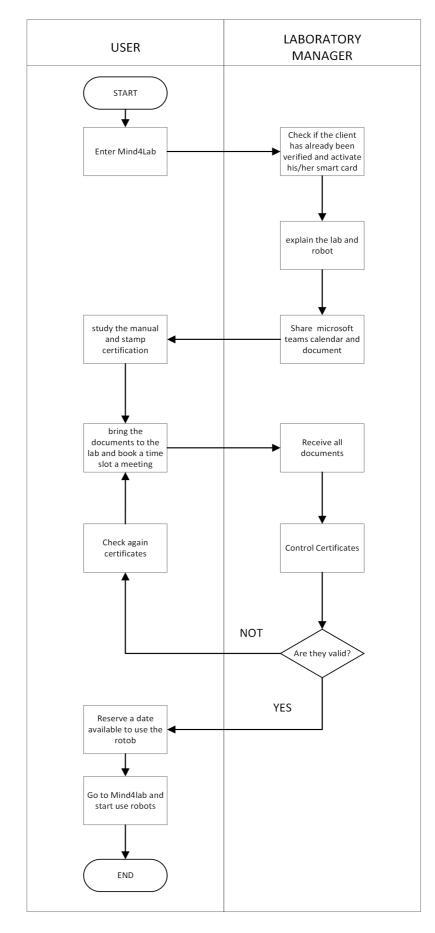


Figure 25 - Process Flow Chart of the previous management system.

#### The logic beyond the process

The process for entering the Mind4Lab laboratory has been streamlined using Power Automate, similar to the general entrance process.

This system integrates OneDrive, Microsoft Excel, Office365, Microsoft Forms, Outlook, and Microsoft Teams to create an efficient workflow.

Initially, a Microsoft Forms module was created to ask laboratory users a few key questions, such as the referent professor's email, department, confirmation of the safety course, use of any Personal Protective Equipment (DPI-PPE), and which robot will be used.

A screenshot of the module has been shown on the previous pages.

Once the user submits the form, Power Automate saves the data into an already created Excel file called "Mind4Lab laboratory" on OneDrive. The following screenshot illustrates the Excel file's layout. It is easy to understand, manage, and modify without any issues for the owner.

1	A B	С	D	E	F	G	Н	1	J	K	L	М	N
1	) 🔄 Nome 🖻	Cognome	Matricola	Email Personale 🛛 💀	Email Referente 🛛 🖂	Check QR	) Dipartimento	Corso sicurezza 🛛	Formato sui DPI	DPI consegnati	Postazione Robot 🛛 🗸	Verificato 🗸	tempo totale 🖂
2	19101100	P.		soogooo@studebti.polito.it	t m		Digep	SI	SI	["Nessuno"]	a	si	0:00:00
3	1	P.	5002008	soogooo@studebti.polito.it	t m		Digep	SI	SI	["Nessuno"]	a		0:00:00
4	1	R	<del>3002000</del>	see2000@studebti.polito.it	t m		Digep	SI	SI	["Nessuno"]	а		0:00:00
5	2		<del>3002000</del>	soccoo@studebti.polito.it	t M		Digep	SI	SI	["Nessuno"]	а		0:00:00
6	3	R	0202002	e202002@studebti.polito.it	t m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot		0:00:00
7	4			see2000@studebti.polito.it	t m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
8	5	Reans	<del>3128450</del>	soogeoo@studebti.polito.it	t m		Digep	si	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
9	6	- Aca	******	s202002@studebti.polito.it	t m		Digep	SI	No	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
10	7	R		see2008@studebti.polito.it	t M		Digep	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
11	89	P	<del>3002000</del>	soccos@studebti.polito.it	t M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
12	99	R	511112	soozooo@studebti.polito.it	t M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
13	10 Dario	Haschie	<del>5000044</del>	socotta@studenti.polito.it	polito.it		DET	SI	SI	["Nessuno"]	Mobile Robot Arm	yes	34:16:17
14	11 Darie	Hasshie	<del>3888844</del>	88888 14@studenti.polito.i	polito.it		DET	SI	SI	["Nessuno"]	Optitrack desktop computer	yes	27:20:27
15	13 <del>Yushon</del>	For	<del>3001025</del>	<del>yuchen.fa</del> n@polito.it	@polito.i		DIGEP	SI	SI	["Guanti"]	Omron Collaborative Robot	yes	0:00:00
16	14 MANOUR	ARANOV	<del>3200405</del>	manounaoranov@polito.it	polito.it		DIGEP	SI	SI	["Nessuno"]	UR10 cobot cell	yes	0:01:41
17	20 Mattee	- Acano-	<del>3002000</del>	6002000@studenti.polito.i	t mail.com	YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	yes	0:00:00
18	21 Aarona 8	DiMatteo	<del>3002520</del>	Socces@estudenti.polito.i	t fillen di	<b>(</b> .	DIGEP	NO	No	["Nessuno"]	Dual arm collaborative robot	yes	6:04:22
19	25 Mario	Rossi	s111111	S111111@studenti.polito.i	t mariorossi@polito.it	YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm		0:00:00
20													

Figure 26 - Excel file illustrating data saved from the Forms fig. 16.

While the data is being written into the file, the user receives the following email explaining the steps he must follow in order to enter the lab.

Documents Mind4Lab         Image: Mittente Destinatario Data       Khurshid Aliev **         Cata       2024-06-05 16:52
Gentile Matteo,
di seguito trova i link con materiali da studiare prima di entrare in Mind4Lab. All'interno della cartella troverai un file chiamato Readme dove ci sono le istruzioni relative ai materiali, quindi iniziare da questo file. Finita la formazione iniziale dovrai inoltrarmi gli attestati dei corsi seguiti rispondendo a questa email.
Per la postazione Mobile Robot Arm usare il seguente link di collegamento https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/EkI8tTveRBhGl3V5WEEFa
Ricorda il tuo codice identificativo ID del mind4lab è: 20, ricordarsi di scrivere l'id identificativo al responsabile di laboratorio nell'email di risposta insieme ai documenti allegati
Cordiali saluti Khurshid Aliev
Dear Matteo,
find the link below with all material that you need to study before entering into Mind4Lab.
Inside the folder, you will find a file called Readme which explain what to do about the material, so first of all start reading it this file.
Once yo have finished the formation you have to reply to this email with the certificates of the courses you followed.
For your machinery station Mobile Robot Arm click to the following link https://politoit-my.sharepoint.com/:fr/g/personal/khurshid_aliev_polito_it/Ekl8tTveRBhGl3V5WEEFaMU
Your unique id for mind4lab is: 20, you have to react the lab to the responsible of mind4lab with the attached documents.
Best regards
Khurshid Aliev



The user needs to study the manuals in the folder shared via the email link and complete a certification that proves his studies. Inside the folder, there is a "Readme" document with instructions on how to navigate the folder, the order of manual, and other useful information. After studying manuals, the user must reply to the email with the certificates.

Once the Mind4Lab manager receives all the documents, he has to verify and confirm the validity using a specific QR Code, as shown in the previous pages.

After submission, the user receives the following email inviting him to join the Teams calendar group in order to book a time slot for the respective robot station.

Iink calendar Mittente Khurshid Aliev 1\* Data 2024-05-27 14:37

English below

Gentiale M,

sei stato aggiunto nel team attraverso la tua mail personale dove potrai accedere al calendario teams microsoft. Dovrai prenotarti nel calendario relativo al robot Omron Collaborative Robot che andrai ad utilizzare.

Saluti

KA

Dear M,

you have been added to the team with your personal email where you can access to calendar teams microsoft. You have to book a time slot of your machinery station Omron Collaborative Robotthat you are going to use.

Best regards

KA

Figure 28 - E-mail received by the user after the confirm through QR code fig. 18.

Destinatario Data	10 s302983@studenti.polito.it* 2024-05-13 15:29	
	Microsoft Teams KHURSHID ti ha aggiunto al team LAB_DIGEP_Mind4Lab!	
	LD	
	LAB_DIGEP_Mind4Lab	
	23 membri	
	LAB_DIGEP_Mind4Lab	
	Apri Microsoft Teams	

Sei stato aggiunto a un team in Microsoft Teams

Figure 29 - E-mail received by the user in meanwhile of fig.28.

A screenshot of Teams calendar interface is provided once the user joins.

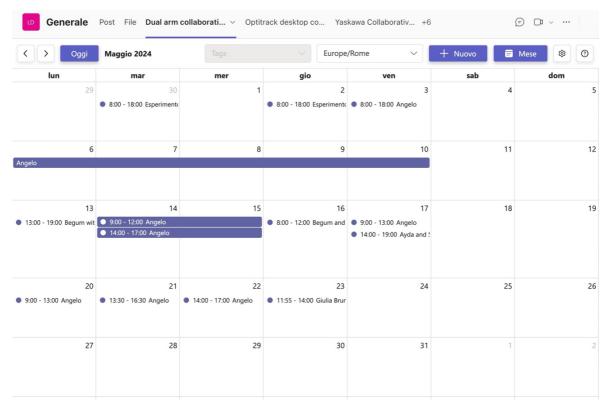


Figure 30 - Teams Calendar after joining through e-mail invitation fig.29.

Meanwhile, the Excel file is updated in real-time to reflect the user's confirmation status, as shown in the following picture.

4	A B	С	D	E	F	G	Н	1	J	K	L	М	Ν
1 10	🛛 🗠 Nome	Cognome	🛛 Matricola 🖻	Email Personale	🖂 Email Referente	Check QR	Dipartimento	Corso sicurezza	Formato sui DPI	DPI consegnati	🛛 Postazione Robot 🛛 💆	Verificato 🗸	tempo totale 🛛
2	1 +101100	-		eeeeeee@studebti.polito	.it m		Digep	SI	SI	["Nessuno"]	а	si	0:00:0
3	1 Hottoo				.it m		Digep	SI	SI	["Nessuno"]	а		0:00:0
1	1-			eeeeeee@studebti.polito	.it m		Digep	SI	SI	["Nessuno"]	а		0:00:0
5	2 ++	<b>A</b>		studebti.polito	.it M		Digep	SI	SI	["Nessuno"]	a		0:00:0
6	3 +101100	-		studebti.polito	.it m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot		0:00:0
7	4++	*		studebti.polito	.it m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:0
3	5 Hottoo	Reune	5120100	studebti.polito	.it m		Digep	si	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:0
9	6 <b>Hat</b>	Rea		eeeeeee@studebti.polito	o.it m		Digep	SI	No	["Nessuno"]	Omron Collaborative Robot	yes	0:00:
0	7++			studebti.polito	.it M		Digep	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:0
1	8 🗰 📥	A		studebti.polito	.it M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:
	9++++++	-		studebti.polito	.it M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:
3	10 -	Manadia		eccentri@studenti.polito	.it <del>Caricania (</del> polite	o.it	DET	SI	SI	["Nessuno"]	Mobile Robot Arm	yes	34:16:
	11 Desire	Mannin	2000044	@studenti.polite	.it <del>Designationallig</del> polite	.it	DET	SI	SI	["Nessuno"]	Optitrack desktop computer	yes	27:20:
5	13 ****	Famme		polito.it	Ominimimi @polite	o.it	DIGEP	SI	SI	["Guanti"]	Omron Collaborative Robot	yes	0:00:
6	14	AGRAMON		@polito.i	t partentiatente polito	.it	DIGEP	SI	SI	["Nessuno"]	UR10 cobot cell	yes	0:01:
7	20 ++++++++++++++++++++++++++++++++++++	Reamo		eeeeeee@studenti.polite	o.it matterna @gmail.c	on YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	yes	0:00:
3	21 +	. Bildation		eccesee@studenti.polite	o.it f <del>iorementerrecelain</del> i@	ppc.	DIGEP	NO	No	["Nessuno"]	Dual arm collaborative robot	yes	6:04:
9	25 Mario	Rossi	s111111	S111111@studenti.polite	it mariorossi@polito.it	YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	VRS	0:00:

Figure 31 - Excel file updated after validation QR code fig. 18.

As explained before, once the user is able to enter into Mind4Lab he can start using the robot station booked and the total time spent on that station is reported into the file excel as shown in the picture blow.

1	A B	С	D	E	F	G	Н	I.	J	К	L	М	Ν
1 10	🖂 Nome 🛛	🛛 Cognome 🖻	Matricola	Email Personale	Email Referente	Check QR	Dipartimento	Corso sicurezza	Formato sui DPI	DPI consegnati	Postazione Robot 🛛 💆	Verificato 🛩	tempo totale 🖂
2	1	-		soogenee@studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	a	si	0:00:00
3	1		5002000	seenen@studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	а		0:00:00
4	1			studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	а		0:00:00
5	2 +			sooneen @studebti.polito.	it M		Digep	SI	SI	["Nessuno"]	a		0:00:00
6	3 +++++++++++++++++++++++++++++++++++++	-		sooneeee@studebti.polito.i	it m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot		0:00:00
7	4			seeses@studebti.polito.i	it m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
8	5 -	Ream	5120100	seeneeneeseeseeseeseeseeseeseeseeseesees	it m		Digep	si	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
9	6 +++++	Rea		seecos@studebti.polito.	it m		Digep	SI	No	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
10	7	-		soccom@studebti.polito.	it M		Digep	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
11	8 🗰			seeces@studebti.polito.i	it M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
12	9 ++++++			socces@studebti.polito.i	it M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
13	10-Danie	-Hanning		seeses @studenti.polito.i	it Device and Control of Control	it	DET	SI	SI	["Nessuno"]	Mobile Robot Arm	yes	34:16:17
14	11-Danie	Hannik		Second @studenti.polito.	it <del>Daries I and </del> @polito.	it	DET	SI	SI	["Nessuno"]	Optitrack desktop computer	yes	27:20:27
15	13 Youtien	fame		polito.it	Darionational@polito.	it	DIGEP	SI	SI	["Guanti"]	Omron Collaborative Robot	yes	0:00:00
16	14-14-14000	R AGRAMEN		manager @polito.it	paolocillaisen@polito.	it	DIGEP	SI	SI	["Nessuno"]	UR10 cobot cell	yes	0:01:41
17	20	Ream		Second @studenti.polito.	it matternam@gmail.co	IT YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	yes	0:00:00
18	21-	o Di Hatte		Second @studenti.polito.	it fiorenzelkanozelkint@	pc.	DIGEP	NO	No	["Nessuno"]	Dual arm collaborative robot	yes	6:04:22
19	25 Mario	Rossi	s111111	S111111@studenti.polito.	it mariorossi@polito.it	YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	yes	3:36:26

Figure 32 - Excel file updated after having user a robot station by the user, see column "Tempo totale".

A specific sheet that monitors all the robot station used has been created. There is illustrated for each ROBOT the number of people that used it, the number of times used, and the total time used.

While into the histogram graph has been reported the total time used for each robot. It is easier to have the whole picture of the time spent, it is possible to rank the robot from the most to the less used.

1	A	В	С	D
1	ROBOT	number of people using	Counting number used	total time used
2	ABB milling Robot cell	0	0	0:00:00
3	Automated Warehouse	0	0	0:00:00
4	Dual arm collaborative robot cell	4	3	6:04:22
5	Mobile Robot Arm	3	12	34:16:17
6	Omron Collaborative Robot	5	0	0:00:00
7	Optitrack desktop computer	1	10	27:20:27
8	UR10 cobot cell	1	1	0:01:41
9	Yaskawa Collaborative Robot (20 K	) 0	0	0:00:00
10	Workstation ML and HoloLens	0	0	0:00:00
11				
12		total tin	ne used	
13		lotat til	ne useu	
14	38:24:00 33:36:00			
15	28:48:00		_	
16	24:00:00 19:12:00			
17	14:24:00			
18	9:36:00 4:48:00			
19	0.00.00		_	
20		cell use stive. Am	ative Kop. , cell ati	.e., and.,
21		Nater Ilabort Robot liat	out cit des. copor lispore	onth
22	885 Milling	onted hastores one hoose on onto colar	Opined askon. Colored work	e
23	88 <sup>8</sup>	on our onder the one	Jastan No.	
24				
25		total t	ime used	
26				

Figure 33 - Excel file sheet Robots illustrating the usage for each robot station.

This chapter demonstrates the overview of all saved data and processes. The file tracking the data is easy to understand and manage, and the owner can modify it like any normal Excel file. The only crucial data that should not be changed is the student's ID entrance, which is a progressive number indicating the response ID of the Forms module.

It is recommended to do not change, modify, columns of the Excel file since Power automate read the table.

Since all data are transferred using Power Automate, which generates the workflow, screenshots have been provided to illustrate the logic behind the process.

The first picture illustrates the flow connecting the initial QR code for entrance, the email system, and Excel file in order to keep track of users. It also connects to the general entrance Excel file to verify if the user has already been registered by the general entrance manager of DIGEP labs.

Currently, there are some issues with the process. Once the flow is generated, the general Excel file does not update for future entries. As a result, the Mind4Lab manager has to manually check new users comparing the two Excel files.

		When a new response is submitted	····	
		Get response details	0	
		Get user profile (V2)	····	
		Add a row into a table	· ···	
	$\checkmark$			
Get a row		····	List rows present in a table	····
	$\downarrow$			$\downarrow$
Send an email (V2)		····	t⊒ For each	
				$\downarrow$
			Get a row 1	····
				$\downarrow$
			Condition	

Figure 34 - Power Automate flow related to QR Code fig. 16.

The picture below is an extract of the previous one. It represents the "Get a row 1" and "Condition" used to verify if the last user entered into the Lab was already verified by the general entrance DIGEP labs.

The actual flow is reported into the appendix.

		$\checkmark$			
	Get a row			····	
	* Location	OneDrive for Business		$\checkmark$	
	* Document Library	OneDrive		~	
	* File	/Laboratorio Mind4Lab.xlsx		6	
	* Table	Generic		$\checkmark$	
	* Key Column	ID		$\checkmark$	
	* Key Value	Response Id ×			
	Show advanced opti	tions 🗸			
		$\downarrow$			
	Condition	1			
		diii     Check Q x     is equal       Add	to V YES		
V If yes			🗙 lf no		
Send me an e	mail notification	····	Send me an ei	mail notification 1	···· (7)
* Subject	New entrance in Mind4lab		* Subject	Wrong new entrance in	Mind4lab
* Body	Clao Khurshid.	ion successo l'ingresso	*Body		Cognome × ha effettuato l'ingresso presso il Inza aver effettuato l'ingresso presso il Lab generiale
	T Add an action				dd an action

Figure 35 - Power Automate condition of the previous fig.34.

While the next picture explains the logic for the second QR code used to confirm the validity of documents and invite the user to join Microsoft Teams calendar.

	When a new response is submitted	⑦ …	
	Get response details	<ul> <li></li> </ul>	
	Update a row	♥ ② …	
	Get a row	↓	
	Condition		
	And ~ -  rt2800d × is eq + Add ~	ual to 🗸 yes	
If yes		X If no	
Add a member to a team	o	Send an email (V2) 1	۵
Send an email (V2)	• 0 ···	Ŧ	Add an action
3	Add an action		

Figure 36 - Power Automate flow related to the QR Code fig. 18.

The following two pictures illustrate the logic flow for tracking the use of each robot.

The first one represents the start of use, adding a new row into the Excel file.



Figure 37 - Power Automate flow related to the QR code fig.20.

This second one illustrates the logic to update the specific user's row in the Excel file, recording the finish time to calculate the total time spent on that robot.

	When a new response is submitted	····	
	$\downarrow$		
	Get response details	····	
	List rows present in a table	····	
_	$\downarrow$		
Apply to each			
* Select an output from previous steps			
value ×			
	Condition		
	And 🗠		
	ID stude x is equal to	✓ rc9ff717 × ····	
	Ora fine x is equal to	✓ 🖉 responder x ····	
✓ If yes	×	lf no	
Update a row	o ···		
		🔔 Add an action	
T	Add an action		
	🖵 Add an action		
	Add an action		

Figure 38 - Power Automate flow related to the QR code fig.22.

### Improvement proposals

Afterwards developing the new management system, a critical analysis has been done. All systems can be always updated, optimized since the technology move forwards each year, even more quick.

I analyzed the process and I found critical aspect.

The first one is about the QR code Flow, and the other is an optimization of tracking the energy consumption and the usage of each machinery.

#### Flow QR-Code

The first crucial improvements are related to the security of the QR code Flow.

It is necessary to create a strictly flow of Form module, or other modules, that allow the use to scan a QR code only if he has already succeeded the previous one.

At the moment there are no limits on the Forms modules, everyone is allowed to scan all QR code, excepted the one to verify certifications that are restricted to the manager's email.

After the creation of a specific flow of QR codes, only a one-way flow, the consecutive improvement could be a creation of QR codes connected directly to the machinery. Once the user scan the Start use robot, the machinery will turn on automatically. The same for the end use of it.

This implementation is very important for the labs since it would consolidate the security of the usage of each robot and keeping track of the exact user of it.

#### Programmable Logic Controller – PLC

The second improvement proposal is related to the exact energy consumption of the machineries.

Programmable Logic Controller, known as PLC, is an industrial computer adapted for controlling and monitoring the manufacturing processes, they are used for automation control.

Since automation control refers also to industries 4.0, they are considered as a fundamental part for the transaction into next generation industries and the government allows the buyer to a discount of the product as a reduction of taxes spent at the end of the working year.

Nowadays there are such as variety of PLC that the user can choose the one that fits his interests. Each PLC has its own language to customize a software for specific needs.

The Programmable Logic Controller connects different types of sensors of machineries to a software that elaborates those input into output and it will send those data to a computer with a monitor that allows the user to understand the output, viewing data.

For example, if energy consumption sensors are connected to all machinery, then the plc will analyze the data received and once the user wants to read the output, the software will show the exact energy consumption for each machinery in the monitor.

This improvement allows managers to have the specific consumption for each machinery and save them into a server giving the possibility to make a quantitative analysis at the end of a period of interest.

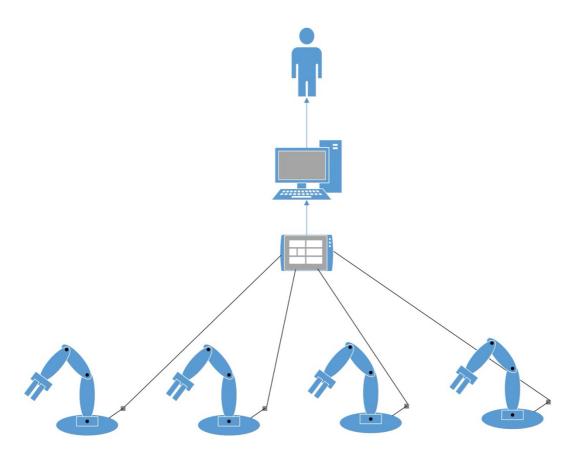


Figure 39 - Possible solutions using PLC connecting all robots and displaying data in the monitor.

The image above represents a possible solution using a Programmable Logic Controller. Each robot is connected to the PLC which elaborates the input received and it will send the data via wireless or cable. Those will be read by the final user through a monitor.

A possible electric scheme is reported in the following picture. Is a draft copy that illustrates the facility of connecting a robot to a PLC which displays the data output in a monitor.

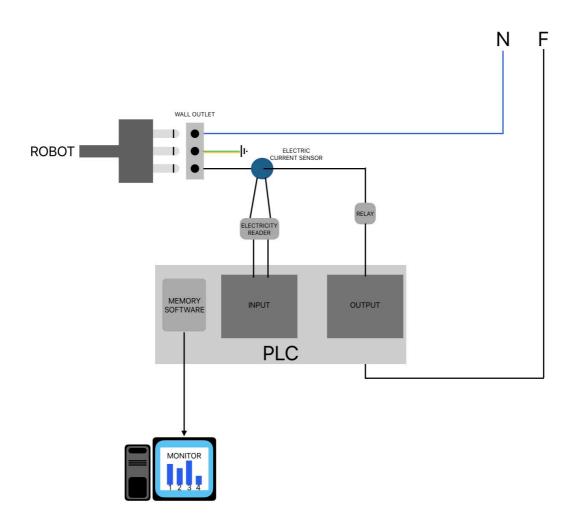


Figure 40 - Example of how to connect a PLC to the wall outlet of the robot.

## Conclusions

I started my thesis by analyzing the existing process developed in the Workshop and with a deep focus on Lean Service, I optimized the flow process changing it and I extended it into Mind4Lab.

This laboratory was my focus because the manager requested a management system that satisfied all the requirements.

The thesis succeeded on it and at the end I found out some next solution for critical point analyzed.

While I was developing the process flow some professors and other laboratories managers were really interested on it, congratulating me and they asked me how it works. This feedback and the focus on Lean Service gave me the idea to develop standardized instructions creating a manual of the process.

This manual has the scope to help managers to extend my process to their own laboratory.

The process flow created optimize and track the user's data and reduce the wasting time for the managers.

Lean means effective and streamlined processes understanding which activities add values to for the customer, eliminating waste. This was the aim of the thesis.

# Appendix

The following appendix provides manual instructions for laboratory managers to expand the new management system. Pay attention to the picture below to understand the management system developed for this thesis.

First, the managers need to create a Microsoft Office account with Politecnico credentials, if they haven't already done it.

After that, log in to OneDrive and create an Excel file. Insert a Table and add as many columns as needed, naming them with titles that represent the data. Then, go to "Table Design" and name the table as you prefer.

The Excel file, table name, and columns titles will be connected to Power Automate. After naming them, do not make any changes, as this will disrupt the automated flow.

The second step before opening Power automate is to create a Microsoft Forms with all questions required to collect data, which will be saved in each row of the Excel table, specifying the columns.

The following pictures illustrates the creation of a Form module related to the Entrance to Mind4Lab.

Ingresso   Entrance to Mind4lab	
1. email del referente   email of your professor *	
Inserisci la risposta	
2. Dipartimento   Department	
O DAD	
ODET	
DIGEP	
DIMEAS	
O DISEG	
◯ DISMA	
O DENERG	
O DIST	
O DISAT	
3. Hai seguito corsi sulla sicurezza?   Have you done the security course? *	
⊖ si	
○ NO	
4. Hai ricevuto la formazione per i DPI?   Have you been formed about DPI? *	
⊖ si	
O No	
5. Quali DPI hai ricevuto?   Which DPI did you receive? *	
Mascherina Mascherina	
Guanti	
Scarpe	
Nessuno Nessuno	
6. Quale robot userai?   Which Robot Station are you going to use?	
ABB milling Robot cell	
Automated Warehouse	
Dual arm collaborative robot cell	
O Mobile Robot Arm	
Omron Collaborative Robot	
Optitrack desktop computer	
UR10 cobot cell	
Viaskawa Collaborative Robot (20 Kg)	
Workstation ML and HoloLens	
+ Aggiungi nuovo	

Before sharing, make sure that it will be available to Politecnico users. To limit access, click the three dots in the top right corner of the screen (as showed), and choose the option "only Politecnico users". After that, click the "raccogli risposte" or "collect responses" button to share the module.

III Forms	Ingresso   Entrance to Mind4lab - S	aheto 🗸	Atre impostazioni modulo
Domande Risposte (25)		ক Anteprima	) Stile 🛛 Raccogli risposte 🖵 Presenta 👉
	Ingresso   Entrance to Mind4lab		postazioni Chi può compilare questo modulo Chiunque può rispondere Solo le persone in Politecnico di Torino poss
	1. email del referente   email of your professor *	7	ono rispondere Accesso necessario per convalidare l'accesso all'ime mo di Politecnico di l'orino e Registra nome Una risposta per persona NO
	2. Dipartimento   Department		Persone specifiche in Politecnico di Torino p ossono rispondere Opzioni per le risposte
	O DAUIN O DET		Accetta risposte     Data di inizio     Data di fine
			Imposta la durata del tempo  Ordine casuale per le domande  Disattivare il numero di domanda per chi
	DIMEAS DISEG		risponde  Mostra indicatore di stato  Nascondi Invia un'altra risposta  Personalizza il messaggio di ringraziamento
	O DENERG		Consenti agli intervistati di salvare le     risposte     Consenti agli intervistati di modificare le     loro risposte

Do not select "una risposta per persona".

III Forms	Prova - Salvato 🗸	Scegii in modalità di raccolta delle risposte 🤉 熊
Domande Risposte		🐵 Anteprima 🧶 Stile 🛛 Raccogli risposte 🖵 Presenta …
	Non ci sono ancora risposte. Ottieni i dati ora. Condividi per raccogliere le risposte	7
	Voualizas 1 replaça d opri domanda, etteri un feetback immediato e información cettagliate.	
	Uta Boer per vivuel taxe i nu tati aggiornati in tabeli e per ordinare, fittare, tratformere o crere prafici basif su dati.	

The share button will show you different option to share the module, the one I have used is QR Code.

III Forms	Provili - Sahato 🗸				? (	0
Domande Risposte		Anteprima	🍳 Stile	Raccogli risposte	🖵 Presenta	
	<ul> <li>Invaso actinguiste risposto</li> <li>Cara conseguista di la conseguista di</li></ul>					
	C feature					

Click the "scarica" or "download" button and print it, then display the QR code in the preferred location in the lab.

After creating a Microsoft Form and an Excel file, you can start using the Power Automate application.

The following pictures illustrate the different pages of excel file related to Mind4lab, each table and column has been named to be used by Power Automate.

1	A B	С	D	E	F	G	Н	1	J	K	L	М	Ν
1	🗸 Nome	Cognome	Matricola	Email Personale	Email Referente	Check QR	Dipartimento	Corso sicurezza	Formato sui DPI	DPI consegnati	Postazione Robot 🛛 🛛	Verificato 🗸	tempo totale 🖂
2	1 Matteo	R		@studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	a	si	0:00:00
3	1 Matteo	R		@studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	а		0:00:00
4	1 Matteo	R		eeeeeee@studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	а		0:00:00
5	2 M	R		studebti.polito.	it M		Digep	SI	SI	["Nessuno"]	а		0:00:00
6	3 Matteo	R		studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot		0:00:00
7	4 M	R		studebti.polito.	it m		Digep	SI	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
8	5 Matteo	Reamo	5110-100	studebti.polito.	it m		Digep	si	SI	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
9	6 Mat	Rea		eccence@studebti.polito.	it m		Digep	SI	No	["Nessuno"]	Omron Collaborative Robot	yes	0:00:00
10	7 M	R		studebti.polito.	it M		Digep	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
11	8 M	R		studebti.polito.	it M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
12	9 Matt	R		studebti.polito.	it M		DIGEP	SI	No	["Nessuno"]	Dual arm collaborative robot	yes	0:00:00
13	10 -	Meetilian		eeeeett@studenti.polito.i	t <del>Caricaniandi</del> @polito	it	DET	SI	SI	["Nessuno"]	Mobile Robot Arm	yes	34:16:17
14	11 Desire	Meesia	2000044	eaccost @studenti.polito.	it Designent contine polito	it	DET	SI	SI	["Nessuno"]	Optitrack desktop computer	yes	27:20:27
15	13 ****	Farmer		polito.it	Ominimi malii @polito	.it	DIGEP	SI	SI	["Guanti"]	Omron Collaborative Robot	yes	0:00:00
16	14	A AGRAMON		@polito.it	partershistent@polito.	it	DIGEP	SI	SI	["Nessuno"]	UR10 cobot cell	yes	0:01:41
17	20 ++++++++++++++++++++++++++++++++++++	Reamo		eeeeee@studenti.polito.	it matterna @gmail.co	on YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	yes	0:00:00
18	21	Billinian		esecces@studenti.polito.	it fiorementionecolinia(@	pc.	DIGEP	NO	No	["Nessuno"]	Dual arm collaborative robot	yes	6:04:22
19	25 Mario	Rossi	s111111	S111111@studenti.polito.	it mariorossi@polito.it	YES	DIGEP	SI	No	["Nessuno"]	Mobile Robot Arm	ves	0:00:00

This is the general sheet named generic and the table is named "Generic". Remember the table name.

	А	В	С	D	E	F	
1	ID studente 🗠	Matricola 🗠	Giorno 🚩	Ora inizic 🗠	Ora fine 🗠	tempo totale	$\sim$
2	10		5/30/2024	10:03:05	11:19:48		1:16:43
3	10		5/30/2024	11:55:03	14:19:37		2:24:34
4	10		5/31/2024	7:33:10	13:15:58		5:42:48
5	10		6/3/2024	7:53:40	10:48:24		2:54:44
6	10	5000044	6/3/2024	12:50:29	13:47:01		0:56:32
7	10		6/4/2024	7:47:10	10:21:37		2:34:27
8	10		6/4/2024	10:54:57	13:47:48		2:52:51
9	10		6/5/2024	10:08:49	11:06:34		0:57:45
10	10	5000044	6/5/2024	12:22:47	14:28:55		2:06:08
11	10		6/6/2024	7:47:08	10:38:33		2:51:25
12	10	0200044	6/12/2024	8:36:13	14:38:07		6:01:54
13	10	3000044	6/13/2024	10:55:22	14:31:48		3:36:26
14	10		6/18/2024	11:54:15	14:28:29		2:34:14
15	10		6/19/2024	9:24:49	15:40:16		6:15:27
16	10	5000044	6/20/2024	8:24:46	14:48:56		6:24:10
17	10		6/21/2024	6:15:29	9:25:32		3:10:03
18	10	5000044	6/25/2024	7:06:37	14:57:39		7:51:02

This is the sheet related to the specific robot station Dual Arm, and the table name is "MobileRobotArm". In the table records the laboratory students'IDs and their personal ID, tracking the start and end time and calculating the total time in the last column.

	A	B
1	Postazione Robot 🛛 🖌	link collegamento
2	ABB milling Robot cell	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/EpxtxdMuNY5Jlfz-1p7vBt4BBvN-U9TDChP4iAGn03VA?e=Nvv9dP
3	Automated Warehouse	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/EsGP5-a6N_tDhFPHnZTgazkBt95qnmIUjSgtTIXANTtQHA?e=SrUhVn_
4	Dual arm collaborative robot cell	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Eq0BltUv-llAmHMary9n1s8B9i5VP-VzWEJrXi118EKxJA?e=A7c57A
5	Mobile Robot Arm	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ekl8tTveRBhGl3V5WEEFaMUB_tGskvdlgfdBlsH-QGrPbw?e=Ra89AH
6	Omron Collaborative Robot	$https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Ep2qghvtdcpAmprSXBtBZPQBAQdFFDDoQkwR9fhnYmKfkw?e=dLJdbFitestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:f:/g/personaliev_polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com/:g/polito_itestarepoint.com$
7	Optitrack desktop computer	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/Eo_9tGNmqbVCqZ0xeX4T-xwBtn0lpLtEyhDQJI3EY4Ak7A?e=Tf1P1f
8	UR10 cobot cell	$https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/EvM2FT_gg3FGihVCNRU-NGkBQvGwzix74XzqHDAvhuTYOQ?e=UVQaHiinterinterinterinterinterinterinterinte$
9	Yaskawa Collaborative Robot (20 Kg)	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/ElBdDx84kPtKrq_45ibETK4BZKjXg1JKvUvPKqGIv6QTdA?e=KiHr9t
10	Workstation ML and HoloLens	https://politoit-my.sharepoint.com/:f:/g/personal/khurshid_aliev_polito_it/ElxG65TwMT9EkJLUQgj9n5ABErHk6aR2FCWGf1sRm7JesA?e=rXvxSG

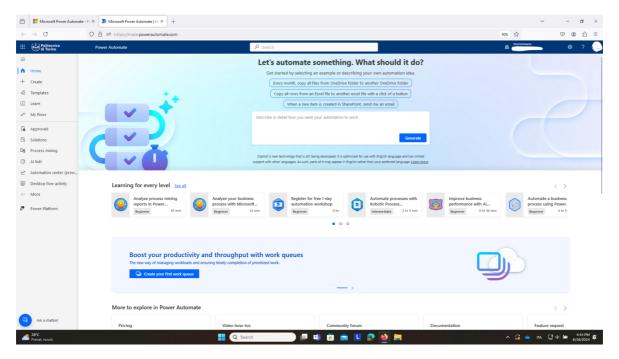
The picture above illustrates the table named "Postazioni", which contains, for each robot station, the specific folder link in OneDrive.

	А	В	С	D
1	ROBOT	number of people using	Counting number used	total time used
2	ABB milling Robot cell	0	0	0:00:00
3	Automated Warehouse	0	0	0:00:00
4	Dual arm collaborative robot cell	4	3	6:04:22
5	Mobile Robot Arm	3	12	34:16:17
6	Omron Collaborative Robot	5	0	0:00:00
7	Optitrack desktop computer	1	10	27:20:27
8	UR10 cobot cell	1	1	0:01:41
9	Yaskawa Collaborative Robot (20 Kg)	0	0	0:00:00
10	Workstation ML and HoloLens	0	0	0:00:00
11				
12		4 - 4 - 1 4 -		
13		total tin	ne used	
14	38:24:00			
15	33:36:00 28:48:00			
16	24:00:00			
17	19:12:00			
18	9:36:00			
19	0.00.00		_	
20	555 Milling State	et poster constants of the start and constants	opine to the top opine the top opine	a salon Mark
21	0000L	arehor aborat aborth ab	ola dest obolt abolat	ann
22	HINST	red We n colle spile for Colle	titract up 10 colle	4.810
23	-88 mil soft	at ustant Mo. Onion	OP. North	
24	b. b.	0.	70.	
25		total ti	me used	
26				

As explained in the previous chapter, this table has been created to calculate the total time used for each robot station, and the results are extrapolated into the histogram chart.

Now it is possible to start using Power automate. Go to the website <u>www.powerautomate.com</u> and log in with your Politecnico Microsoft credentials.

The following picture illustrates the home page.



	nate - Pil X Microsoft Power Automate   Hil X +					~ - o
→ C	C 🔒 🕫 https://make.powerautomate.com				90% 🟠	♥ @ £
Politecnico di Torino	Power Automate	€ Search			£	• • • • • • • • • • • • • • • • • • •
Home			e something. What sho			
Create			ng an example or describing your own au			
Templates			Il files from OneDrive folder to another One			
lemplates Learn	· · · · · · · · · · · · · · · · · · ·		an Excel file to another excel file with a click			
		When a new	ritem is created in SharePoint, send me an er	nail		
My flows		Describe in detail how you w	nt your automation to work			
Approvals						
Solutions				Generate		
Process mining		Control is new technology that is at	Il being developed. It is optimized for use with English	Incruses and har Dollard		
Al hub			, parts of it may appear in English rather than your pref			
Automation center (previ						
Desktop flow activity	Learning for every level See al					< >
More	Analyze process mining	Analyze your business Register	for free 1-day	e processes with	ve business 🔨 A	Automate a business
Power Platform	reports in Power	process with Microsoft 💽 automati	on workshop 🔊 Robotic P	rocess perform	mance with Al 👔 p	process using Power.
	Beginner 45 min	Beginner 43 min Beginner	inclusion of	ate 2 hr 5 min Beginn	Her Contraction	Beginner 4 hr 5
			• • •			
	Boost your productiv	ity and throughput with work queues				
	The new way of managing workloads	and ensuring timely completion of prioritized work.				
	Create your first work queu					
			· •			
	More to explore in Power Auton	ate				$\langle \rangle$
Ask a chatbot	Pricing	Video how-tos	Community forum	Documentation		Feature request
28°C Preval. nuvol.	· · · · · · · · · · · · · · · · · · ·		🗊 💼 💼 🛄 🔗 📦			та Ст ф 🍅 445 г

To start creating a new flow, click the "My Flows" button as shown below.

On this page, you can see your current flows and create a new one. Click the "New Flow" button, then select "Automated cloud flow", as illustrated in the following picture.

	ate - Pi × Microsoft Power Automate   Mi × +		<ul> <li>σ</li> </ul>
· → C	○ A ≈ <sup>2</sup> https://make.powerautomate.com/e	wironments/Default-2a05ac92-2049-4a26-9b34-897763efc8e2/flows	90% ☆ ◎ 幺
Politecnico di Torino	Power Automate	♀ Search	A Contronments (S) ? (
	🕂 New flow 🗸 🛏 Import 🗸		🔎 Search
Home	Start from a template		Install $\vee$
Create	2 Template ared with me		
Templates	Visio template		
Learn	Build your own from blank	Modified Type	
My flows	S Instant cloud flow	5 h ago Automated	
Approvals	Scheduled cloud flow		
Solutions	🕒 Describe it to design it	6 d ago Automated	
Process mining	Desitop flow	6 d ago Automated	
Al hub			
Automation center (previ	4 <u>9</u>	l wk ago Automated	
Desktop flow activity	12	1 vik ago Automated	
Power Platform		1 wk ago Automated	
	e.	2 wk apo Automated	
	192 (St. 192	2 wk ago Automated	
	<i></i>	2 wk spo Automated	
	<i>a</i>	2 wk apo Automated	
	<i>a</i>	2 wk ago Automated	
Ask a chatbot	10	2 wk apo Automated	
ASK a chatalot	10	2 isk kon datanska Q Search III 🛱 🖻 🗓 😥 👲	^ C ← TA C ↔ 447 PM

After that, a script will appear. Name the flow as you prefer and select the trigger option "When a new response is submitted" from Microsoft Forms. Then, start creating the actual flow.

III Politecnico Power Autor	nate	,∽ Search
Primo ingresso in mind4lab		
Your flow is ready to go. We recommend you test it.		
When a new response is submitted	= <	
Parameters Settings Code View About		When a new response is submitted
Form Id *		submitted
Ingresso   Entrance to Mind4lab	✓	€ <b>₽</b>

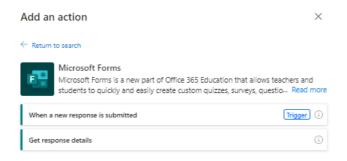
Select the form from which you want to collect data from the drop-down menu.

_																																										_	_	_	_	_	_	_	_	_	_		-
	Ċ	Pol	itecni orinc	co					P	ow	er	Aut	on	ate																	۶	2 5	iearc	h																			
←	Prim	o ing	esso	in m	ind4	ab																																															
0	) Your	flow is	ready	to go	o. We	reco	nme	nd y	ou ti	est	it.																																										
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																										_			nitted			Ø																					
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Click the "+" symbol and choose "Add an Action".

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		(In App)													
Desktop flows		Excel Online (Business)													
-		—													
Excel Online For Business		Mail													
Excer online for business	0	- Wan	0												
Microsoft Dataverse		Microsoft Dataverse													
Microsoft Dataverse		Microsoft Dataverse													
			_												
Microsoft Forms		Microsoft Teams													
Microsoft Teams	(i)	MSN Weather	0												
—		_													
Notifications	(i)	Office 365 Outlook	0												
		Since Sos Gallook	<u> </u>												
<b>a</b>	0		(i)												
Office 365 Users	(i)	OneDrive	0												

Different applications will appear on the left, and you have to choose the application that you want to use in your logic idea for the creating flow. In our case, select Microsoft Forms since we need to extract data from the module.



Click the "Get response details" button.

III 🖓 Politecnico Power Automate			Politecnico di Torino	Power Automate		
Primo ingresso in mind4lab		÷	Primo ingresso in mind4lab			
Your flow is ready to go. We recommend you test it.		6	Your flow is ready to go. We recommend	you test it.		
Get response details	: <		Get response details	:	<	When a new
Parameters Settings Code View Testing About			Parameters Settings Code View	Testing About		response is submitted
Form Id *			orm Id *		1	· · · · · · · · · · · · · · · · · · ·
Ingresso   Entrance to Mind4lab	$\sim$	- I	Ingresso   Entrance to Mind4lab	~		$\oplus \ \cdots \ \oplus \ \oplus \ \cdots \ \oplus \ \oplus \ \oplus \ \oplus \ \oplus \ $
Response Id *           Image: Response in the second secon	\$ (X		Response id * Respons ×		]<	0 2 X
Connected to khurshid aliev@polito.it. Change connection			Connected to khurshid.aliev@polit	0.it Change connection		earch ,
						Response Id Unique identifier of the response. Use with 'Get response details' actio

Select the form from which you want to collect data from the drop-down menu. Click on the field labeled "Response id", and a blue lightning will appear. Click on it to open a drop-down menu and select the option "Response id".

Again, press the "+" symbol to add a new action and select the Office365.

Add an action	×
← Return to search	
Office 365 Users Office 365 Users Connection provider lets you access user prof organization using your Office 365 account. You can perform v	•
Send an HTTP request	<b>(</b> )
Get direct reports (V2)	(i)
Get manager (V2)	0
Get my profile (V2)	<b>(</b> )
Get my trending documents	0
Get relevant people	0
Get trending documents	<b>(</b> )
Get user photo (V2)	0
Get user photo metadata	0
Get user profile (V2)	Ū
Search for users (V2)	()
Update my profile	(i)
Update my profile photo	(i)

Click on "Get user profile (V2).

III 🔮 Politecnico di Torino	Power Automate		,⊅ Search
Primo ingresso in mind4lab			
Your flow is ready to go. We recommend your flow is ready to go.	ou test it.		
Get user profile (V2) Parameters Settings Code View User (UPR) *	: Testing About	When a new response is submitted	<ul> <li>Image: A state of the state of</li></ul>
responder *		0 2	× · · · · · · ·
		. ✓ Search	
Advanced parameters		Get response details See Les	3 🔶 · · · · · · · · ·
Showing 0 of 1	Show all Clear all	Quali DPI hai ricevuto?   Which DPI did you receive? Answer to the question above	
<ul> <li>Connected to khurshid.aliev@polito.</li> </ul>	.it. Change connection	email del referente   email of your professor Answer to the question above	1111111
		Hai seguito corsi sulla sicurezza?   Have you done the security of Answer to the question above	-
		Quale robot userai?   Which Robot Station are you going to use Answer to the question above	?
		Dipartimento   Department Answer to the question above	
		Hai ricevuto la formazione per i DPI?   Have you been formed a Answer to the question above	-
		Responders' Email Email address of responder who submitted the form.	
		Submission time Timestamp when a new response is submitted	
		When a new response is submitted	
		Response Id	•

Click on the field labeled "User (UPN)", and a blue lightning icon will appear. Click on it to open a drop-down menu and select the option "Responders' Email". This application extracts some personal information using the responders' email, as all Politecnico users have an office365 account. This action allows for the removal of personal data questions from the module.

Again, press the "+" symbol to add a new action and select the Excel for Business app.

Add an action	$\times$
← Return to search	
Excel Online (Business) Excel Online (Business) connector lets you work with Excel files i libraries supported by Microsoft Graph (OneDrive for Business,	
Delete a row	0
Get a row	0
Get worksheets	(i)
List rows present in a table	0
Run script	(i)
Run script from SharePoint library	(i)
Update a row	0
For a selected row	Trigger i
Add a key column to a table	0
Add a row into a table	0
Create table	(i)

Choose the option "Add a row into a table".

III 🔐 Politecnico Power Automate	
Primo ingresso in mind4lab	
Your flow is ready to go. We recommend you test it.	
Add a row into a table :	
Parameters Settings Code View Testing About	When a new response is submitted
OneDrive for Business V	•••••••••••••••••••••••••••••••••••••••
Document Library * OneDrive	$\oplus$
File *	Get response details
/Laboratorio Mind4Lab.xlsx	
Table *           Generic         V	
	Get user profile (V2)
Advanced parameters           Showing 11 of 23         Show all         Clear all	
D	+
Respons ×	Add a row into a table
Nome Given Na × X	
Cognome	
Matricola	
Nickname ×	
Email Personale	
Email Reference rodoc321	
Dipartimento	
2 r007dd8 * X	
Corso Sicurezza Eseguito           re2cr113e *	
Formato Sul DPI	
DPI Consegnati	
r387ft6c × X	
Vottasone Kobot rseb2c58 *	
ତ Connected to khurshid.aliev@polito.it. Change connection	-

Complete all the field labels. The first three labels are always "OneDrive for Business", "OneDrive", and the file name "LabortorioMind4Lab", which is our file created at the beginning. For the Table field, you need to select the table that pertains to this specific flow; in this case, it is "Generic" table.

Then click the "Show all" button, which will display all the columns of the table. Now, you are going to fill each of them using the blue lightning icon that simplifies the data selection. For the columns related to the forms' answers, the selection is straightforward. Regarding the personal data extracted by Office365, choose "Given Name" for the name, "Surname" for the last name and "Nickname" for StudentID-matricola.

Again, press the "+" symbol to add a new action, select the Excel for Business app and choose the option "Get a row".

III 🔐 Politecnico di Torino	Power Automate	∠P Search
<ul> <li>Primo ingresso in mind4lab</li> </ul>		
Your flow is ready to go. We record	mmend you test it.	
Get a row	÷	<
Parameters Settings Cod	e View Testing About	<ul> <li>When a new response is submitted</li> </ul>
OneDrive for Business	~	• • • • • • • • • • • • • • • • • • • •
Document Library * OneDrive	~	
File *		Get response details
/Laboratorio Mind4Lab.xisx	۵	• • • • • • • • • • • • • • • • • • • •
Table *		
Postazioni	~	• • • • • • • • • • • • • • • • • • •
Key Column *		G Get user profile (V2)
Postazione Robot	~	
Key Value *		
rSeb2c58 ×		0 2 X
		Bearch
Advanced parameters		Get user profile (V2)     See More (31)     nto a
Showing 0 of 1	Show all Clear all	The name of the company in which the user works.
		Get response details     See More (8)
Connected to khurshid aliev	Spolito.it. Change connection	Quali DPI hal ricevuto?   Which DPI did you receive? Answer to the question above
		email del referente   email of your professor Answer to the question above
		Hai seguito corsi sulla sicurezza?   Have you done the security c Answer to the question above
		Quale robot usersi?   Which Robot Station are you going to use? Answer to the question above
		Dipartimento   Department Answer to the question above
		Hai ricewito la formazione per i DPI?   Have you been formed a Antarer to the question above
		When a new response is submitted
		Response Id Urrique identifier of the response. Use with 'Set response details' v

Fill in the first three labels as before, then select "Postazioni" for Table, "Postazione Robot" for Key columns, and "Quale robot userai? | Which robot station are you going to use?" for Key value.

This action searches through the column "Postazione Robot" in the table "Postazioni" for the specific robot station answered by the user. In this table, there are two columns: one related to the robot station and the second one filled with OneDrive folder links.

Again, press the "+" symbol to add a new parallel action, select the Office 365 Outlook app and choose the option "Send an email (V2)".

Add an action	×
← Return to search	
Office 365 Outlook Microsoft Office 365 is a cloud-based service the your organization's needs for robust security, rel	2
Create contact (V2)	Ū
Create event (V4)	Ū
Send an HTTP request	(j
Send an email (V2)	(i)
When a new email arrives (V3)	Trigger (i)
When an email is flagged (V3)	Trigger (i)
When an email is flagged (V4)	Preview Trigger (i)
Delete contact (V2)	(i)
Delete email (V2)	<u>(</u> )
Delete event (V2)	<u>(</u> )
Export email (V2)	<u>(</u> )
	~

- 8	: 💕 Politecnico di Torino	Power Automate				,⊅ Search	
÷	<ul> <li>Primo ingresso in mind4lab</li> </ul>						📈 Sen
	Your flow is ready to go. We recommend	you test it.					
	Send an email (V2)		: <	<	When a new response is submitted		
	Parameters Settings Code View	Testing About				<b>6</b>	
₿ fr	To *		×		Get response de	letails	
-	Subject *					<i>6</i> 0	
	Documents Mind4Lab				(H)		
	Body*	15px V B I U A 💩 co			· · · · · · · · · · · · · · · · · · ·		
	English below	Sherr B. I. Z. H. Z. S.	*		Get user profile	e (V2)	
	Gentile di Nome * ,					©	
	All'interno della cartella troverai un istruzioni relative ai materiali, quin	i da studiare prima di entrare in Mind4Lab. n file chiamato Readme dove ci sono le di iniziare da questo file. Inoltrarmi gli attestati dei corsi seguiti	1		Add a row into a table	a 	
	Per la postazione di Postazio	<ul> <li>usare il seguente link di collegamento</li> </ul>		· · · · · · · · · · · · · · ·	÷		
	Ricorda il tuo codice identificativo ricordarsi di scrivere l'id identificat	ID del mind4iab è: 📧 🛛 ID × , ivo al resoonsabile di laboratorio nell'email	di 🔻		💷 Get a row	•	
	Advanced parameters Showing 2 of 7	✓ Show all C	aar all		<b>•</b>		
	Reply To khurshid.aliev@polito.it		×		end an email (V2)	Ψ	
	Importance Normal	~	] ×		end an email (v2) ⊗		

Fill the first label using the lightning icon and select the option "Responders' email" since it is the email address to which the email will be sent. Then name the Subject as you prefer and write the email that will be received by the users.

::: 🍰 Politecnico di Torino	Power Automate			,⊅ Sear	::: 🛃 Politecnico di Torino	Power Automate		,⊅ Sea
← Primo ingresso in mind4lab					← Primo ingresso in mind4lab			
Your flow is ready to go. We recommended	nd you test it.				Your flow is ready to go. We recom	mend you test it.		
Send an email (V2)		1 < 1		When a new response is submitted	Send an email (V2)		•	Vhen a new response is submitted
Parameters Settings Code Vi	ew Testing About		· · · · · · · · · · · · · · · · · · ·		Parameters Settings Code	View Testing About		
responder *		×		Get response details	To *		×	Get response details
Subject *				© 1	Subject *			
Documents Mind4Lab					Documents Mind4Lab			
Body*				🕀	Bady *			🕀
C C Normal V Arial	∨ 15px∨ B <i>I</i> <u>U</u> A <u>&amp;</u> on	• ·		Get user profile (V2)	ී ී Normal V Arial பாதுவா சல்லா	∨ 15px∨   B <i>I</i> <u>U</u> A A on	Eearch	① ✓ × profile (V2)
Gentile 🛤 Nome × ,		∳ ∫≰		• · · · · · · · · · · · · · · · · · · ·	Gentile 💶 Nome × ,		Get a row	
	riali da studiare prima di entrare in Mind4Lab. i un file chiamato Readme dove ci sono le			· · · · · · · · · · · · · · · · · · ·	All'interno della cartella trove	teriali da studiare prima di entrare in Mind4Lab. erai un file chiamato Readme dove ci sono le	Postazione Robot	)
	undi iniziare da questo file. rai inoltrarmi gli attestati dei corsi seguiti			Add a row into a table		, quindi iniziare da questo file. Iovrai inoltrarmi gli attestati dei corsi seguiti	Enk collegamento	w into a
Per la postazione 🗐 Postazio	usare il seguente link di collegamento			• · · · · · · · · · · · · · · · · · · ·	Per la postazione 🖷 Posta	zio • usare il seguente link di collegamento	Add a row into a table	See More (22)
Link colle * .		•		÷	fink colle * .		ID	y
	ivo ID del mind4lab è: 🔤 🛛 ID × , cativo al responsabile di laboratorio nell'email	di 🖵		Get a row		ativo ID del mind4lab è: 🖷 🛛 ד , tificativo al responsabile di laboratorio nell'emali c	I w Nome	v
				• • • • • • • • • •			Cognome	<b>\$</b>
Advanced parameters				÷ (†)	Advanced parameters		Matricola	)
Showing 2 of 7	V Show all C	ear all	· · · · · · · · · · · · · · · · · · ·		Showing 2 of 7	✓ Show all On	r all Email Personale	
Reply To			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	Reply To			(†
khurshid.aliev@polito.it		×	5 Send an er	mail (V2)	khurshid.allev@polito.it		Email Referente	
Importance					Importance		Get user profile (V2)	See More (31)
Normal		×		×0	Normal	~	🖌 – Terrera de Leona	•
							1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	①
©. Connected to khurshid alieu®in		1						

You can customize the email body by using the lightning icon and selecting the data collected in the previous steps.

Again, press the "+" symbol to add a new action, select the Notifications app and choose the option "Send me an email notification".



III di Torino Power Automate	,∕⊃ Search
Primo ingresso in mind4lab	
Send me an email notification :	< response is submitted
Subject *	• • • • • • • • • • • • • • • • • • •
check the new user in Mind4Lab	Get response details
Body * HI, Khurshid check if the new user III Nome * III Cognome * has already completed the QR Code for the generic entrance in the file named "Ingresso Generae Laboratori Digep"	
Connected to Notifications. Change connection	Get user profile (V2)
	table
	Get a row
	↓ ↓ ↓ Send an email (V2) ⊕ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

Fill the labels as you prefer and customize the Body as you did for the email body illustrated in the previous step.

Once you have finished creating the flow, save it and run the test.

,⊅ Search		A poito.it (default)		<ul> <li>Environments</li> <li>polito.it (default)</li> </ul>	
	🖉 Send feedback 🛛 😨 Copilot 🔜 S	Savi 😲 Flow check 🖞 🛓 Test 🛛 New designer 👥	R Send feedback 🕢 Copilot		
				Test Flow	×
	· · · · · · · · · · · · · · · · · · ·	·····		0	
· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · ·	Manually Submit a new response to the selected fo	and the design of the
When a new		🚺		Sobmit a new response to the selected to	im to bigger it.
response is submitted				Automatically	
submitted			-	O Automatically	
• • • • • • • • • • • • • • • • • • • •					
Ψ					
Get response details					
Get response details					
9					
• • • • • • • • • • • • • • • • • • • •					
Get user profile (V2)					
· · · · · · · · · · · · · · · · · · ·					
Add a row into a table					
· · · · · · · · · · · · · · · · · · ·					
Get a row					
•••••••••••••••••••••••••••••••••••••••					
<b>(</b>					
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÷ +					
	<b></b>				
Send an email (V2) Send me an email notification	· · · · · · · · · · · · · · · · · · ·				
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	ð <mark> </mark>				
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Then click on the "Manually" button to test the flow by scanning the QR code.

The Entrance to Mind4Lab flow has been created successfully.

Now you need to create the second flow related to the verification of the documents after the user enters the lab.

Repeat the first passage of the flow, create a new flow and choose the trigger option "When a new response is submitted" from Microsoft Forms.

Politecnico Power Automate		,⊅ Search	
Verify certificates			
When a new response is submitted	: <		
	When a ne	2W	
	response is		
Parameters Settings Code View About	submitted		
		®	
Form Id *			
Verifica attestati			
	· · · · · · · · · · · · · · · · ·		
C. Consideration the second state of the Constitution of the Const			
Connected to khurshid.aliev@polito.it. Change connection			

Select the form from which you want to collect data from the drop-down menu.

Click the "+" symbol and choose "Add an Action". Click on Microsoft Forms app then "Get response details" button.

III 🖓 Politecnico Power Automate	ур Search
← Verify certificates	
Get response details	E < When a new
Parameters Settings Code View Testing About	response is submitted
Form Id * Verifica attestati	
Response Id *	Get response details
Connected to khurshid aliev@polito.it. Change connection	
	· · · · · · · · · · · · · · · · · · ·

Select the form from which you want to collect data from the drop-down menu. Click on the field labeled "Response id", and a blue lightning will appear. Click on it to open a drop-down menu and select the option "Response id".

Again, press the "+" symbol to add a new action, select the Excel for Business app and choose the option "Update a row".

III 🔐 Politecnico Power Automate	,O Search	
← Verify certificates		R Send f
🖽 Update a row : <		
Parameters Settings Code View Testing About	When a new response is submitted	
Lecation *	<u> </u>	
OneDrive for Business		
OneDrive V	Get response details	
File * /Laboratorio Mind4Labx/sx		
Table * Generic  V	Update a row	
Kay Column *	with the second se	
Key Value *		
rssecon_ *	Search	
Advanced parameters Showing 0 of 23 V Show all Clear all	Cer response details	
	ID cliente Answer to the question above	
Connected to khurshid aliev@polito.it Change connection	Confermo Answer to the question above	
	Responder: 'fmail Email address of responder who submitted the form. Submission time	
	Instatum when a new response is submitted	
	Company in the response to administrative     Company is denoted by the response details' acts	

Fill all the labels, and for the Key value use the blue lightning icon, which guides you on what to insert. For this example, choose "ID Cliente".

Again, press the "+" symbol to add a new action, select the Excel for Business app and choose the option "Get a row".

III 🔐 Politecnico di Torino	Power Automate		م	Search
<ul> <li>Verify certificates</li> </ul>				
Get a row		: <		
			When a new	
			response is	
Parameters Settings Code V	view Testing About		submitted	
			0	
Location *				
OneDrive for Business	· · · · · · · · · · · · · · · · · · ·			
Document Library *		<u> </u>	· · · · · J· · · ·	
OneDrive			Get response details	
		⊻		
File *			@	<u>.</u>
/Laboratorio Mind4Lab.xlsx	0	<u>а с с с с с с с с с с с с с</u>		
Table *				
Postazioni				
		▲	Update a row	
Key Column *			9	
Postazione Robot		A A A A A A A A A A A A A A A A     A	~	
Key Value *				
Postazio *		<b>4</b>	D 🖉 🗙 🔄	
Postalo		x		7
		Fearch		
		_	A Q	•
Advanced parameters			e More (22)	
Showing 0 of 1	Show all Clear a			
		ID		
		Nome		
Connected to khurshid aliev@p	polito.it. Change connection	Nome		
		Cognome		
		Cognone		
		Matricola		
		Email Personale		
		Email Referente		
		_		
		Get response details		
		ID cliente		
		Answer to the question above		
		Confermo		
		Answer to the question above		
		Responders' Email	<b>v</b>	

Fill in all labels. For this example, under the Key Column label, it should say "Postazione Robot", and under the Key Value label, it should say "Postazione robot".

Click the "+" symbol and choose "Add an Action". Click on Control app then "Condition" button.

Add an action	×
$\leftarrow$ Return to search	
Control	
Condition	In App 🛈
Apply to each	In App 🛈
Do until	In App 🛈
Scope	In App (i)
Switch	In App 🛈
Terminate	In App (i)

III 🖗 Politecnico di Torino	Power Automate	,₽ Search
← Verify certificates		
Condition	: <	When a new
Parameters Settings Code View	About	response is submitted
Condition Expression * Provide the values to compare and select th	e operator to use.	•
AND ~	is equal to $\checkmark$ yes	Get response details
+ New item V	⊙ ∠ <sup>n</sup>	 ₽
	Get response details	▲ Update a row
	ID cliente Answer to the question above	$\overline{\oplus}$
	Confermo Answer to the question above	Get a row
	Responders' Email Email address of responder who submitted the form. Submission time Timestamp when a new response is submitted	
	Body Form response details	
	When a new response is submitted	
	Response Id Unique identifier of the response. Use with 'Get response details'	
	body/resourceData Body	

For the condition, select the operator "AND" and in the new item, choose "Confermo" using the blue lightning icon. Then, select "is equal to" and type "YES" in the last label, as shown in the picture.

Add an action	$\times$
← Return to search	
Microsoft Teams Microsoft Teams enables you to get all your content, tools in the Team workspace with Microsoft 365.	s and conversations
When a new channel message is added	Trigger (i)
Add a member to a team	(j)
Create a Teams meeting	0

Under the True condition, add an action and choose Microsoft Teams app. Then select the option "Add a member to a team". Fill in the labels as shown in the following picture: choose "Email personale" for User and choose the teams LAB\_MIND4LAB from the drop-down menu.

II 🛃 Politecnico di Torino	Power Automate		, P Search
<ul> <li>Verify certificates</li> </ul>			R Send feedback
Add a member to a team		• • • • • • • • • • • • • • • • • • • •	When a new response is submitted
Parameters Settings Code Vie	ew Testing About		
User * Email Per × Taam *			
LAB_DIGEP_Mind4Lab			
Advanced parameters		—	Update a row
Showing 0 of 1	∽ Show all	Clear all	
⊛ Connected to khurshid aiiev@po	Diffo.it Change connection		÷
			Gil Get a row
			•
			II Condition
		Тие	
		Add a mer	
		team	
		•	

Add another action below the previous one and select the Office 365 Outlook app, choosing the option "Send an email (V2)".

III Contecnico	Power Automate		Q	Search	
Verify certificates					R Send feedback
			-		
Send an email (V2)	: <		When a new response is submitted		
Parameters Settings Code Vie	w Testing About		0		
To *					
🕮 Email Per M	×		÷		
Subject *			Get response details		
link calendar			0		
Body *					
🖒 🖒 Normal 🗸 Arial 🦴	/15px ∨ B / U A 💁 on 🔿				
English below			Update a row		
Gentile 🗰 Nome × ,			0		
	verso la tua mail personale dove potrai		· · · · · · · · · · · ·		
accedere al calendario teams mi	relativo al robot 💷 Postazio × che andrai				
ad utilizzare.	elativo al robot 🔤 Postazio ~ Crie andrai		et a row		
			0		
			•		
Saluti KA					
KA					
			II Condition		
	······ •		AA Condition		
		True		False A	
Advanced parameters			-    '		
Showing 1 of 7	V Showall Clear all	(†)		÷	
		J		I	
Importance		Add a me	mber to a		
Normal	~ ×	team			
			9		
Connected to khurshid aliev@pol	to.it. Change connection	• • • • • • • • •			
		• • • • • • • • • • • • • • • • • • •			
		. 😆 Send an e	(0.0 line		
			(ve)		
		a service a service servic	90		
		÷			

Fill in all labels as you have done in the previous flow.

Then, under the False condition, add an action by selecting the Office 365 Outlook app, and then choose the option "Send an email (V2)".

::: (2) Politecnico di Torino	Power Automate		,∕P Search			
← Verify certificates					🔗 Send feedback	🍘 Copilot
Send an email (V2) 1	: <		When a new response is submitted			
Parameters Settings Code View	Testing About					
To *	×		Get response details			
Subject * link calendar Body *						
	15px - B I U A A co		Update a row			
problema riguardante la documen	ato aggiunto nei teams poiché vi é stato un tazione inoltratami. per chiedere maggiori informazioni a					
КА			Get a row			
Dear 🖲 Nome × .	•	π.	Condition ^			
Advanced parameters Showing 1 of 7	Show all Clear all		False ^			
Importance Normal	~ × ×	Add a member to a     team	send an email (V2) 1			
⊕ Connected to khurshid aliev@polit	O.It. Change connection					
		Send an email (V2)	©			

Compile the email as the previous flow.

Once you have finished, remember to save the flow and test it.

After this flow, the user is able to come to Mind4Lab and start using the booked robot station.

Now you need to create a new flow that keeps track of the usage of the robot station.

Again, repeat the first passage of the flow, create a new flow and choose the trigger option "When a new response is submitted" from Microsoft Forms.

Politecnico Power Automate		
Start Mobile Robot Arm		
When a new response is submitted	: <	
	· · · · · · · · · · · · · · · · · · ·	
Parameters Settinos Code View About		
arameters settings code view About	🕐 🖓 🖓 When a new	
	response is	
orm Id *	submitted	
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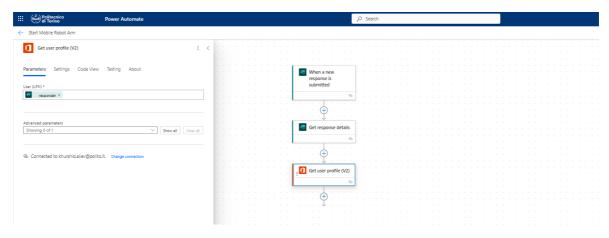
Select the form from which you want to collect data from the drop-down menu, in this case the one related to the start usage of Dual Arm Robot station.

Click the "+" symbol and choose "Add an Action". Click on Microsoft Forms app then "Get response details" button.

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Start Mobile Robot Arm			
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Select the same form from which you want to collect data from the drop-down menu. Click on the field labeled "Response id", and a blue lightning will appear. Click on it to open a drop-down menu and select the option "Response id".

Again, press the "+" symbol to add a new action, select the Office 365 app and choose the option "Get user profile (V2)".



Fill in the label User using the blue lightning icon and selecting responder's email from Microsoft Forms.

Add the next action selecting Excel for Business and choose the option "Add a row into a table".

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Complete the labels as in the previous flow and select the table named "MobileRobotArm" related to the specific robot station.

For the other fields, remember to use the blue lightning icon to facilitate the compilation.

At the end of the flow, save it and run a manual test.

The flow just created saves the user and the starting time, which is equal to the submission time of the module, into the table of the specific robot.

Now, you have to create the flow that keeps track of the end time of the robot usage.

Repeat the first passage of the flow, create a new flow and choose the trigger option "When a new response is submitted" from Microsoft Forms.

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Select the form from which you want to collect data from the drop-down menu, in this case the one related to the start usage of Dual Arm Robot station.

Click the "+" symbol and choose "Add an Action". Click on Microsoft Forms app then "Get response details" button.

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← End use Mobile Robot Arm		
Get response details	I <	
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Finish Mobile Robot Arm	✓	
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Select the same form from which you want to collect data from the drop-down menu. Click on the field labeled "Response id", and a blue lightning will appear. Click on it to open a drop-down menu and select the option "Response id".

Again, press the "+" symbol to add a new action, select the Excel for Business app and choose the option "List rows present in a table".

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Fill the labels and select the table related to the robot station, which is the "MobileRobotArm" table.

Click the "+" symbol and choose "Add an Action". Click on Control app then "Apply to each" button.

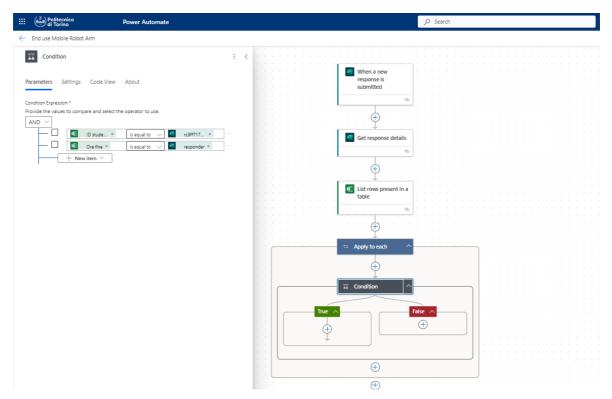
III Politecnico Power Automate	ېکې کې Search
← End use Mobile Robot Arm	
Apply to each	i < · · · · · · · · · · · · · · · · · ·
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Complete the label by selecting the body value using the blue lightening icon.

Again, press the "+" symbol to add a new action, select the Control app and choose the option "Condition".

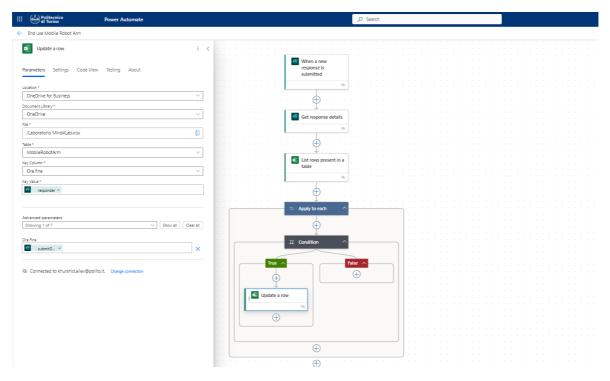
For the condition, select the operator "AND" and in the new item, choose "ID student" using the blue lightning icon. Select "is equal to" and then choose the "ID mind4lab student" option from the Forms responses, see the picture below.

Therefore, create a second item and choose "Ora fine" selecting then is equal to and choose the option "Responder's email". This last option is the one that you have used to fill the Excel file in the previous flow when the user starts using the Robot.



Under the True condition, add an action and choose Excel for Business. Then select the option "Update a row". Fill in the labels as shown in the following picture: type "Ora fine" for Key Column and choose "Responder's email" for Key value.

In the advance parameters select Ora fine and choose "Submission time" using the blue lightning icon.



Remember to save and run a manual test.

The flow related to Mind4Lab has finished successfully.

Now, let's look at the management system used for the general entrance to Digep Labs.

For the new system flow, the computer of the responsible person for the general entrance of the DIGEP lab was used.

First of all, the responsible manager has to create an Excel file on OneDrive as the one illustrated below.

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2	17	5/2/24 16:37:24										Tesista	DIGEP	Officina Meccanica;
3	18	5/2/24 16:40:0	2									Tesista	DIGEP	Officina Meccanica;
4	19	5/2/24 16:41:5	2							0.0		Tesista	DIGEP	Officina Meccanica;
5	20	5/2/24 16:46:3	8					0		0.0		Tesista	DIGEP	Officina Meccanica;
6	21	5/2/24 16:48:1	)	_				0				Tesista	DIGEP	Officina Meccanica;
7	22	5/2/24 17:07:1	9		-					••		Tesista	DIGEP	Officina Meccanica;
8	23	5/2/24 17:10:2	5									Tesista	DIGEP	Officina Meccanica;
9	24	5/2/24 17:12:5	8		a							Tesista	DIGEP	Officina Meccanica;
10	25	5/2/24 17:26:5										Tesista	DIGEP	Officina Meccanica;
11	26	5/2/24 17:35:5										Tesista	DIGEP	Officina Meccanica;
12	27	5/3/24 9:17:23	2		- 10001110						YES	Tesista	DET	Mind4Lab;
13	28	5/7/24 12:25:4									YES	Tesista	DIMEAS	Centro IAM;
14	29	5/15/24 16:50:5									YES	Tesista	DIGEP	Mind4Lab;
15	30	5/16/24 11:33:23	2								YES	Borsista/collaboratore	DIGEP	Mind4Lab;
16	31	5/21/24 14:15:2		_							YES	Tesista   Tesist	DIGEP	Mind4Lab;
17	32	5/23/24 12:32:04							and a second	0	YES	Tesista   Tesist	DIGEP	Mind4Lab;
18	33	5/30/24 12:28:0	Autora	oma	Diriateo	3002020		3002020@3000cmap	onton	norenzosianecocisine positori	YES	Borsista/collaboratore   collaborator	DIGEP	Mind4Lab;
19	34	6/3/24 15:49:2	6		-						YES	Dottorando   PhD student	DIGEP	Mind4Lab
20	35	6/3/24 15:51:3	8	_			_				YES	Assegnista   grant holder	DIGEP	Mind4Lab
21	36	6/3/24 15:59:3								0	YES	Tesista   Thesist	DIGEP	Mind4Lab
22	38	6/19/24 9:48:4	6	_	f		_			0,	YES	Tesista   Thesist	DIGEP	["Mind4Lab"]
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24	40	6/21/24 7:27:20	0000		regarren				outom	Burners and Chestern	YES	Tesista   Thesist	DIGEP	["Mind4Lab"]

You need to name all columns to properly save the data you want to track during the flow.

After that, the manager has to create a Microsoft Forms module which will be used to collect data. The one used for this system is illustrated below.

Ingresso Laboratori Digep	
A fine modulo verranno inviati i documenti e informazioni per poter accedere presso i laboratori. Devi compilare prima di entrare nuovamente in Lab.	
Once you submit the form, you will receive all documents and information in order to be able to access to laboratories. You have to compile them before entering again the Lab.	
1. Email del referente/docente strutturato in dipartimento   Email of your professor of	
department *	
Inserisci la risposta	
2. In qualità di   Acting as *	
Personale dipendente   Polito Staff	
Dottorando   PhD student	
C Tesista   Thesist	
Assegnista   grant holder	
Borsista/collaboratore   collaborator	
Personale esterno   External	
Visiting	
3. Dipartimento di appartenenza   Department to which you belong *	
O DAD	
DIMEAS	
DISNA DENERG	
Altro	
4. A Quale/i Laboratorio/i devi accedere?   Which laboratory do you need to access? *	
Centro IAM	
Laboratorio Tomografi	
Officina Meccanica	
Centro J-Tech	
Mind4Lab	
RMLAB	
Reverse Engineering	
Laboratorio di Qualità e Metrologia	
Laboratorio di Economia e Produzione (LEP)	
+ Aggiungi nuovo	

This Forms is used by the users who will come to one of the proposed laboratories.

The following module is used by the manager to confirm the documents received.

Verifica moduli sicurezza	
1. ID student lingresso Lab (prima colonna file excel "Ingresso Lab Generico" * i valore dore essere un numero	
2. Confermo moduli * YES NO	
+ Agglungi nuovo	

As with the form created for Mind4Lab, remember to limit access to Politecnico users only.

Now the manager is ready to start creating the flow using Power Automate. Follow the steps from the previous flow.

Again, start by creating a new flow and choose the trigger option "When a new response is submitted" from Microsoft Forms.

III 💭 Politecnico Power Automate							۶	Ce	rca							
<ul> <li>Quando viene inviata una nuova risposta -&gt; Aggiungi una riga in una</li> </ul>																
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Ingresso Laboratori Digep	~								Ų.							
Connesso a giovanni.marchiandi@polito.it. Modifica connessione																

Select the form from which you want to collect data from the drop-down menu, in this case it is called "Ingresso Laboratori Digep".

Click the "+" symbol and choose "Add an Action". Click on Microsoft Forms app then "Get response details" button.

III 🕹 Politecnico Power Automate									Q	Cer	rca										
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Recupera dettagli della risposta	:	<																			
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Select the same form from which you want to collect data from the drop-down menu. Click on the field labeled "Response id", and a blue lightning will appear. Click on it to open a drop-down menu and select the option "Response id".

Again, press the "+" symbol to add a new action, select the Office 365 app and choose the option "Recupera profile utente (V2)".

	Politecnico Power Automate	3						
←	Quando viene inviata una nuova risposta -> Aggiungi una	riga in una						
	Recupera profilo utente (V2)	:	<					
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	Visualizzazione di 0 di 1	Mostra tutto Cancella tutto		Dipartimento di appartenenza   Depa Answer to the question above Email del referente/docente struttura				
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				A Quale/i Laboratorio/i devi acceder Answer to the question above	e?   Which laboratory do you n			
				Responders' Email Email address of responder who subm	nitted the form.			
				Submission time Timestamp when a new response is su	ubmitted			
				🖉 Quando viene inviata una n	nuova risposta			
				ID risposta Identificatore univoco della risposta. L				

Select "Responder's email" for Utente (UPN).

Click the "+" symbol and choose "Add an Action". Click on Excel for Business app then "Aggiungi una riga in una tabella" button.

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←	Quando viene inviata una nuo	va risposta -> Aggiungi una riga in una										🖗 Invia	commenti	🕢 Copi	lot 🔚 Salva	🎖 Verifici
L	Aggiungi una riga in una	tabella		: <												
P	Parametri Impostazioni Vi:	isualizzazione Codice Test Informa	zioni su	*				viene inviata va risposta								
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4	A Quale Laboratorio Devi Accedere?   \	Which Laboratory Do You Need To Access?		Rec.	upera dettagli	li della risposta										
	asb5a8 ×		× ı	Dipartimer. Answer to t	nto di apparten the question ab	ienza   Departmer. ove	nt to which you belong									
9	Connesso a giovanni.marchia	andi@polito.it. Modifica connessione			referente/docen the question ab		dipartimento   Email o.	- 11								
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Fill all the labels as shown in the picture above. Remember to use the blue lightning icon, which facilitates completion of each field.

Select the Excel file created earlier and the correct table; in this example, they are the "Ingresso Generale Laboratori Digep" file and the "Ingressogen" table.

Again, press the "+" symbol to add a new action, select the Outlook email app and choose the option "Invia un messaggio di posta elettronica (V2)".

III 🔮 Politecnico Power Automate		
<ul> <li>Quando viene inviata una nuova risposta -&gt; Aggiungi una riga in una</li> </ul>		🔗 Invia commenti 🛛 🖗 Copilot  📾
Invia un messaggio di posta elettronica (v2)		
Parametri Impostazioni Visualizzazione Codice Test Informazioni su	Quando viene inviata una nuova risposta	
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responder × X		
Oggetto * Documentazione per laboratori	Recupera dettagli	
Corpo *	della risposta	
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English below		
Buongiorno 📴 Nome   × ,		
Come comunicato dai referenti di laboratorio, di seguito trova i link e documenti da compilare prima del prossimo incontro presso il lab. Seguire il	Recupera profilo utente (V2)	
"Corso di Formazione Generale dei Lavoratori su Salute e Sicurezza", 4 ore online al seguente link:		
https://www.sls.polito.it/formazione/formazione_dei_lavoratori		
Compilato la Scheda SIR (Scheda Individuale di Ricognizione dei pericoli lavorativi) scaricabile nel seguente link (tranne per i tesisti, questi ultimi sono esenti dalla SIR):	Aggiungi una riga in una tabella	
https://www.sls.polito.it/lavoratori/documentazione_dei_lavoratori		
Parametri avanzati	· · · · · · · · · · · · · · · · · · ·	
Visualizzazione di 2 di 7 Visualizzazione di	Invia un messaggio di posta elettronica (v2)	
	• • • • • • • • • • • • • • • • • • •	
Allegati		

Fill all fields as in the previous flow and customize the email body as desired.

Once you have finished setting up the flow, save it and perform a manual test.

Now, the final flow remains related to the manager confirming receipt of the documents.

Again, start by creating a new flow and choose the trigger option "When a new response is submitted" from Microsoft Forms.

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verifica moduli																					
Quando viene inviata	una nuova risposta	:	<										-			-					
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Verifica moduli sicurezza		~												. ]	; .						
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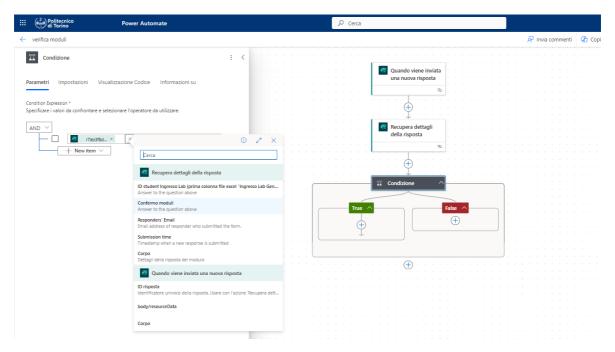
Select the form from which you want to collect data from the drop-down menu, in this case it is called "Verifica moduli sicurezza".

Click the "+" symbol and choose "Add an Action". Click on Microsoft Forms app then "Get response details" button.

::: 🗳 Politecnico di Torino	Power Automate							Q	Cerc	а		
← verifica moduli												
Recupera dettagli della	a risposta	:	< :								· · · · · · · · · · · · · · · · · · ·	
											🚇 Quando viene inviata	
Parametri Impostazioni	Visualizzazione Codice Test Informazioni su	I										
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Verifica moduli sicurezza		$\sim$										
ID Risposta *			1								Recupera dettagli	
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Select the same form from which you want to collect data from the drop-down menu. Click on the field labeled "Response id", and a blue lightning will appear. Click on it to open a drop-down menu and select the option "Response id".

Again, press the "+" symbol to add a new action, select the Control app and choose the option "Condition".



For the condition, select the operator "AND" and in the new item, choose "Confermo moduli" using the blue lightning icon. Then, select "is equal to" and type "YES" in the last label, as shown in the picture.

Under the True condition, add an action and choose Excel for Business. Then select the option "Aggiungi una riga". Fill in the labels as shown in the following picture: type "Id" for Key Column and choose "Id student entrance" for Key value.

In the advance parameters select Confermo/Confirm and choose "Confermo" by Microsoft Forms using the blue lightning icon, as show in the picture below.

III 🗳 Politecnico Power Automate	,∕⊃ Cerca		
← verifica moduli		🔗 Invia commenti	🕼 Copilot  🗟
Aggiorna una riga	I <		
Parametri Impostazioni Visualizzazione Codice Test Informazioni su	Quando viene invista una nuova risposta		
Percorso * OneDrive for Business			
Raccolta Documenti *	Recupera dettagli		
OneDrive File *	della risposta		
/ingresso Generale Laboratori Digep.xlsx Tabella *	•		
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Colonna Chlave * Id			
Valore Chiave * 🚾 rb2a527 ×			
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Conferma   Confirm			
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Click the "+" symbol and choose "Add an Action". Click on Excel for Business app then "Recupera una riga" button.

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Visualizzazione di 0 di 1 Visualizzazione di 0 di 1 Utto			
Connesso a giovanni.marchiandi@polito.it. Modifica connessione	Recupera una riga		
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Fill all labels as you in the picture.

Choose "Id" for Key columns and "Id student entrance" for key value.

Click again the "+" symbol and choose "Add an Action". Click on Outlook e-mail app then "Invia un messaggio di posta elettronica (V2)" button.

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Fill all fields as in the previous flow and customize the email body as desired.

Once you have finished setting up the flow, save it and perform a manual test.

The management system used for this thesis has been successfully completed.

## **Bibliography and Website**

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