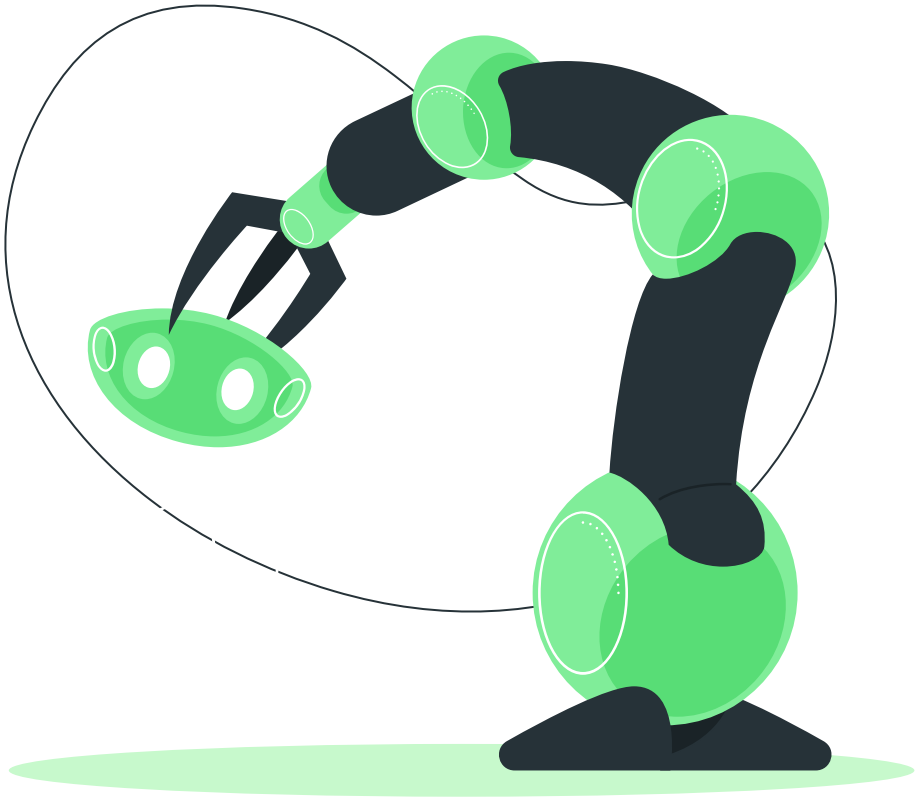
Quality Inspection Cell: Burrs detection



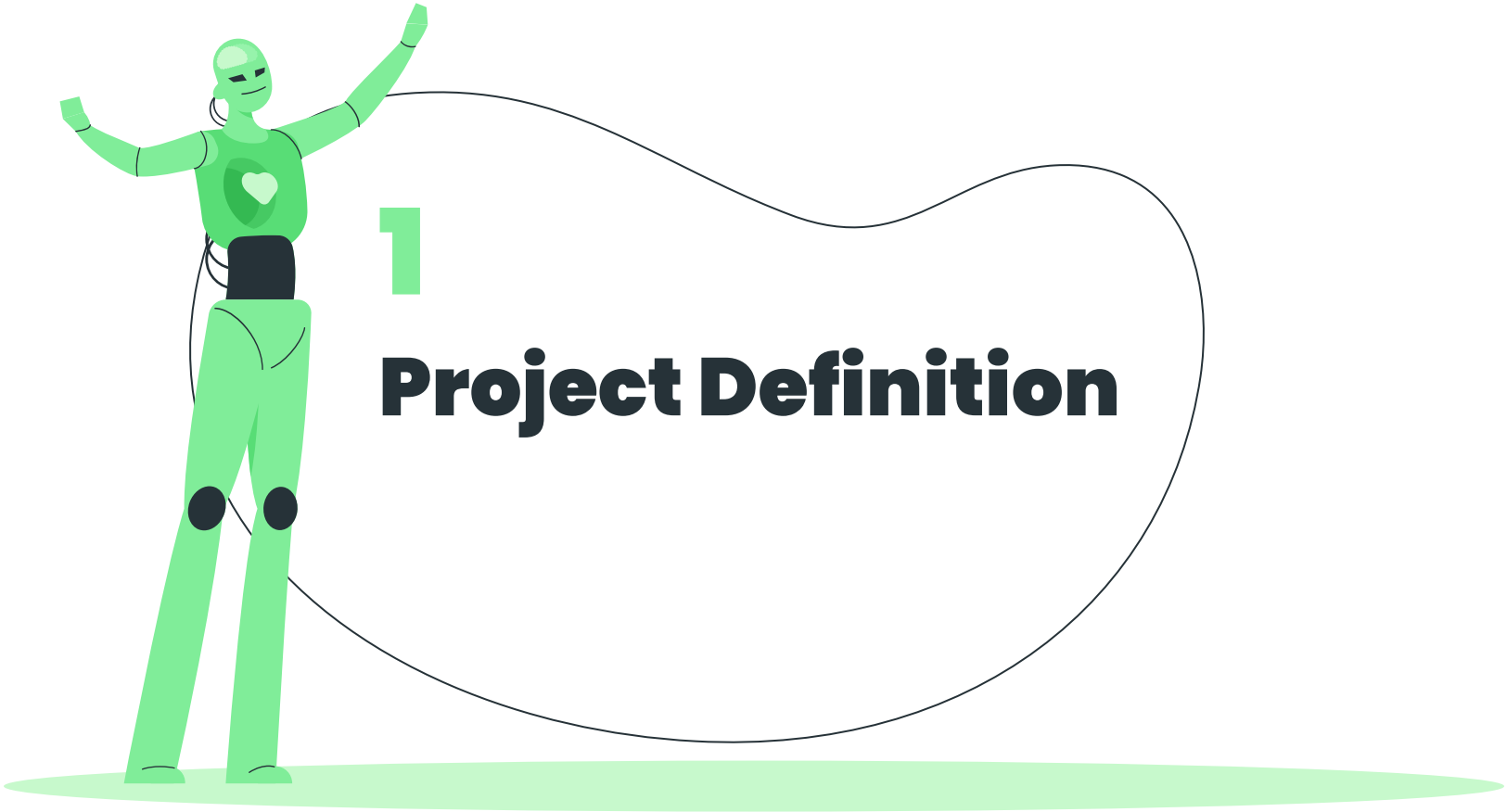
Mechatronic Design MR3009
Sergio Uribe

P4.

José Angel Soto Hernández	A01039978
Nathalie Vilchis Lagunes	A01364838
Hector Everardo Martínez Cisneros	A01282300
Teclo Moreno Rodriguez	A01252067
Estefany Morales Valdes	A01281880
Diego A. Santisteban Pozas	A01154423
Jose Antonio Arrambide Garza	A00817790

01/09/2021

Table of Contents

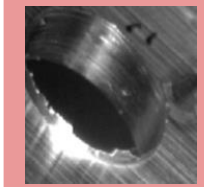


1 Project Definition

Project Definition

- Automate the inspection of drilled aluminium profiles.
- Discriminate Clean parts from Rejected parts
- Fuse computer vision and cobot integration.
- Machine Learning

Problem/Opportunity



- Aluminium drilling implies material removal.
- Metal burrs may appear due to many factors.
- Tool velocity, precision, quality
- Potential risk for subsequent processes.
- Performance Failure

Suggested Solutions

Major Risks

Technology Risks

- Lack of useful training data
- Inaccurate burrs detection

Business Risks

- Cost effectivity
- Competition

Main Beneficiaries

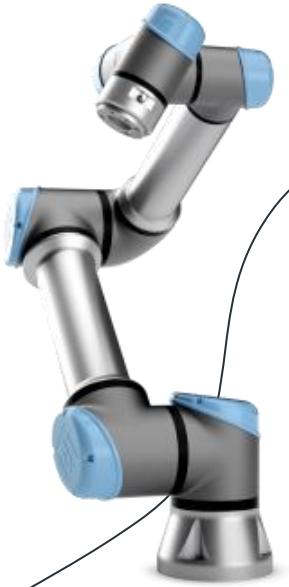
CID y T-Tec:

- QA Department
- Operator/quality Inspector

Other Customers

Project target

1. Automatic process of burrs detection with computer vision
2. Increase process efficiency
3. Less expensive by eliminating the human factor

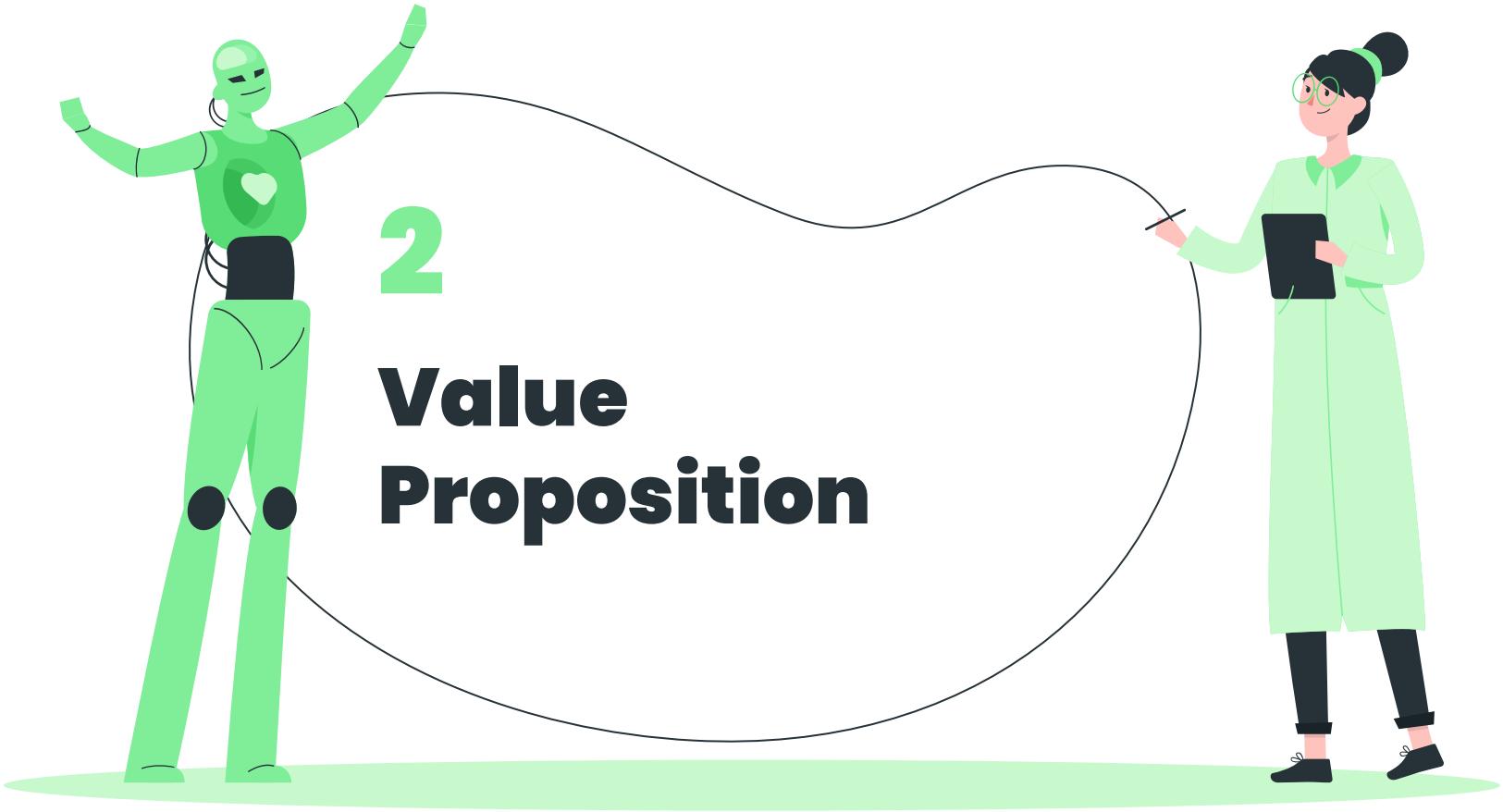


Project Scope

- ➔ Research
- ➔ Quality control
- ➔ Automation & manufacturing

Project Deliverables

- **Design of the full inspection cell**
- **Training and verification of the system**
- **Machine Learning classifier**
- **Program the cobot integrating the full function**



2

Value Proposition

Value Proposition

Increase

- Adaptability
- Detection speed
- Accuracy
- Higher quality

Create

- User-friendly interface
- Database
- Alarms
- Machine learning

Quality Inspection Cell: Burrs detection

Reduce

- Price
- Workspace
- Hardware/Software requirements

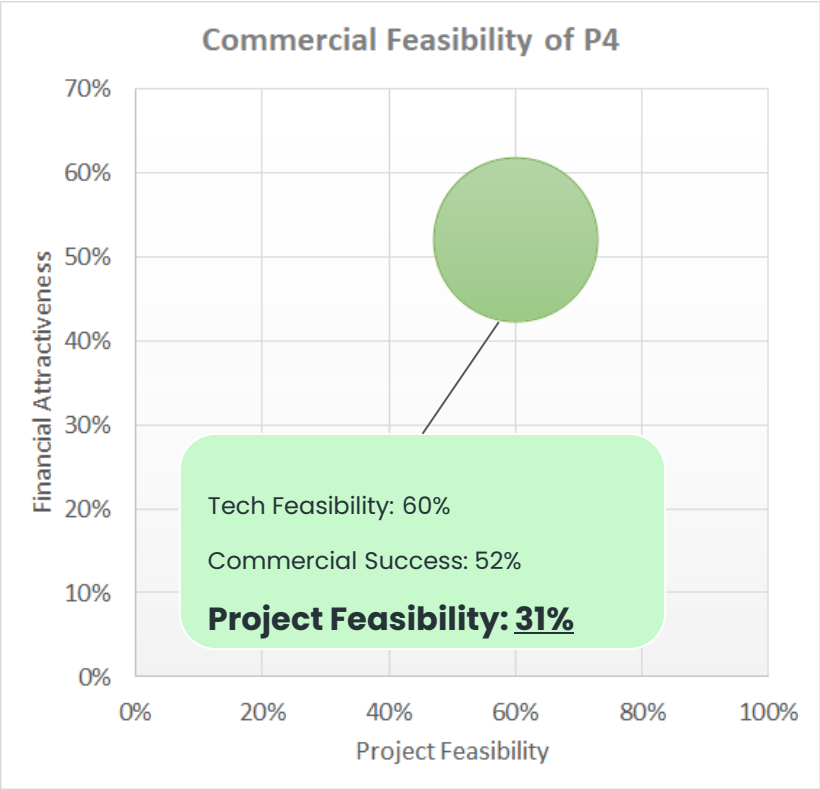
Eliminate

- Overhead
- Human error

3

Business Case

Commercial Feasibility



The project is technologically challenging, but based on a **proven concept.**

A niche market is targeted, but the **growth is expected to be moderate** (<15%).

The delivered benefit rests on the **radical improvement in performance, cost, and quality.**

Added value and customer need should be highlighted and constantly improved upon to keep the strong competitors at bay.

Project Financials

Project development time:

18 weeks (4.5 months)

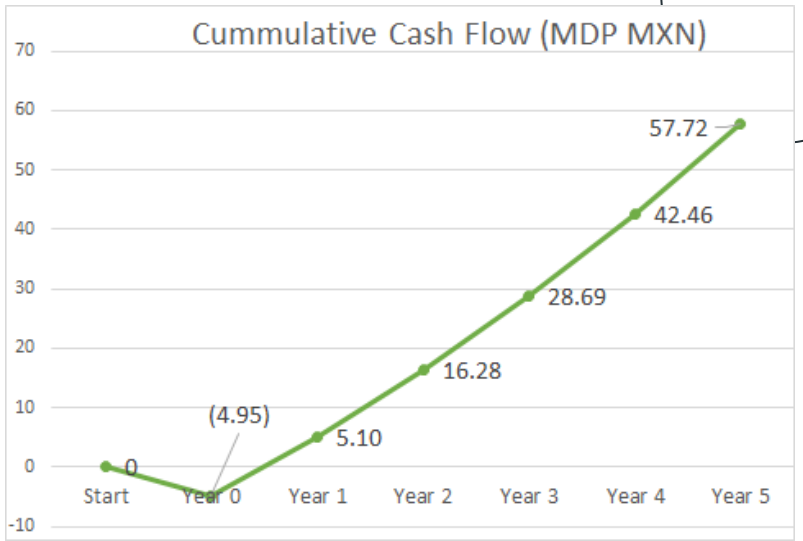
Assuming:

- **6 monthly sales**
- **30% mark-up**
- **10% market growth**

IRR: **213%**

ROI: **635%**

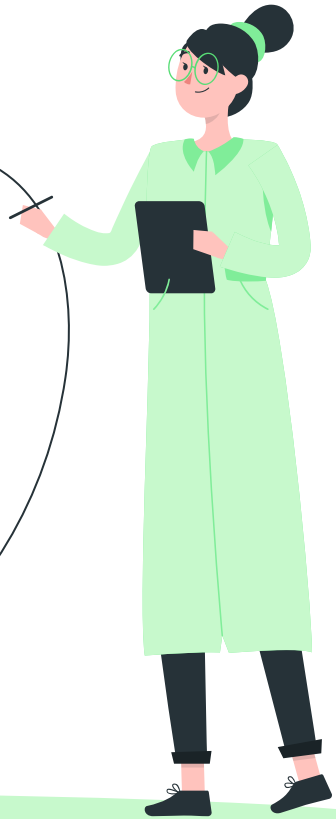
6 month payback period



Initial investment: ~~4,950,750 MXN~~

Note: projection up to year 5

4
Product Requirements Solutions



Qualifiers

Optimized layout for lean operation

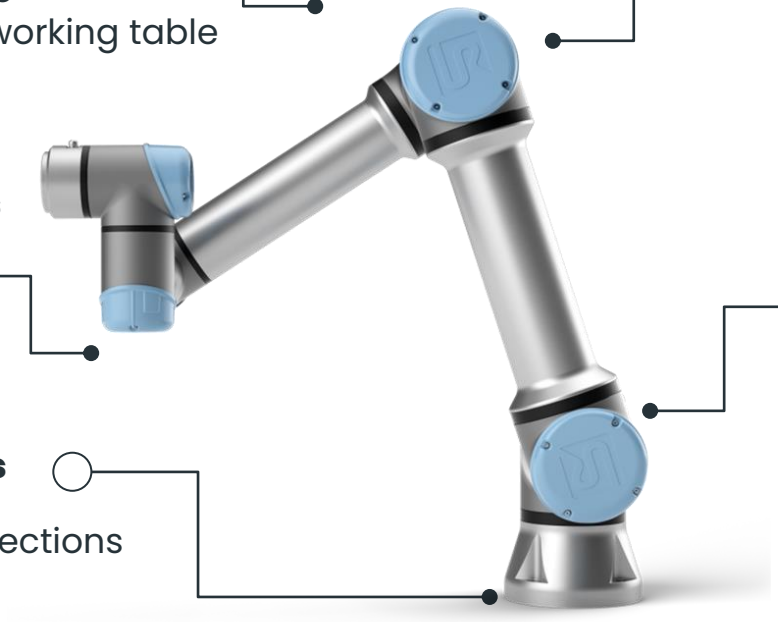
- ➔ Minimize the cycle time
- ➔ Integrated in a single working table

Automatic detection of metal burrs

- ➔ High precision
- ➔ Fast response time
- ➔ Reduce human error

Reduce cost of the process

- ➔ Reduce workforce



Safety Operation

- ➔ Reduce accidents
- ➔ Avoid product damages
- ➔ Avoid infrastructure to be damaged

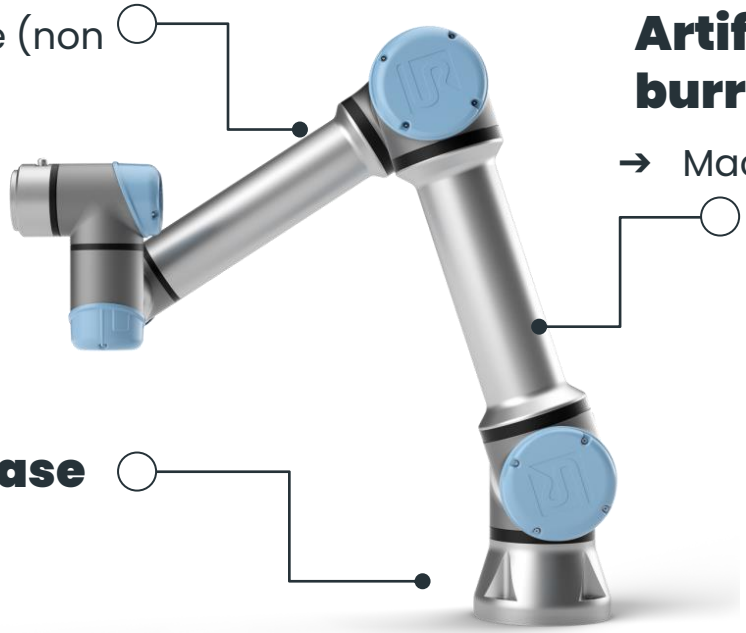
Guarantee quality products

- ➔ Reduce mismatch inspections
- ➔ Reduce false negatives

DIFFERENTIATORS

User Friendly Workspace

➔ Interaction user-machine (non invasive interaction)



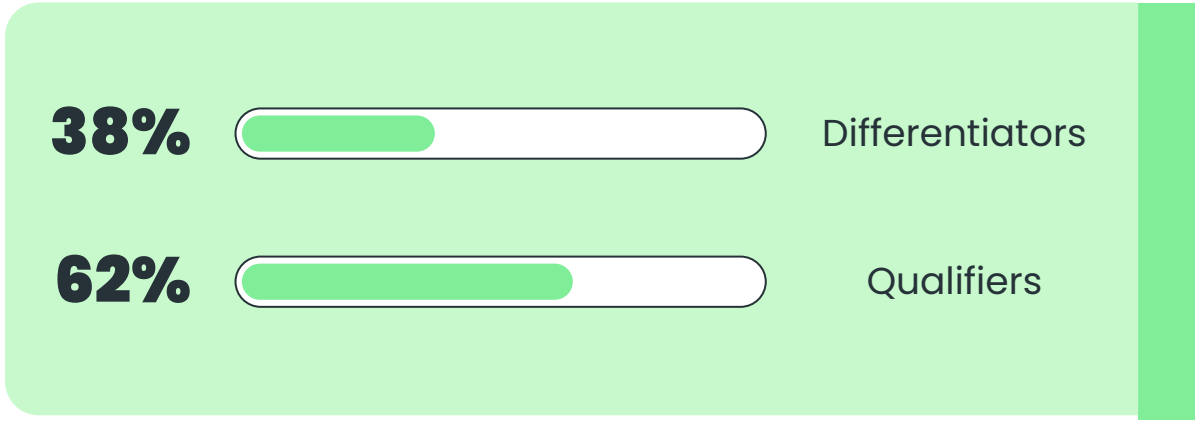
Artificial intelligence for burrs detection

➔ Machine learning

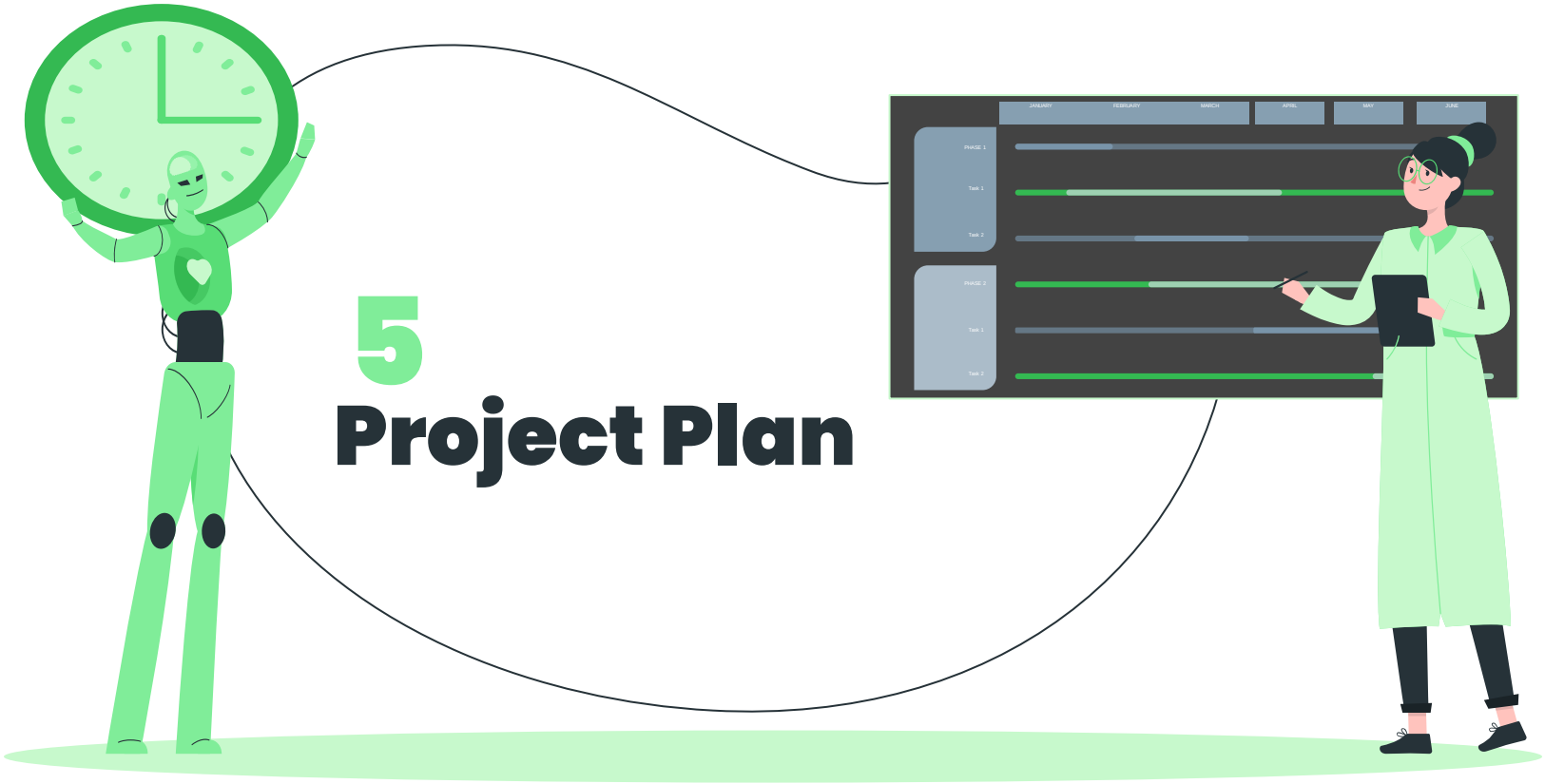
Exportation of database

➔ Creating Knowledge

Product Requirements Solutions (PRS)



The solution needs more **added value** in order to get **more money** back → More Differentiators to distinguish the product

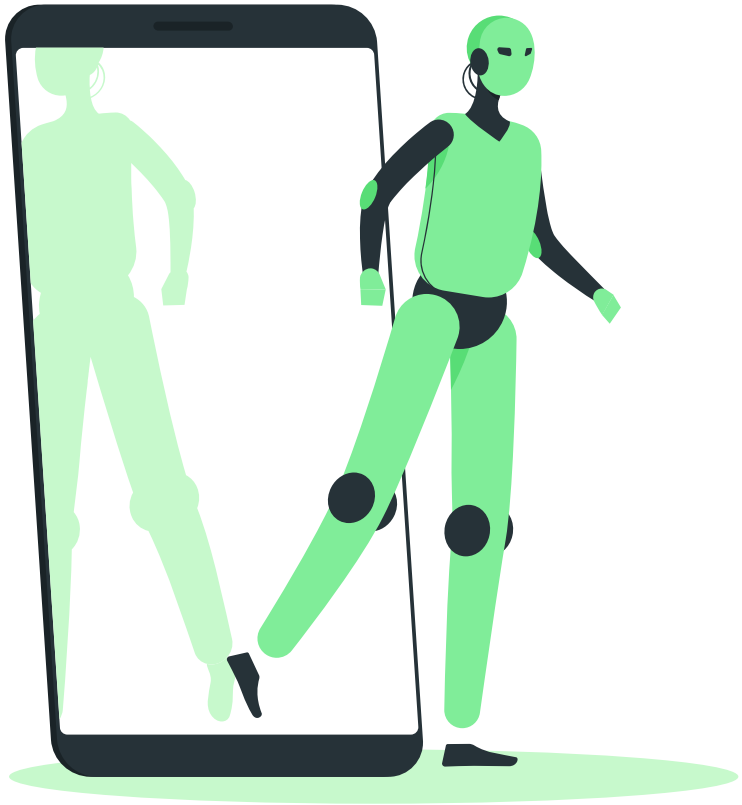


5
Project Plan

Project Plan (18 weeks)

Activities/Task	Responsible	Support by	Week number																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TRL1: Project Definition	Ev.	Ev.	P	P	P	P																
Customer visit	Ev.	Ev.			A																	
Project Definition (Target, Scope, Deliverables)	Ev.	Ev.		A																		
Value Proposition definition	T & J	Ev.		A																		
Product Requirements Specification definition	H & N	Ev.			A																	
Business Case Analysis	E & D	Ev.				A																
Project Team definition and engagement	A & T	Ev.			A																	
Consolidate Master Plan for execution	A & T	Ev.				A																
Consolidate TRL1 presentation	Ev.	Ev.				MR																
Presentation TRL1	Ev.	Ev.				MR																
TRL2: Concept Definition						P	P	P	P	P	MR											
TRL3: Design											P	P	P	P	MR							
TRL4: Proof of Concept /Conclusions															P	P	P	P	P	MR		


Q & A



Thank you!