Pflichenheft

Learning model on e-mobility

by Mauro Maragon e Alessandro Scaldaferro

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PIA SOCIETÀ SAN GAETANO

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Learning e-Mobility Plus

Confartigianato

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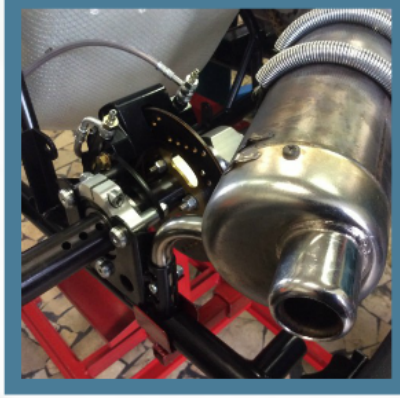
LEARNING MODEL ON E-MOBILITY

Learning e-Mobility Plus

INDEX



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SUMMARY OF MAIN CHARACHTERISTICS

0.3 AIM AND APPLICATIONS

This handbook completes the Lastenheft in the same lesson plan and it absorbs the subjects. It highlights the real possibility of fulfillment and the order of priorities. For each specifications the reasons why they are included and how they are intended to realize in the final plan are analyzed in details.

The book is not a handbook for the fulfillment of the teaching act in a technical environment in the vocational education on the topic of the electrical mobility.

The book is a set of guidelines to create the best scenery in a learning environment. It's useful to the development of the subjects. For this reason this handbook is flexible to be used in various situations in the vocational education in accordance with the defined requisites.

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0.5 THE CONTENTS OF THE DOCUMENT

The document is divided into different sections in order to be easily used.
Section1 (Chapter from1):it has got the instructions for the achievements of different output. The main phases are indicated to be followed but they are flexible to meet specific demands of the didactic work.
This section is built up with easy tables for consultation. The times are indicated but they are useful to skip a waste of resource.

Section 2 (from chapter 2 to 5):in this section there is the analysis of the instructions which were indicated on the Lastenheft. The same plan is kept so the two sections can be compared.
The analysis of each requisite can accept many requests and give details of the method for the translation of a requisite.

For each activity specified on the following handbook, a master is built up in a table:
1.Competence
2.final manager
3.achievment managers
4.expected times
5.additional figures
6.final outcome

1.Knowledges to impart during the activity: each output is important to learn knowledge connected with electrical mobility. Cross or basic knowledge are not indicated on the table. Since they are essential they are also in the first section of the handbook where it's possible to find the instructions for each output.
2.Final Activities Manager: for each aspect a manager must be indicated. He should check the activities out.
3.Activities Manager: he should be clearly indicated and mentioned for the real achievement of the activities.
4.Expected times for the activities: they must be mentioned because the master is the output of many actions and their synchronization is necessary to be repeated in future. These times can vary in order to meet different demands, face possible problems, give any clarification the users can consider important to be cleared.
5.Possible additional figures: on this section possible consultants must be indicated because they are important for the achievement of the activities.
6.Final output: it indicates how the final output of the activities is presented.
On the document people and outputs are generically indicated but the person who is going to do some activities must explain people and times involved (the beginning and the end).

SECTION ONE

Technical instructions for the outputs realization

1.1 HYBRID KART WITH SERIES CONNECTIONS AND HYBRID KARTS WITH PARALLEL CONNECTIONS

1.2 EDUCATIONAL MATERIAL ABOUT SAFETY

1.3 EDUCATIONAL MATERIAL ABOUT ELECTRIC TECHNOLOGY

1.4 TESTING REPORT AND PERFORMANCE EVALUATION

1.5 ACTIVITY FLOW CHART

1.1 INSTRUCTIONS FOR KARTS REALIZATION

Skills to reach and develop:

- Basic welding skills on hybrid systems (series and parallel) acquired through the comprehension of technical keywords
- Participate the planning phases of the project and all the successive stages from a planned description of activities
- Set up instruments and tools needed in every stage of activity according to quality standard and expected results
- Check the efficiency of instruments, tools and machines, performing common maintenance activities
- Set up and manage working spaces according to quality and safety standard
- Work according to quality standard defined by the management
- Semi-finished activities for evidences/user needs
- Fit together all the parts of a kart (body) and technical elements and specific instructions
- Conduct the testing activities, check the functionality of the components
- Read drills in defining metal parts and possible damaged the vehicle
- Foam working tools
- Problem solving skills

Realization steps
(estimated timetable)

Example 1

1.1 HYBRID KART WITH SERIES CONNECTIONS AND HYBRID KARTS WITH PARALLEL CONNECTIONS

1.2 EDUCATIONAL MATERIAL ABOUT SAFETY

1.3 EDUCATIONAL MATERIAL ABOUT ELECTRIC TECHNOLOGY

1.4 TESTING REPORT AND PERFORMANCE EVALUATION

1.5 ACTIVITY FLOW CHART

1.1 INSTRUCTIONS FOR KARTS REALIZATION

Skills to reach and develop:

- Basic working skills on hybrid systems (series and parallel) acquired through the comprehension of technical features.
- Translate the planning phases of the project and all the operative stages from a general description of activities.
- Set up instruments and tools needed in every stage of activity according to quality standard and expected results.
- Check functionality of instruments, tools and machines, performing common maintenance activities.
- Set up and managing working spaces according to quality and safety standard
- Work according to quality standard defined by the management
- Turn into real activities the customer/user needs
- Fit together all the parts of a kart reading and technical documents and specific instructions.
- Conduct the testing activities, check the functionality of the components.
- Basic skill on defining weak points and possible damage of the vehicle
- Team working skills
- Problem solving skills

Realization steps (estimated timetable)

		TIMES
1	Work Planning Instruments and tools setup Definition of check points	2 hours
2	Workspaces arrangement	
3	Making of the support for the kart	1 hour
4	Positioning of the karts following concepts of stability, moving and working easiness	1 hour
5	Remove the engine from the kart	3 hours
6	Remove all the unnecessary parts	3 hours
7	Installation of the thermic engine and components adaptation	3 hours
8	Installation of the electric engine and components adaptation	4 hours
9	Installation of battery pack	2 hours
10	Mechanical functioning test	2 hours
11	Electrical functioning test	2 hours
12	Required adjustments	1 hour
13	Testing	1 hour
14	Failure scouting	2 hours
15	Failure repair	2 hours
16	Substitution of defective components	1 hour
		30

Example 1

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SECTION TWO

Requirements analysis and realization

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Example 2

2

2. ANALYSIS OF REQUIREMENTS: TECHNICAL AND FUNCTIONAL
2.1 SYSTEM SET REQUIREMENTS
2.2 SECONDARY REQUIREMENTS
2.3 FUNCTIONAL REQUIREMENTS

3

3. REQUIREMENTS ANALYSIS: PERFORMANCE REQUIREMENTS

4

4. REQUIREMENTS ANALYSIS: QUALITY REQUIREMENTS

5

5. REQUIREMENTS ANALYSIS: OTHER REQUIREMENTS

6

6. FUTURE DEVELOPMENTS
- The realization of the learning model should be a starting point for the introduction of e-mobility in curricular activities.
- This section introduces a series of improvements that could be realized by the vocational training school to develop this learning area.
- For example:
  - a) Do this action again on different car models. This handbook could be used as a starting point for the activity.
  - b) Buy an hybrid car to study its technology and simulate failures.
  - c) Buy an electric car (this should be the final point).
- Other improvement could be defined later

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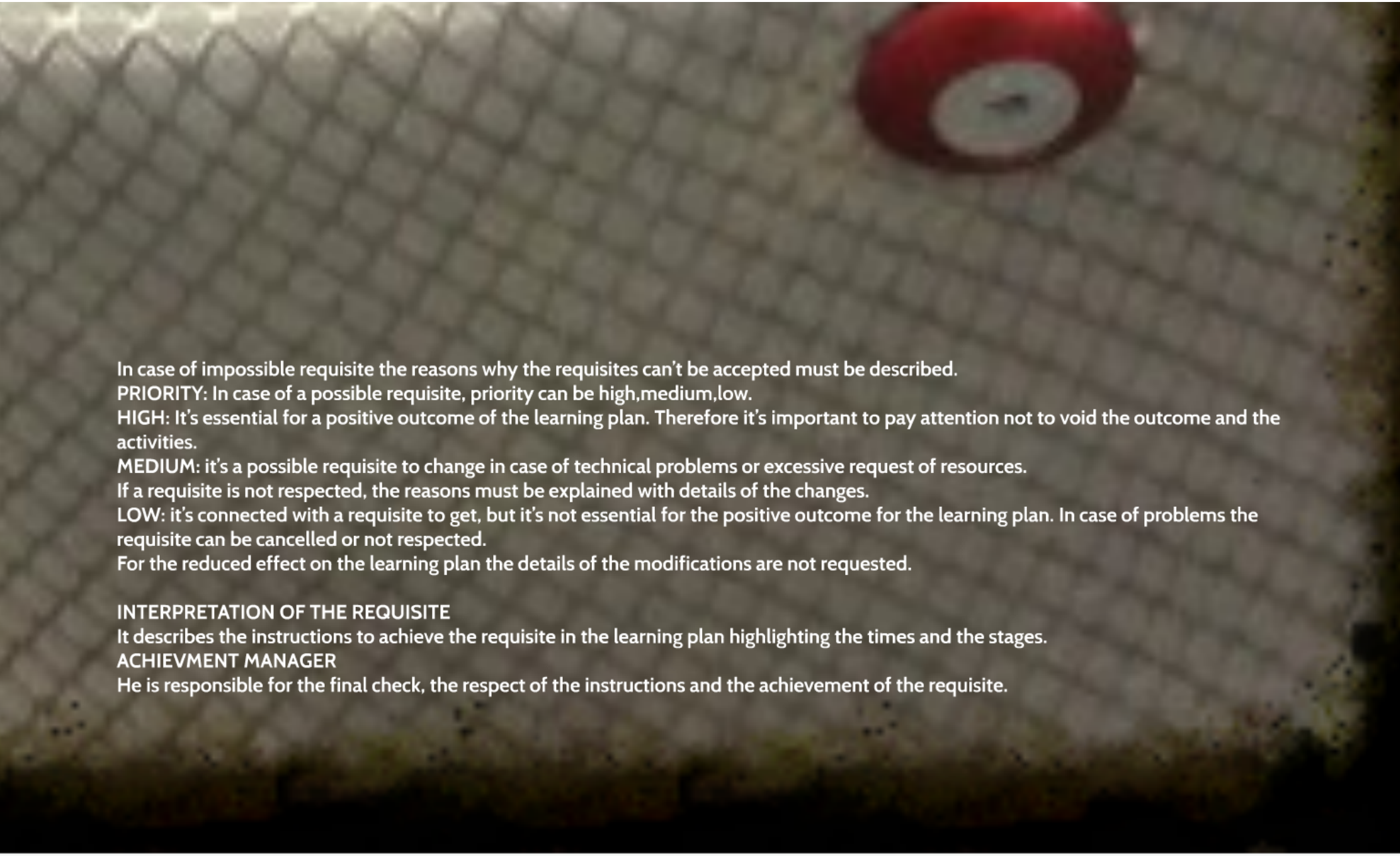
7. CONCLUSIONS
- The document ends with a check list that should be used by the vocational training school to summarize the quality of the activities, comparing the expectations and the outputs.
- The control is about:
  - Has more technical requirements been found
  - Has some construction activities between different organizations been here realized also any work in area
  - The main problems found during each process
- The results should improve the model, before or later.

For the analysis of the single requisite the previous document (Lastenheft) is to be followed adding some columns to see how each requisite has been analyzed.
REQUISITE CODE/ STARTING REQUISITE/JUDGEMENT REQUISITE/PRIORITY/ANALYSIS OF THE REQUISITE
AND ITS DEVELOPMENT/ MANAGER REQUISITE

JUDGEMENT REQUISITE: the requisite can be meant POSSIBLE or IMPOSSIBLE.
The most important elements to analyze the real achievement of the requisite come from:
- Final addressees of the lesson plan and general targets
- Economic resources and equipment
- Human resources and real knowledge

He is responsible for the final check, the respect of the instructions and the achievement of the requisite.



In case of impossible requisite the reasons why the requisites can't be accepted must be described.
PRIORITY: In case of a possible requisite, priority can be high,medium,low.
HIGH: It's essential for a positive outcome of the learning plan. Therefore it's important to pay attention not to void the outcome and the activities.
MEDIUM: it's a possible requisite to change in case of technical problems or excessive request of resources.
If a requisite is not respected, the reasons must be explained with details of the changes.
LOW: it's connected with a requisite to get, but it's not essential for the positive outcome for the learning plan. In case of problems the requisite can be cancelled or not respected.
For the reduced effect on the learning plan the details of the modifications are not requested.

INTERPRETATION OF THE REQUISITE
It describes the instructions to achieve the requisite in the learning plan highlighting the times and the stages.
ACHIEVMENT MANAGER
He is responsible for the final check, the respect of the instructions and the achievement of the requisite.

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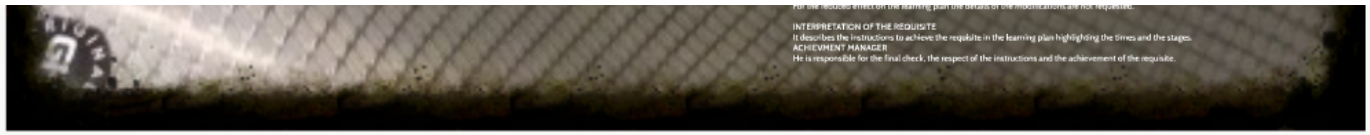
Example 2



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2. ANALYSIS OF REQUIREMENTS: TECHNICAL AND FUNCTIONAL

2.1 NECESSARY REQUIREMENTS

Example 3

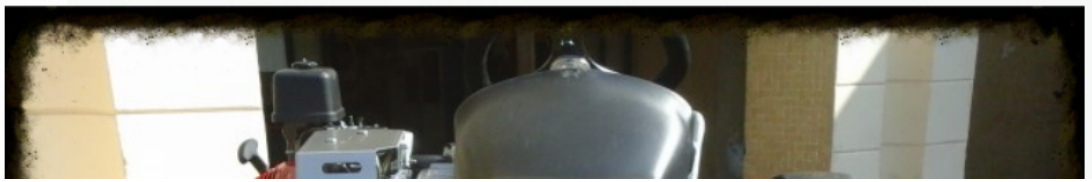
2.2 SECONDARY REQUIREMENTS

2.3 FUNCTIONAL REQUIREMENTS

3. REQUIREMENTS ANALYSIS: PERFORMANCE REQUIREMENTS

4. REQUIREMENTS ANALYSIS: QUALITY REQUIREMENTS

5. REQUIREMENTS ANALYSIS: OTHER REQUIREMENTS



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6. FUTURE DEVELOPMENTS

- *The realization of the learning model should be a starting point for the introduction of e-mobility in curricular activities.*
- *This section introduces a series of improvements that could be realized by the vocational training school to develop this learning area.*
- *For example:*
  - *1) Do this action again on different car models. This handbook could be used as a starting point for the activity*
  - *2) Buy an hybrid car to study its technology and simulate failures.*
  - *3) Buy an electric car (this should be the final point).*
- *Other improvement could be defined later*

7

7. CHECK INSTRUMENTS

- The document ends with a check list that should be used by the vocational training school to summarize the quality of the activities, comparing the expectations and the outputs.
- The control is about:
  - * How many expected requirements have been found
  - * How many cooperation activities between different organizations have been realized during each process
  - * The main problems faced during each process Example 4
- The results should improve the model, before or later.


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