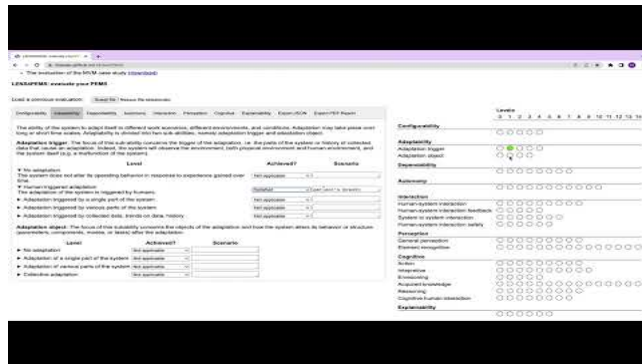# LENS4PEMS: Usefulness in making an assessment and identifying possible improvements for PEMS

- LENS (evaLuation framEwork for autoNomous Systems) is an evaluation framework and it can be used for (i) making an assessment of a system under the lens of abilities related to adaptation and smartness, (ii) identifying the possible directions of improvement, and (iii) making a re-assessment when the improvement has been performed.
- We propose the use of LENS for the class of Programmable Electronic Medical Systems (PEMS), which is a specific class of medical devices exhibiting a DOA (degree of autonomy), without manipulation and motion abilities. Examples of PEMS are mechanical ventilators, x-ray machines, pill-boxes, pacemakers, etc.

The following video provides a brief and fast introduction to LENS4PEMS

http://youtube.com/watch?v=ttx07eOx3pI

An example of the evaluation performed using LENS4PEMS on a real case study of a Mechanical Ventilator for ICUs is available at https://github.com/foselab/LENS4PEMS/raw/main/files/LENS_MVM_REPORT.pdf

The information we collect is anonymised and we will use the data only for the purpose of a scientific paper, which is an extension of the research work published in ACSOS 2022: *A. Bombarda, S. Bonfanti, M. De Sanctis, A. Gargantini, P. Pelliccione, E. Riccobene, P. Scandurra*, "Towards an Evaluation Framework for Autonomous Systems" in 2022 IEEE International Conference on Autonomic Computing and Self-Organizing Systems Companion (ACSOS-C), pp. 43-48, *doi: 10.1109/ACSOSC56246.2022.00025*

Introductory questions

1. Where are you located? *

    Mark only one oval.

    ( ) Europe

    ( ) Asia

    ( ) North America

    ( ) South America

    ( ) Africa

    ( ) Oceania

    ( ) Antarctica

2. Kind of organization where you work (the answer that best fits) *

Mark only one oval.

- ( ) University
- ( ) Research center
- ( ) Enterprise/Company
- ( ) Other: _____

3. Your current role (the answer that best fits) *

Mark only one oval.

- ( ) Researcher
- ( ) Product/Project manager
- ( ) System analyst
- ( ) Requirements engineer
- ( ) Developer
- ( ) Tester
- ( ) Other: _____

4. Size of the organization where you work *

   Mark only one oval.

   ◯ Small (< 50 employees)

   ◯ Medium (51- 250 employees)

   ◯ Large (251 - 999 employees)

   ◯ Extra-large (> 1000 employees)

5. Your experience in projects for developing/studying/using PEMS *

   Mark only one oval.

   ◯ < 2 years

   ◯ 2 - 5 years

   ◯ 5 - 8 years

   ◯ > 8 years

6. Number of PEMS projects that you have worked on: *

   Mark only one oval.

   ◯ < 2 projects

   ◯ 2 - 5 projects

   ◯ 5 - 8 projects

   ◯ > 8 projects

   Usefulness

7. Do you believe it is useful to have an evaluation framework for assessing the adaptation and smartness of autonomous   *
   systems?

   Mark only one oval.

   ◯ Yes   *Skip to question 9*

   ◯ No   *Skip to question 8*

   Usefulness - Not useful

8. Why do you consider not useful to have an evaluation framework for the assessment of adaptation and smartness of autonomous systems? *

_____

_____

_____

_____

_____

Usefulness - Useful

9. It is a good idea to perform the evaluation in terms of abilities (e.g. Adaptability, Autonomy, etc.) and levels *

Mark only one oval.

Strongly disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly agree

10. Comments

11. It is useful to enable an evaluation for each level with values "Not applicable", "Satisfied", and "Unable", together with an *
    evaluation of how costly is to perform an extension "Improvable (low effort)" and "Improvable (high effort)"

Mark only one oval.

Strongly disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly agree

12.   Comments

13. I believe that LENS4PEMS can be useful to assess the current level of adaptation and smartness of a PEMS *

Mark only one oval.

Strongly disagree

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Strongly agree

14.   Comments

_____

_____

_____

_____

_____

15. I believe that LENS4PEMS can be useful for understanding in which ability it is worth to invest in order to make a PEMS smarter *

Mark only one oval.

Strongly disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly agree

16.   Comments

17. I believe that LENS4PEMS can be useful for making a re-assessment when the improvement has been performed on a PEMS *

Mark only one oval.

Strongly disagree

1 ⬭

2 ⬭

3 ⬭

4 ⬭

5 ⬭

Strongly agree

18. Comments

_____

_____

_____

_____

_____

19. Do you have a PEMS and/or are you interested in using LENS4PEMS for evaluating your PEMS? *

   Mark only one oval.

   ⬭ Yes

   ⬭ No

Titolo predefinito
If you want to try LENS4PEMS for the assesment of your own PEMS, you can use our tool

20. Can we contact you for clarifications about your answers? If yes, please leave your email address and we will reach you as soon as possible!

   The email will be exclusively used for the purpose of this questionnaire and not made available outside the team of the authors

   _____

Google Forms