

## BESTMaintenance\_LowerRisks – Buildings’ Envelope SLP-based Maintenance: Reducing the Risks and Costs for Owners

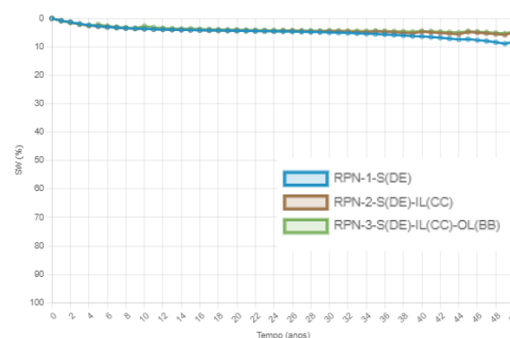
### Summary

The Portuguese built park, although relatively recent, shows clear signs of degradation. The rehabilitation needs exceed 200 billion Euros and should be a priority for the country’s sustainable economic development. This degradation is due to the natural aging of the materials, associated with a lack of resources and an incipient maintenance culture (in part, due to restrictions on house rents), and a “build and let decay” attitude has been adopted for decades.

The physical degradation of buildings contributes to the social degradation of cities and, consequently, should be mitigated through proper maintenance activities. This project intends to answer the Societal challenge of improving the way cities are perceived, reducing the owners’ risks and costs from a reactive maintenance culture. Reactive maintenance strategies, based on subjective criteria, are still a current practice [3]. Managers of the built park are faced with difficult decisions about when and how to intervene and lack the adequate tools to assist the planning of effective maintenance. Existing sources indicate an average service life for the buildings’ elements and standardized intervention procedures, neglecting the way in which the buildings deteriorate as well as the risks and costs associated with that degradation.

This project proposes a software (Figure 1) for designing maintenance plans based on service life prediction models, applied to the buildings’ envelope, which, due to their higher incidence of anomalies, have a significant weight in maintenance costs. This tool is applied in the scope of the Insurance companies that, currently, intentionally exclude the buildings’ envelope of their policies, since they lack reliable information about the risks and degradation models and are unable to estimate

the probabilities of intervention and corresponding costs. The main lines of innovation of the project are: Definition of maintenance strategies based on the service life of the elements; Application of stochastic models, to evaluate the risk of failure of the elements over time and according to their characteristics; Probabilistic economic models of maintenance management over the building’s life cycle; Design of insurance policy models, evaluating different risk premiums based on the owners and the insured object characteristics.



Elemento	Vida útil (anos)	Custos [ € / m <sup>2</sup> ]			
		Aplicação	Inspeção	Manutenção	Total
RPN-1-S(DE)	-	136.79	2.88	0.52	140.19
RPN-2-S(DE)-IL(CC)	-	136.79	2.88	4.56	144.23
RPN-3-S(DE)-IL(CC)-OL(BB)	-	136.79	2.88	39.05	178.72

Figure 1. Illustrative example of the results obtained from the application of the software: degradation curve and synthesis table for the same maintenance strategy in natural stone claddings and in aluminium window frames and for a time horizon of 100 years.

### Project reference

PTDC/ECI-CON/29286/2017

### Leading Institution

IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal)

### Partners

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### CERIS Research Team

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### Funding

ANI – Agência Nacional de Inovação

### Period

2018-2022

### Total

236 288.83€

### CERIS

236 288.83€

### Project Website

<http://bestmaintenancelowerisks.webnode.pt>