

**CON REP NET**  
**THEMATIC NETWORK ON PERFORMANCE BASED  
REHABILITATION OF REINFORCED CONCRETE  
STRUCTURES**

**TASK 2.4**

**Methodology for Monitoring  
and assessing performance**

**C. Andrade and I. Martínez**  
**IETcc**



# OBJECTIVE

- **To develop a standard methodology by which the performance of rehabilitated concrete structures can be monitored and assessed in the future, using data gathering and processing exercise made in the previous tasks of WP 2.**

# CHARACTERISTICS

- **The methodology is such that consistency is possible in the conclusions achieved by different organizations or inspectors on different structures.**
- **It needs to cover not only the direct measurements that must be made by instruments, but also the related information and observations.**

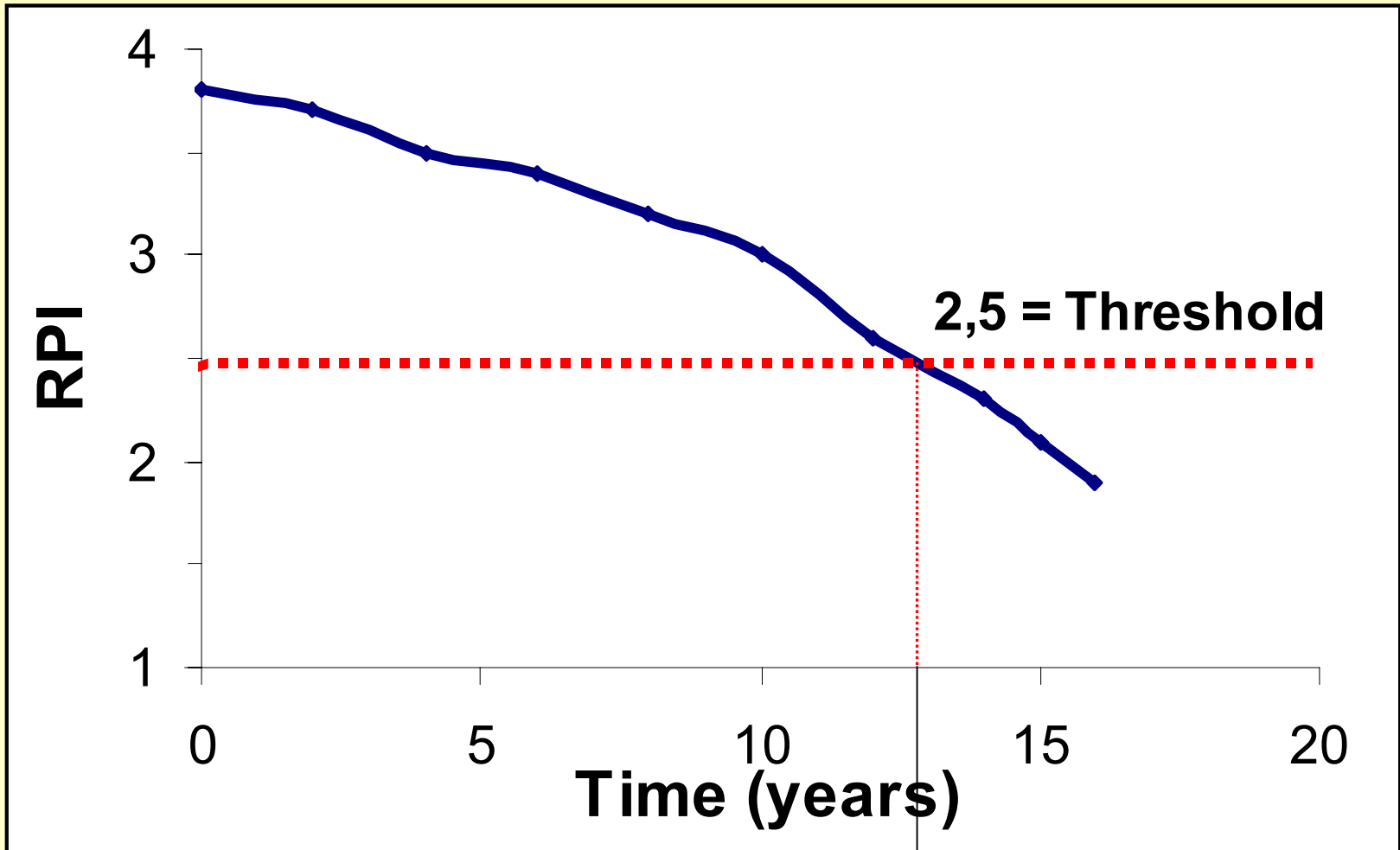
# METHODOLOGY PROPOSED

- Definition of requirements, R.
- Qualification of requirements by Performance Indicators, PI (ranked in levels from 1 to 4)
- Calculation of Repair performance Index, RPI

$$RPI = \frac{\sum^n PI}{n}$$

- Definition of a threshold value: could be a weight of 2,5

# Monitoring: Evolution with time



A new reparation is needed

# REPAIR METHODS AND SYSTEMS TO BE CONSIDERED

- Cathodic protection
- Chloride extraction
- Realkalisation
- Chemical inhibitors
- Surface treatment
- Sealing
- Injection
- Patching
- Strength with reinforced concrete
- Strength with steel bonded plates
- Strength with fiber bond strips
- Strength with external prestressing

# REPAIR METHODS AND SYSTEMS TO BE CONSIDERED

## ⇒ Cathodic protection

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# EXAMPLE 1

## CATHODIC PROTECTION

R Requirement	P.I Performance Indicator	Ranking		Weight Date...	Weight Date...
		Weight	Criteria		
Bar Potential	Potential Off ( $E_{off}$ )	1	>-500 mV (SCE)		
		2	-500/-600mV (SCE)		
		3	-600/-700mV (SCE)		
		4	<-700mV (SCE)		
	Instantaneous polarization from Initial Potential ( $E_{ini}-E_{off}$ )	1	<100 mV		
		2	100-200mV		
		3	200-400mV		
		4	>400mV		
	Depolarization in 4 hours	1	<30 mV		
		2	30-60mV		
		3	60-100mV		
		4	>100mV		
Passivity Verification Technique	Efficiency	1	Non protected		
		2	moderately protected		
		3	Protected		
		4	Well protected		
Repair Performance Index	Averaged value				

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- ⇒ Patching
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# EXAMPLE 2 PATCHING

R Requirement	P.I Performance Indicator	Ranking		Weight Date...	Weight Date...
		Weight	Criteria		
Bond	Debonding crack width (in situ, visual)	1	>0,4 mm		
		2	0,1-0,4 mm		
		3	0,1mm		
		4	<0,05mm		
Permeability	Cracking in the patch material	1	>0,4 mm		
		2	0,1-0,4 mm		
		3	0,1mm		
		4	<0,05mm		
	Carbonation and chloride front rate	1	>6mm/year <sup>0.5</sup>		
		2	3-6mm/year <sup>0.5</sup>		
		3	1-3mm/year <sup>0.5</sup>		
		4	<1mm/year <sup>0.5</sup>		
Water sorption	1	xxx			
	2	xxx			
	3	xxx			
	4	xxx			
Durability	Reinforcement Potential	1	>-350 mV (SCE)		
		2	-250 / -350 mV (SCE)		
		3	-100 / -250 mV (SCE)		
		4	<100 mV (SCE)		
	Reinforcement Corrosion Rate	1	>10µm/year		
		2	5-10µm/year		
		3	1-5 µm/year		
		4	<1mm/year		
	Concrete cover resistivity	1	<50 Ω.m		
		2	50-100 Ω.m		
		3	100-500 Ω.m		
		4	>500 Ω.m		
Concrete cover mechanical strength	1	<10 MPa			
	2	10-20 MPa			
	3	20 MPa-Parent concrete			
	4	>Parent concrete			
<b>Repair Performance Index</b>	<b>Averaged value</b>				