L'exploitation
et la maintenance
des infrastructures

PN - ANR MOVE
DVDC
DURÉE DE VIE DES CHAUSSÉES

IREX
Institut pour la recherche appliquée
et l'expérimentation en génie civil

Knowing the condition of a network

Bruno ESPINASSE – Puy-de-Dôme Departmental councillor
Stéphane THERET – Eure Departmental councillor

MINISTÈRE
DE LA TRANSITION
ÉCOLOGIQUE
Liberté
Égalité
Fraternité

Public presentation of results
7 November 2023, ENTPE, Vaulx-en-Velin

AGENCE NATIONALE DE LA RECHERCHE
ANR

► OBJECTIVES OF THE TASK FORCE (*)

- EVALUATE THE PRACTICES AND TECHNIQUES IN ROAD NETWORK MANAGEMENT
- IDENTIFY PROBLEMS
- DEVELOP A POSTERIORI DETERIORATION PROCESSES SPECIFIC TO EACH OF THESE MECHANISMS

(*) Department 63 Council, Companies, Cerema, Consultants



► TWO-PART PROCEDURE:

A SURVEY OF DEPARTMENTAL COUNCILS (26 RESPONSES)
PRESENTED TODAY

A SURVEY OF METROPOLITAN AREAS (LOW RESPONSE RATE)



► TOPICS COVERED IN THE SURVEY

- ROAD NETWORK TYPES
- MAINTENANCE POLICY
- ROAD PAVEMENT STRUCTURES AND TECHNIQUES USED
- PATHOLOGIES ENCOUNTERED AND PERIODS OF ONSET
- MAINTENANCE SOLUTIONS FOR WEARING COURSES
- FEEDBACK AND EXPECTATIONS



► ADDITIONAL TOPICS ADDRESSED DURING THE SURVEY

- BEHAVIOUR OF ROUNDABOUTS (OUTSIDE BUILT-UP AREAS)
- RELATIONSHIPS BETWEEN TECHNIQUES AND NETWORK CLASSES
- MAINTENANCE LIFE OF CLASS 3 & 4 NETWORKS
- DETERIORATIONS OF ROAD PAVEMENT STRUCTURES
- PATHOLOGY AND CLIMATE



► TYPES OF DEPARTMENTAL ROAD NETWORKS

► LENGTH: 3884 km (average)

< High Volume > < Low Volume >

	Class 1 (km)	Class 2 (km)	Class 3 (km)	Class 4 (km)
Average	496	647	1515	1226
Percentage	12.8%	16.7%	39.0%	31.6%
Percentage	29.4%		70.6%	



► MAINTENANCE POLICY

- ALL DEPARTEMENTAL COUNCILS HAVE A ROAD DATABASE
- MAINTENANCE POLICY IS NOT ALWAYS THE RESULT OF A DEFINED PROCESS
- WORKS ARE SCHEDULED OVER 3 YEARS
- BUT IT IS NOT ALWAYS CODIFIED



► MAINTENANCE POLICY: KNOWING ROAD PAVEMENT STRUCTURES

1 (UNKNOWN) TO 5 (KNOWN)

Class 1	Class 2	Class 3	Class 4
2.7	2.4	2.2	2.0



► MAINTENANCE POLICY: KNOWING ROAD PAVEMENT STRUCTURES

CLASS 1 (% AVERAGE)

Flexible road pavements: BB/GNT	Old road pavements: hedgehog - blocking	Asphalt road pavements	Road pavements treated with hydraulic binders	Concrete road pavements
19	0.4	56	24	0.6
		80		



► MAINTENANCE POLICY: KNOWING ROAD PAVEMENT STRUCTURES

CLASS 4 (% AVERAGE)

Flexible road pavements: BB/GNT	Old road pavements: hedgehog - blocking	Asphalt road pavements	Road pavements treated with hydraulic binders	Concrete road pavements
39	55	6	0	0
94				



► PATHOLOGIES ENCOUNTERED

ONSETS FOR CLASS 1 (AVERAGE)

Rutting of the wearing course	Tearing	Peeling	Slipperiness	Alligator cracking	Cracking at the top of bituminous mixes	Transverse cracking	Joint treatment	Bleeding
10 to 14 years					3 to 8 years			
< Traffic and age >					< Climate and thermal variations >			



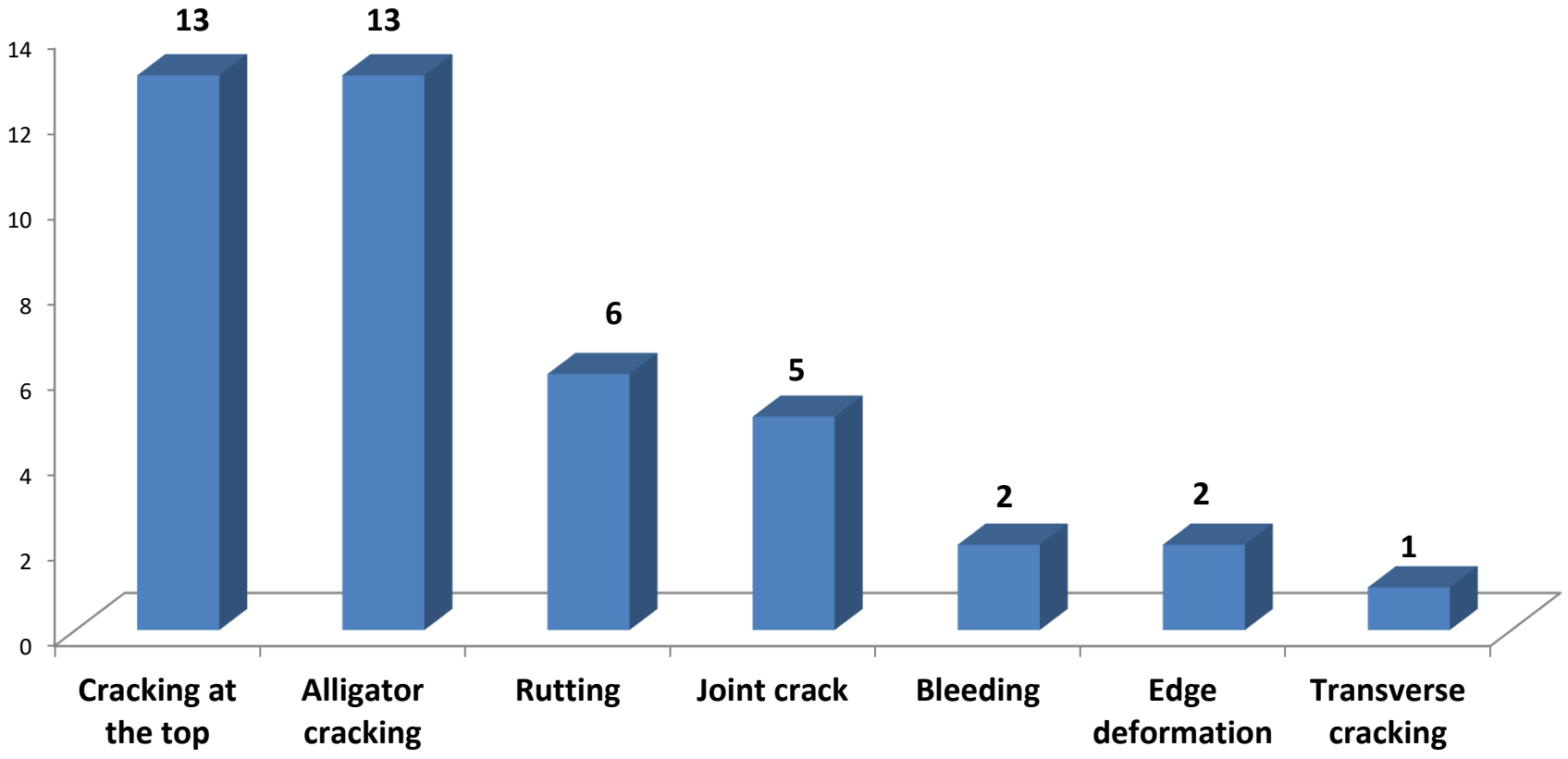
► PATHOLOGIES ENCOUNTERED

ONSETS FOR CLASS 4 (AVERAGE)

Rutting of the wearing course	Tearing	Peeling	Slipperiness	Alligator cracking	Cracking at the top of bituminous mixes	Transverse cracking	Joint treatment	Bleeding
9 to 10 years				4 to 7 years				
< Traffic and age >				< Climate and thermal variations >				



► MOST FREQUENT DETERIORATIONS TO FLEXIBLE ROAD PAVEMENTS (NUMBER OF RESPONSES)





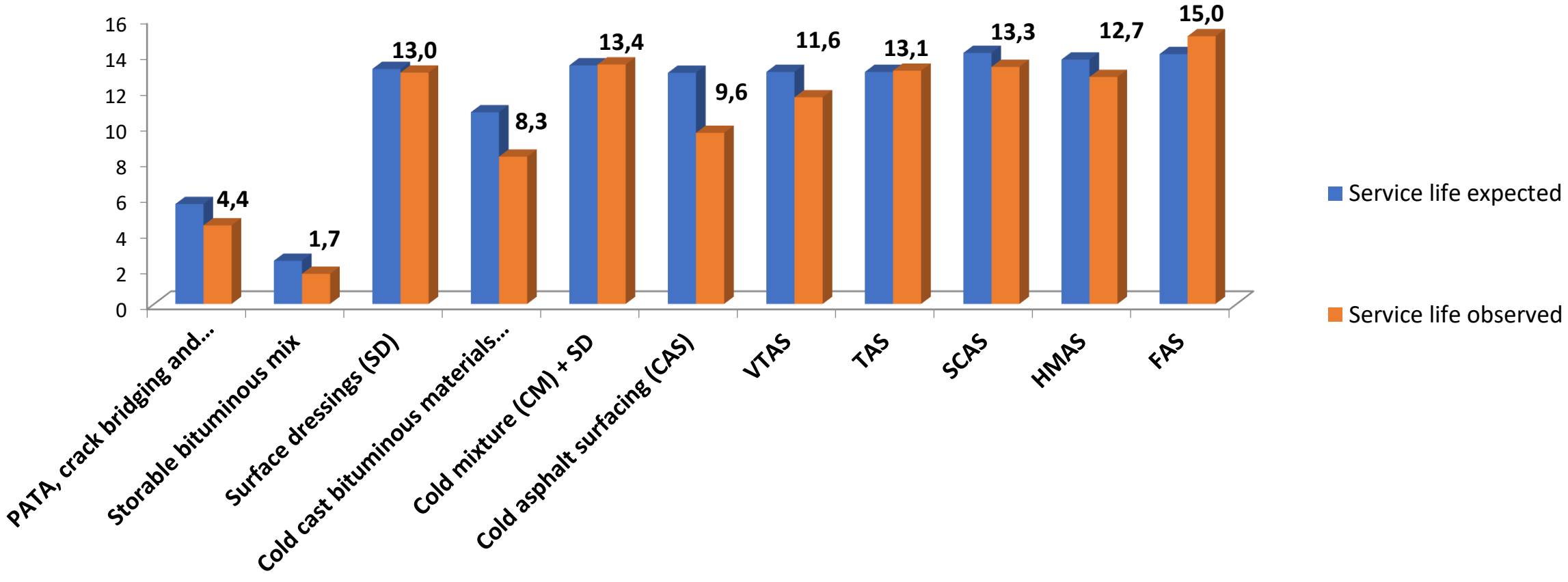
► RESURFACING AND/OR REINFORCEMENT

Class 1	Class 2	Class 3	Class 4
Asphalt mix > 6 cm			
Annual percentage			
4.5 %	5.1 %	1.6 %	1.1 %
Frequency (years)			
22	20	63	95

Consistent with the design

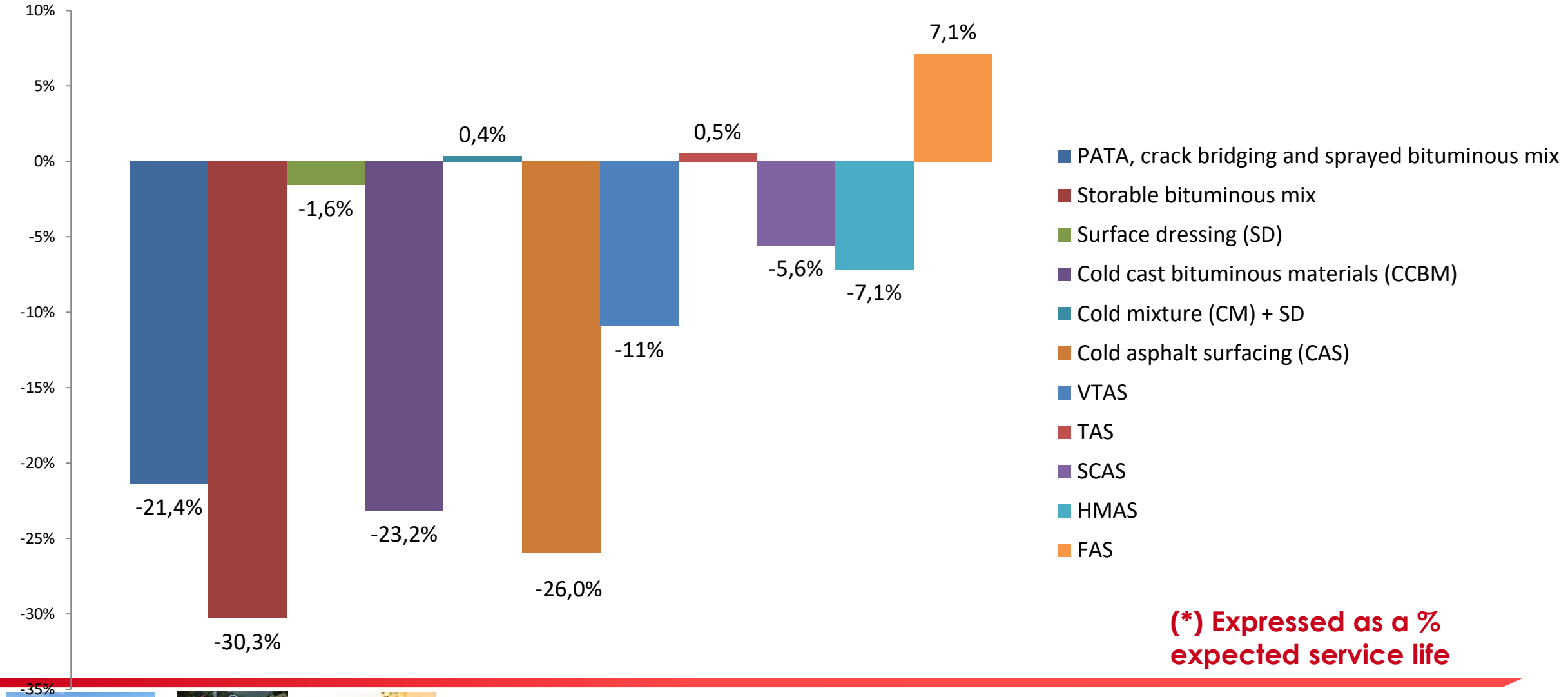


► SERVICE LIFE (IN YEARS) OF MAINTENANCE TECHNIQUES





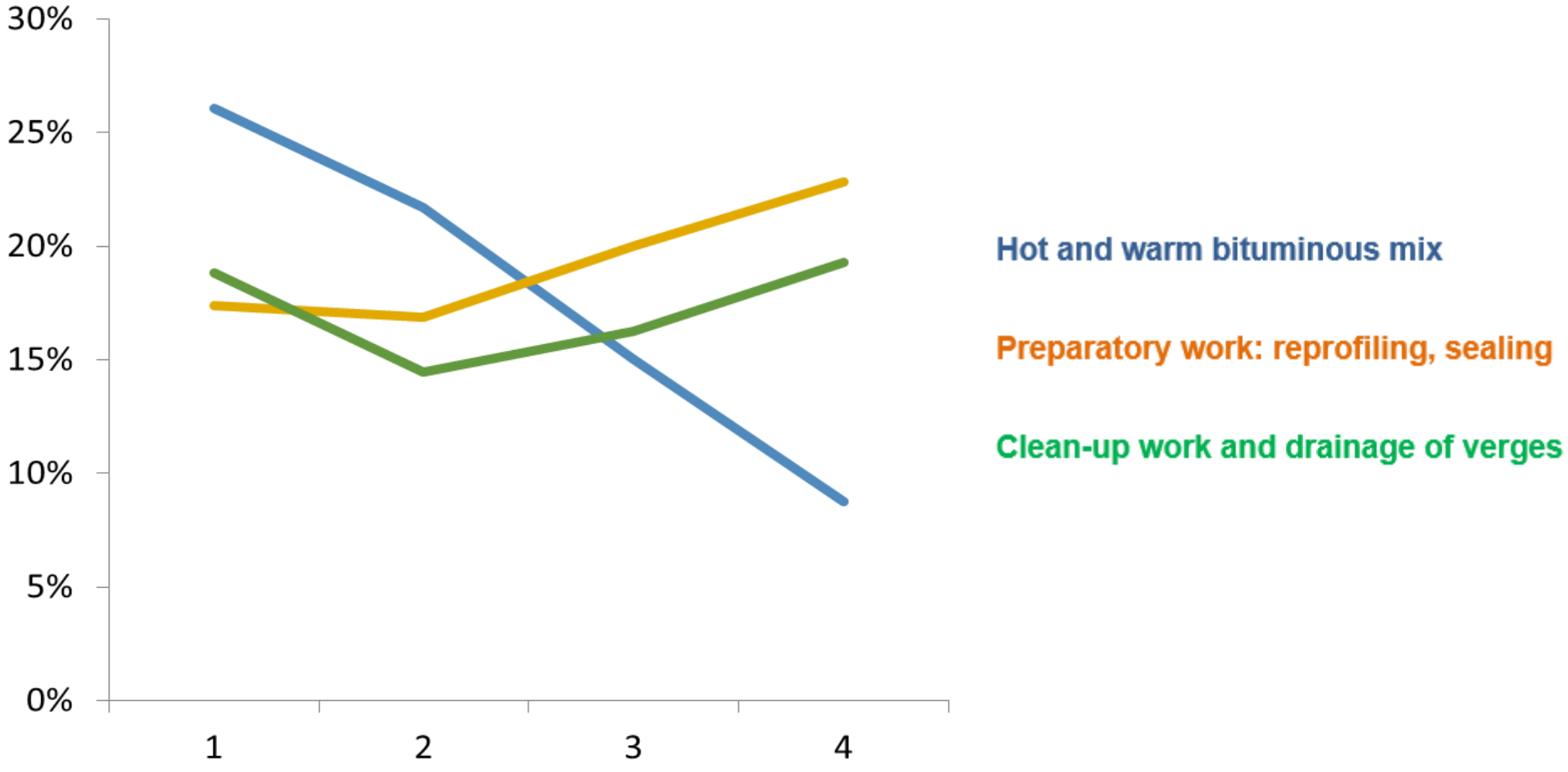
► VARIATION BETWEEN EXPECTED AND OBSERVED SERVICE LIVES (*)



(*) Expressed as a % expected service life

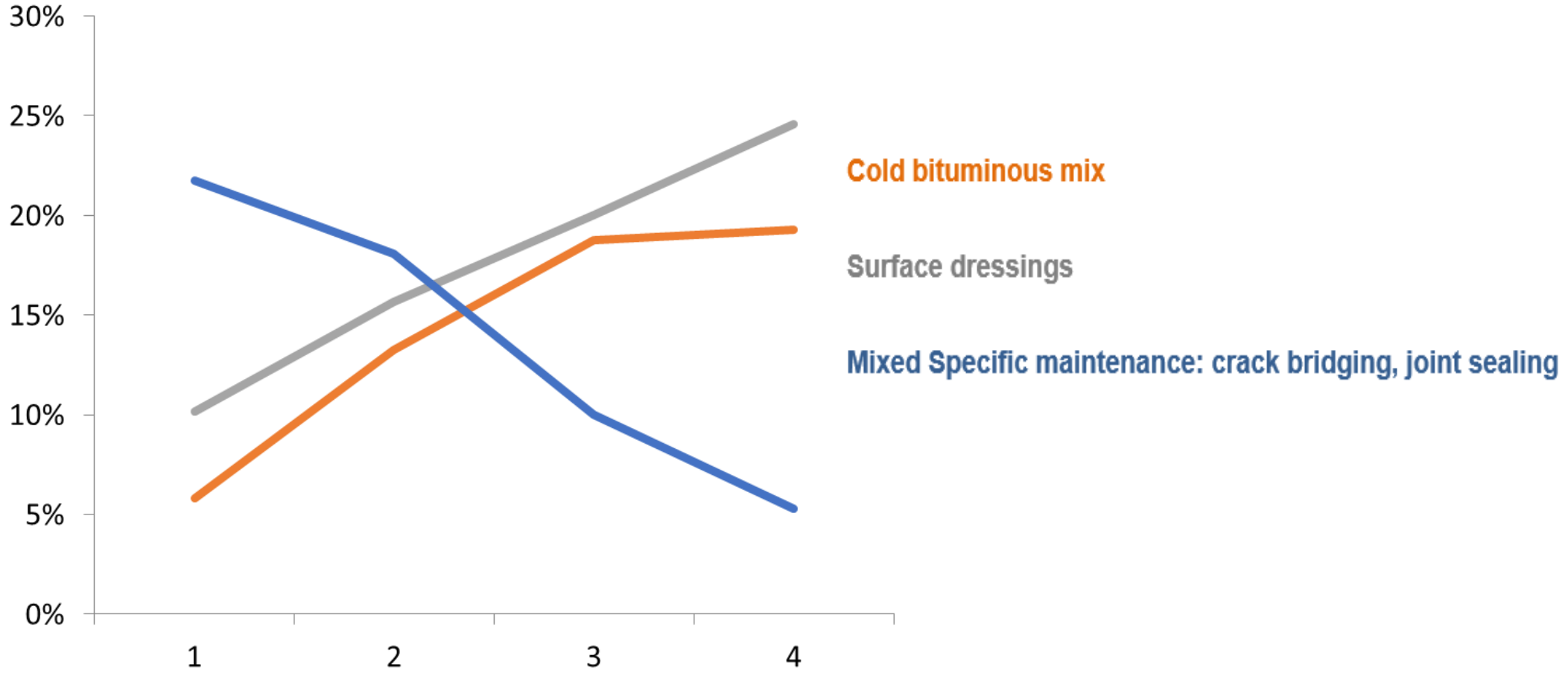


► DISTRIBUTION OF MAINTENANCE TECHNIQUES BY NETWORK CLASS



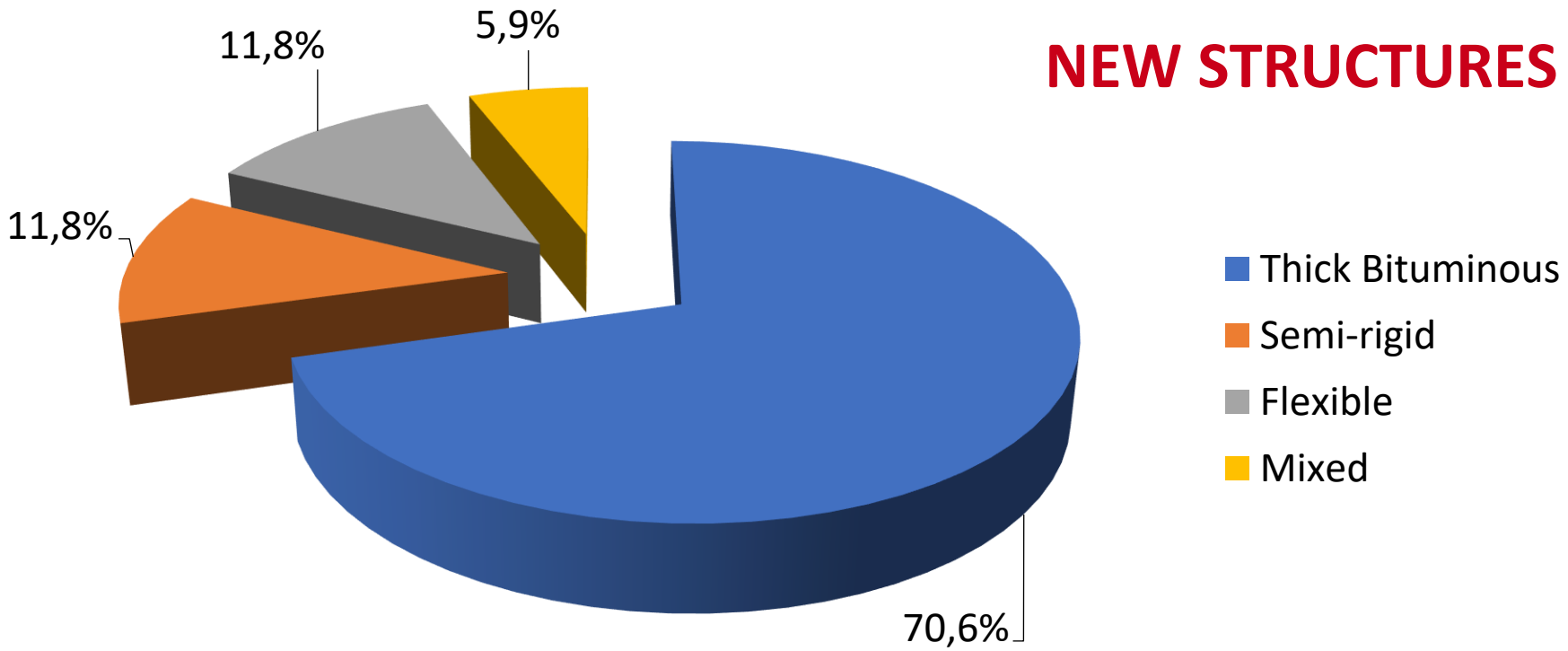


► DISTRIBUTION OF MAINTENANCE TECHNIQUES BY NETWORK CLASS



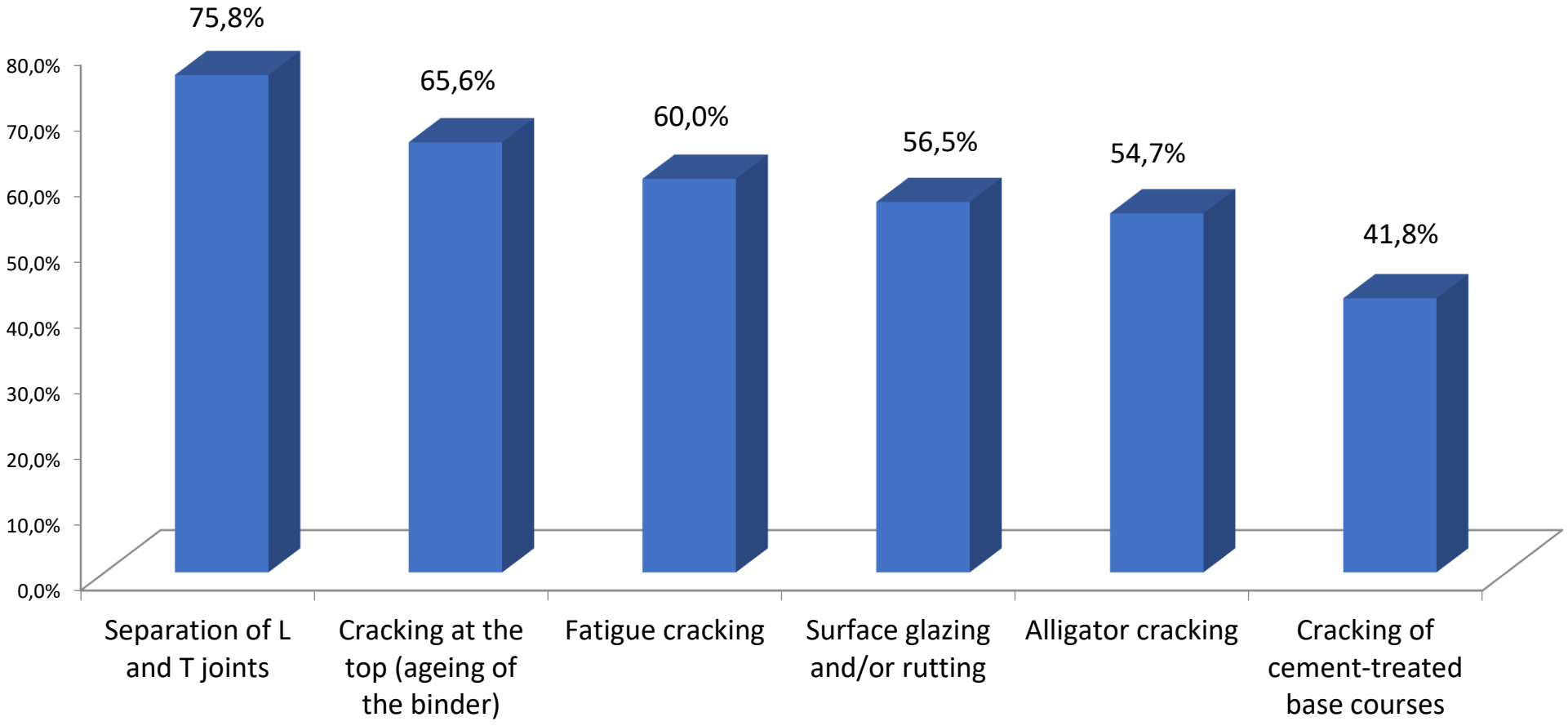


► ROUNDABOUTS OUTSIDE BUILT-UP AREAS: 228 PER DEPARTMENTAL COUNCIL (i.e. 1 EVERY 18 KM)





► ROUNDABOUTS: CLASSIFICATION OF DETERIORATIONS BY FREQUENCY OF ONSET*.



(*) several responses possible



► CONCLUSIONS OF THE STUDY

- **BETTER UNDERSTANDING**

✓ **ROAD NETWORK TYPOLOGIES AND THE MAINTENANCE POLICIES ADOPTED**

✓ **ROAD PAVEMENT STRUCTURES BY NETWORK CLASS**

- **IDENTIFICATION AND QUANTIFICATION (ACCORDING TO NETWORK CLASS AND TYPE OF PAVEMENT STRUCTURE)**

✓ **PATHOLOGIES ENCOUNTERED, THEIR PERIODS OF ONSET, MECHANISMS OF ONSET AND AGGRAVATING FACTORS**

✓ **THE SERVICE LIFE OF ROAD PAVEMENT STRUCTURES OR TECHNIQUES**



► CONCLUSIONS OF THE STUDY

- COMPARISON OF EXPECTED AND ACTUAL SERVICE LIVES
- BEHAVIOUR AND SERVICE LIFE OF ROUNDABOUTS OUTSIDE BUILT-UP AREAS
- FOCUS ON MOUNTAIN ROAD NETWORKS (> 800 M) WITH THE AIM OF CREATING A COMMUNITY WITH THE RELEVANT **DEPARTMENTAL COUNCILS**