

Assessment of Reconnaissance Capabilities in Artillery

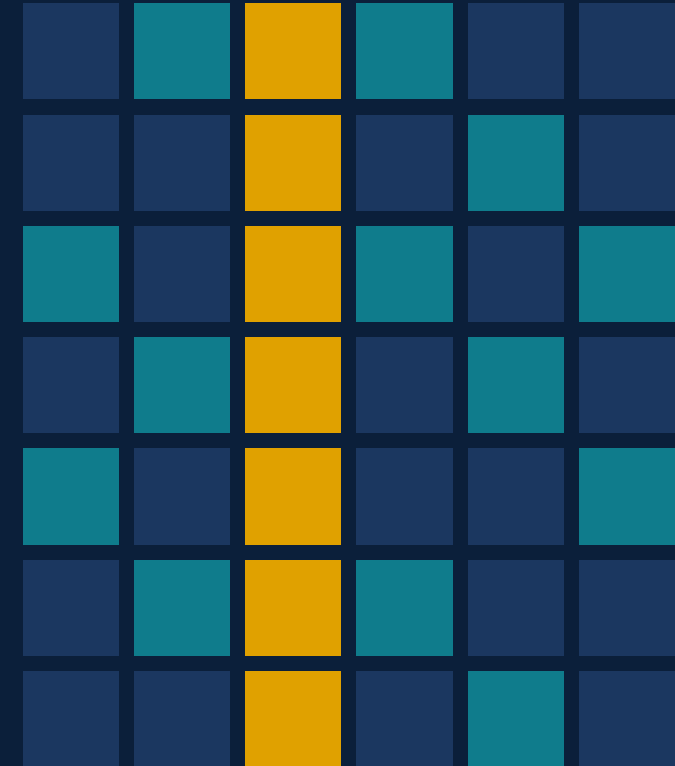
A multi-criteria comparison of Czech systems and NATO
alternatives

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01

Range is useless without reconnaissance

1

Ground systems

Direct observation, identification, location and battle damage assessment

2

Weapon-locating radars

Point of origin and impact of enemy fire, without line of sight

3

UAV systems

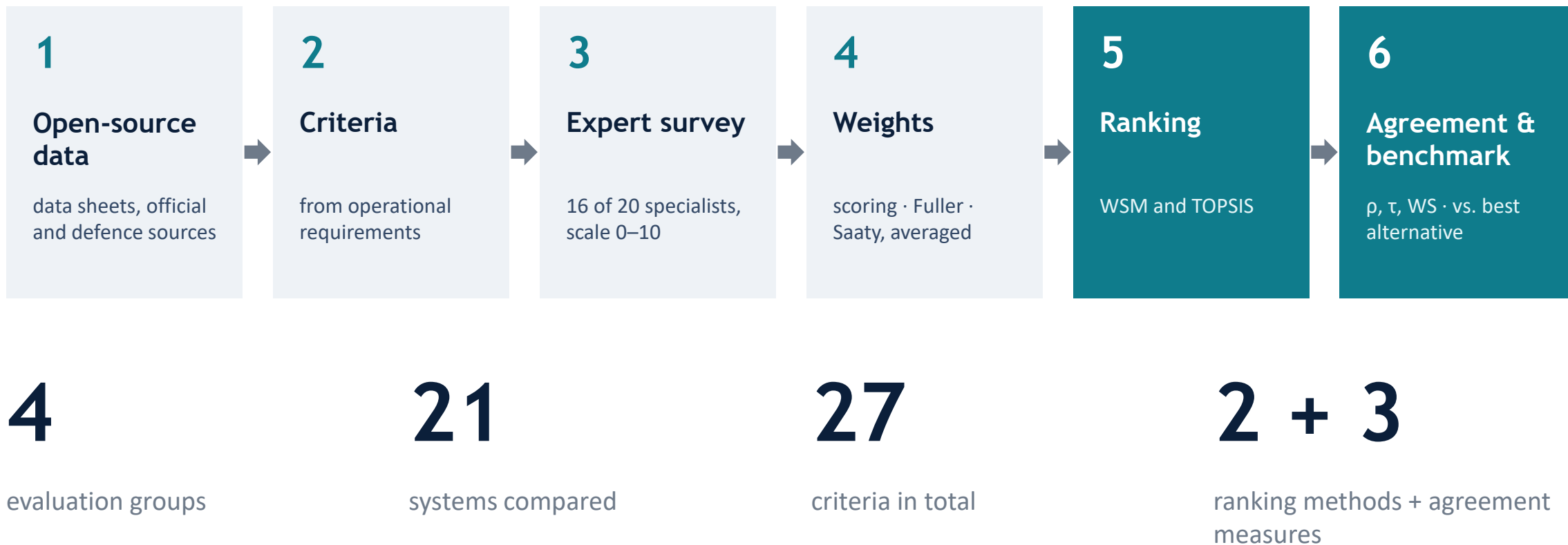
Observation behind terrain and in depth; target confirmation

None of them meets every requirement alone.

TODAY IN THE CZECH ARMY

Ground observation vehicles **LOV-Pz**, **LOS-M** and the weapon-locating radar **ARTHUR**. How do they compare with NATO alternatives, and what should be modernized first?

A repeatable assessment framework



Technical comparison only: cost, logistics, training and integration are outside the scope.

03 Four groups, evaluated separately

Vehicle platforms

LOV-Pz

LOS-M

PIRANHA 5

CV90 MkIV

ASCOD

VBMR Griffon

Sensor suites

LOV-Pz suite

LOS-M suite

BAA II

Kate-LR

NERIO-ULR

Weapon-locating radars

ARTHUR

ELM-2311 C-MMR

GM200 MM/C

AN/TPQ-53

COBRA

Giraffe 4A

UAV systems

no organic UAV

Puma 3 AE

Vector AI

ScanEagle

TEKEVER AR3 EVO

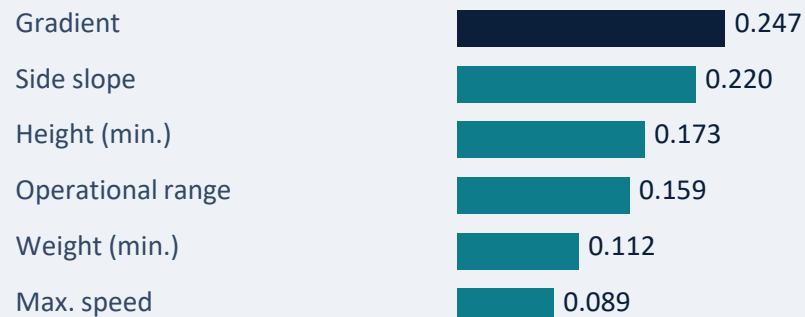
 in Czech service

Open sources only · NATO systems · declared performance, not common field tests

What the specialists value most

Vehicle platforms

Terrain mobility ≈ 47 %



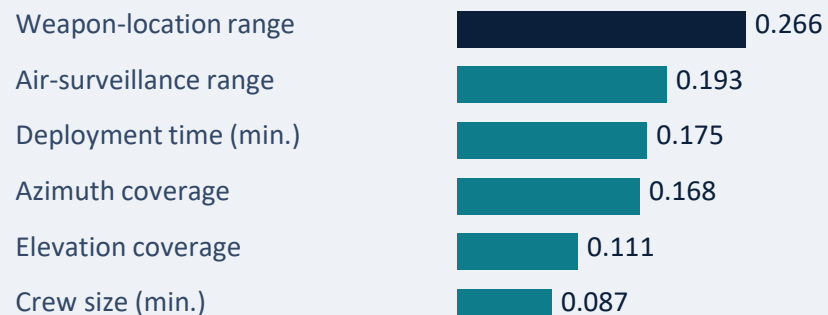
Sensor suites

Recognition dominates



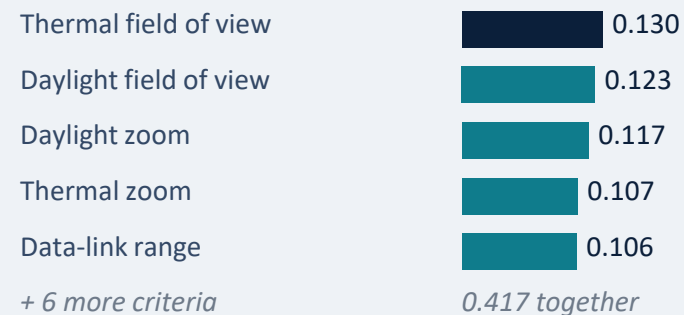
Weapon-locating radars

Preference for multifunction



UAV systems

Sensor criteria = 55.5 %



Two ways to aggregate the same data

Weighted sum (WSM)

Adds up weighted, normalized scores.

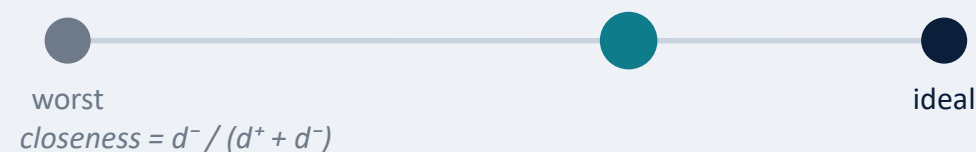


$$\text{score} = \sum \text{weight} \times \text{value}$$

Compensatory: one excellent value can make up for weak ones.

TOPSIS

Distance to an ideal and to a worst-case alternative.

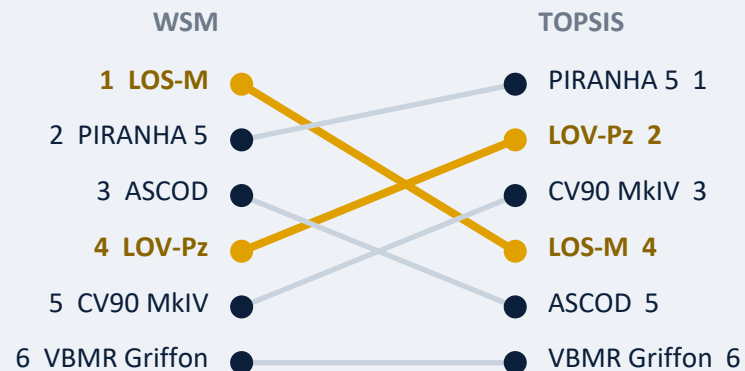


Rewards a balanced profile across all criteria.

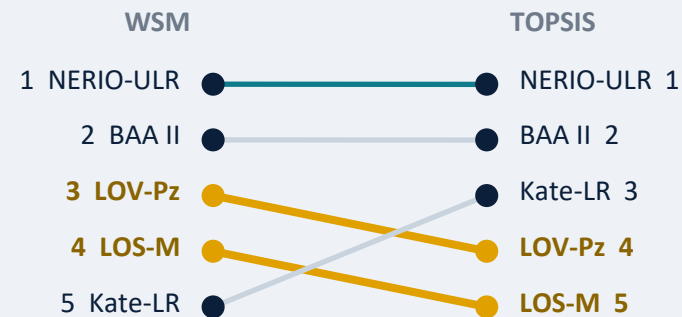
Agreement → robust result. **Disagreement** → uneven profile. We report it, and we measure it.

Rankings: WSM versus TOPSIS

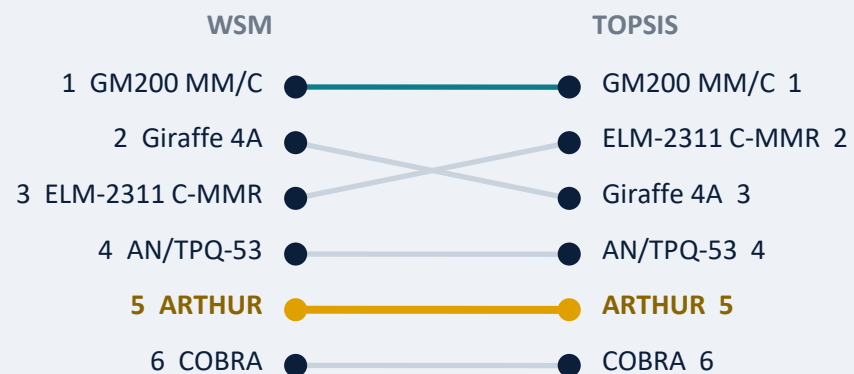
Vehicle platforms



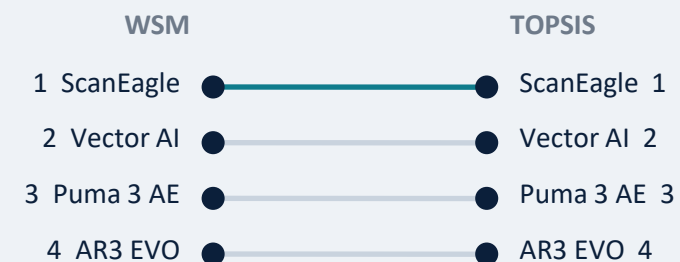
Sensor suites



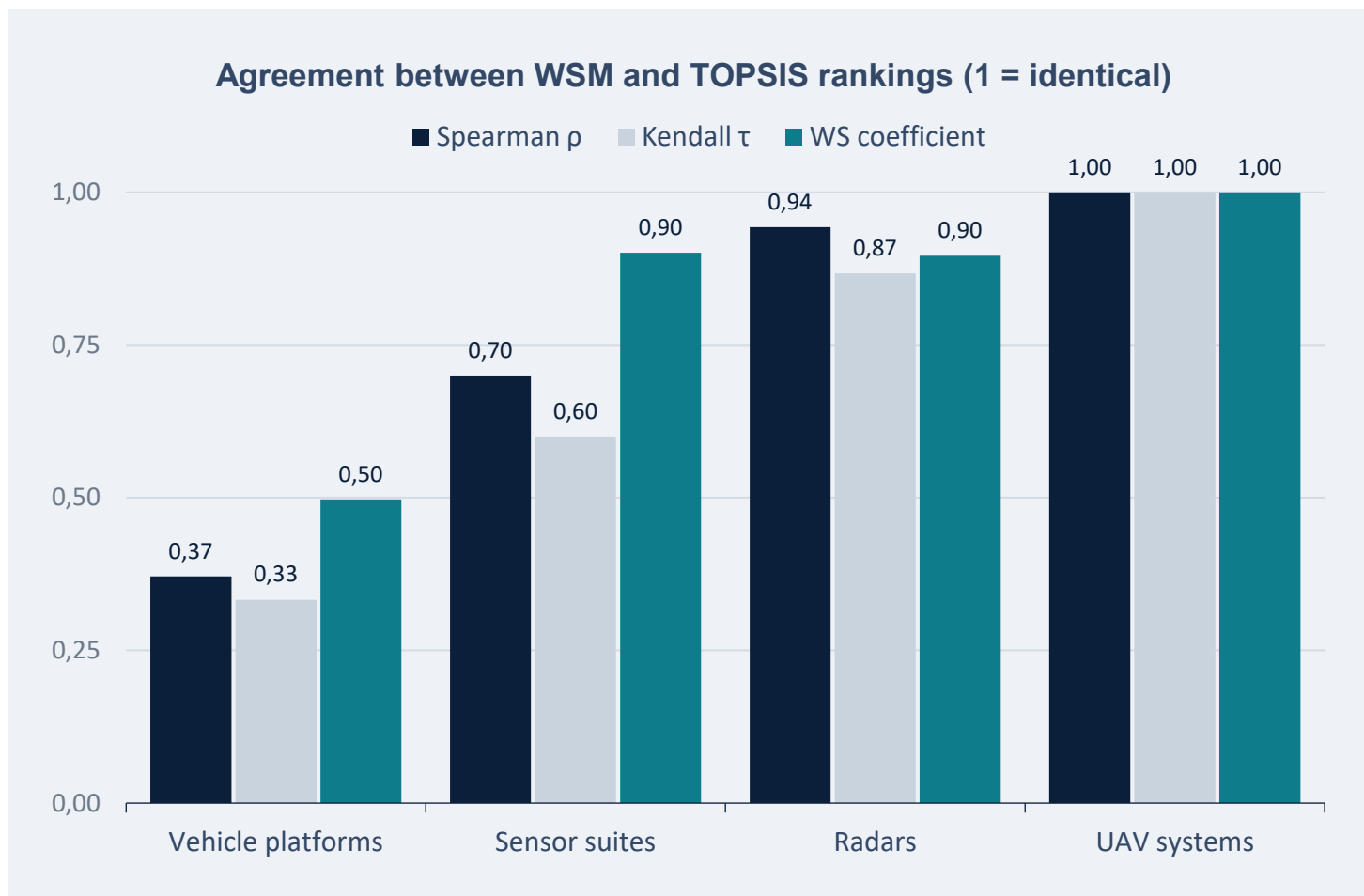
Weapon-locating radars



UAV systems



How firmly can each result be read?



Descriptive values: with 4–6 systems, ρ and τ are not significance tests.

Vehicle platforms

INDICATIVE

1 of 6 identical · max. shift 3

Sensor suites

FIRM AT THE TOP

2 of 5 identical · top two agree

Weapon-locating radars

METHOD-INDEPENDENT

4 of 6 identical · max. shift 1

UAV systems

IDENTICAL

4 of 4 identical

Vehicle platforms: Czech systems remain competitive

System	WSM	TOPSIS
LOV-Pz	0.419 (4)	0.510 (2)
LOS-M	0.628 (1)	0.468 (4)
PIRANHA 5	0.564 (2)	0.550 (1)
CV90 MkIV	0.358 (5)	0.498 (3)
ASCOD	0.522 (3)	0.457 (5)
VBMR Griffon	0.232 (6)	0.412 (6)

0.093

TOPSIS spread of the five best platforms

■ No decisive winner

LOS-M first in WSM, LOV-Pz second in TOPSIS.

■ LOS-M: uneven profile

Excellent terrain mobility, weaker elsewhere: TOPSIS penalizes the imbalance.

■ Next platform choice

A balanced mix of mobility, range, speed and dimensions.

score (rank) · gold = in Czech service

Sensor suites: the clearest limitation

System	WSM	TOPSIS
LOV-Pz suite	0.284 (3)	0.189 (4)
LOS-M suite	0.201 (4)	0.131 (5)
BAA II	0.359 (2)	0.259 (2)
Kate-LR	0.150 (5)	0.192 (3)
NERIO-ULR	1.000 (1)	1.000 (1)

score (rank) · gold = in Czech service

1.000

NERIO-ULR: best on every criterion, in both methods

■ Czech suites in the lower part

Recognition range carries the highest weight (0.410).

■ First place by dominance

Not by the choice of weights.

■ Modernization focus

Long-range recognition and identification, laser rangefinder range.

Radars: multifunction systems lead

System	WSM	TOPSIS
ARTHUR	0.186 (5)	0.432 (5)
ELM-2311 C-MMR	0.767 (3)	0.772 (2)
GM200 MM/C	0.967 (1)	0.927 (1)
AN/TPQ-53	0.417 (4)	0.442 (4)
COBRA	0.087 (6)	0.140 (6)
Giraffe 4A	0.865 (2)	0.677 (3)

0.193

weight of air-surveillance range, which ARTHUR cannot score

■ ARTHUR 5th: partly category

A dedicated weapon-locating radar, not a counter-battery weakness alone.

■ Multifunction leads

Weapon location + air surveillance, coverage, fast deployment.

■ Next step

Sub-ranking on weapon-locating criteria only.

score (rank) · gold = in Czech service

UAV systems: an identical ranking

System	WSM	TOPSIS
Puma 3 AE + Mantis i45	0.442 (3)	0.461 (3)
Vector AI + Raptor-360	0.456 (2)	0.554 (2)
ScanEagle + Dual Imager	0.741 (1)	0.615 (1)
AR3 EVO + HD55-MV	0.415 (4)	0.409 (4)

4 of 4

same position under both methods

■ No organic UAV in Czech artillery

All four alternatives are market systems.

■ One system, three parts

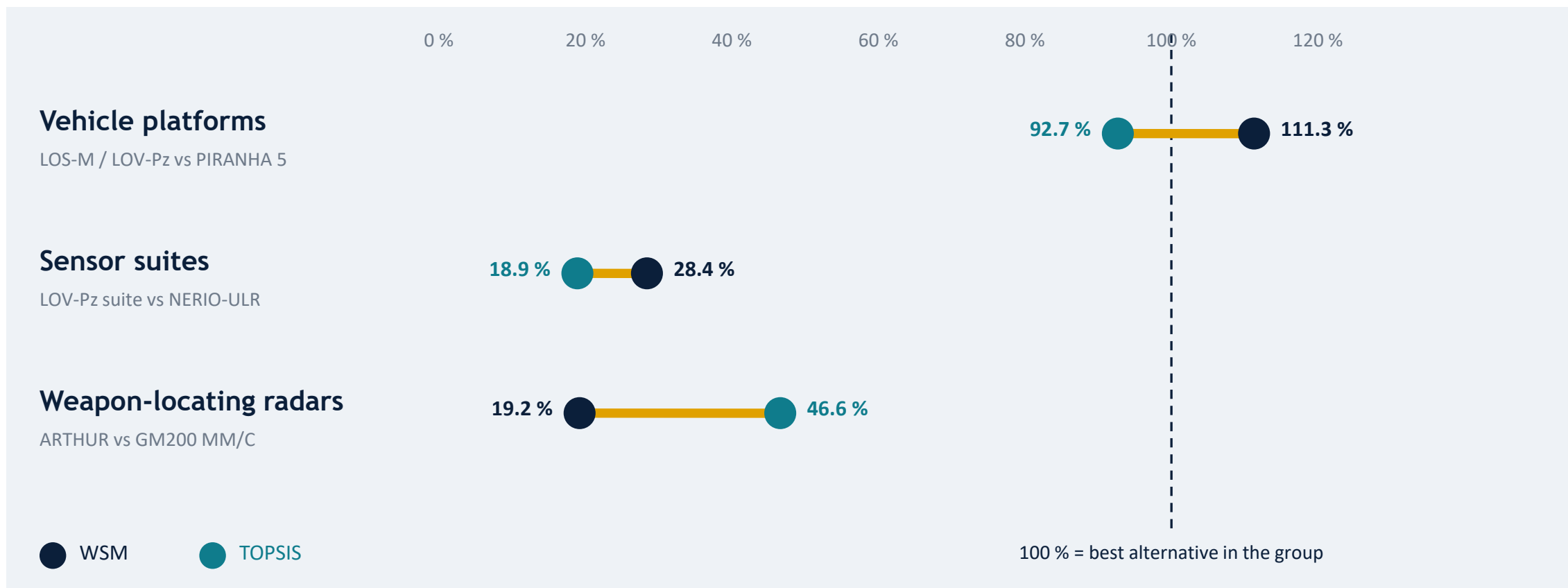
Aircraft, data link and payload are assessed together.

■ Not scored yet

VTOL, survivability, launch and recovery, C2 integration.

score (rank) · no Czech system in this group

Benchmark: position of the system in service



Read with care: 0 % is the weakest system in the sample, not “no capability”. Ratios are method-specific; compare within a group.

What follows for capability development

1

Report both methods

With uneven profiles, the aggregation principle matters. Show both rankings and their agreement.

2

Sensors before vehicles

For ground reconnaissance, sensor modernization likely brings more than new platforms.

3

Multifunction radars

Counter-battery support and UAV detection in one system.

4

An organic artillery UAV

Assessed as one system: long endurance, multisensor payload, C2 integration.

14 Limitations and the final paper

LIMITATIONS

- Declared, not measured, performance data
- 16 specialists from one artillery regiment
- Smaller panel for the pairwise comparisons
- Saaty consistency ratio not verified
- Equal mix of three weighting methods not tested
- Correlated criteria, e.g. detection / recognition / identification range

IN THE FINAL PAPER

- Full decision matrices with units and sources
- Consistency ratios for all Saaty matrices (threshold 0.10)
- Sensitivity of rankings to each weighting method
- Radar sub-ranking on weapon-locating criteria only
- Later: field verification and cost, logistics, life-cycle criteria

- Czech vehicle platforms remain competitive in mobility.
- The main limitation lies in the sensor suites: long-range recognition and identification.
- GM200 MM/C leads the radars, ScanEagle the UAV systems.
- Two methods plus their agreement show which results are firm.

Thank you. Questions?

Funded by the Czech Ministry of Defence (DZRO-FVL22-LANDOPS) and MEYS (SV25-FVL-K107-KOR).

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