HEAVY HAUL SEMINAR

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JUNE 10-12, 2025

WRI2025HH

HEAVY HAUL - JUNE 11-12, 2025

30 Years of Wheel/Rail Interaction: Cheers and Jeers

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WRI2025HH

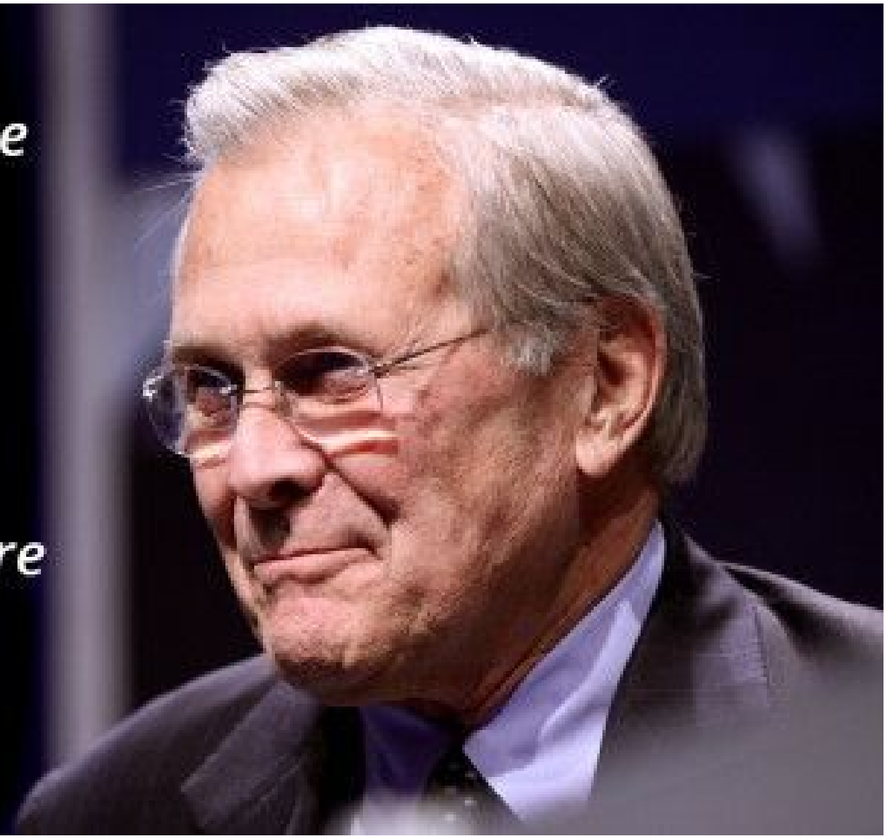
FAMOUS QUOTE

There are known knowns; there are things we know that we know.

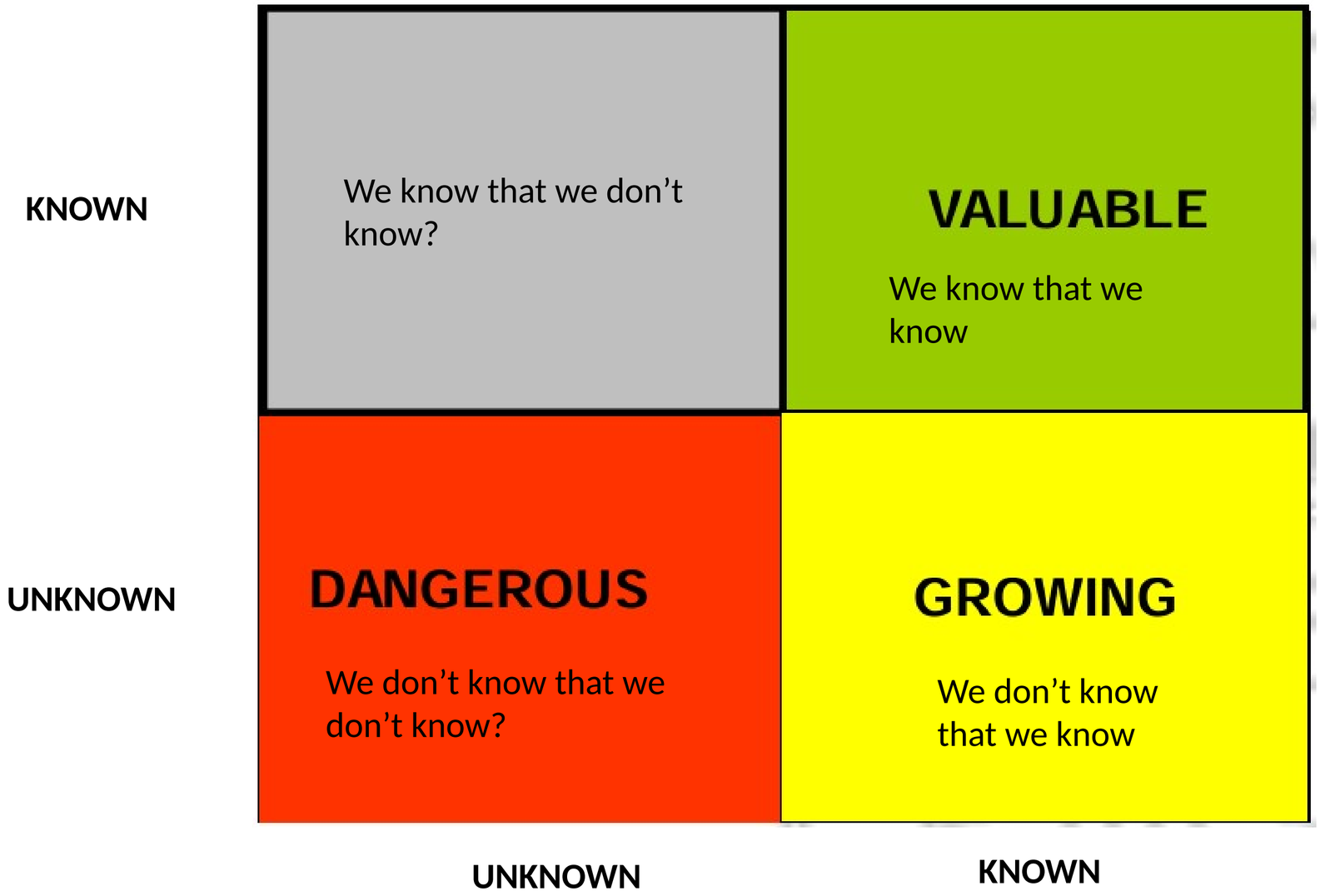
There are known unknowns; that is to say, there are things that we now know we don't know.

But there are also unknown unknowns – there are things we do not know we don't know.

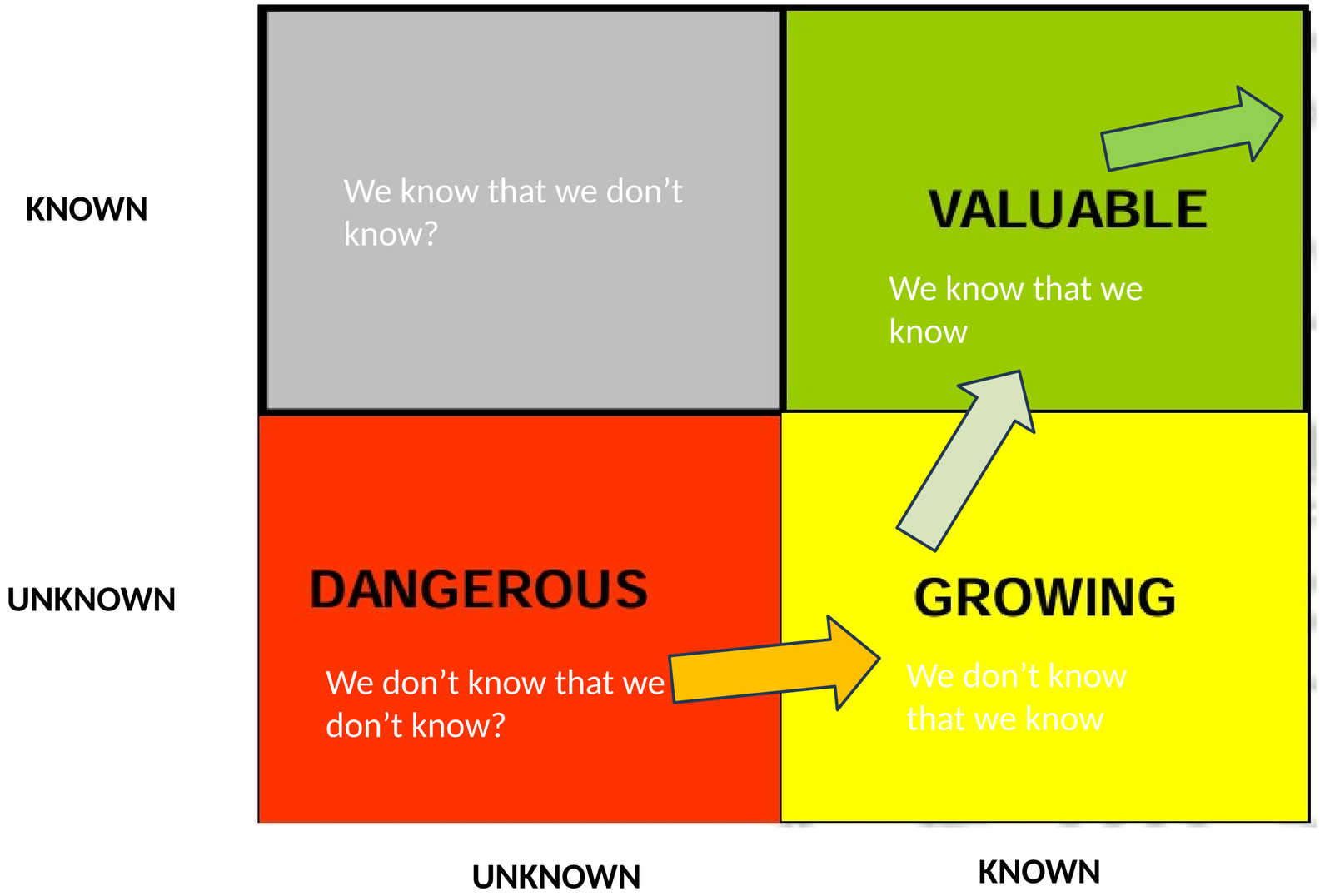
-Donald Rumsfeld

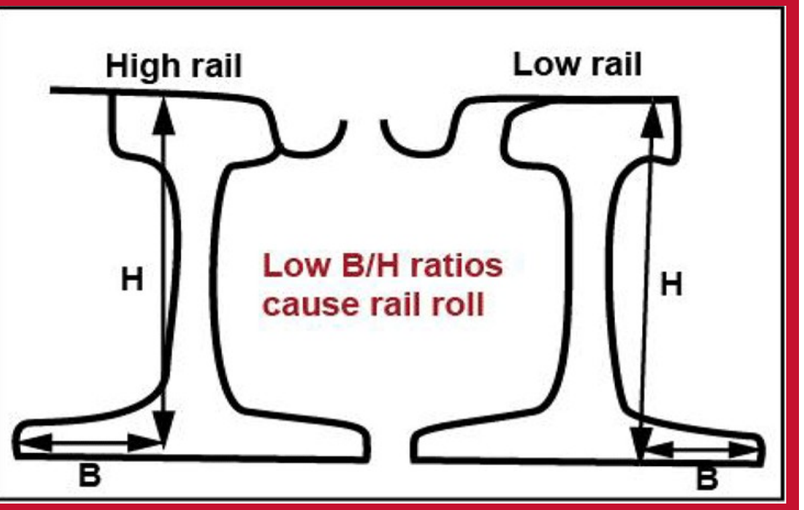


Matrix of Wheel/Rail Understanding



PROGRESSION OF KNOWLEDGE OVER 30 YEARS





WE DIDN'T KNOW WE DIDN'T KNOW?

ROLLING STOCK

- Effects of tread hollows.
- Cost of high impact wheels
- Effects of low truck warp stiffness
- Cost of "bad actor" cars
- How wheel profiles affect curving until they wear in
- Why low speed derailments happen
- Why empty tank cars and loaded grain cars derail

TRACK

- The impact of deviation from stress free temperature
- How non-metallic impurities cause rail failures
- The rail rollover risk from flat rails
- The cost of high friction levels
- Causes of concrete tie abrasion
- The impact of combination and clustered track geometry defects

OPERATIONS

- High risk train marshalling parameters
- Intermodal derailment causes
- Long train longitudinal dynamics
- Effect of curvature/grade on lateral forces for long trains

WE DIDN'T KNOW WE KNEW

ROLLING STOCK

- Wheel profiles can improve steering while also controlling hunting
- Tighter specs. on trucks can improve curve negotiation.
- Wayside detectors can ferret out "bad actor" cars
- Car fleet owners can live with repair codes for wheel impacts.
- Residual stresses are a factor in wheel rim failures
- Low speed wheel climb derailments are preventable

TRACK

- Rail profile grinding can control wheel/rail mismatch
- Preventive rail grinding controls RCF
- Lubrication can dramatically reduce rail wear
- Concrete tie abrasion is manageable
- Tighter rail flaw detection greatly reduces rail failure risk
- Rail neutral temperatures can be managed with good field practice.

OPERATIONS

- Long trains can be run more productively and less destructively with distributed power.
- Train drivers can be assisted with onboard computer algorithms.

WE KNOW THAT WE KNOW

ROLLING STOCK

- Wayside detectors can be the main driver for rolling stock maintenance.
- When wheel profiles and “as ground” rail profiles are in sync, there is little “wearing in” and lower wheel/rail wear.

TRACK

- Rail grinding patterns can be dynamically controlled to achieve an optimal rail shape.
- Milling a viable option under the right circumstances
- Friction management has an upside to be used economically over larger territories.
- Track geometry measurement can be autonomous; tighter intervals reduces the need for track inspections
- Non stop rail flaw detection allows tighter test intervals.
- Track is a system where fouled ballast causes track geometry issues which affect occurrence of rail defects.
- Under tie pads can reduce transition issues.
- Rail neutral temperatures can be managed with good field practice.

OPERATIONS

- Even long trains can be run autonomously.

CONCLUSION

CIBC	CM	93.99	-0.56	4.1	2968	12.2
Cdn Natl Rail	CNR	145.22	-0.26	2.4	1083	20.3
Cdn Natrl Res	CNQ	42.55	-0.50	5.5	15156	11.9
Cdn Pacific K	CP	111.76	+0.31	0.8	1174	27.1
Cdn Tire A NV	CTC.A	173.31	+2.51	4.1	235	11.3

JEERS

- Slow pace of change .
- Capital intensive industry with long life of assets
- Market drives short term results over transformative
- R&D delivers long term, not short term financial results
- Regulatory environment requires change management
- Turnover of experienced engineers.

CHEERS

- WRI, AREMA, IHHA provide exchange of best practice
- There are centres of excellence in MxV and affiliated universities.
- The rail industry is global
- Railway suppliers have been innovative, but need buyers
- Government is supportive of R&D
- Railways are showing progress in safety and productivity

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