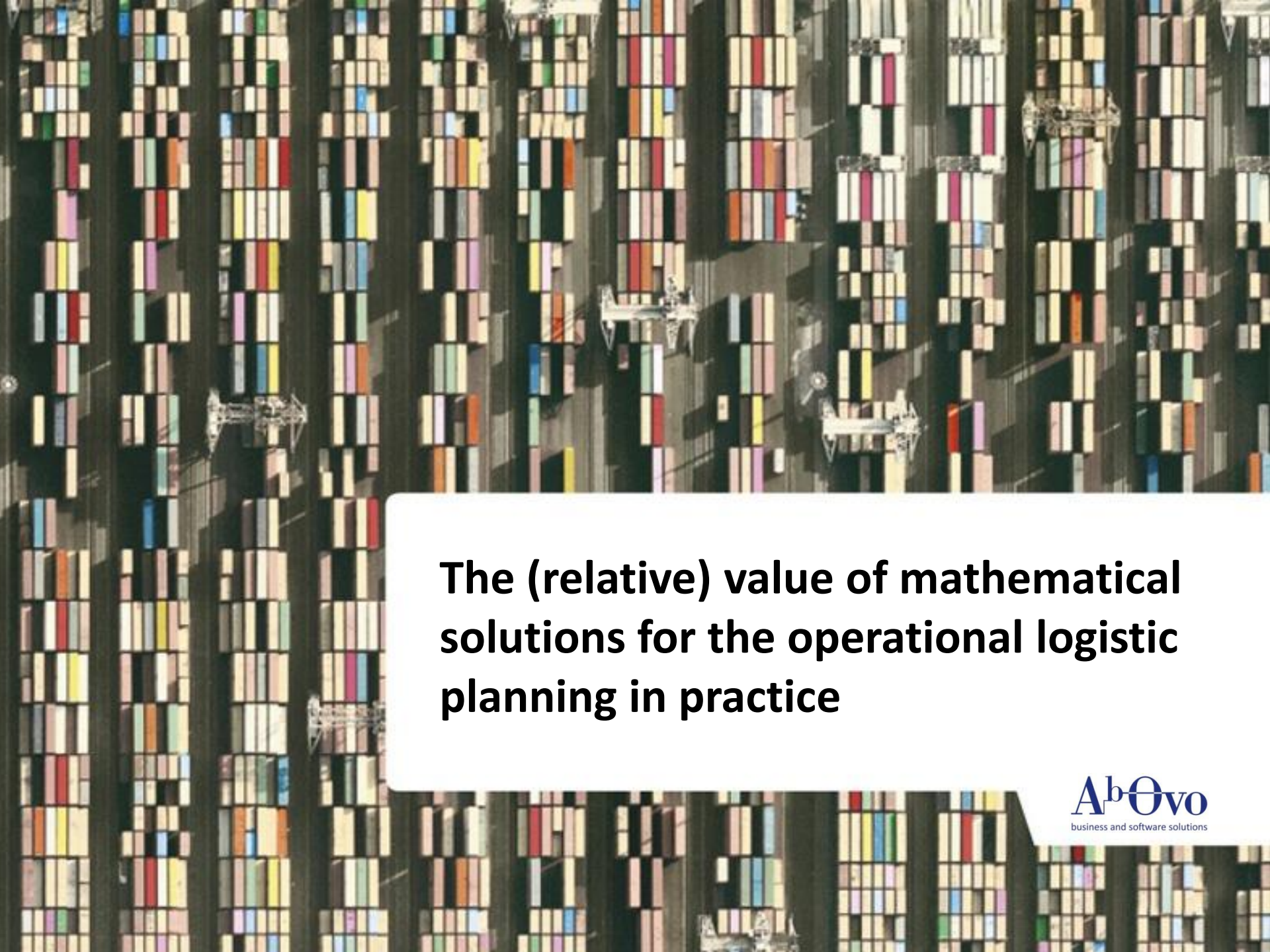

The (relative) value of mathematical solutions for the operational logistic planning in practice

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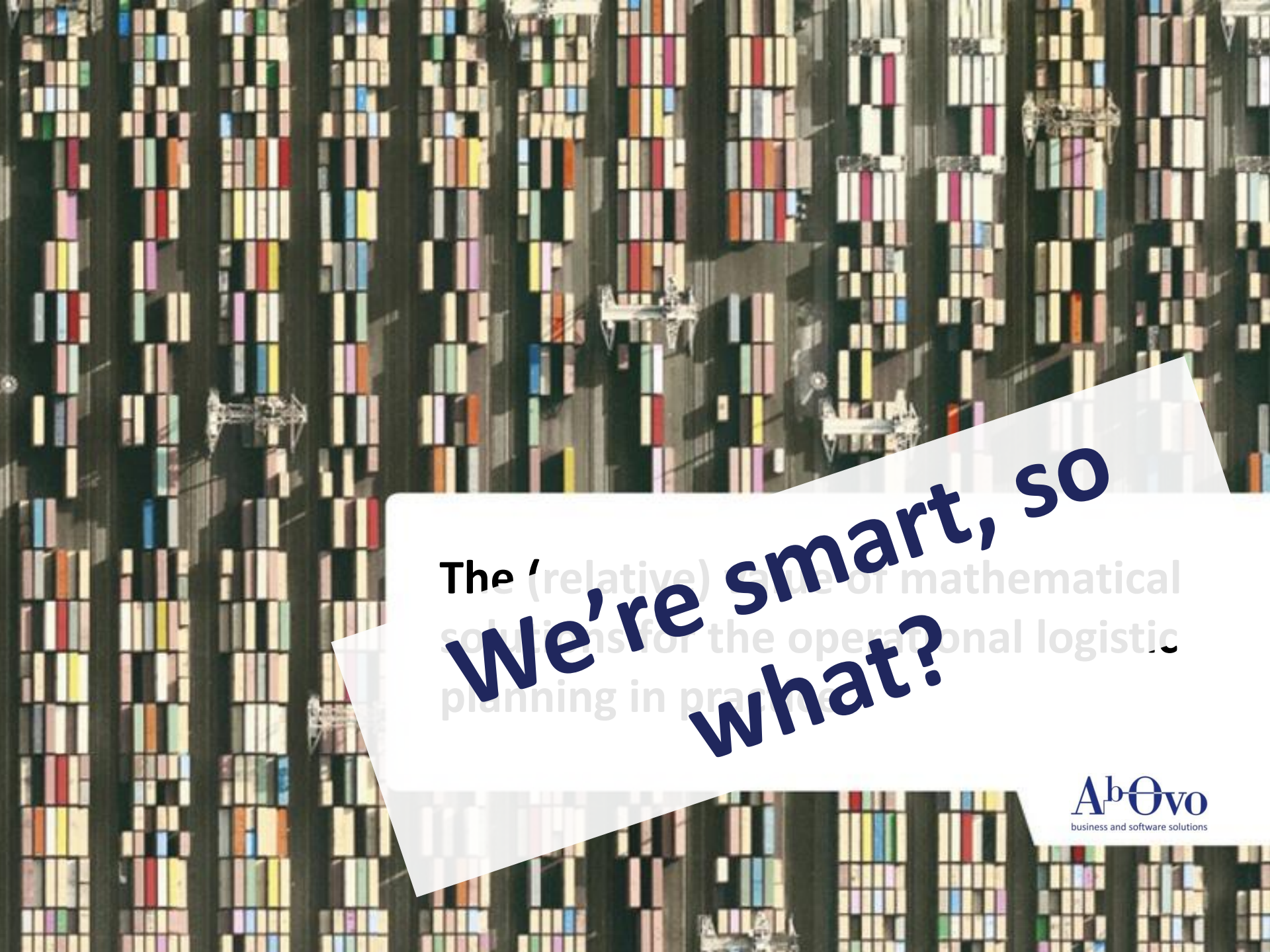
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We're smart, so what?
(relative) value of mathematical
solutions for the operational logistic
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Michiel de Neef - Bio

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Michiel de Neef - Bio

- Econometrics – Erasmus University Rotterdam
  - Thesis: “Order acceptance using Fuzzy Logic”
- Developer
  - Delphi, AIMMS, Quintiq
- Business Consultant
  - Process industry, Logistics puzzles (Rail, Maritime)
- Project manager
- Business Unit Director
  - Managing a team of 55 highly educated professionals to deliver planning solutions to logistical companies

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Agenda

- About Ab Ovo
- Typical planning landscape
- Operational planning
- Best practice
- Key messages

„Ab Ovo usque ad mala“

The Romans began the meal with traditional eggs ("ovo"), and they concluded with apples ("mala")…from start to finish

Ab Ovo business philosophy

- We accompany our customers holistically, from strategic roadmap to implementation
- We design and implement planning systems at our customers
- We advise our customers and run through the change process together
- We think in solutions and after all in realization

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Profile

Ab Ovo is an independent business and software solutions provider

- Established in 1997
- >100 employees and a turnover of 15 million EUR in 2014
- Offices in Rotterdam (HQ), Amsterdam, Düsseldorf and Stockholm
- Customer retention rate above 80%

Market focus and competencies

- Rail, Maritime, Logistics, Supply Chain, and Freight Forwarding
- Logistics and industry process know-how, project management, Lean Six Sigma, mathematical optimization, change management, Advanced Planning & Scheduling, (strategic) scenario planning

Partnerships

QUINTIQ AIMMS KING ICT ipopema Business Consulting DINALOG Dutch Institute for Advanced Logistics

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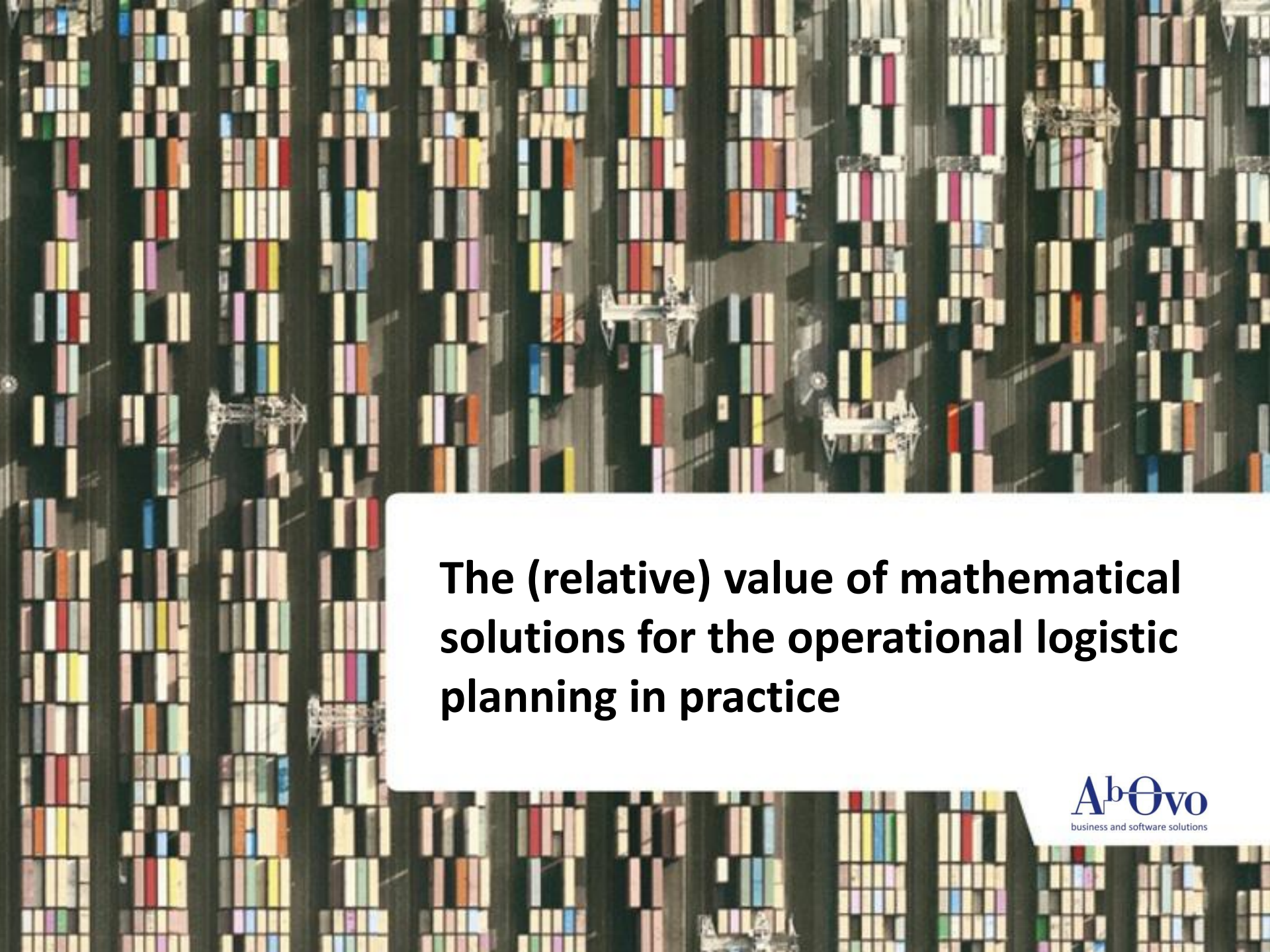
Ab Ovo references

Rail	DB SCHENKER	green cargo	VR	First transforming travel	HECTORRAIL
	Slovenske železnice	SNCB Logistics	HŽ CARGO		EESTI RAUDTEE
	EURAILSCOUT	ProRail	one	duisport rail	European Rail Shuttle
	ntv Nuovo Trasporto Viaggiatori	EWS	NX National Express Group		
Maritime	HÖEGH AUTOLINERS	WALLENIUS WILHELMSEN LOGISTICS	MAERSK LINE	Port of Rotterdam	Zeeland Seaports
	UECC	EMO	Vopak		
Logistics	RHENUS LOGISTICS	Staalduinen logistics	BUDELPACK	InterBulk GROUP	RIJK ZWAAN
	DHL	Wincanton			
Air	transavia.com	KLM	KLM Catering Services	Martinair	Schiphol Group
	DFS Deutsche Flugsicherung				



The (relative) value of mathematical solutions for the operational logistic planning in practice

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Operational Planning - Example

Level	Personnel planning	Train Planning	Loco Planning	etc
Strategic	McKinsey	Oliver Wight	Thesis / Student	
Long term	CR 	Bespoke 	Round Trips 	
Shift Planning	LR PBS 	Timetable 	Actual loco 	
Operational	???			

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System characteristics

- Strategic
  - Plenty of time to make calculations
  - Input for decision layer
  - Based partly on assumptions
- Long term
  - Time for calculations
  - Based on validated assumptions
- Short term
  - Take into account real information
  - Less time for calculations
- Operational level
  - No time for calculations
  - Based on a continues inflow of real data

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Goal of the operational planning

- Execute the plan, taking into account ALL constraints
  - ALL, the plan needs to be feasible
- So a minor disruption could trigger a full reoptimization of
  - Personnel planning
  - Train planning
  - Loc planning
- What is the chance the new plan is more or less the same as the old plan?
  - Typically very slim
  - But…
- What is the use of that plan, when during recalculation, the environment has changed?

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Remember system landscape

- Different systems for different planning puzzels
- Operationally no time available
- No time for data exchange
- Separate operational planning system

- Possibilities for local optimization

Level	Personnel planning	Train Planning	Loco Planning	etc
Strategic	McKinsey	Oliver Wight	Thesis / Student	
Long term	CR	Bespoke	Round Trips	
Shift Planning	LR PBS	Timetable	Actual loco	
Operational	???			

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Operational environment

- Execute the plan, taking into account ALL constraints
  - ALL, the plan needs to be feasible
- Plus:
  - Minimize deviations from the plan
- So
  - Combine all puzzles
  - Feasible solution
  - Additional constraint

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Operational environment

- Local optimization needed
  - Heuristics
  - Robust optimization

- No optimality in OR terms
- Optimality in Business terms

Agenda

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Default approach (best practice)

- Solve the puzzle with hard OR
  - Internships, R&D projects
- Solve the puzzle with heuristics
  - Benchmark against the hard OR solution
- Implement the heuristic
  - In joint effort with the customer
  - Local optimization for operational use

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Key message

- More research needed on robust optimization
  - In result stability
  - In data input
- Heuristics are key in an **operational** business environment
  - The planner need to understand the solution
  - Else the operation will not accept nor execute the solution
  - Calculation time is key

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