

AI in Freight Rail and Multi Modal Transportation

IBM TRAVEL & TRANSPORTATION INDUSTRY

What business are you in?



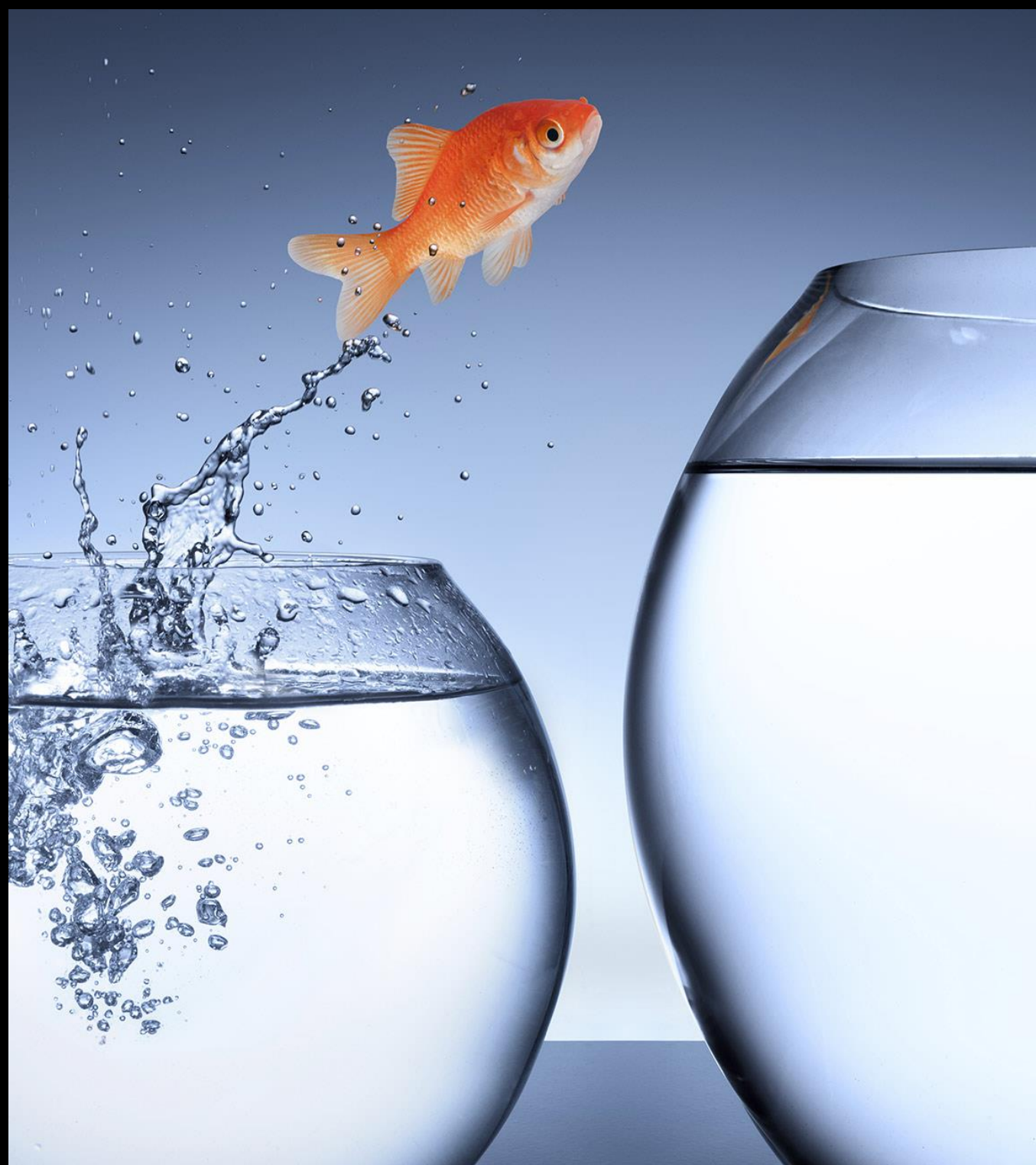
Think Beyond the Rails



The AI Opportunity

AI could potentially deliver additional global economic activity of around **\$13 trillion globally by 2030**, or about 16 percent higher cumulative GDP compared with today

This amounts to about 1.2 percent additional GDP growth per year



6 out of 10
people in this
room use AI
every day



Business trends accelerating AI

Challenges

- Customers demand more control over their transportation needs
- Companies need to tackle mountains of structured and unstructured data
- Freight and logistics operations providing reliable service and deploying resources

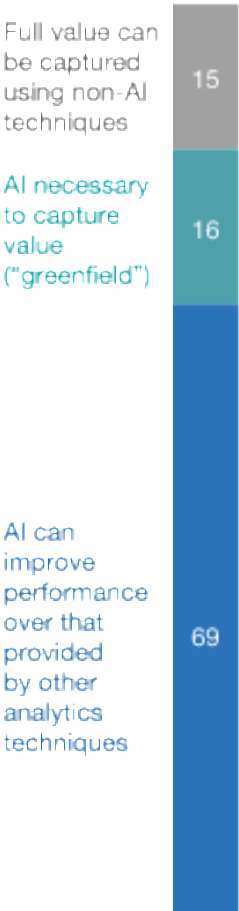
Solutions

- AI can harness data and help freight and logistics companies achieve the interconnected vision
- AI enables freight and logistics marketing and sales functions to deliver personalized offers

According to a McKinsey study, the Transport and Logistics industries can capture the among highest value increase from AI /ML based solutions

In more than two-thirds of our use cases, artificial intelligence (AI) can improve performance beyond that provided by other analytics techniques.

Breakdown of use cases by applicable techniques, %

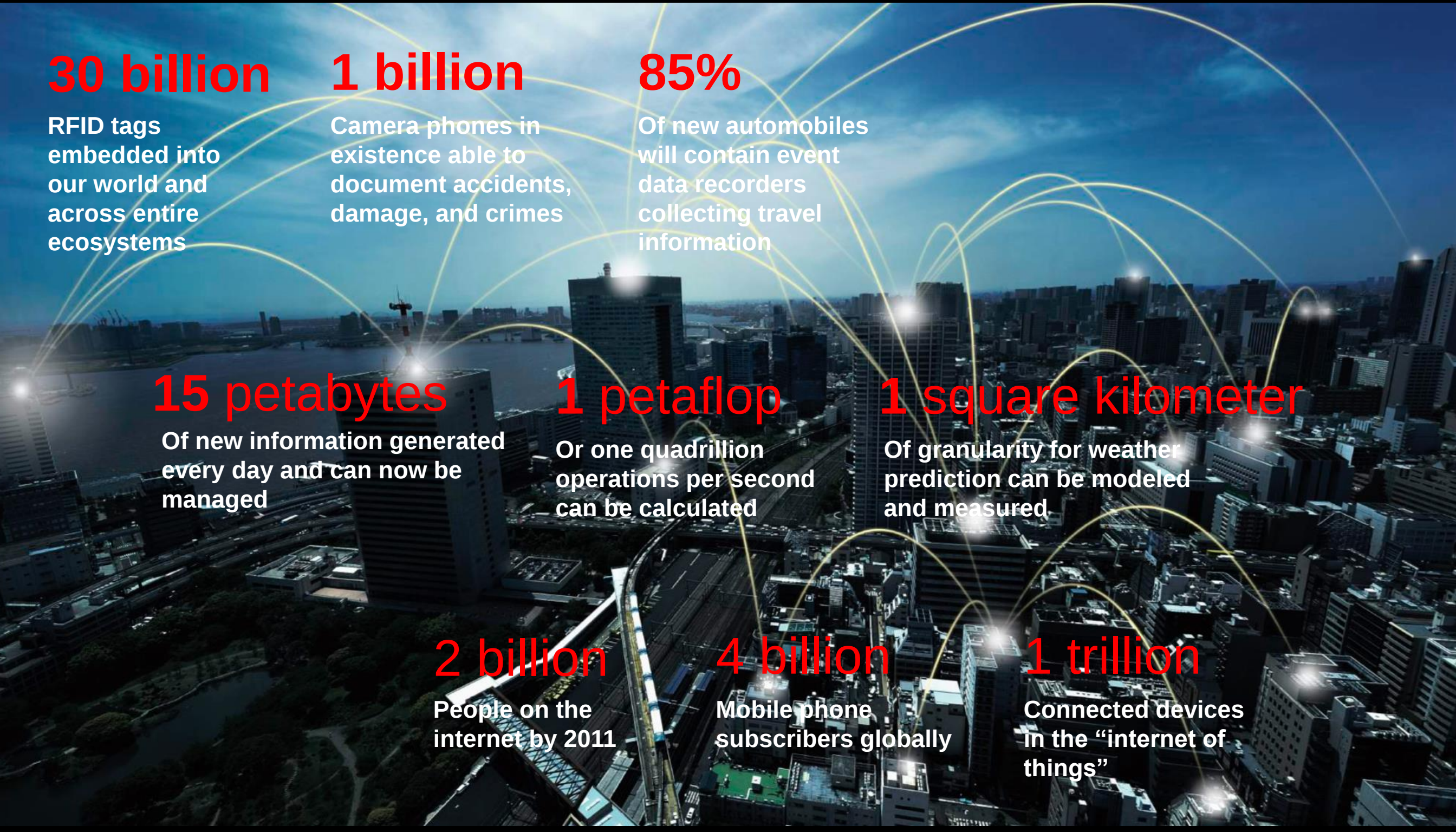


Retail
Transport and logistics
Travel

Potential incremental value from AI over other analytics techniques, %



Aggregate dollar impact (\$ trillion)		Impact as % of industry revenues	
Retail	0.4–0.8	3.2–5.7	
Transport and logistics	0.4–0.5	4.9–6.4	
Travel	0.3–0.5	7.2–11.6	



30 billion

RFID tags
embedded into
our world and
across entire
ecosystems

1 billion

Camera phones in
existence able to
document accidents,
damage, and crimes

85%

Of new automobiles
will contain event
data recorders
collecting travel
information

15 petabytes

Of new information generated
every day and can now be
managed

1 petaflop

Or one quadrillion
operations per second
can be calculated

1 square kilometer

Of granularity for weather
prediction can be modeled
and measured

2 billion

People on the
internet by 2011

4 billion

Mobile phone
subscribers globally

1 trillion

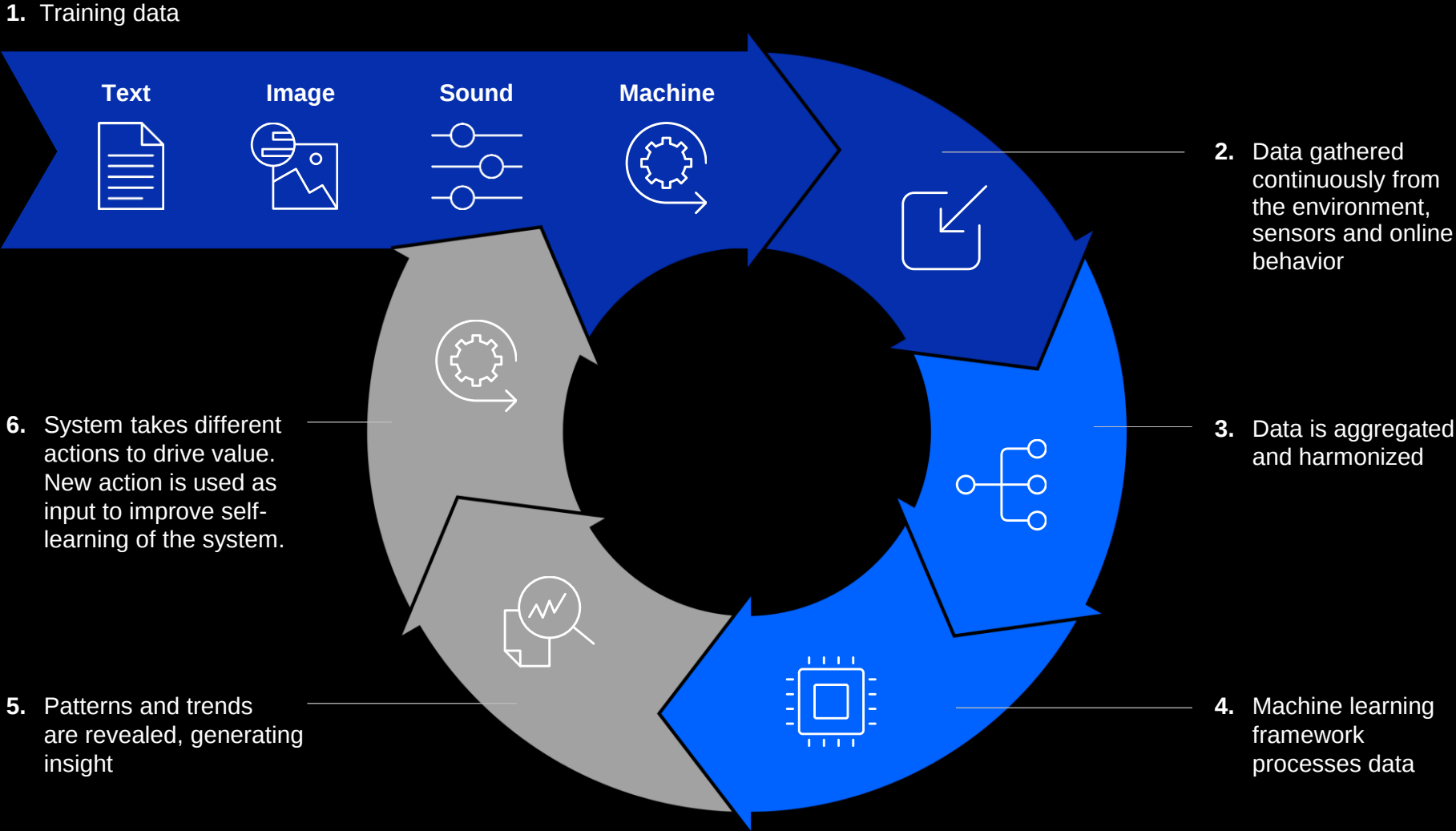
Connected devices
in the “internet of
things”

How do you
make sense of
all this data?

80% is not
captured by
companies
today... and
data is not
information or
insight

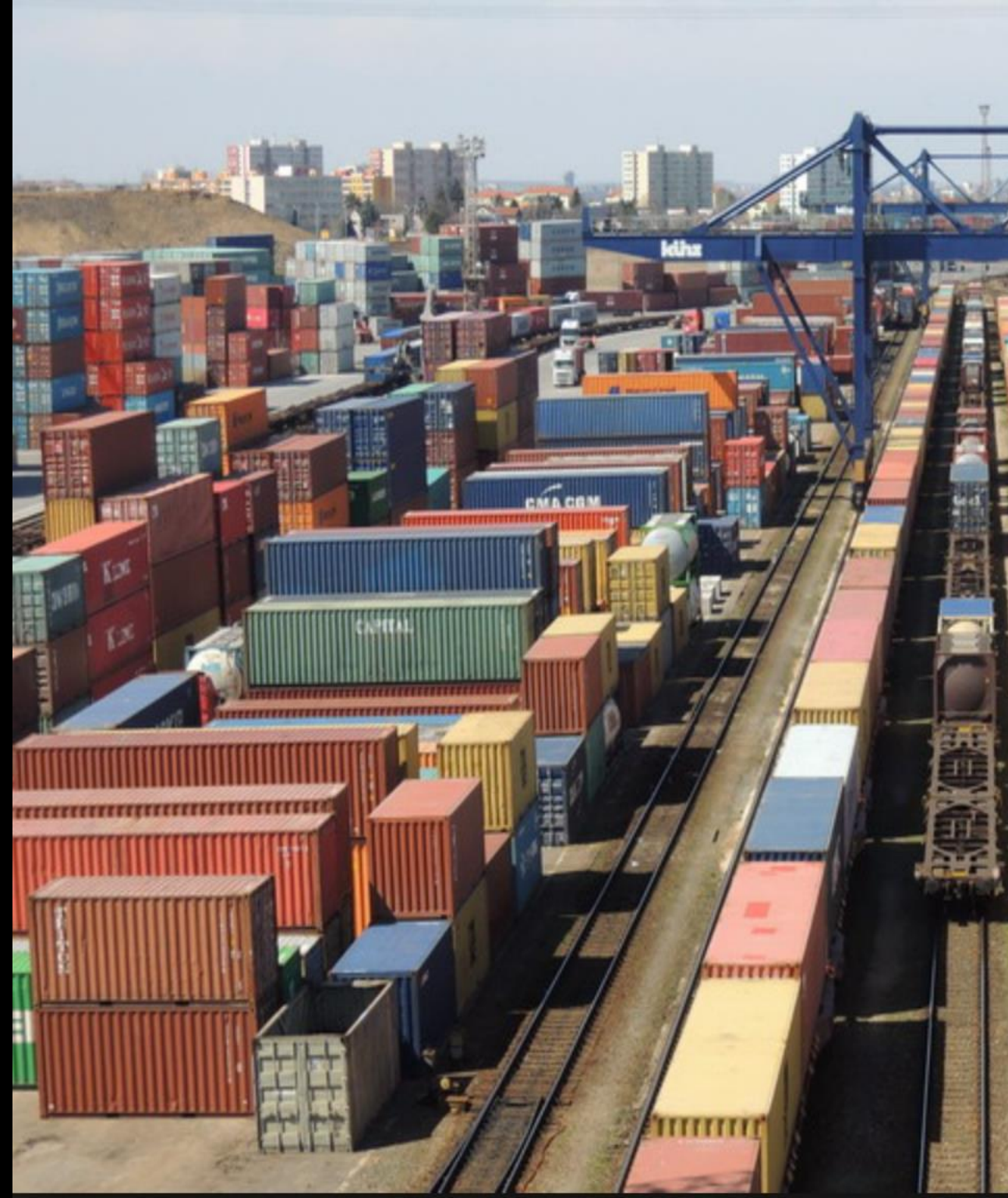
The full AI learning cycle

- Sensing**
How machines perceive
- Processing**
Ingesting and organizing large volumes of data
- Learning**
How machines acquire and build on knowledge, and generate insights that improve continually



Use Case: AI powered visual inspection for rail and multi-modal yard management

- Drone provides automatic, accurate, fast, and safe inventory checks
- AGV's with telescoping camera masks
- CCTV cameras connected to cloud-based AI image recognition
- Gives visibility into
 - Inventory
 - Productivity
 - Safety



Use case: AI powered visual inspection

Edge Camera devices installed along a train track uploads images to Watson where AI image classifiers identify damage.

- Cognitive visual recognition
- Inspect wear and damage to physical assets
- Determine appropriate corrective action
- Accuracy improved to over 98%



Use case: anticipatory logistics

Relationship between logistics providers and consumers is changing. AI can help personalize these interactions to increase customer loyalty and retention.

- Predict what customers will purchase
- Sources Vast and varied data – browsing behavior, purchase history, weather, social media chatter and news reports
- Shorten delivery times – move inventory and resources to meet anticipated demand



Use Case: Cargo Customs & Compliance with Artificial Intelligence

Increase of sales and compliance agent
responsiveness on handling Booking requests

Reducing and optimizing the time spent on
repairs of non-compliant Shipments

Reducing or eliminating fines due to non-
compliance by reduce fine amount as a result
of lower false positives

Benefits and business value will apply to both
Air Cargo Carriers and Freight Forwarders



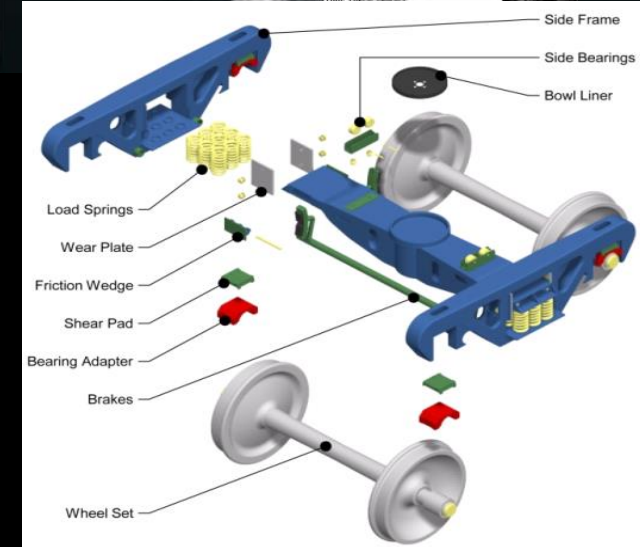
Use case: sensor fusion for anomaly detection

Edge Devices collecting data on wagon
and Locomotive Data

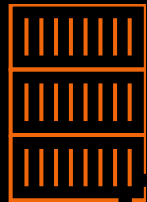
Using data analytics and machine
learning coupled with the vast amount of
data collected through sensors

Find patterns in alarms

AI to recommend next best action



GLOBAL TRADE IN NUMBERS



\$16+ TRILLION IN GOODS

ARE SHIPPED ACROSS
INTERNATIONAL BORDERS EACH
YEAR



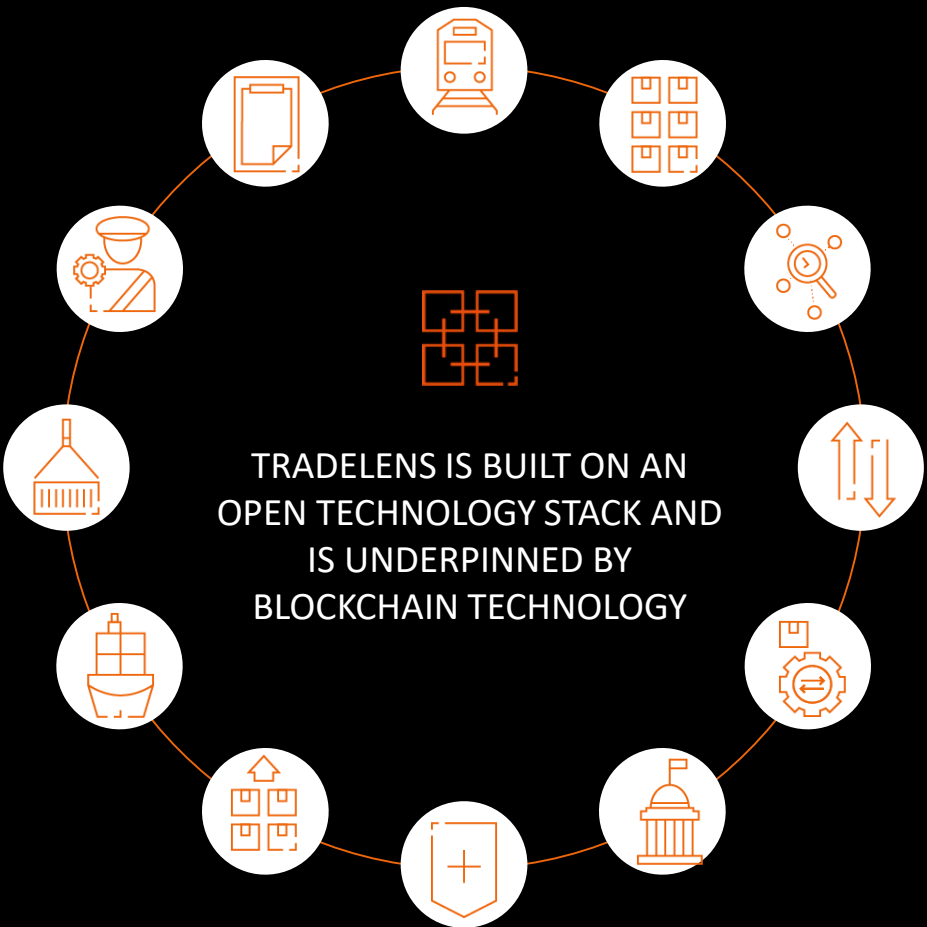
80% OF THE GOODS

CONSUMERS USE DAILY ARE
CARRIED BY THE OCEAN
SHIPPING INDUSTRY



BY REDUCING BARRIERS WITHIN THE
INTERNATIONAL SUPPLY CHAIN, GLOBAL
TRADE COULD

**INCREASE BY NEARLY
15%**



OUR MISSION

DIGITIZE THE GLOBAL SUPPLY CHAIN

- **Connect the ecosystem**
- **Drive true information sharing**
- **Foster collaboration and trust**
- **Spur innovation**
- **100+ Ecosystem Members**
- **40M+ Containers Tracked**
- **675M+ Events**
- **5.7M+ Documents**

Use case: Customer service

What is the least expensive mode of transportation to achieve a 5 day lead time

What is the ETA for order 1234?

What sales orders have a requested ship date of tomorrow

Are there any delayed shipments for carrier XYZ?

Which supplier has the best on-time delivery performance?



Accelerating advances in technology and transforming every part of your rail and logistics business



Cognitive analytics



Cloud computing



Pervasive connectivity



Product Lifecycle Management



Embedded sensors

Improving operations and lowering costs



Creating new products and services



Driving engagement and customer experience



Partnered Innovation

- Open ecosystem
- Device partnerships
- Embedded security
- Edge Analytics



Data Integration

- Weather data
- Social data
- Application data
- Platform of platforms



Advanced Analytics

- Predictive Analytics
- Real-time Analytics
- Data Mining
- Optimization



Cognitive Technology

- Natural Language Processing
- Machine Learning
- Textual Analytics
- Video/Image Analytics



VITTORIA
Bulk Carrier

STATUS OK

STATUS FAULT

DREDGE
PLANNED

ETD 14:42

UNAUTHORIZED
CONTAINER

Container: YAKU0908852
Shipment: 762384641
Origin: MOL
Time: 11:36:28
Destination: Shanghai, CN

INSPECTION

NETWORK OK

Container: PONU0408148
Shipment: 962354649
Origin: Maersk Line
Time: 47:16:55
Destination: Gdansk, PL

APMT Crane

Container: HYDA02257814
Shipment: 142933420
Origin: Hyundai
Time: 148:22:39
Destination: Rotterdam, NL

PROJECT
I.0201854

ETA 12:31

COLLISION
RISK

CMA CGM MOLIERE
Container Ship

DREDGE
PLANNED

ROUTE OK

ECT Crane

Container Area 52

ECT Building 42

AVAILABLE

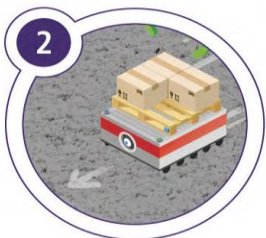
ECT Crane

Port of
Rotterdam

SEEING, SPEAKING & THINKING LOGISTICS OPERATIONS



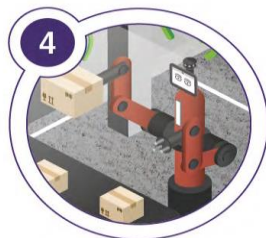
1
Vision-based inventory management



2
Self-learning & self-navigating AGVs



3
Machine-video perception



4
Vision-based intelligent sorting



5
Autonomous delivery fleet



6
Conversationally enabled WMS system



7
AI driven inspection



The Emerging Quantum Age



Classical

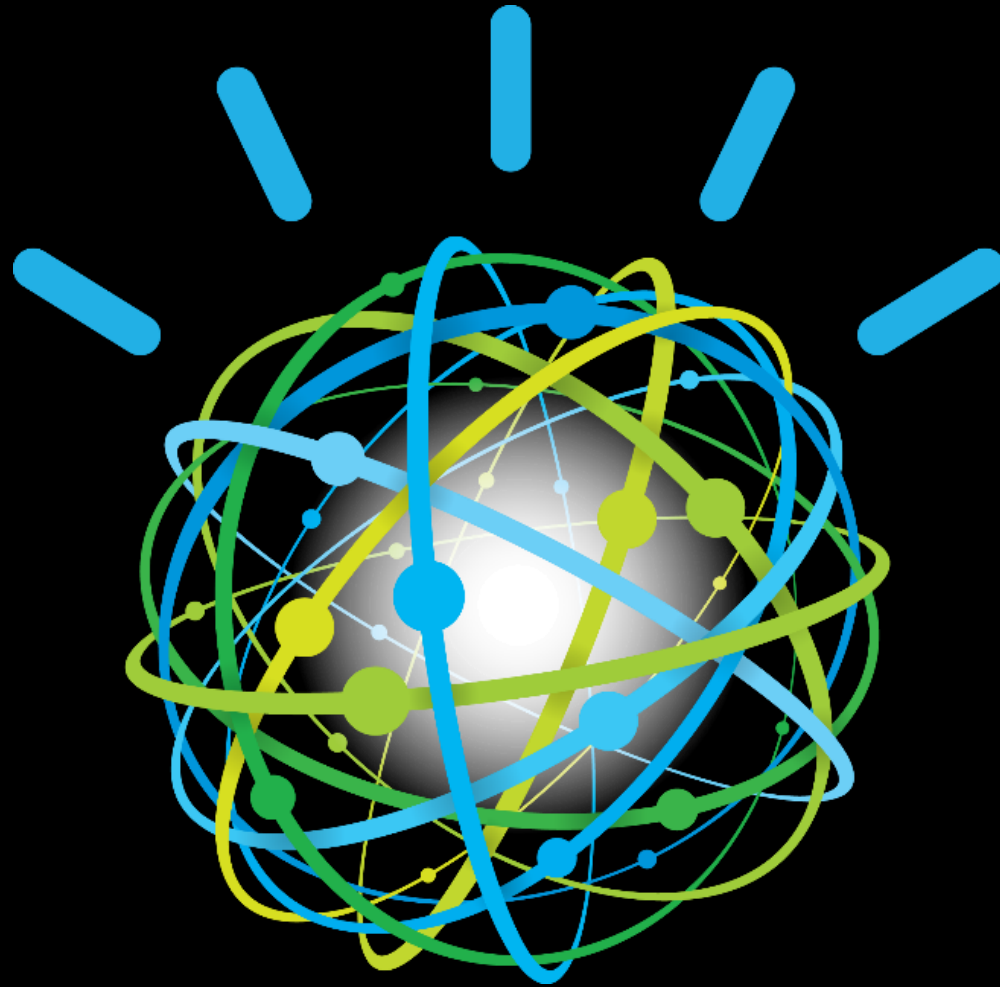
$$t \sim \exp(O(n^{1/3} \log^{2/3} n))$$

28,000,000,000,000,000,000,000 years

Quantum

$$t \sim O(n^3)$$

100 seconds



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