



The new frontiers of AI for

inventory management and planning

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Supply Chain challenges become tougher

Amazon effect + Covid + uncertain geopolitics + global warming + ... \rightarrow

3X

Organizations with effective supply chain digital transformation roadmaps are +3X as likely to see their digital supply chains succeed.

<u>Gartner</u>

90%

of the top 25 companies in the world noted for their supply chain excellence have made **significant investments in planning** solutions.

<u>Gartner</u>

50%

of supply chain organizations will **invest in applications that support artificial intelligence** and advanced analytics capabilities

<u>Gartner</u>

Supply chain professionals need more/better technology



Demand Forecasting

- Machine Learning Engine
- Historical sales, product correlations, seasonal products
- Stockout items
- **Dynamic exogenous** data (marketing operations, weather, Epidemic distribution)
- Periodic exogenous data (population, School holidays)

Orders Proposals

- Operations research for best allocation decision
- **Logistic constraints** (delivery calendar & in-transit, MOQ, Packaging priority, Service level)
- Physical constraints (Stock level, Security stock, Maximum Stock)
- Monetary constraints (Item discounts, Free delivery)
- **Demand & Reservations** (Forecasts & uncertainty, Reservations)

This is generation III of inventory planning systems

Inventory management and planning solutions evolution

Generation I Basic rules

Simple automation : Min max order proposal

Generation II APS

Statistical forecast : - Use only time data

Order calculation - Compute a single « optimal » quantity and apply basics constraints

Generation III : Integrated business planning

- AI powered forecast
- Take advantage of all good quality data

Order optimization

- Optimize : find the best solution that take in consideration
 - constraints and costs
 - For next decision
 - No uncertainty fine modelisation

Users try to use EXCEL to control and to enter data

Users use the plateform and dashboards to check and updates decisions

Generation IV?



Generation IV : Algorithmic business planning

Intertwined

through

Probabilistic

modelling

Demand Forecasting

- Machine Learning/Deep learning Engine
- **Probabilistic** / scenarios (demand / lead times)
- Coherent forecasting (Network / Multi-Echelon)
- Stock performance based forecast measure
- Historical sales, product correlations, seasonal products
- Stockout items
- **Dynamic exogenous** data (marketing operations, weather, Epidemic distribution)
- Periodic exogenous data (population, School holidays)

Orders Proposals

- Artificial Intelligence / probabilistic algorithm
- Probabilistic Network-wide computation (Multi-Echelon Inventory Optimization)
- Best allocation decision multi-step
- Supply chain Environmental constraints / objectives digital twin
 - Logistic / physical / Economic constraints
 - **Demand & Reservations** (Forecasts & uncertainty, Reservations)



How tools evolved

Gen. I

Simple automation : Min max order proposal

Gen. ll : APS

Statistical forecast : - Use only time data

Order calculation - Compute a single « optimal » quantity and apply basics constraints

Generation III : IBP

- AI powered forecast
- Take advantage of all good quality data

Order optimization

- Optimize : find the best solution that take in consideration constraints and costs
 - For next decision
 - No uncertainty fine modelisation

Generation IV : ABP

Probabilistic Forecast

- Modelize data quality
- Takes advantage of all data, even low quality data
- Explore all possibles futurs

Multiple step optimization

- Explore possibles futurs and propose the robustest and optimal decision (better KPI)
- Take in consideration many constraints and costs

Users try to use EXCEL to control and to enter data

Users use the plateform adn dashboards to check and updates decisions Users is alerted , analyse and arbitrate between good decisions



automation



multiple echelons



large scale





Generation IV Technology

Vekia's platform





Demand planner interaction

The AI explains itself





Demand planner interaction

The demand planner is in control



'der proposals				Create or
r der list tus, source of supply & total cost				
Warehouse orders 🛛 🛃 Store orders	Manual orders		Show filters Edit filt	Show all info
SOURCE OF SUPPLY	SUPPLIED SITE	STATUS	ORDER DATE	101A COS
7623 Brugge Hops	5910 Nantes warehouse	IN PROGRESS	12/10/2019	12,738.
7810 Foulouse Warehouse	5873 Vileneuve d'ascq	IN PROGRESS	15/10/2019	890.
7810 Foulouse Warehouse	3630 Marseille		13/10/2019	
910 Montpellier	5873 Nice Antipolis	IN PROGRESS	Tomorrow	378.
623 Vaterstart	5873 Toulouse	EXPORTED	12/10/2019	9,872
910 Jle Warehouse	3630 Amiens	IN PROGRESS	09/10/2019	1,056.
f 623 Fotterson	1324 Poitiers		10/10/2019	207.
278 Jaxter	7810 Toulouse warehouse	IN PROGRESS	Today	1,389.
i910 Annecy	5423 Lyon	EDITED	12/10/2019	349.
7810	9874 Monta Joan	IN PROGRESS	10/10/2019	890.



Looking into the future

What comes next with AI within 12 months?

Performance

- Even better accuracy
- Automated performance tuning
- Intelligent « Cold start » / first allocation
- Even higher uncertainty
- Even more constrainsts

User empowerment

- Easy to use, large scale data correction tools
- Even more visibility throughout the organization
- Simulation (what if scenarios)
- Situation Handling advisor

Implementation

- ERP Embedded (Dynamics 365)
- Algorithms auto- set up
- 2x Faster data connection
- Partners enabled
- Defense compliant secured environments
- Multiple time zones

New use cases

Markeplaces – Circular economy – Operations optimization – Mobile stock management (vans) - Defense



Looking into the future

What comes next with AI within 12-24 months?

Technology

- Almost real-time computation and simulation
- Even higher automation
- Multiple tenants inter-connection
- Permanent, automated, performance fine-tuning
- Chatbot interaction with the AI

Capabilities

- Transportation / sourcing selection automation
- Enhanced end2end future visibility
- Recommendations for purchase conditions negociation
- Environmental impact monitoring and optimization
- Long term planning / strategic inventory management

Implementation

- Multiple ERP Embedded
- Data auto-connection
- Public APIs
- No-code Uls



+50 countries using our solution

+10K Key Users driving their supplychain with our solution

12 years of experience

14 millions€ in R&D (10 years in ML)

35 people in the team

PHD AI, Data scientists, Data analysts, Developers

Lille / Paris



