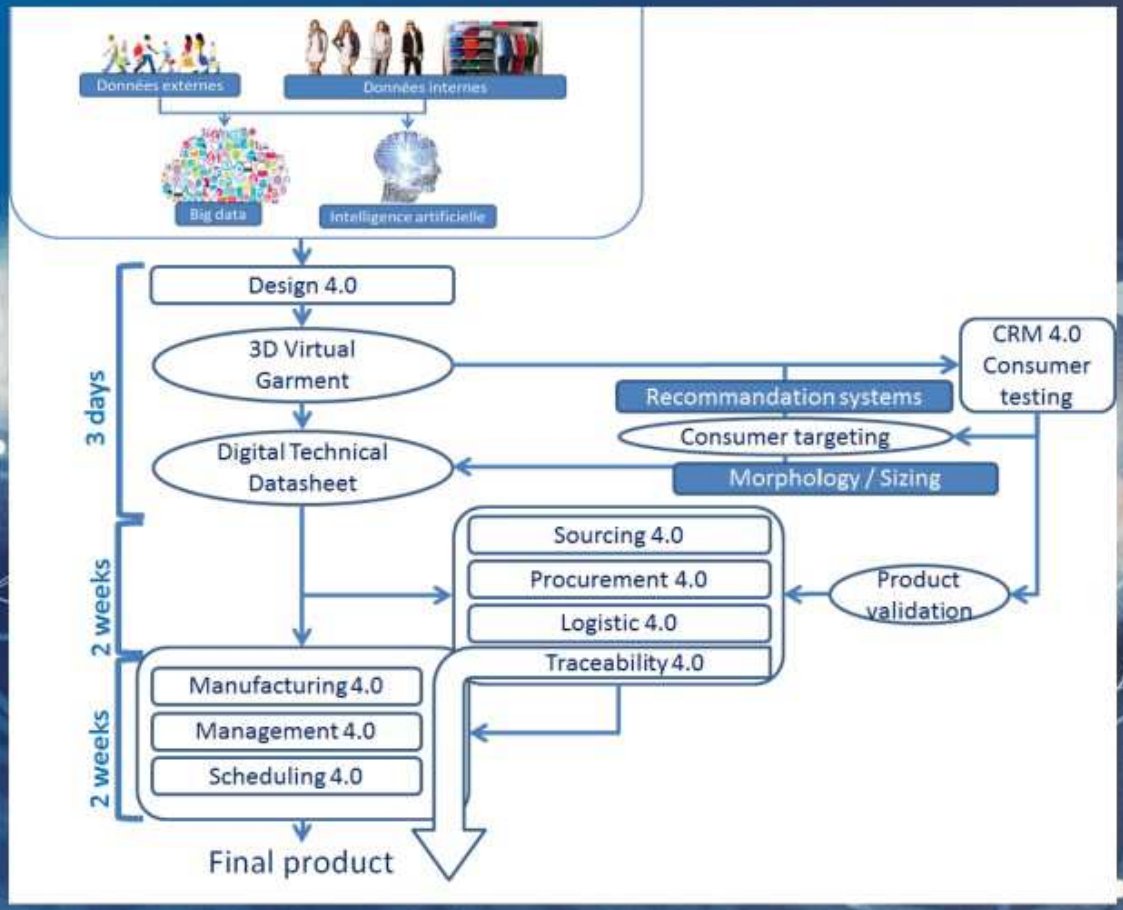
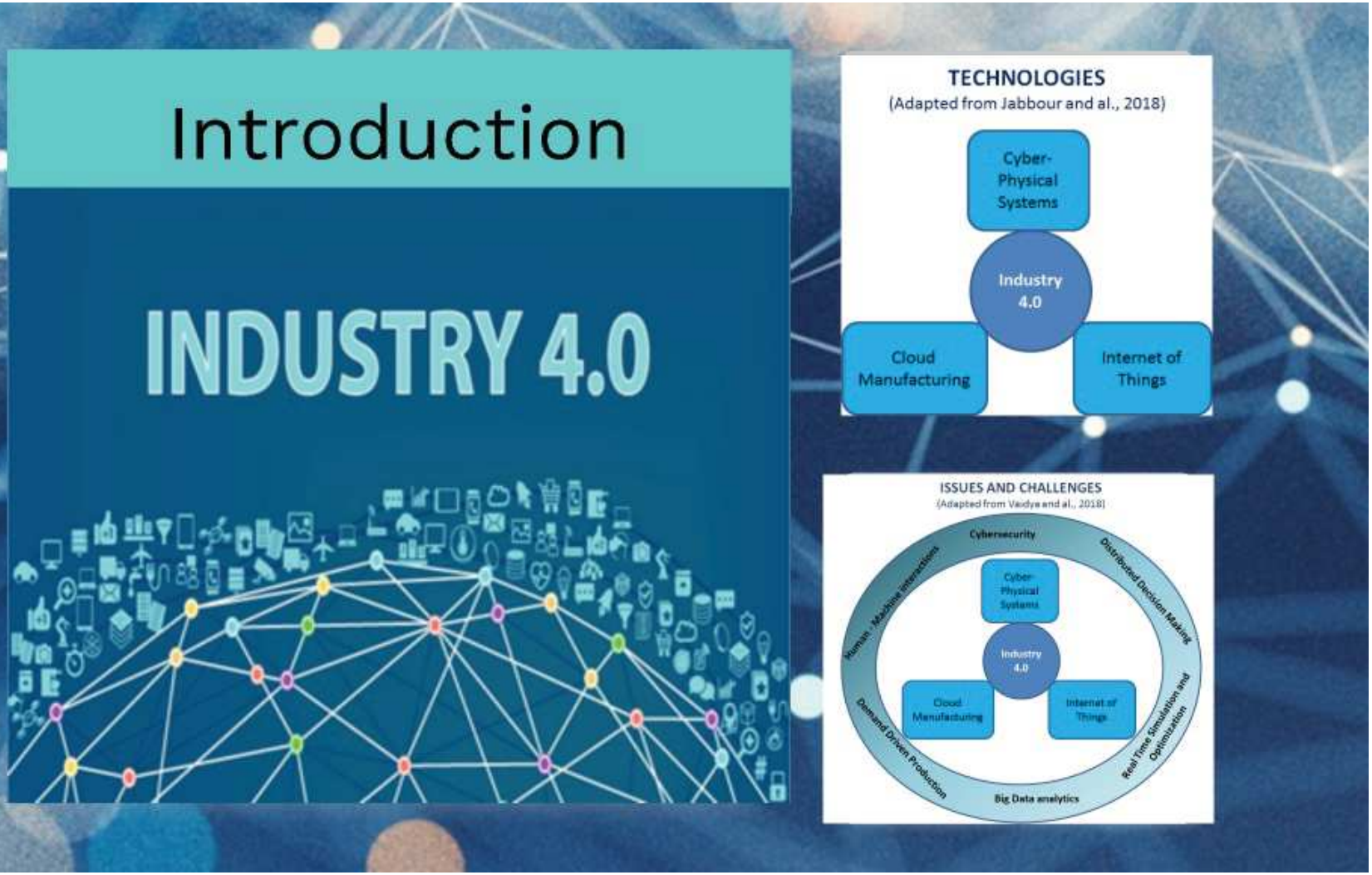
Opportunuiti

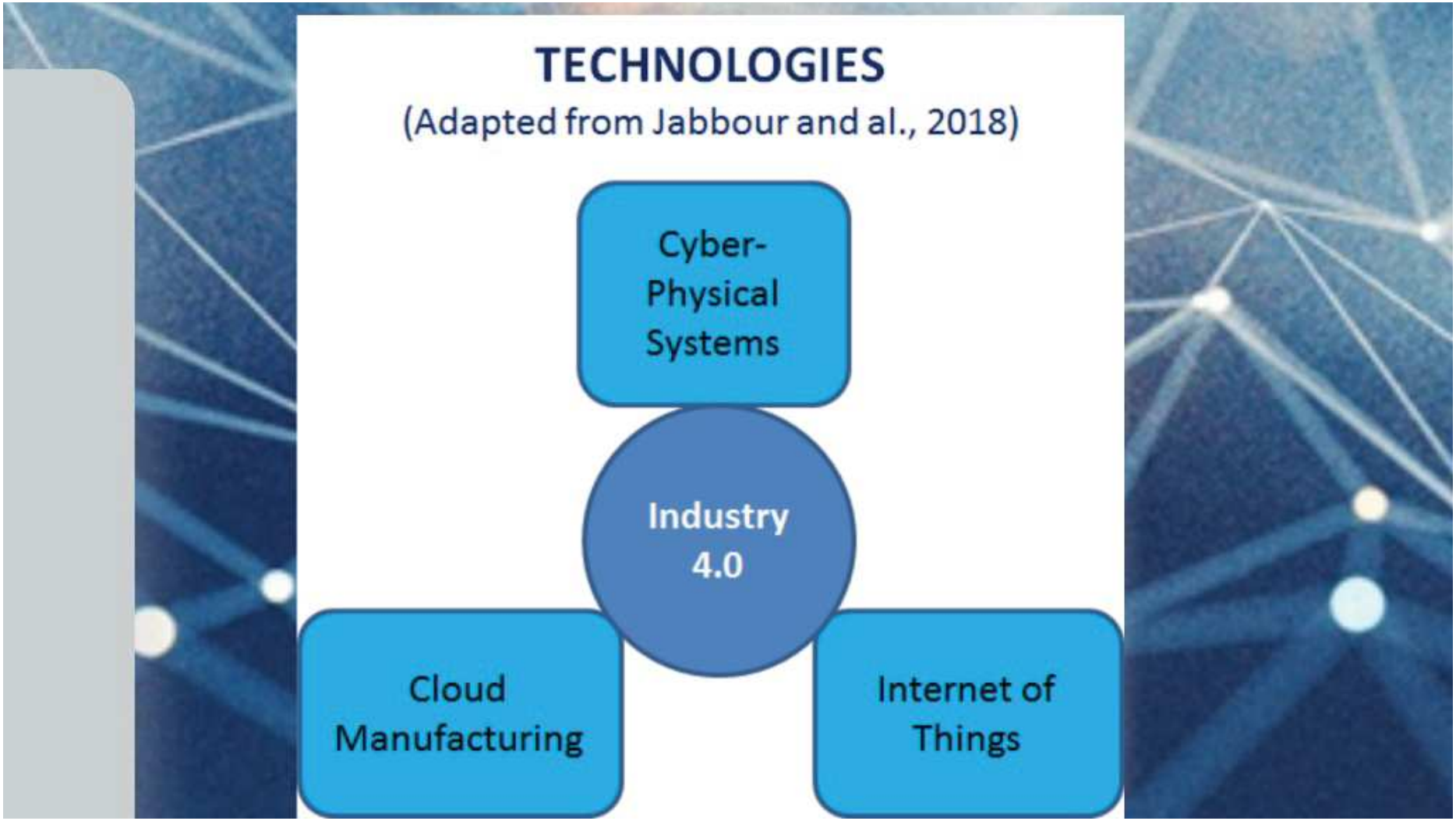
Industry 4.0 : scope and opportunities

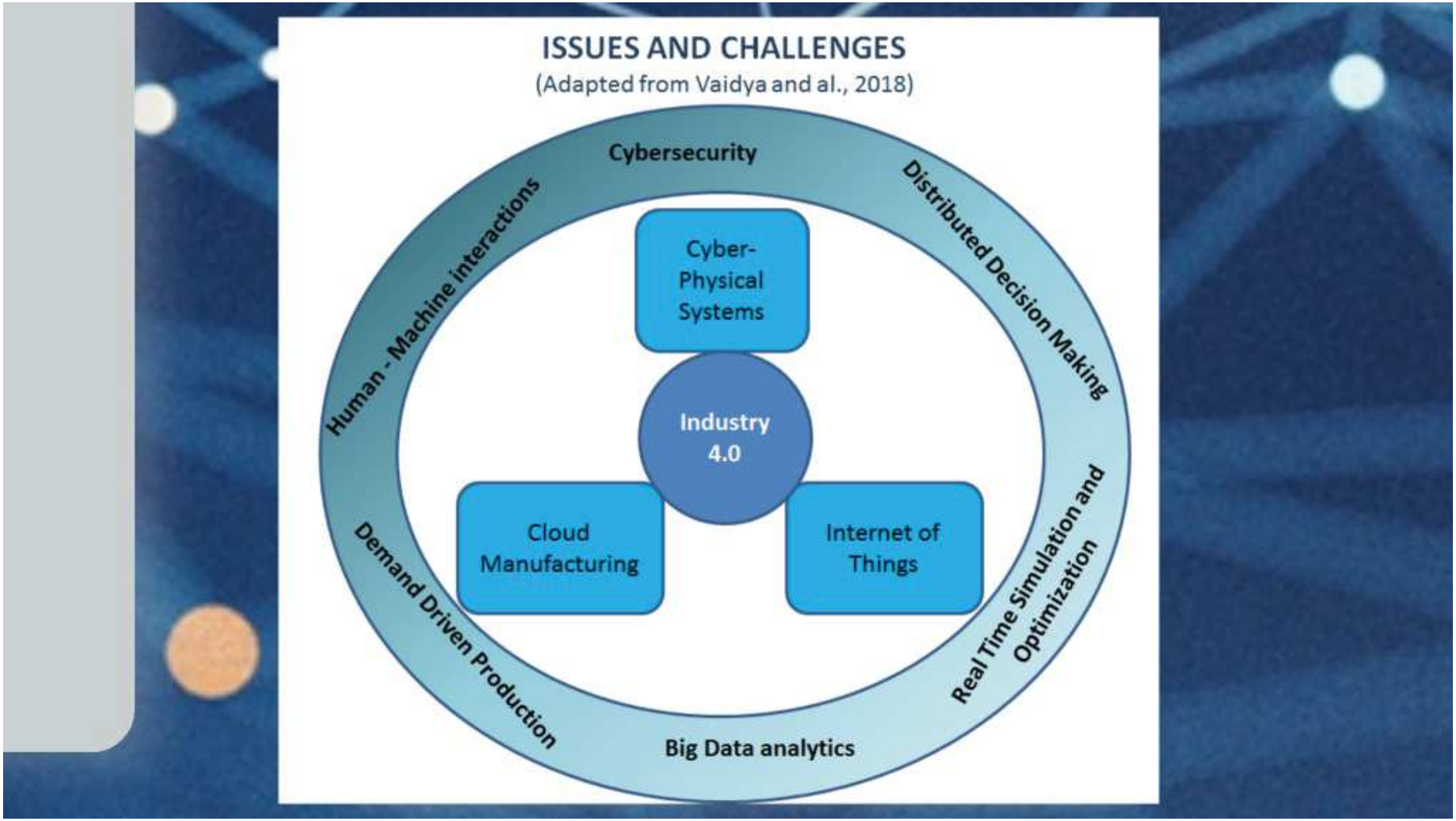
Introduction



Introduction




TECHNOLOGIES
(Adapted from Jabbour and al., 2018)
Cyber-Physical Systems
Industry 4.0
Cloud Manufacturing
Internet of Things


ISSUES AND CHALLENGES
(Adapted from Vaidya and al., 2018)
Cybersecurity
Distributed Decision Making
Real Time Simulation and Optimization
Big Data analytics
Demand Driven Production
Human - Machine interactions
Cyber-Physical Systems
Industry 4.0
Cloud Manufacturing
Internet of Things

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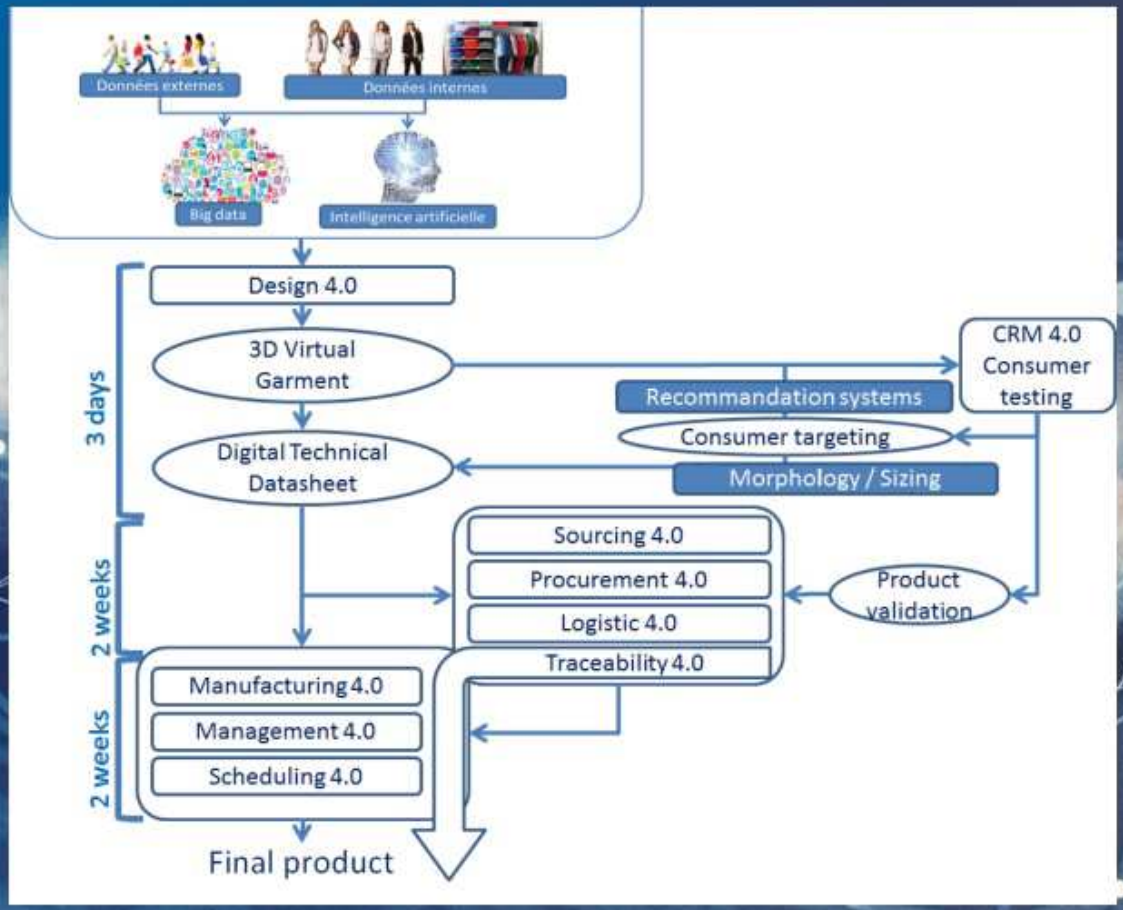
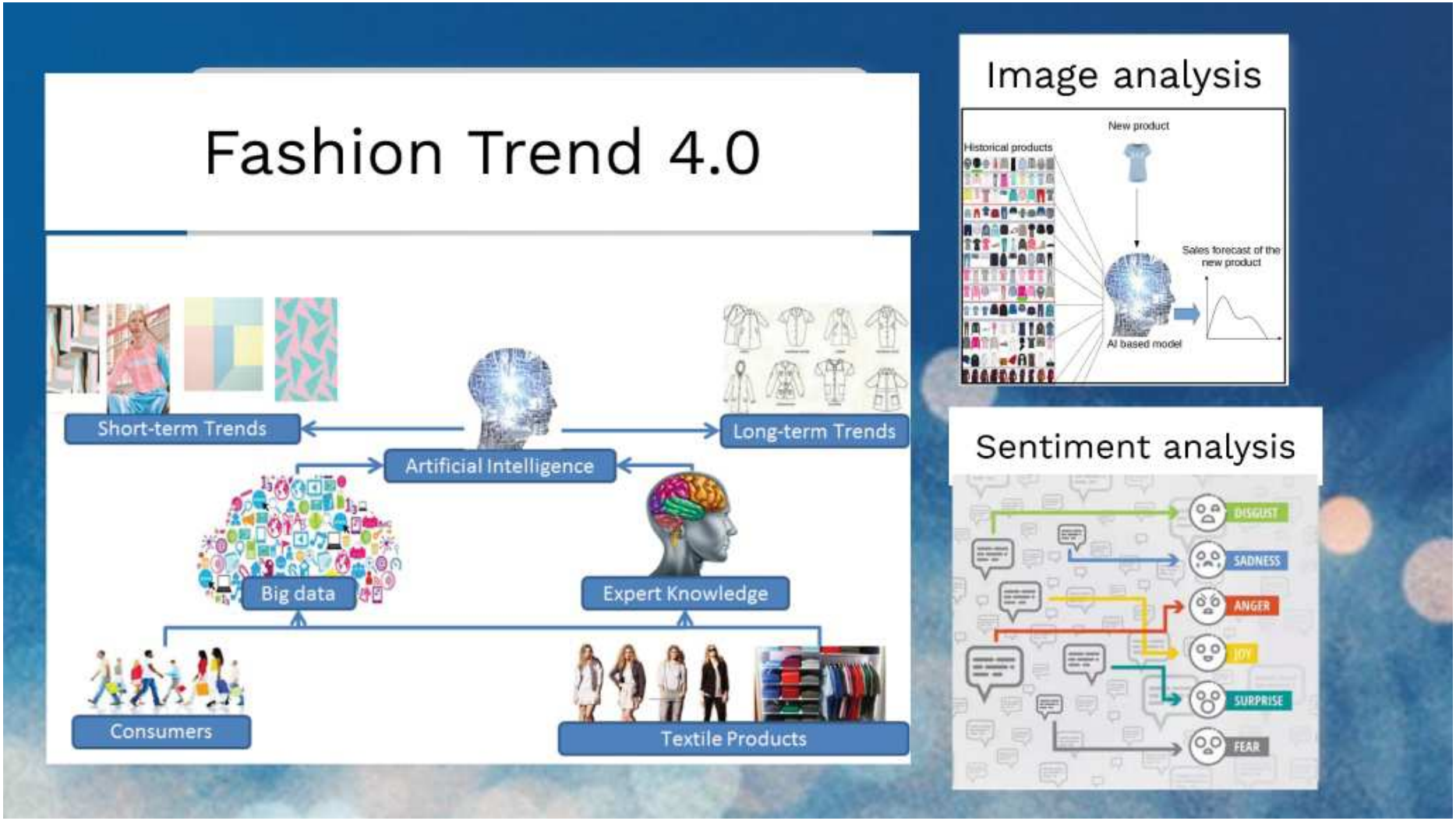
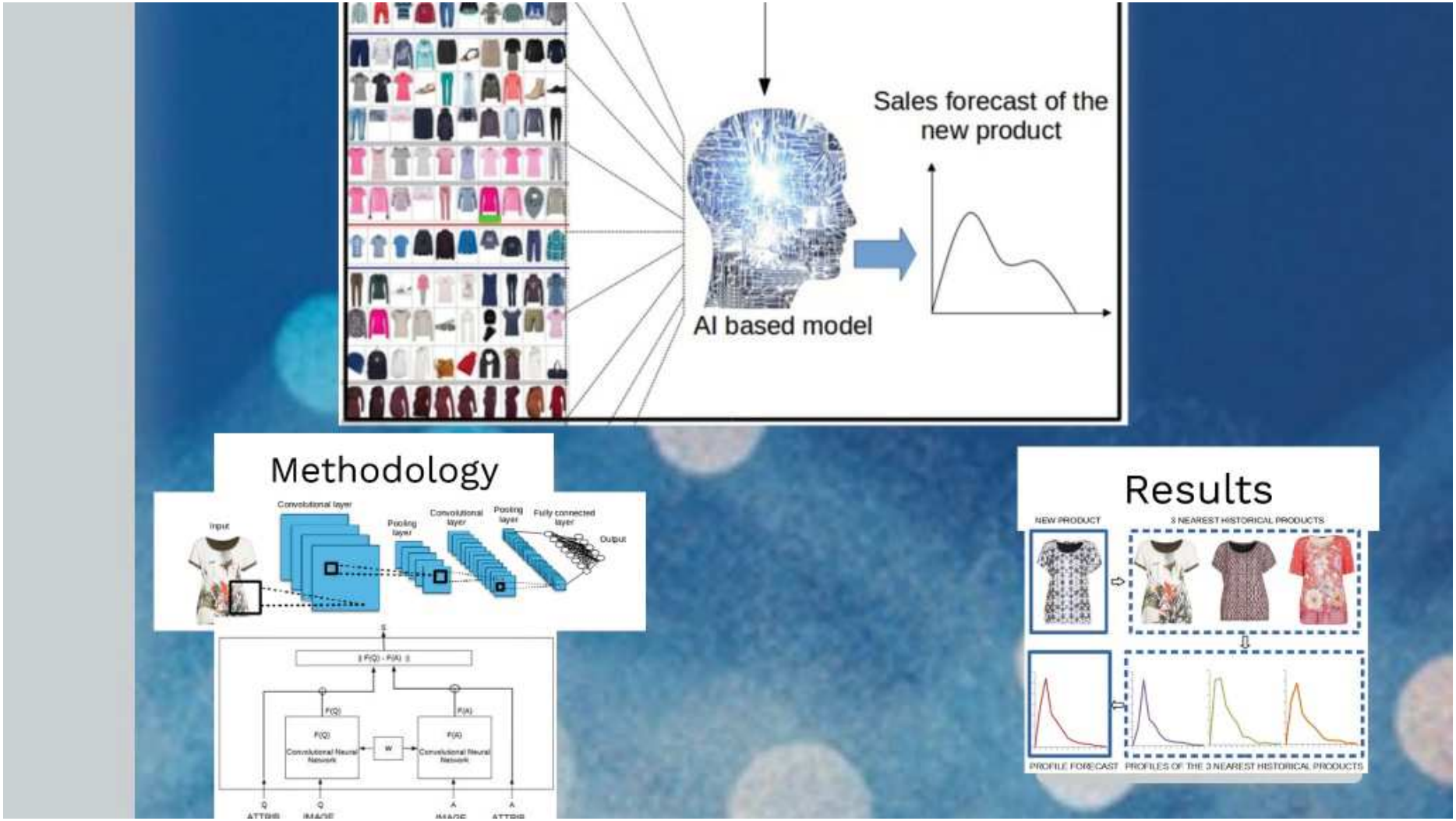
Industry 4.0 : scope and opportunities

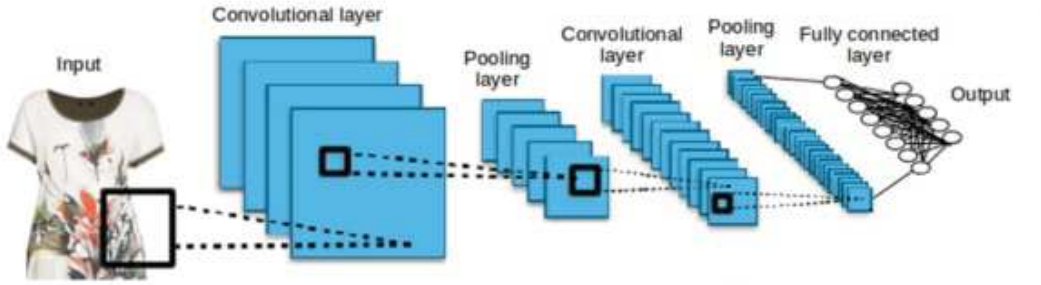
Introduction

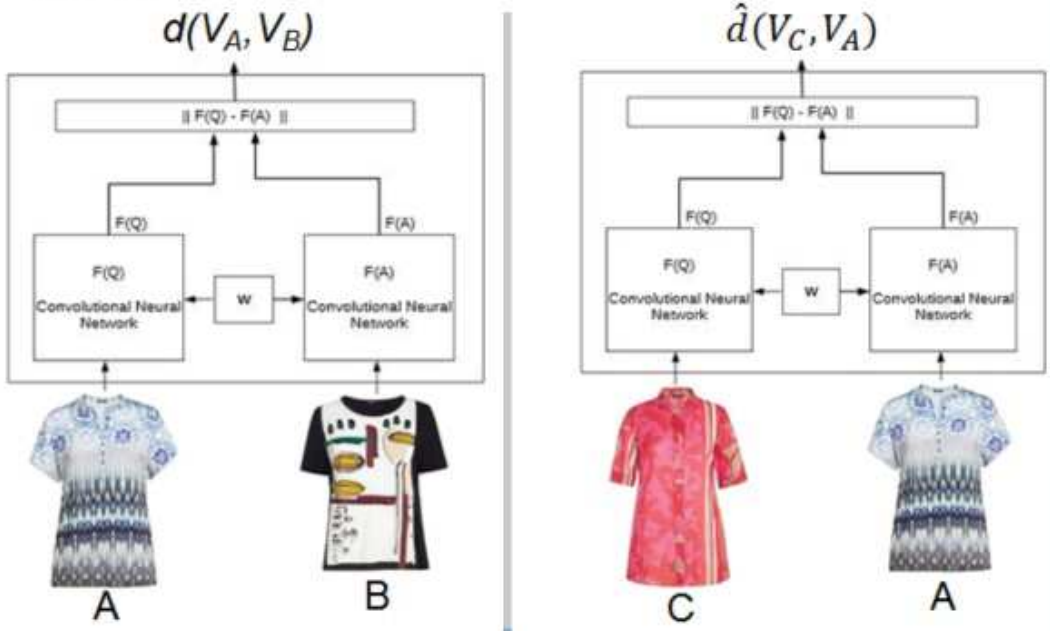



Fashion Trend 4.0
Short-term Trends
Long-term Trends
Artificial Intelligence
Big data
Expert Knowledge
Consumers
Textile Products
Image analysis
New product
Historical products
Sales forecast of the new product
AI based model
Sentiment analysis
DISGUST
SADNESS
ANGER
JOY
SURPRISE
FEAR

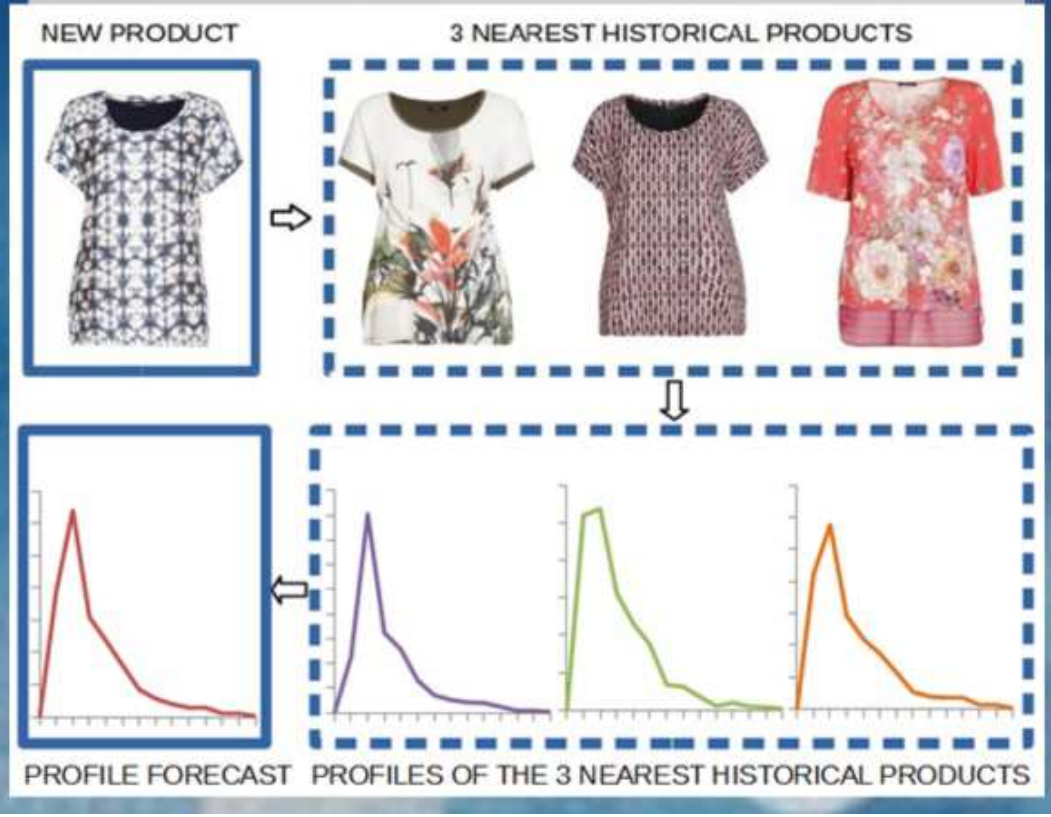

Sales forecast of the new product
AI based model
Methodology
Input
Convolutional layer
Pooling layer
Convolutional layer
Pooling layer
Fully connected layer
Output
Results
NEW PRODUCT
3 NEAREST HISTORICAL PRODUCTS
PROFILE FORECAST
PROFILES OF THE 3 NEAREST HISTORICAL PRODUCTS

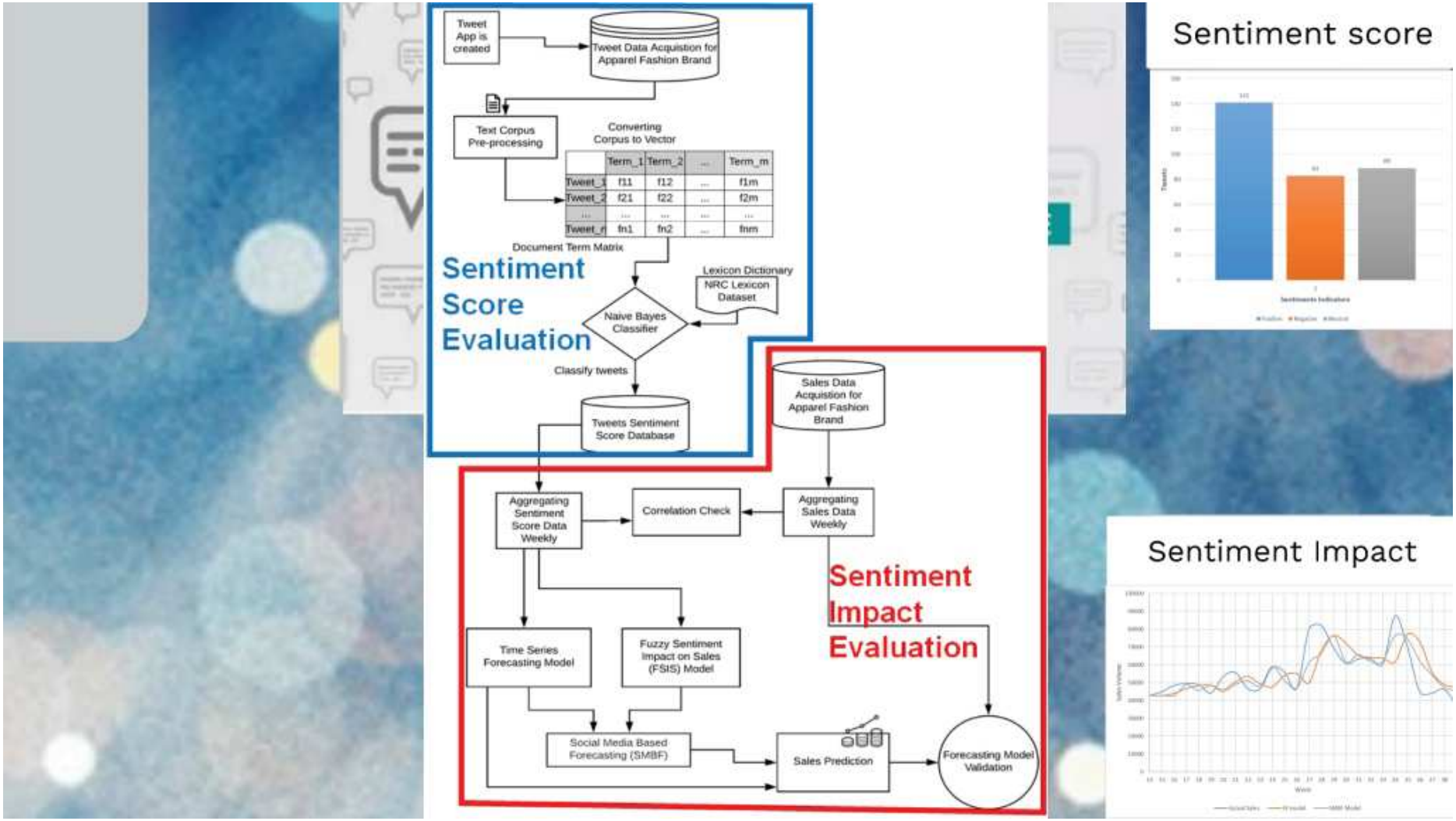
Methodology



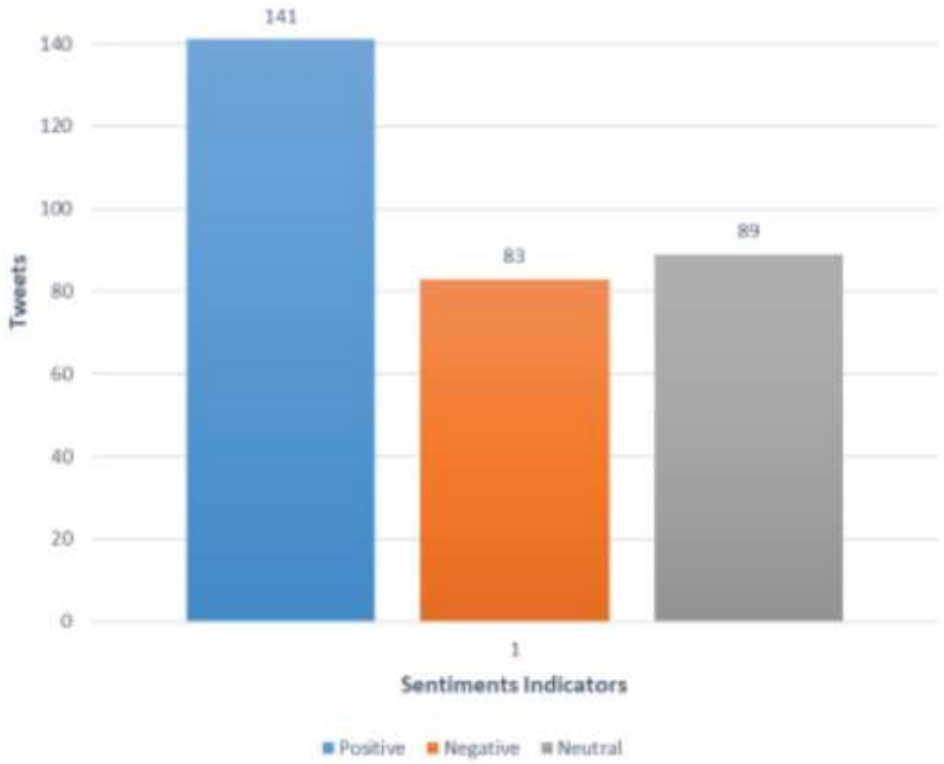


Results

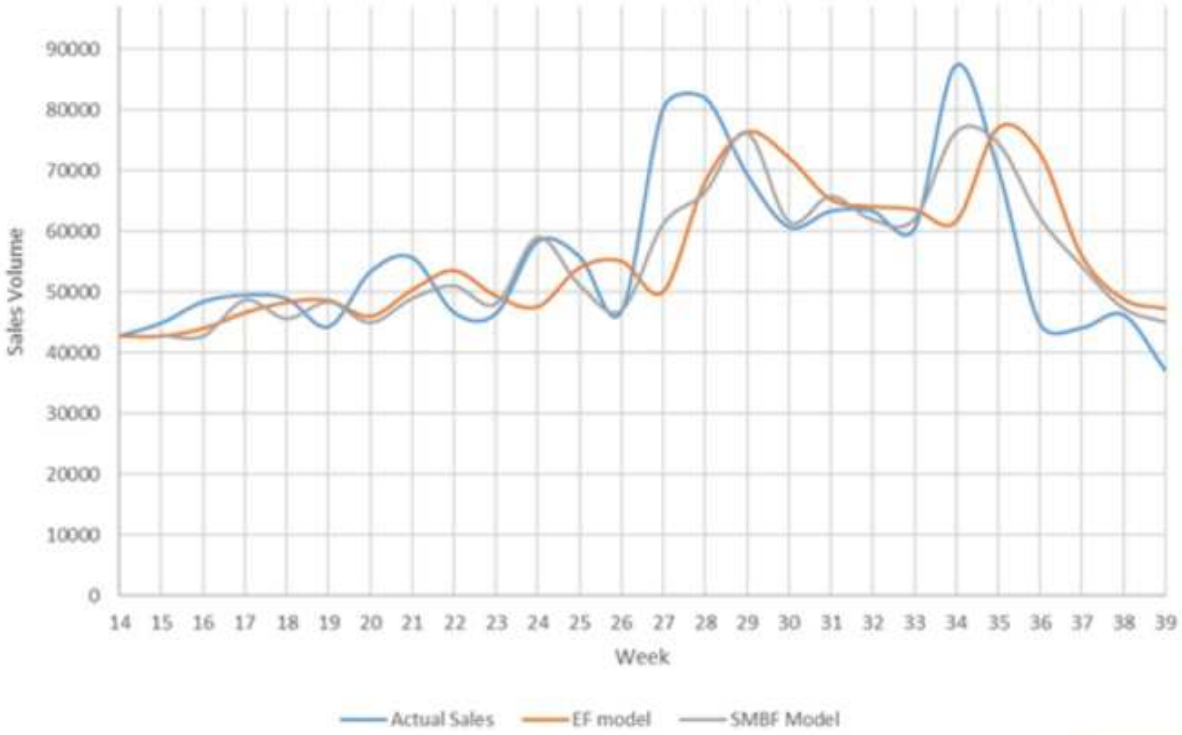

NEW PRODUCT
3 NEAREST HISTORICAL PRODUCTS
PROFILE FORECAST
PROFILES OF THE 3 NEAREST HISTORICAL PRODUCTS


Tweet App is created
Tweet Data Acquistion for Apparel Fashion Brand
Text Corpus Pre-processing
Converting Corpus to Vector
Term_1 Term_2 ... Term_m
Tweet_1 f11 f12 ... f1m
Tweet_2 f21 f22 ... f2m
Tweet_n fn1 fn2 ... fnm
Document Term Matrix
Sentiment Score Evaluation
Lexicon Dictionary
NRC Lexicon Dataset
Naive Bayes Classifier
Classify tweets
Tweets Sentiment Score Database
Sales Data Acquistion for Apparel Fashion Brand
Aggregating Sentiment Score Data Weekly
Correlation Check
Aggregating Sales Data Weekly
Sentiment Impact Evaluation
Time Series Forecasting Model
Fuzzy Sentiment Impact on Sales (FSIS) Model
Social Media Based Forecasting (SMBF)
Sales Prediction
Forecasting Model Validation
Sentiment score
Sentiment Impact

Sentiment Score Evaluation



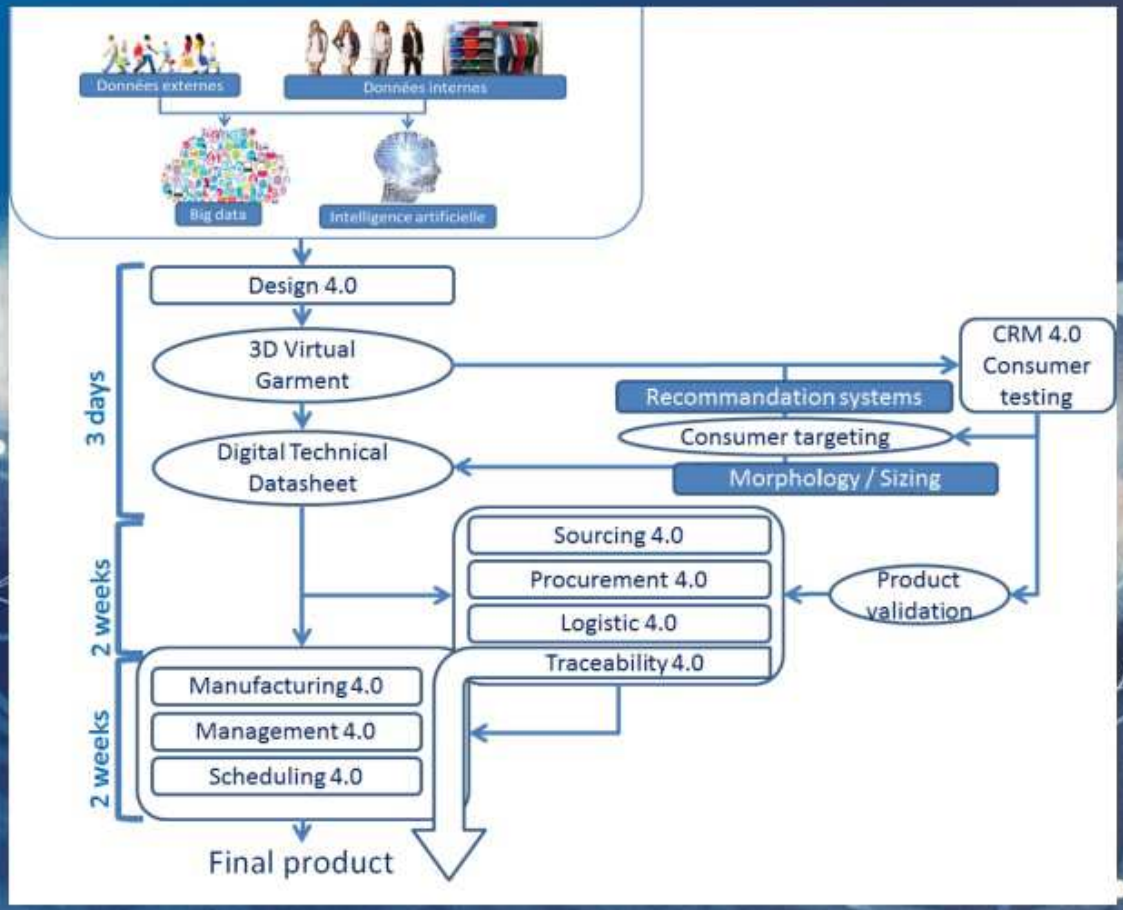
Sentiment Impact Evaluation

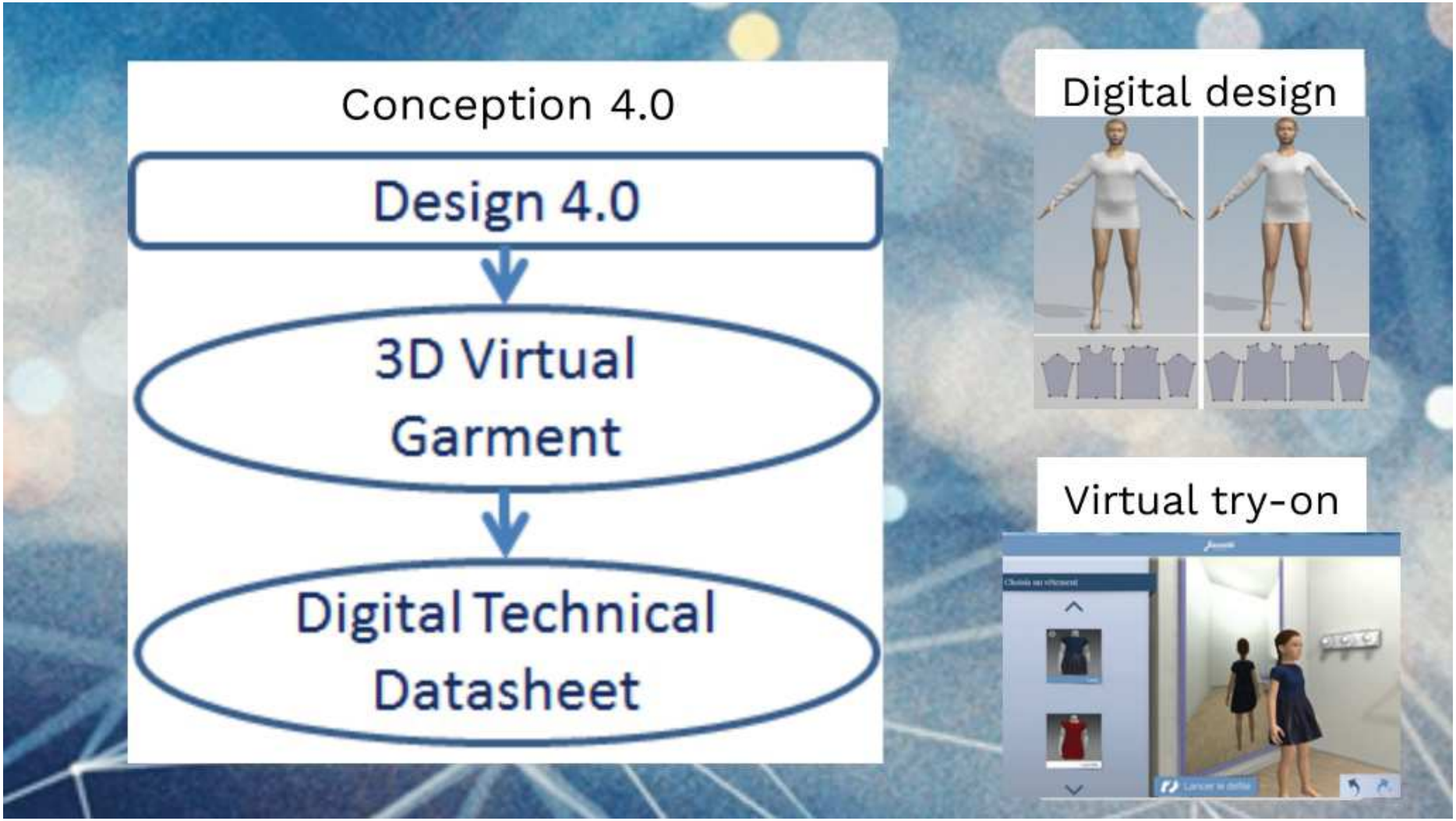


Opportunuiti

Industry 4.0 : scope and opportunities

Introduction



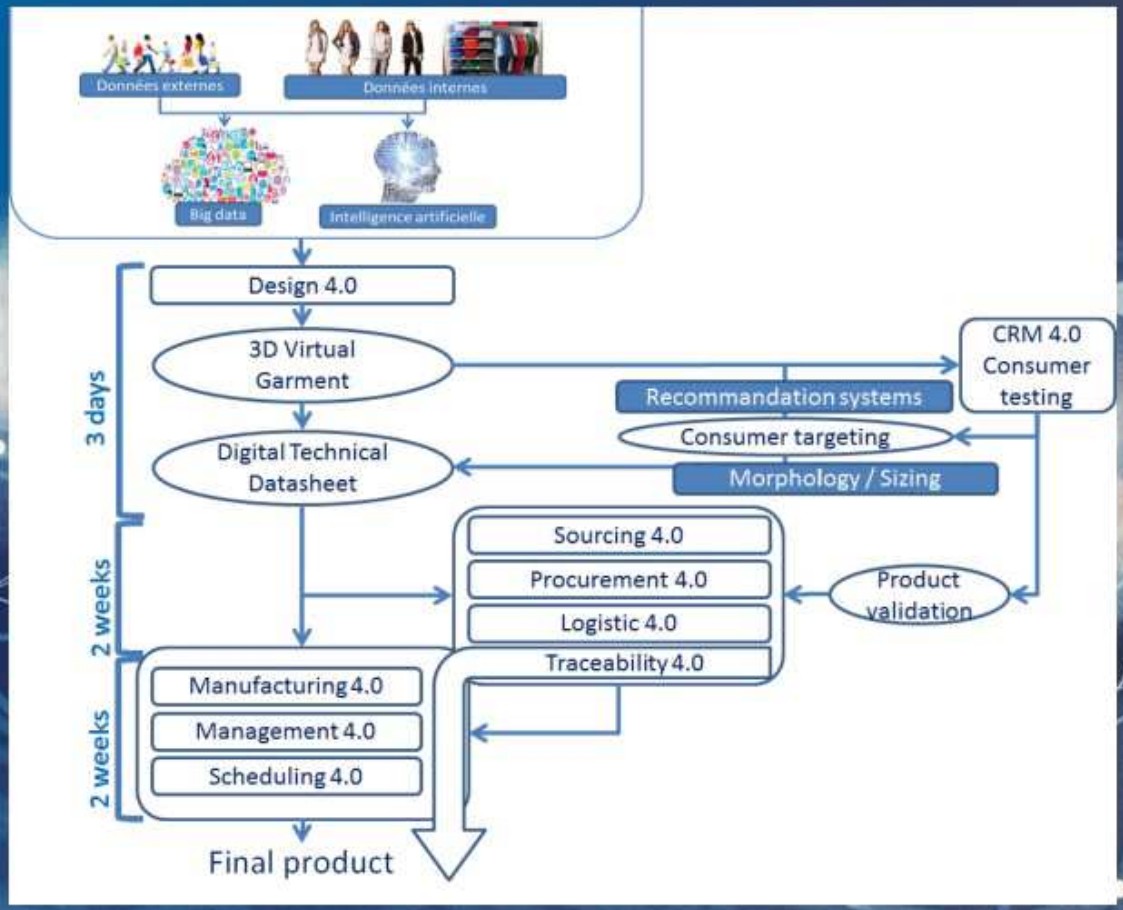

Conception 4.0
Design 4.0
3D Virtual Garment
Digital Technical Datasheet
Digital design
Virtual try-on


Choisis un vêtement
Lancer le défilé

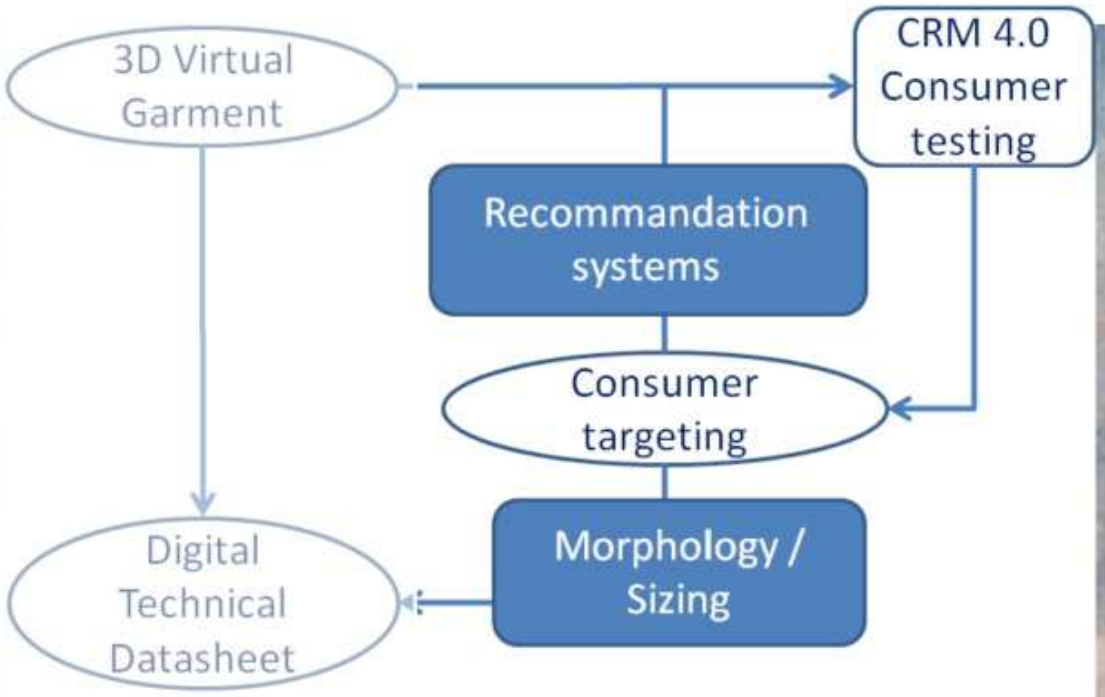
Opportunuiti

Industry 4.0 : scope and opportunities

Introduction



Consumer integration



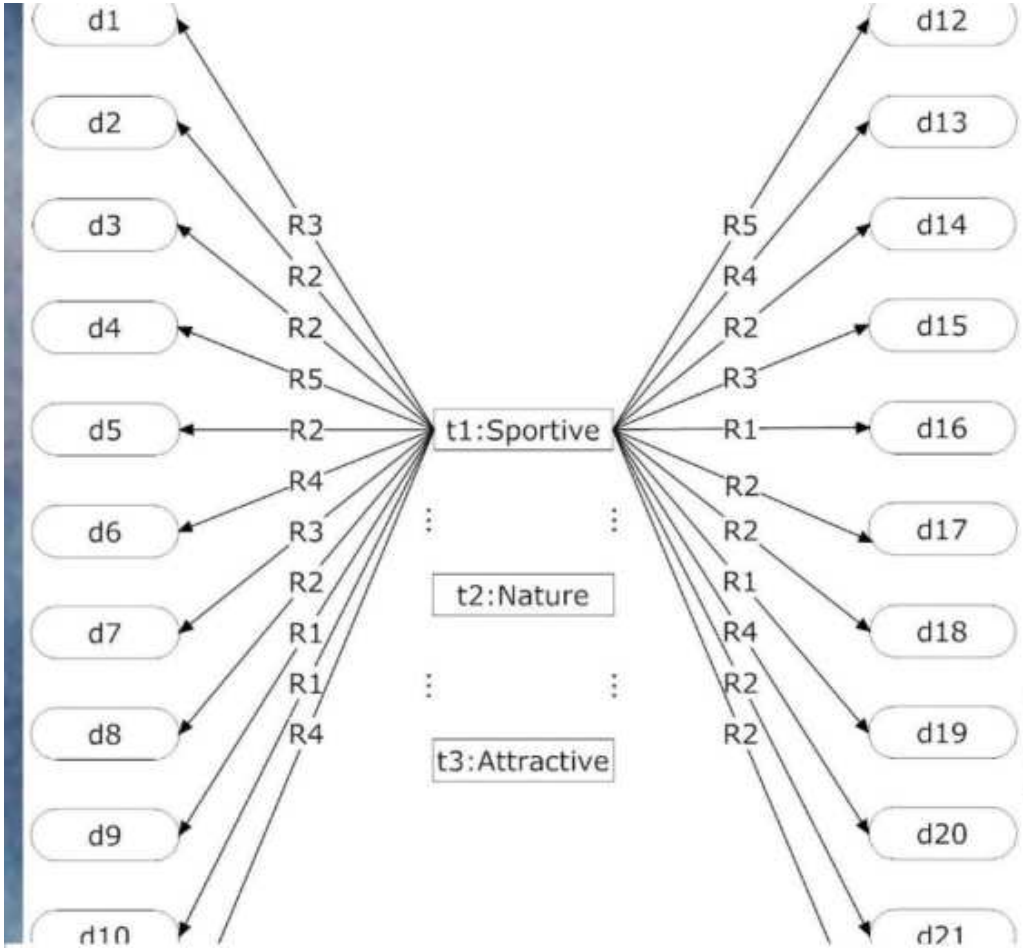
Recommendation Systems

br_1	br_2	br_3	br_4	br_5
0.32	0.53	0.22	0.45	0.56
br_6	br_7	br_8	br_9	br_{10}
0.60	0.41	0.85	1.05	0.81
br_{11}	br_{12}	br_{13}	br_{14}	br_{15}
1.45	0.70	0.57	0.48	0.39

Sizing Systems

Femme : blouses, tuniques, chemisiers et tabliers

Taille	Point Lafont	Tour de poitrine (cm)
Tailles allongées		Mesures du corps
32	00	71-74
34		75-78
36	0	79-82
38		83-86
40	1	87-90
42		91-94
44	2	95-98
46		99-102
48	3	103-106
50		107-110
52	4	111-114
54		115-118
56	5	119-122
58		123-126
60	6	127-130
62		131-134

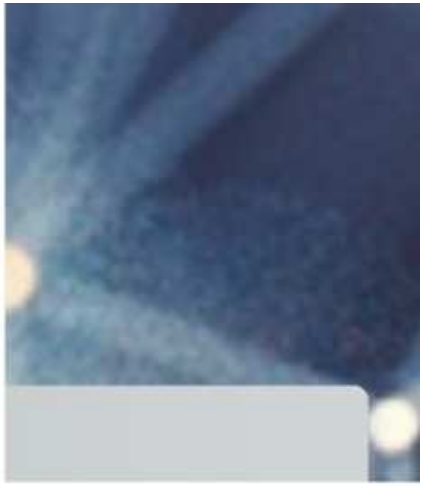


Body ratios

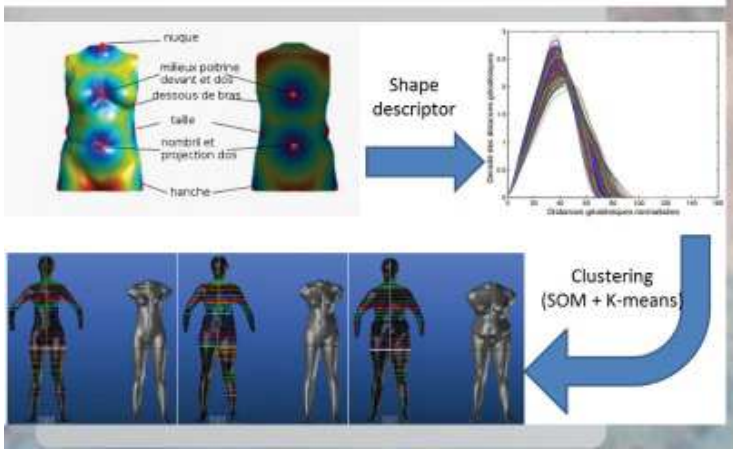
br_1	br_2	br_3	br_4	br_5
0.32	0.53	0.22	0.45	0.56
br_6	br_7	br_8	br_9	br_{10}
0.60	0.41	0.85	1.05	0.81
br_{11}	br_{12}	br_{13}	br_{14}	br_{15}
1.45	0.70	0.57	0.48	0.39

Wang, Lichuan et al. “Intelligent Fashion Recommender System: Fuzzy Logic in Personalized Garment Design.” IEEE Transactions on Human-Machine Systems 45 (2015): 95-109.

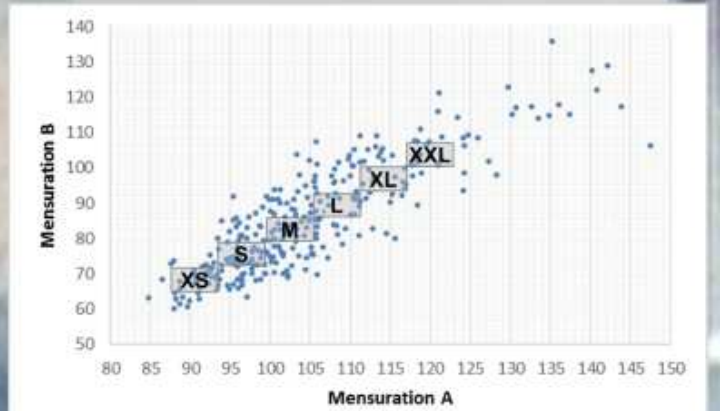
42	1	91-94
44	2	95-98
46		99-102
48	3	103-106
50		107-110
52	4	111-114
54		115-118
56	5	119-122
58		123-126
60	6	127-130
62		131-134

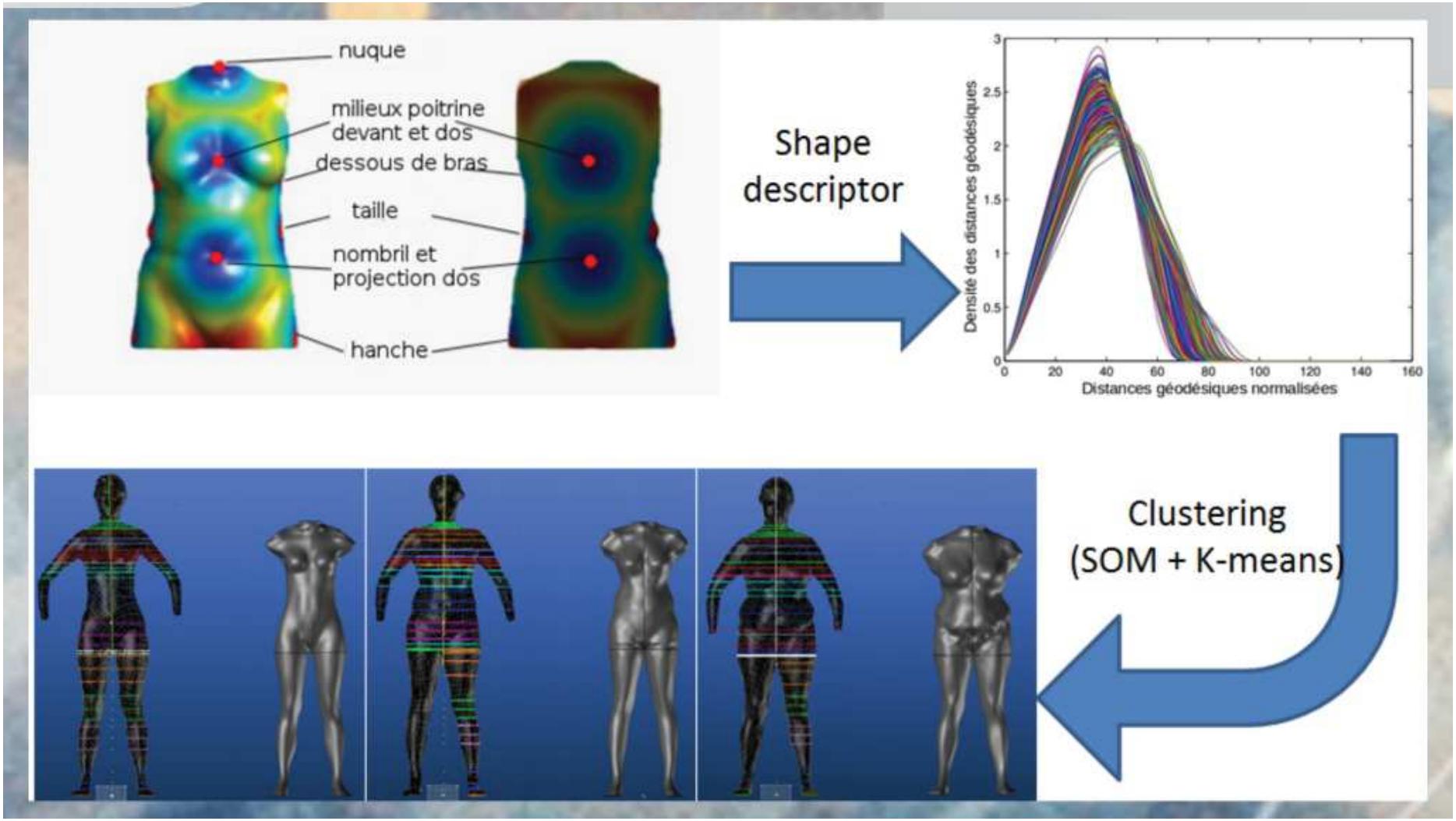


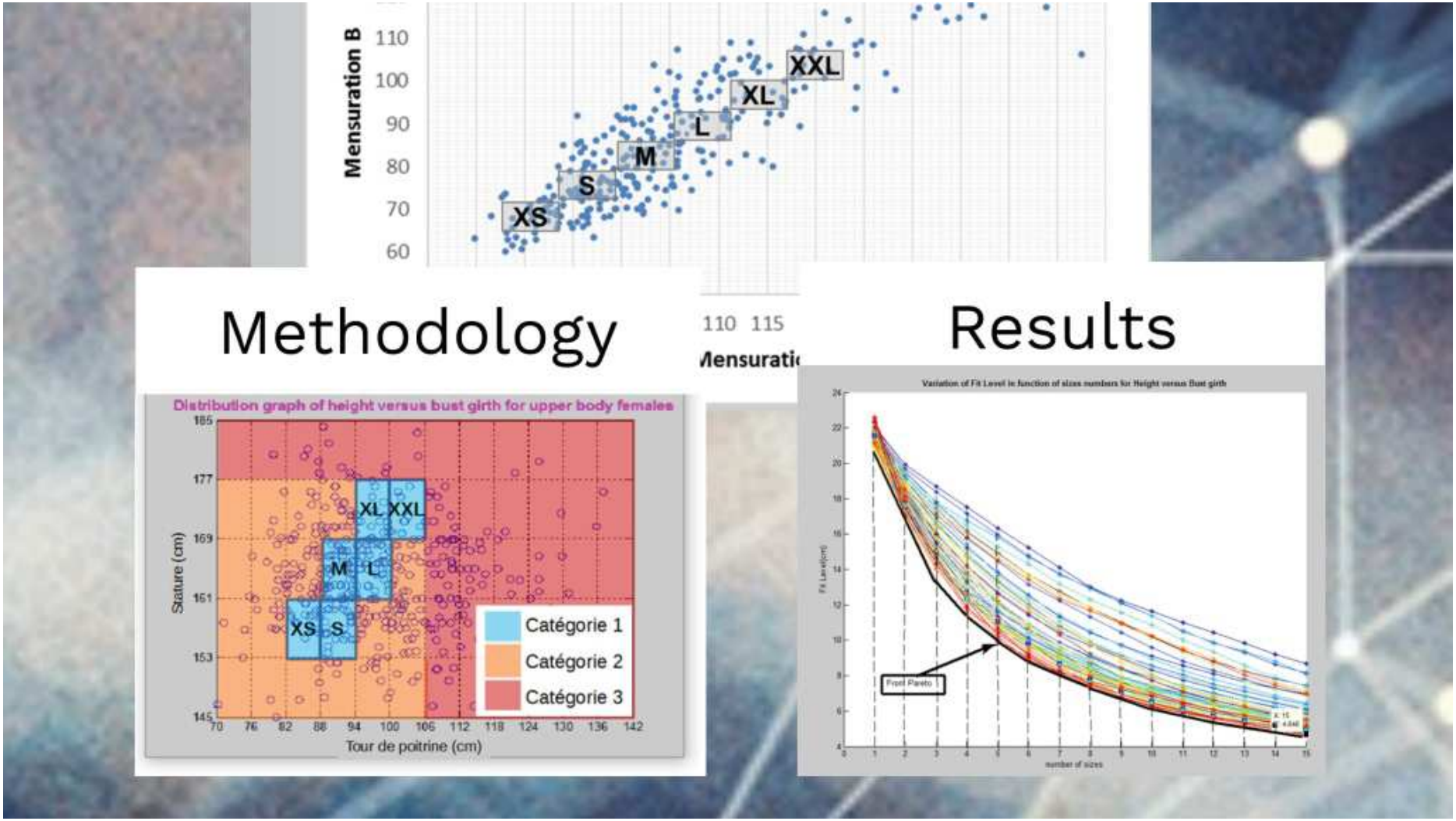
Morphology classification

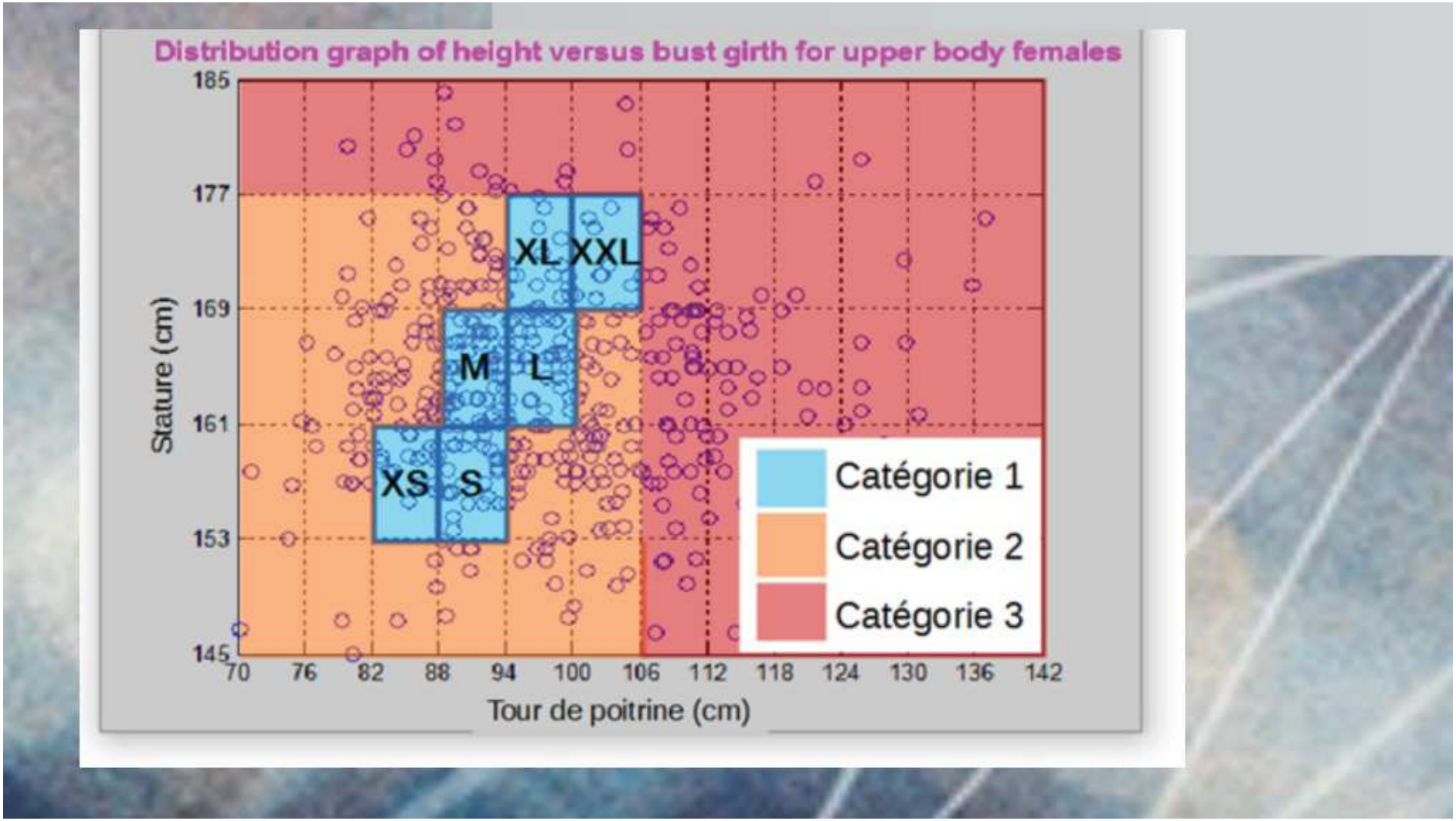


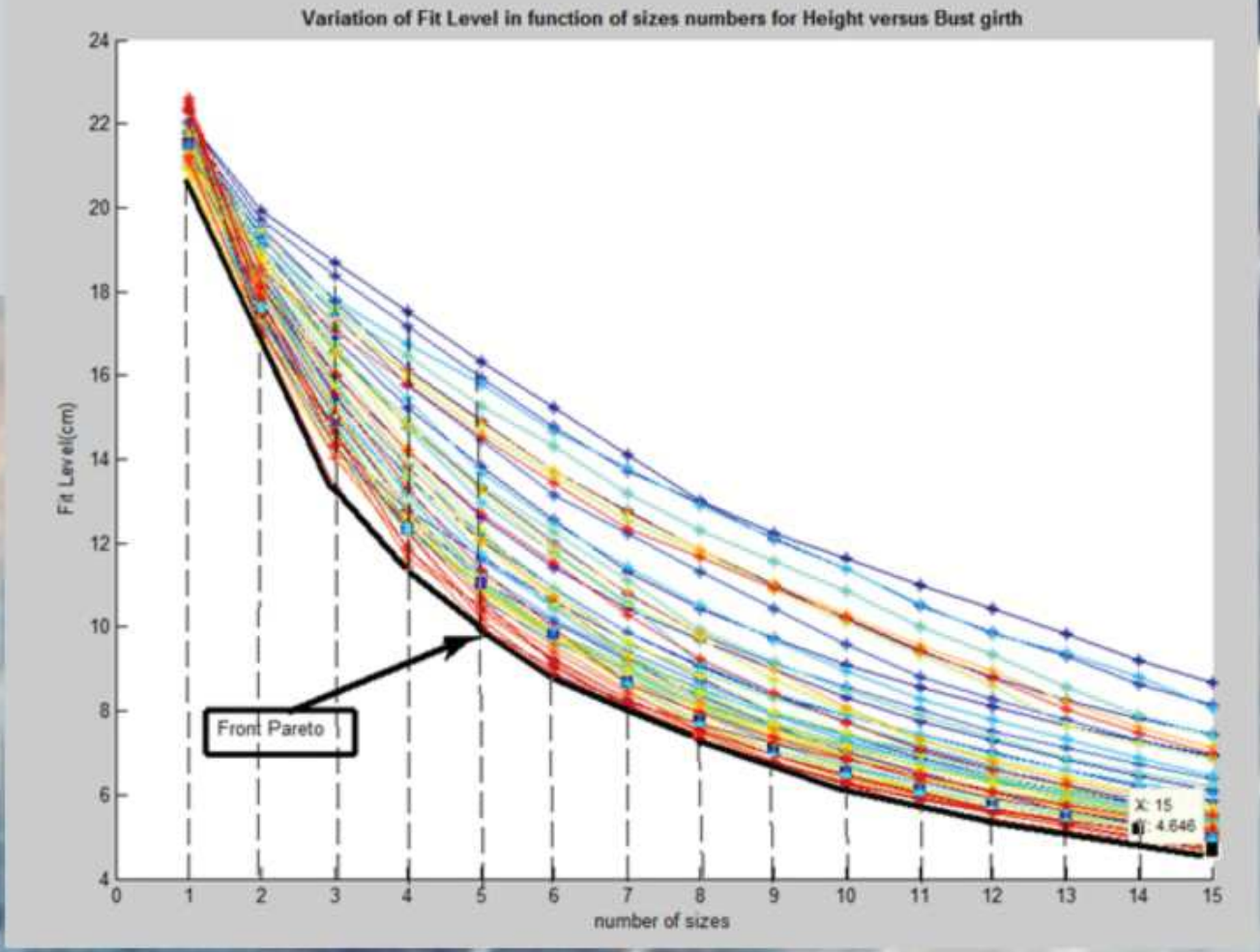
Sizing system optimization




nuque
milieux poitrine
devant et dos
dessous de bras
taille
nombril et
projection dos
hanche
Shape
descriptor
Densité des distances géodésiques
Distances géodésiques normalisées
Clustering
(SOM + K-means)


Mensuration B
110
100
90
80
70
60
XS
S
M
L
XL
XXL
110 115
Methodology
Results
Distribution graph of height versus bust girth for upper body females
Stature (cm)
185
177
169
161
153
145
70 76 82 88 94 100 106 112 118 124 130 136 142
Tour de poitrine (cm)
XS
S
M
L
XL
XXL
Catégorie 1
Catégorie 2
Catégorie 3
Variation of Fit Level in function of sizes numbers for Height versus Bust girth
Front Pareto
number of sizes

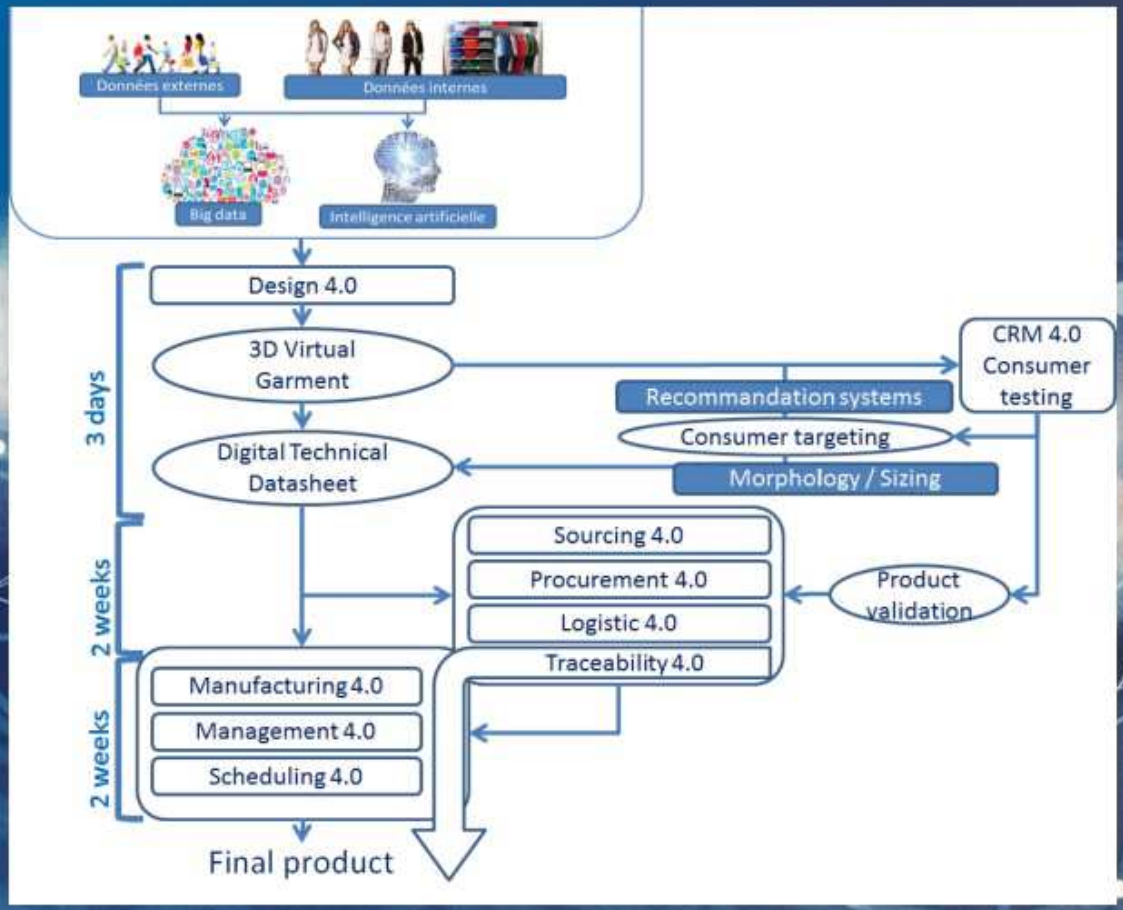

Distribution graph of height versus bust girth for upper body females
Stature (cm)
185
177
169
161
153
145
70
76
82
88
94
100
106
112
118
124
130
136
142
Tour de poitrine (cm)
XS
S
M
L
XL
XXL
Catégorie 1
Catégorie 2
Catégorie 3


Variation of Fit Level in function of sizes numbers for Height versus Bust girth
Fit Level(cm)
number of sizes
Front Pareto
X: 15
Y: 4.646

Opportunuiti

Industry 4.0 : scope and opportunities

Introduction



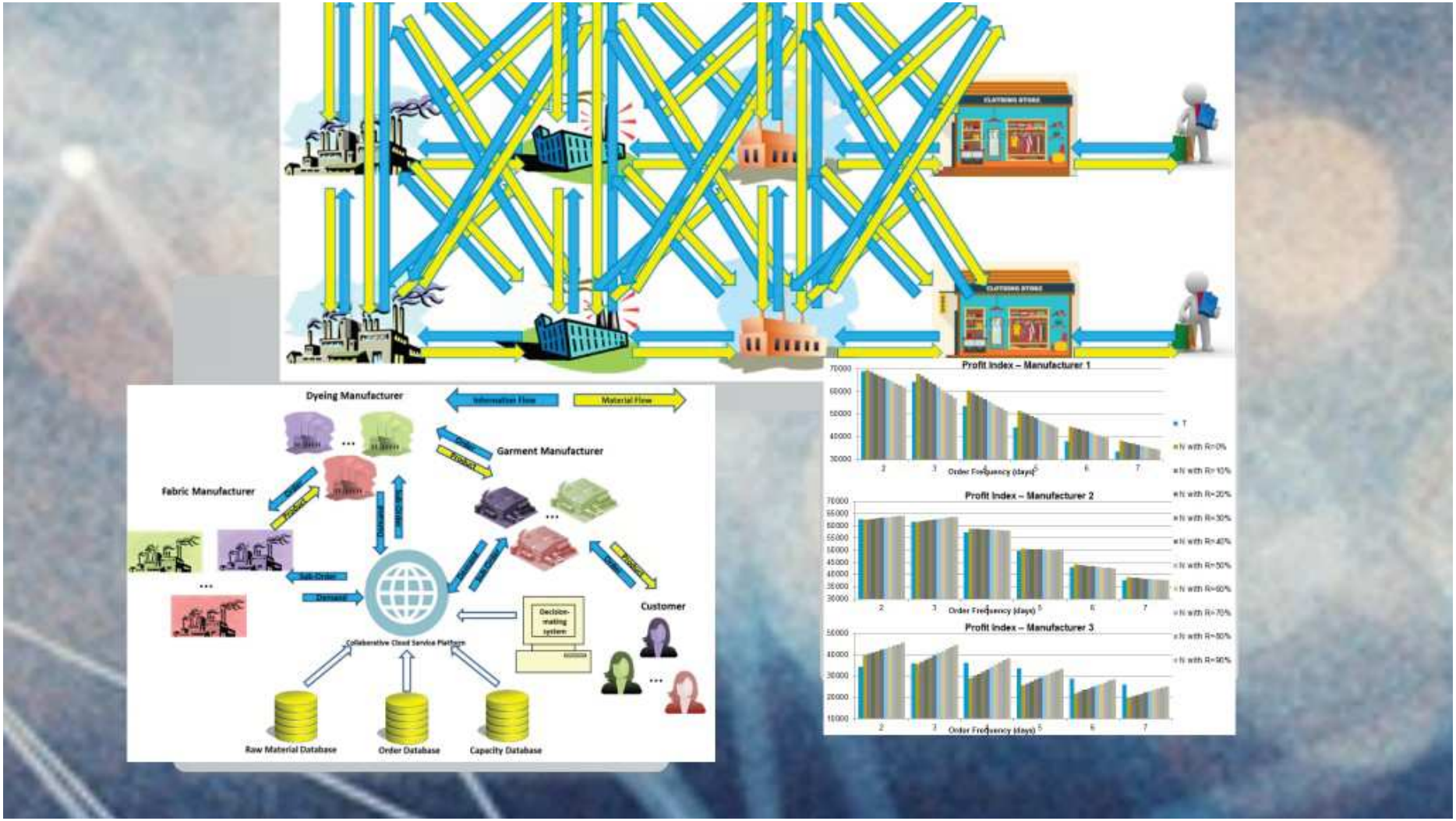
Supply Chain 4.0

- Sourcing 4.0
- Procurement 4.0
- Supply 4.0
- Logistique 4.0

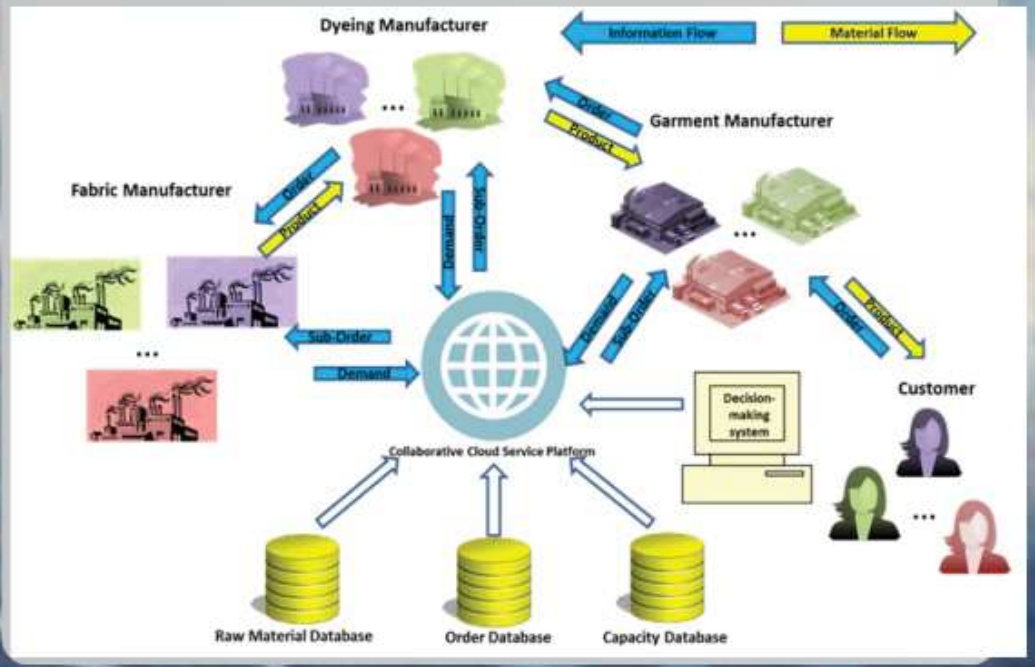
Supply Chain collaborative

Supplier Selection

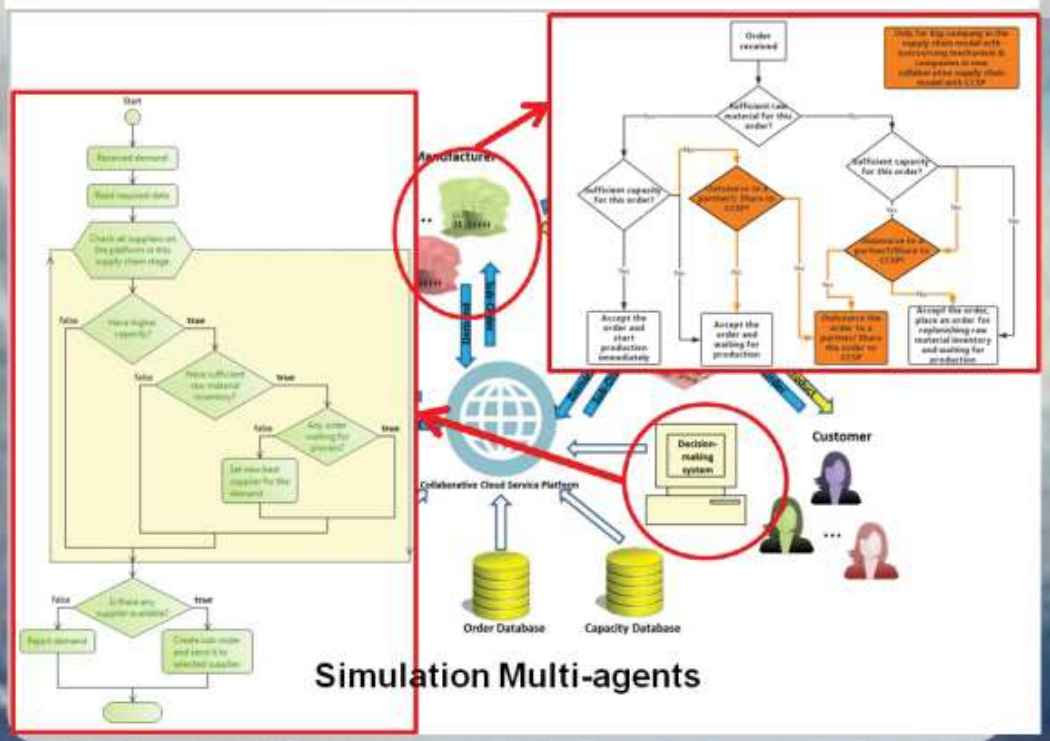
Real time simulation

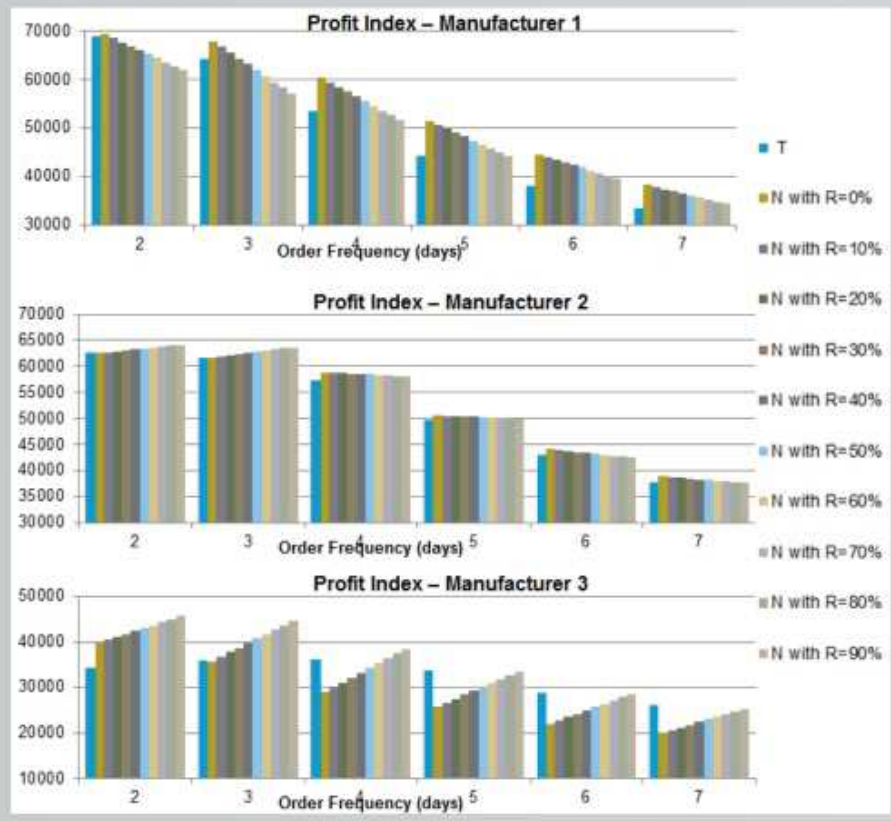

Dyeing Manufacturer
Information Flow
Material Flow
Garment Manufacturer
Fabric Manufacturer
Customer
Decision-making system
Collaborative Cloud Service Platform
Raw Material Database
Order Database
Capacity Database
Profit Index – Manufacturer 1
Profit Index – Manufacturer 2
Profit Index – Manufacturer 3
Order Frequency (days)

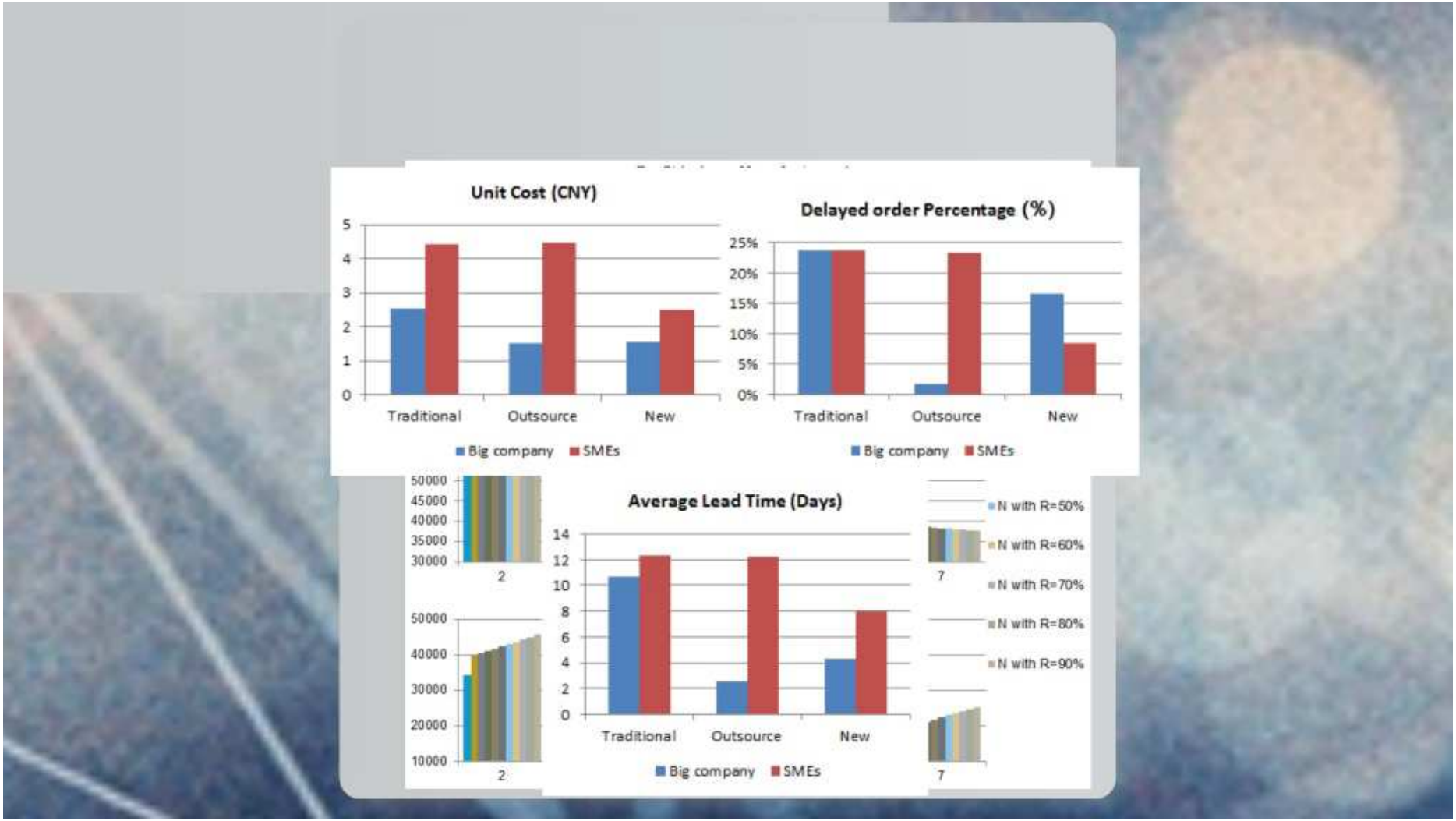
Multi agent simulation: real time negociation mechanism

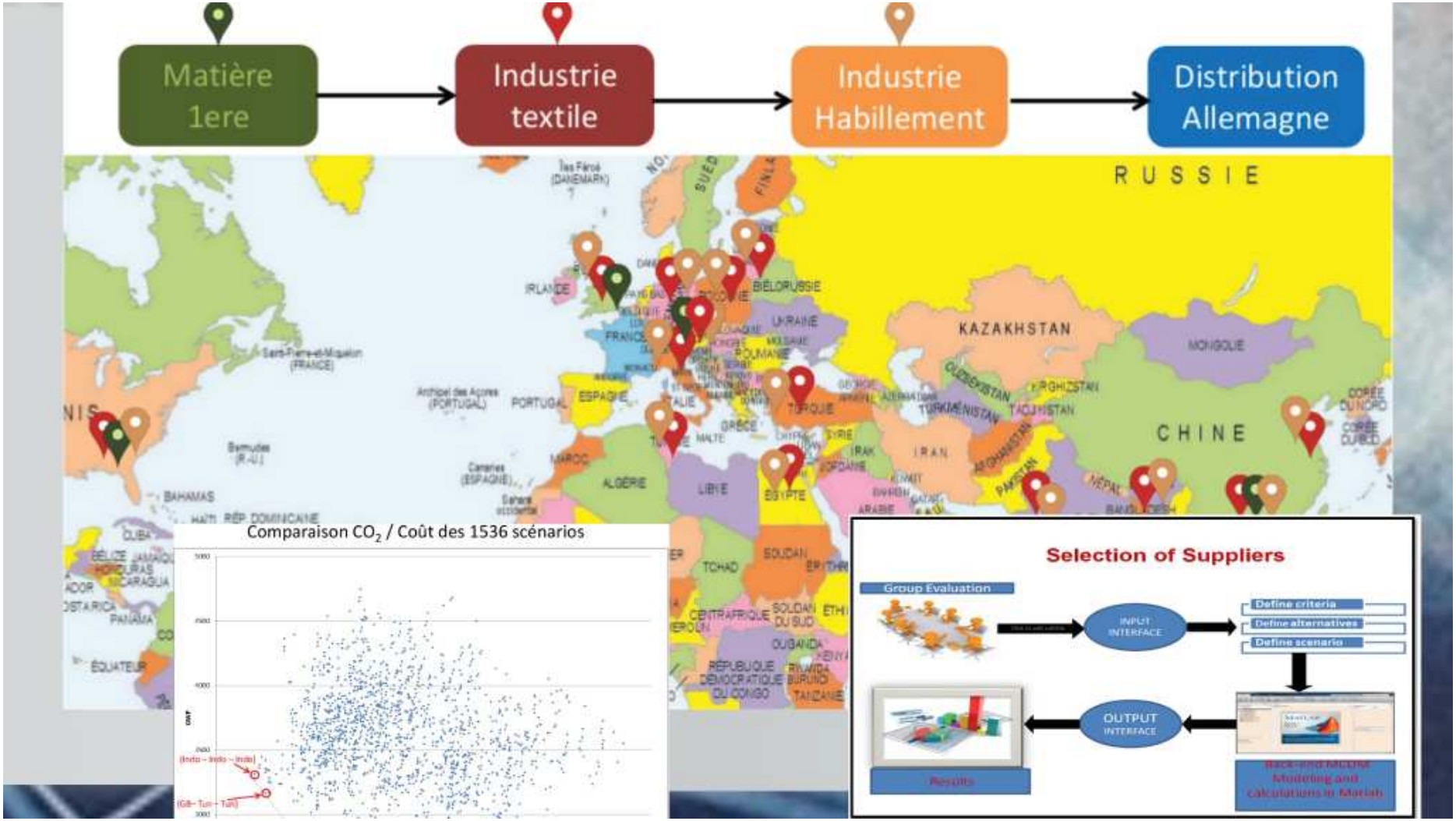


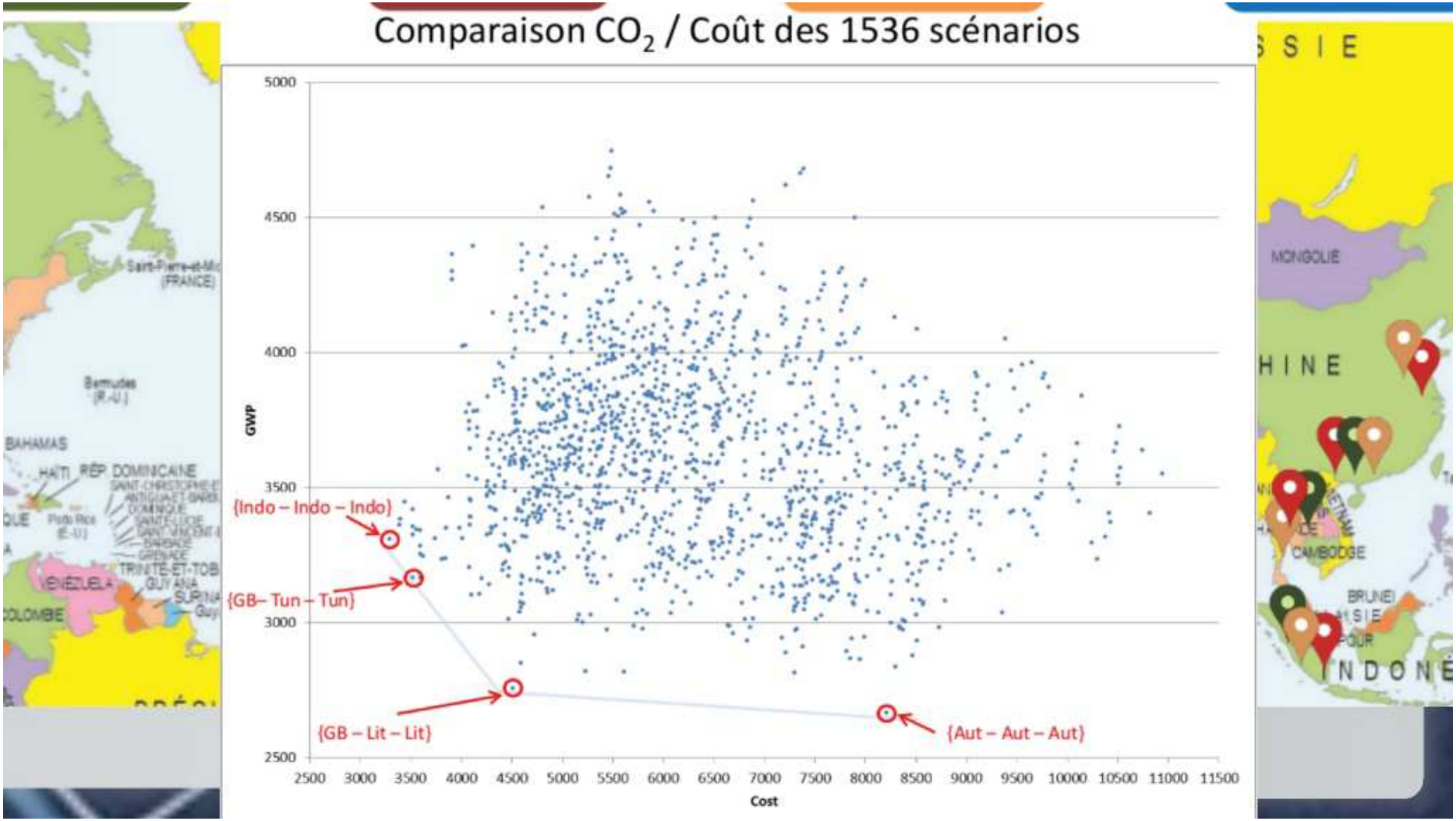
Multi agent simulation: real time negociation mechanism

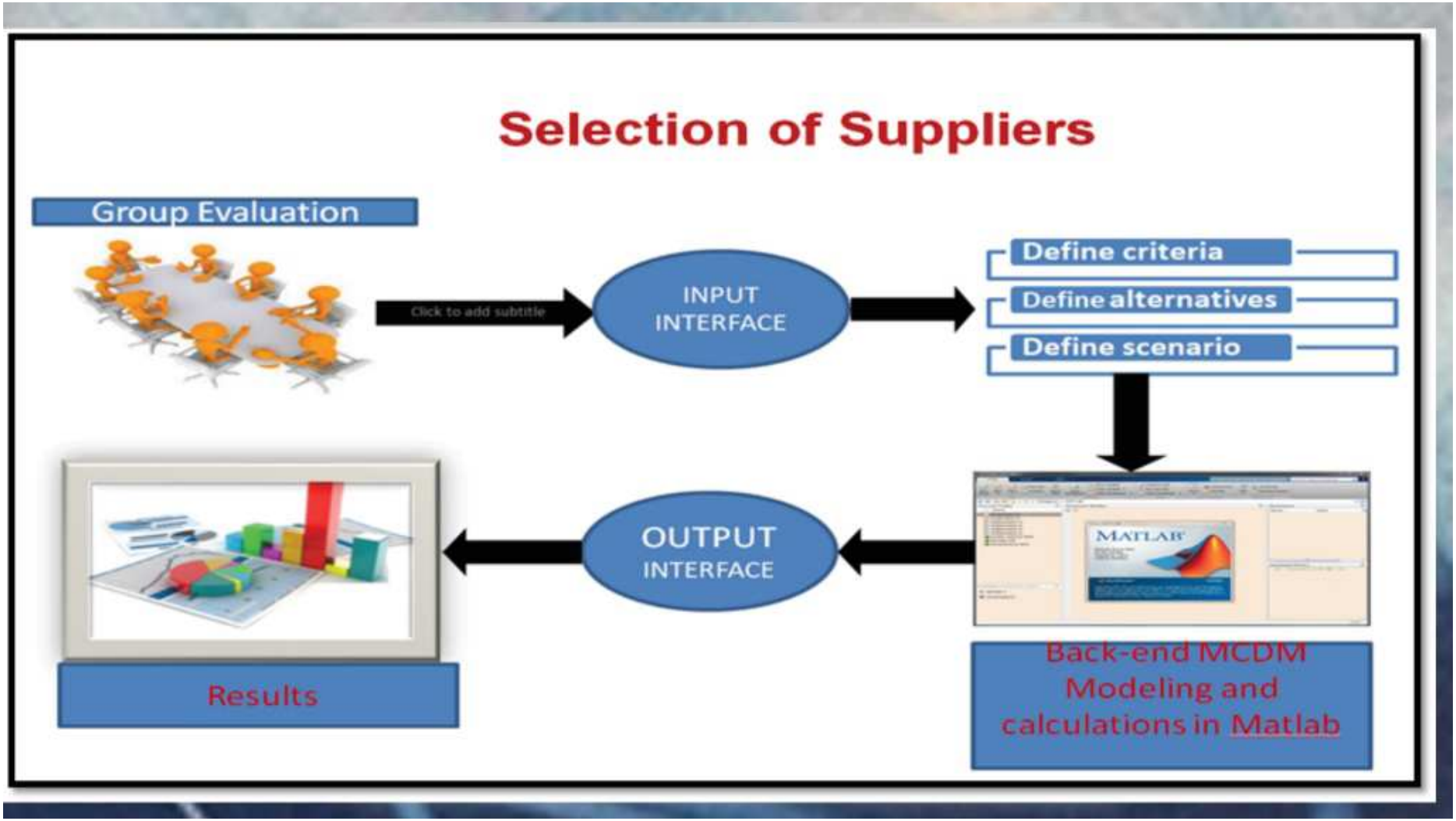


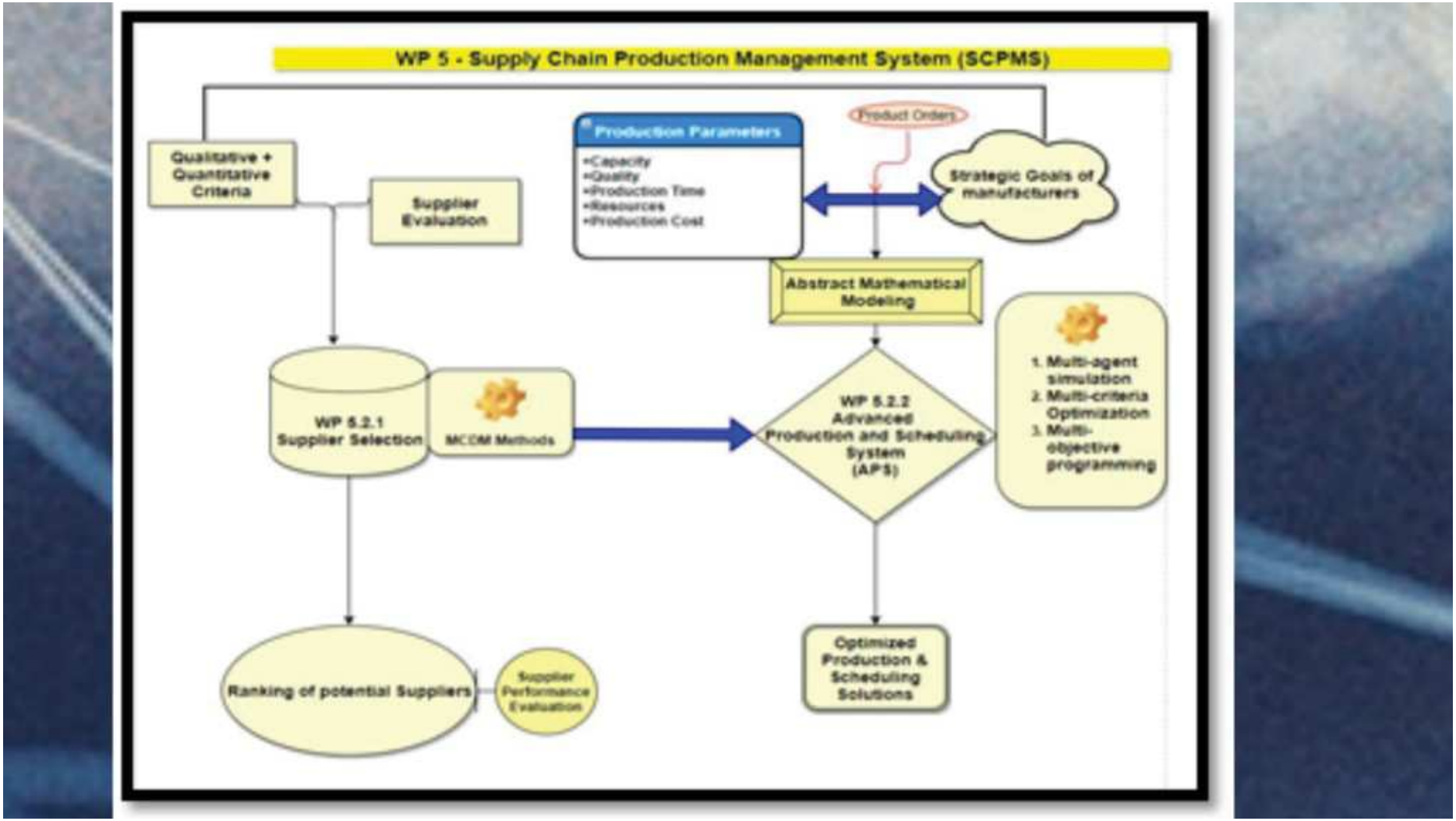

Profit Index – Manufacturer 1
70000
60000
50000
40000
30000
2
3
4
5
6
7
Order Frequency (days)
T
N with R=0%
N with R=10%
N with R=20%
N with R=30%
N with R=40%
N with R=50%
N with R=60%
N with R=70%
N with R=80%
N with R=90%
Profit Index – Manufacturer 2
70000
65000
60000
55000
50000
45000
40000
35000
30000
2
3
4
5
6
7
Order Frequency (days)
Profit Index – Manufacturer 3
50000
40000
30000
20000
10000
2
3
4
5
6
7
Order Frequency (days)


Unit Cost (CNY)
5
4
3
2
1
0
Traditional
Outsource
New
Big company
SMEs
Delayed order Percentage (%)
25%
20%
15%
10%
5%
0%
Traditional
Outsource
New
Big company
SMEs
50000
45000
40000
35000
30000
2
50000
40000
30000
20000
10000
2
Average Lead Time (Days)
14
12
10
8
6
4
2
0
Traditional
Outsource
New
Big company
SMEs
N with R=50%
N with R=60%
N with R=70%
N with R=80%
N with R=90%
7
7


Matière 1ere
Industrie textile
Industrie Habillement
Distribution Allemagne
RUSSIE
KAZAKHSTAN
CHINE
Comparaison CO_2 / Coût des 1536 scénarios
Selection of Suppliers
Group Evaluation
INPUT INTERFACE
Define criteria
Define alternatives
Define scenario
OUTPUT INTERFACE
Results


Comparaison CO_2 / Coût des 1536 scénarios
GWP
Cost
5000
4500
4000
3500
3000
2500
2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000 8500 9000 9500 10000 10500 11000 11500
{Indo – Indo – Indo}
{GB– Tun – Tun}
{GB – Lit – Lit}
{Aut – Aut – Aut}
MONGOLIE
CAMBODGE
BRUNEI
BAHAMAS
HAITI
RÉP. DOMINICAINE
VENEZUELA
GUYANA
SURINA

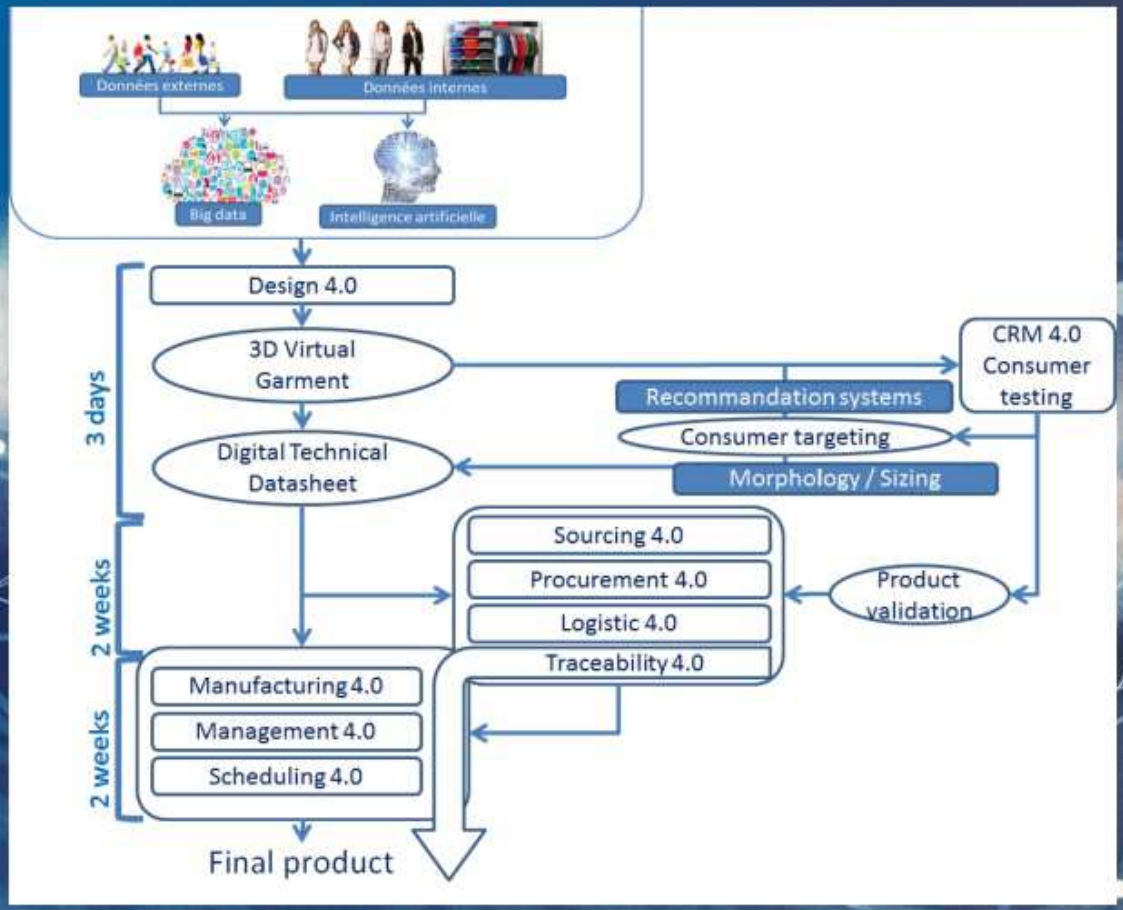

Selection of Suppliers
Group Evaluation
Click to add subtitle
INPUT INTERFACE
Define criteria
Define alternatives
Define scenario
MATLAB
Back-end MCDM Modeling and calculations in Matlab
OUTPUT INTERFACE
Results


WP 5 - Supply Chain Production Management System (SCPMS)
Qualitative + Quantitative Criteria
Supplier Evaluation
Production Parameters
•Capacity
•Quality
•Production Time
•Resources
•Production Cost
Product Orders
Strategic Goals of manufacturers
Abstract Mathematical Modeling
WP 5.2.1 Supplier Selection
MCDM Methods
WP 5.2.2 Advanced Production and Scheduling System (APS)
1. Multi-agent simulation
2. Multi-criteria Optimization
3. Multi-objective programming
Ranking of potential Suppliers
Supplier Performance Evaluation
Optimized Production & Scheduling Solutions

Opportunuiti

Industry 4.0 : scope and opportunities

Introduction



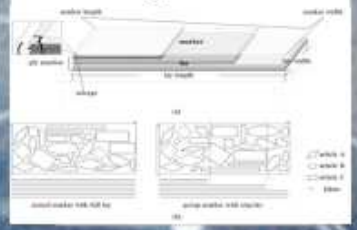
Production 4.0

Manufacturing 4.0

Management 4.0

Scheduling 4.0

Cutting Process



Simulation - optimization

Smart Fashion 4.0

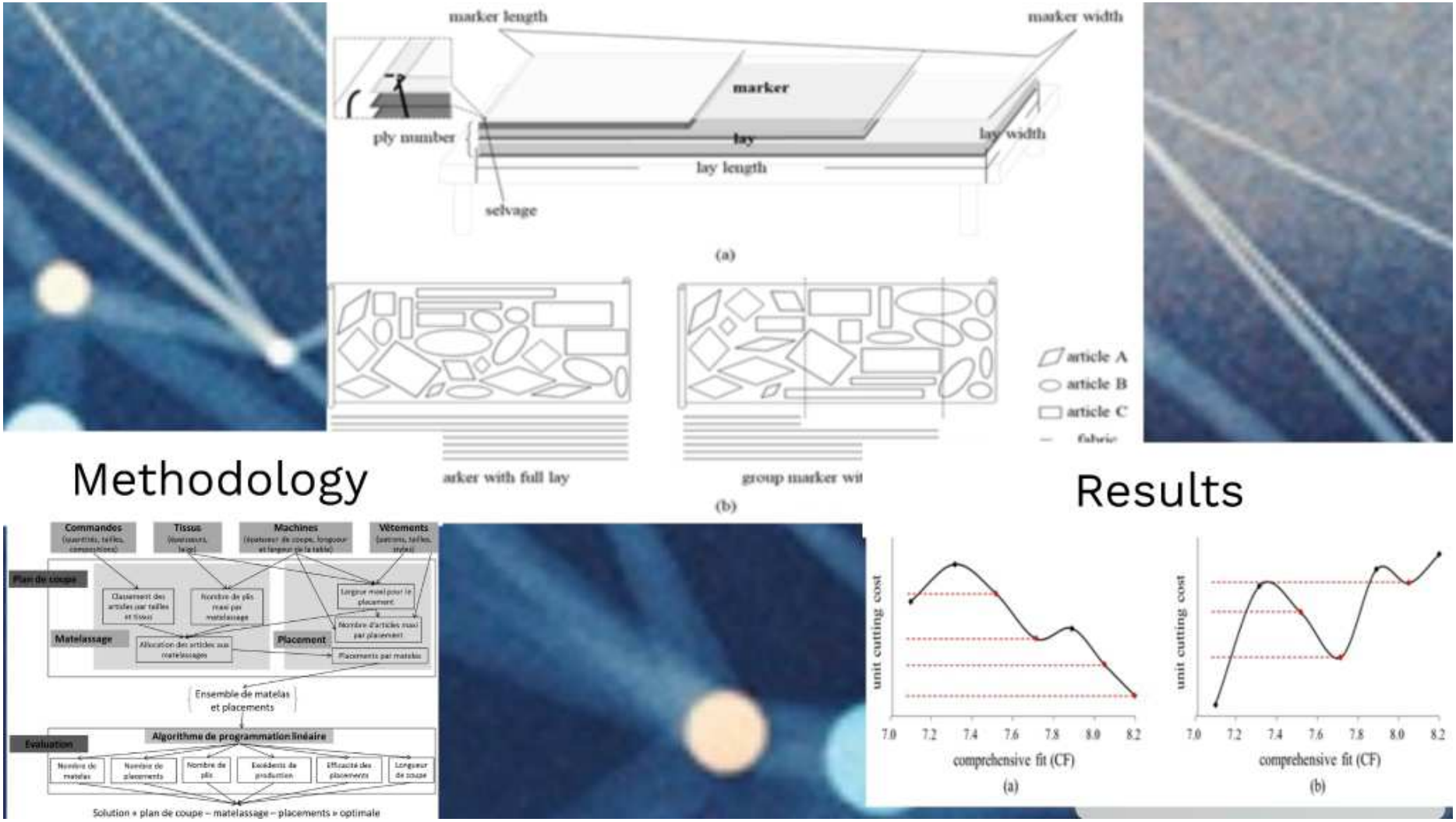
CAMAÏEU

NORDCRÉA

gemtex

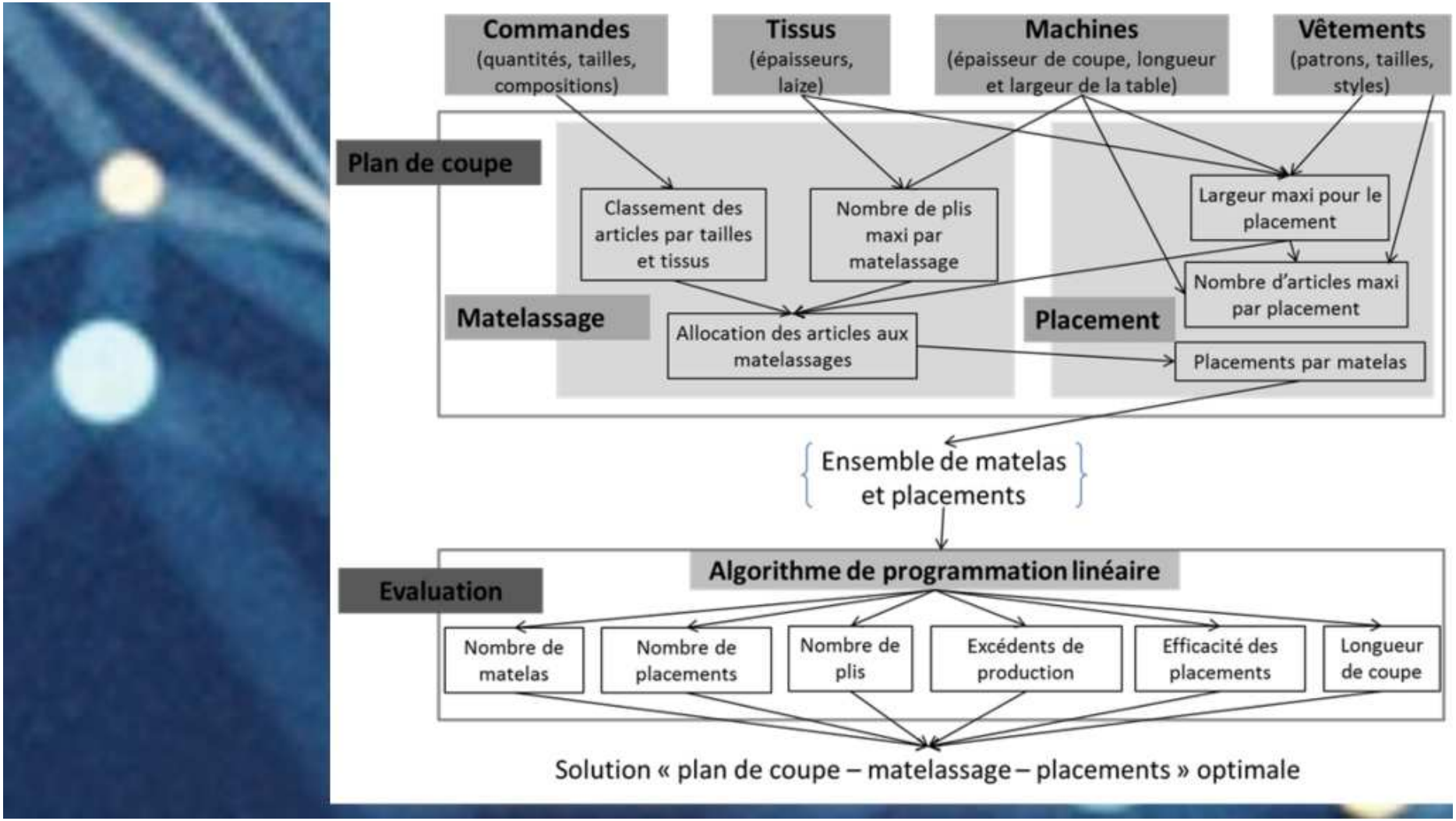
LAMIH

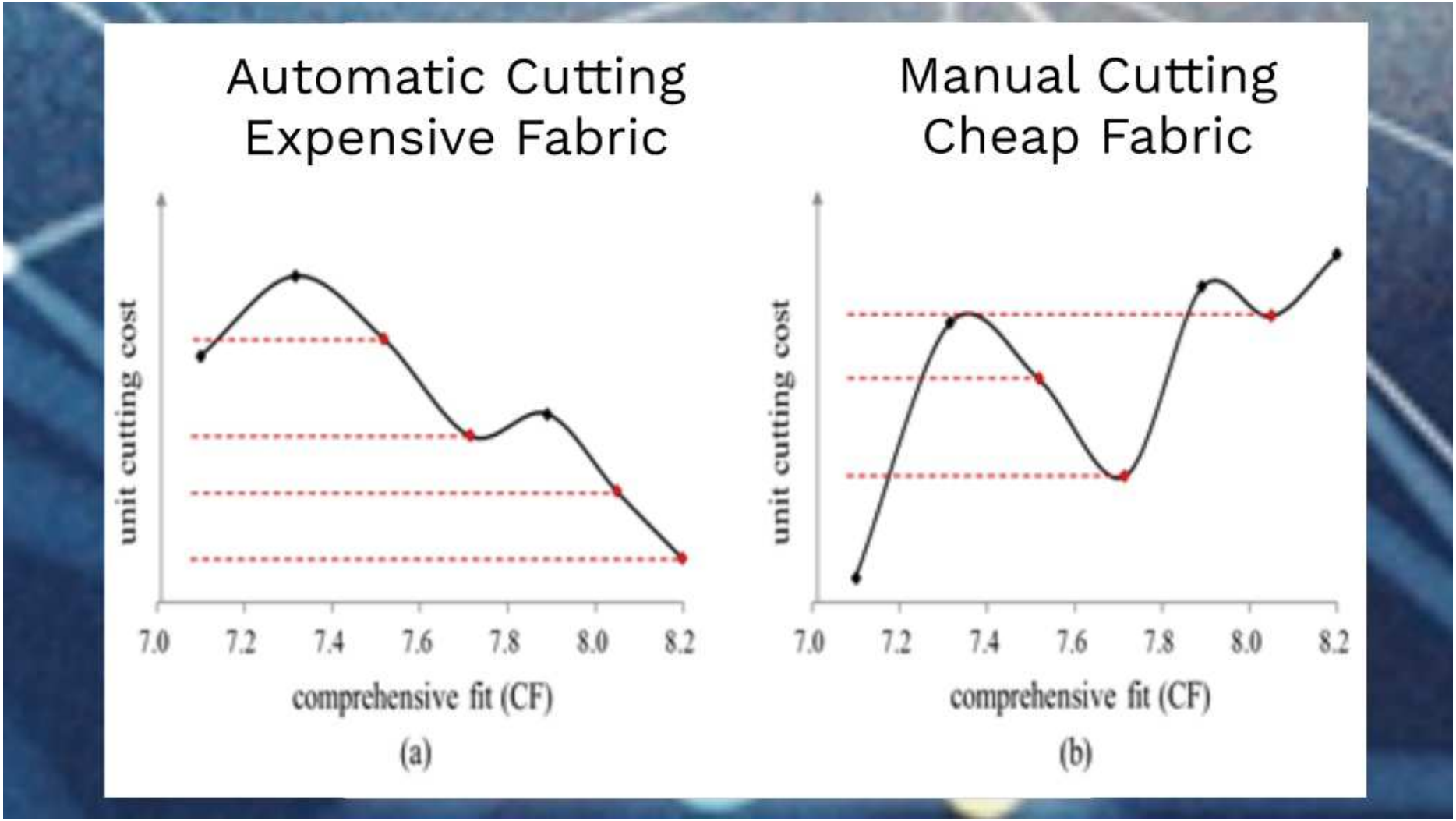
UMR CNRS 8201



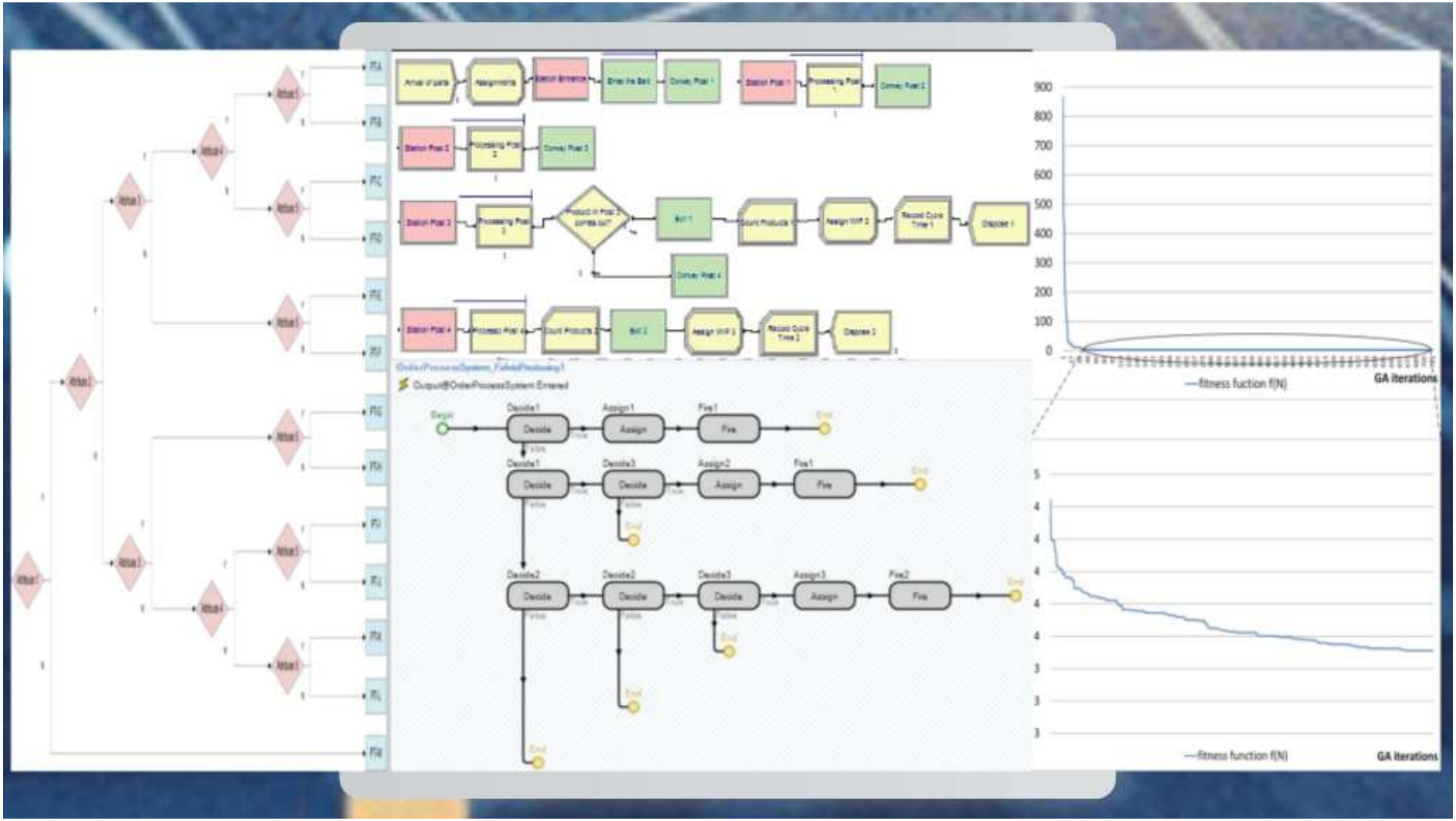
Methodology

Results


Commandes
(quantités, tailles, compositions)
Tissus
(épaisseurs, laize)
Machines
(épaisseur de coupe, longueur et largeur de la table)
Vêtements
(patrons, tailles, styles)
Plan de coupe
Classement des articles par tailles et tissus
Nombre de plis maxi par matelassage
Largeur maxi pour le placement
Nombre d'articles maxi par placement
Matelassage
Allocation des articles aux matelassages
Placement
Placements par matelas
Ensemble de matelas et placements
Evaluation
Algorithme de programmation linéaire
Nombre de matelas
Nombre de placements
Nombre de plis
Excédents de production
Efficacité des placements
Longueur de coupe
Solution « plan de coupe – matelassage – placements » optimale


Automatic Cutting
Expensive Fabric
unit cutting cost
7.0
7.2
7.4
7.6
7.8
8.0
8.2
comprehensive fit (CF)
(a)
Manual Cutting
Cheap Fabric
unit cutting cost
7.0
7.2
7.4
7.6
7.8
8.0
8.2
comprehensive fit (CF)
(b)

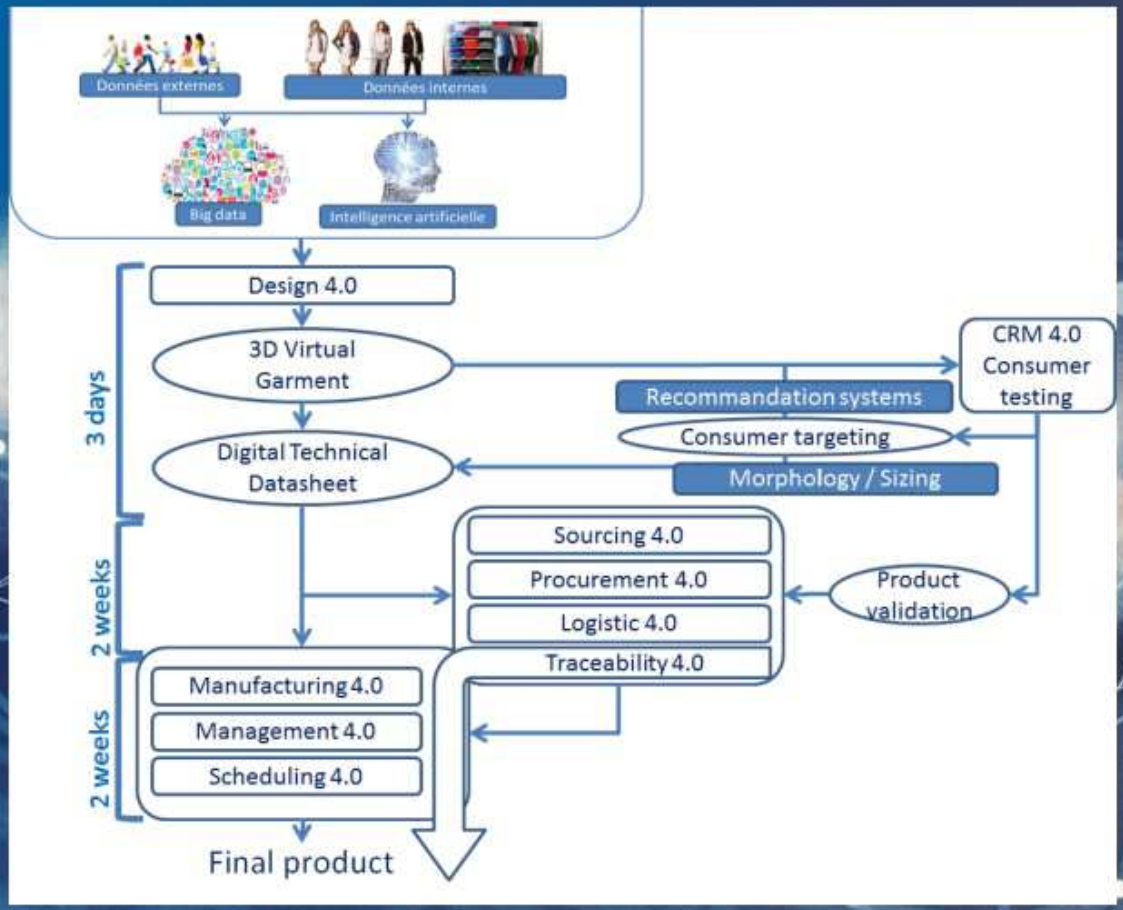

Smart Fashion 4.0
CAMAÏEU
NORDCRÉA
gemtex
ROUBAIX
LABORATOIRE DE RECHERCHE TEXTILE
LAMIH
UMR CNRS 8201


900
800
700
600
500
400
300
200
100
0
fitness fuction f(N)
GA iterations
5
4
4
4
4
3
3
3
fitness function f(N)
GA iterations

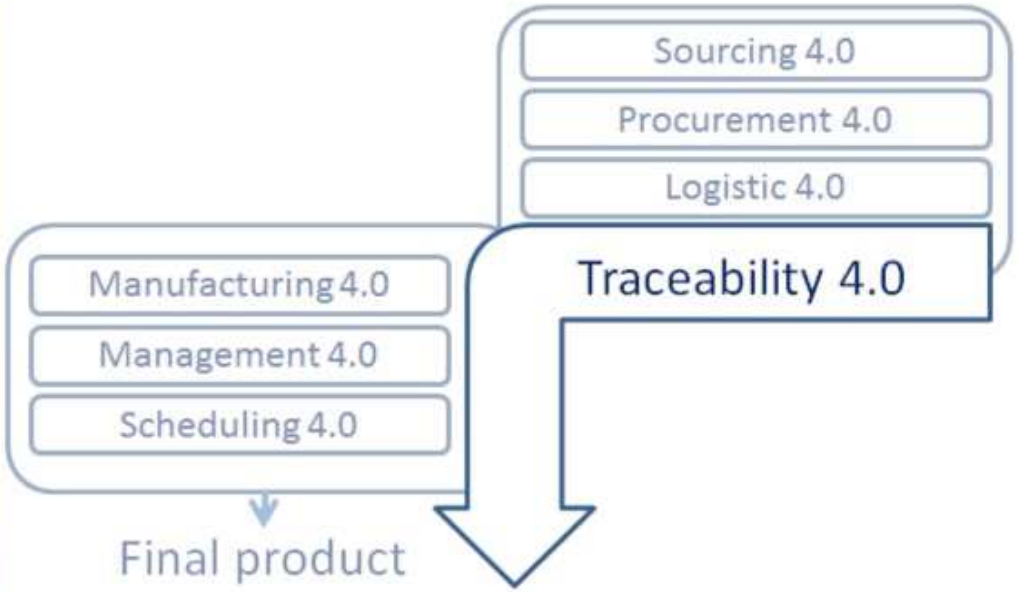
Opportunuiti

Industry 4.0 : scope and opportunities

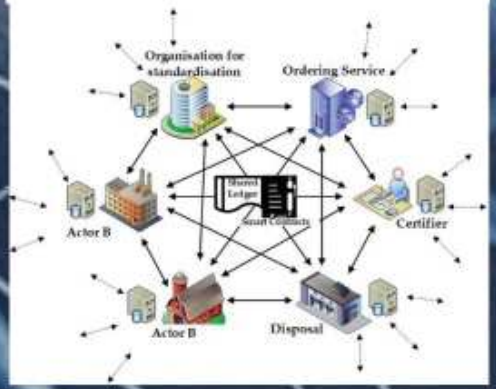
Introduction



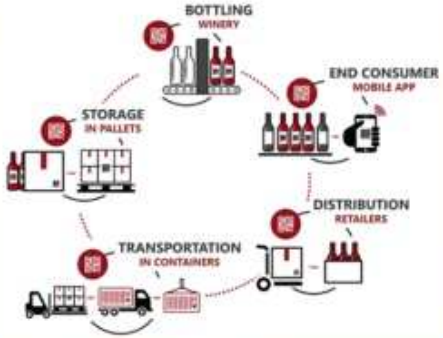
Traceability 4.0



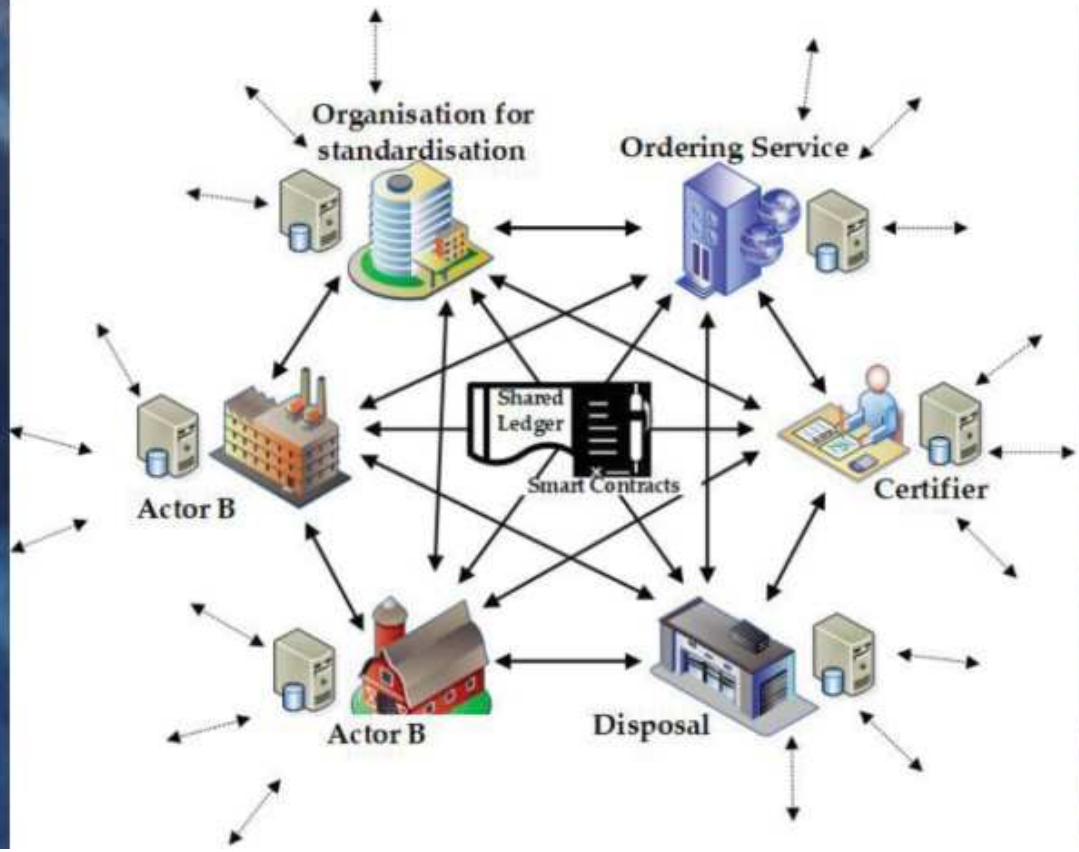
Textile Blockchain

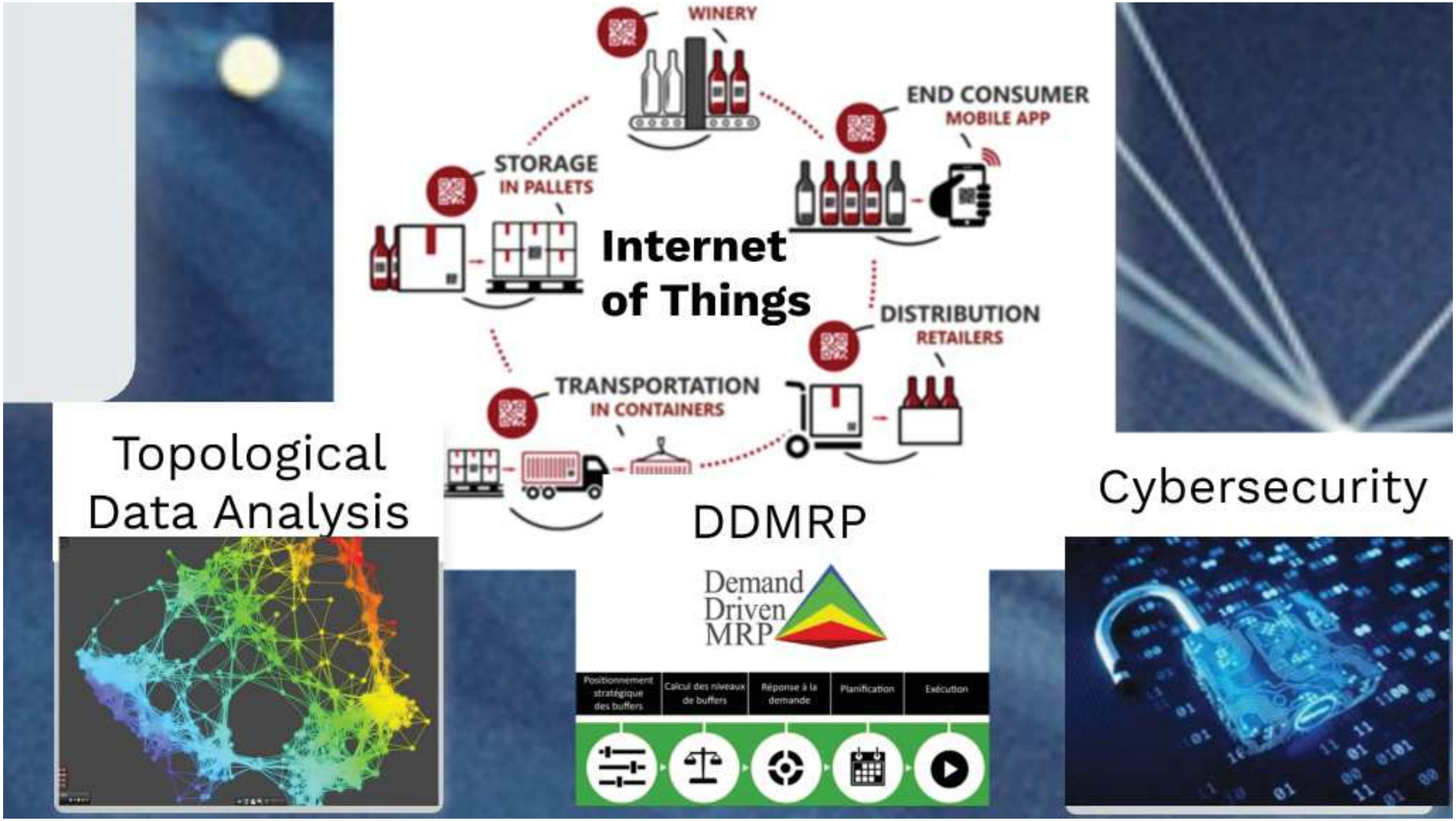


ERC generator

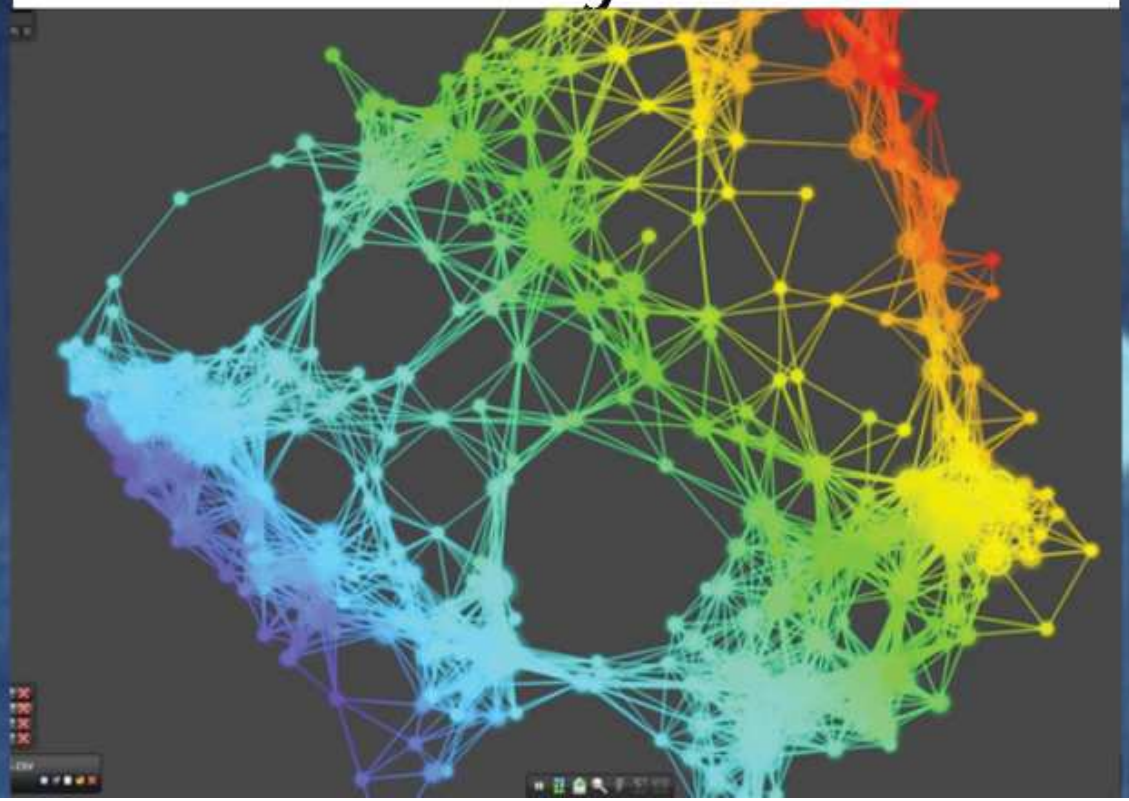


Textile Blockchain

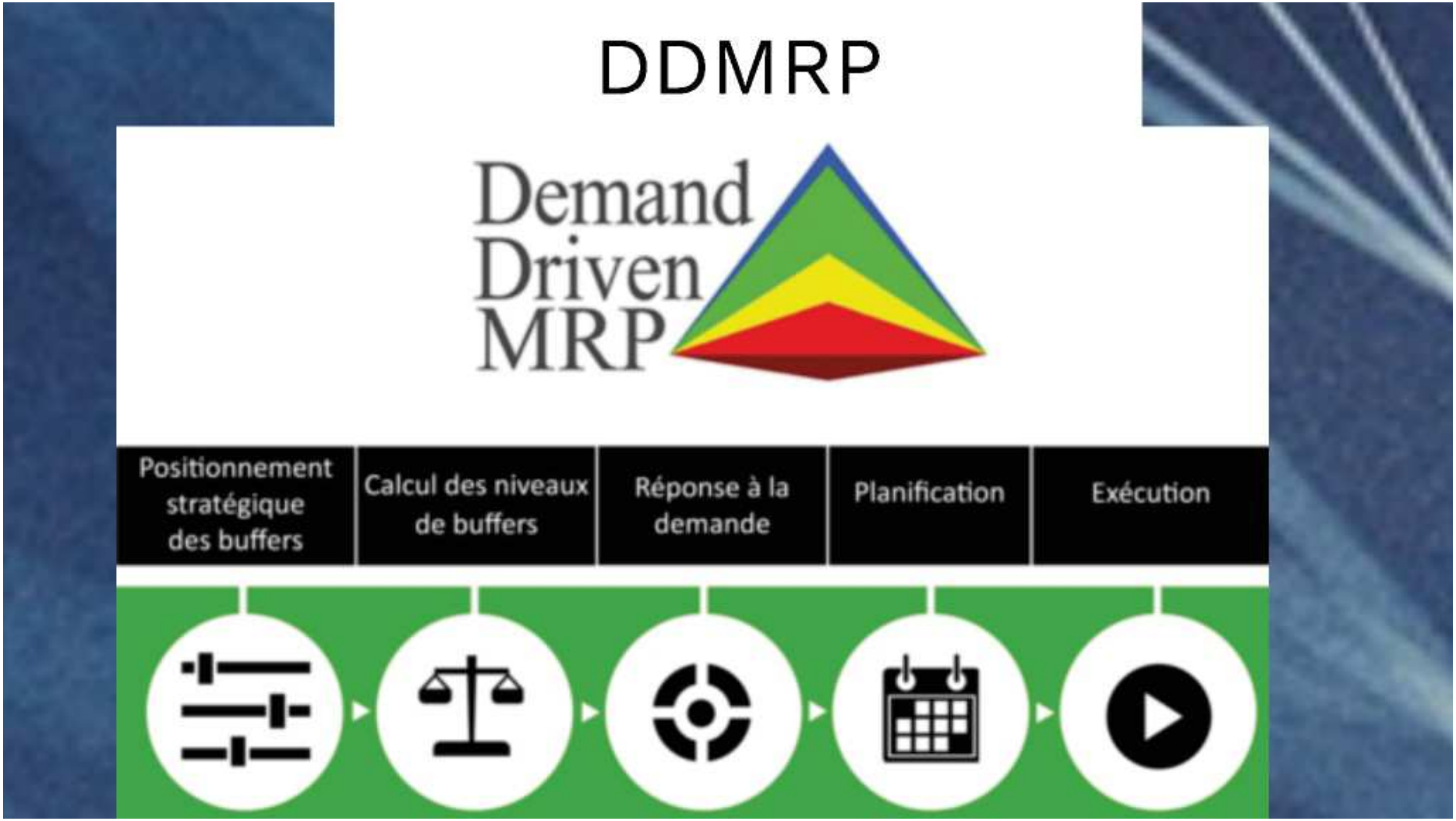



WINERY
END CONSUMER
MOBILE APP
STORAGE
IN PALLETS
Internet
of Things
DISTRIBUTION
RETAILERS
TRANSPORTATION
IN CONTAINERS
Topological
Data Analysis
DDMRP
Demand
Driven
MRP
Positionnement stratégique des buffers
Calcul des niveaux de buffers
Réponse à la demande
Planification
Exécution
Cybersecurity

Topological Data Analysis



DDMRP


Demand Driven MRP
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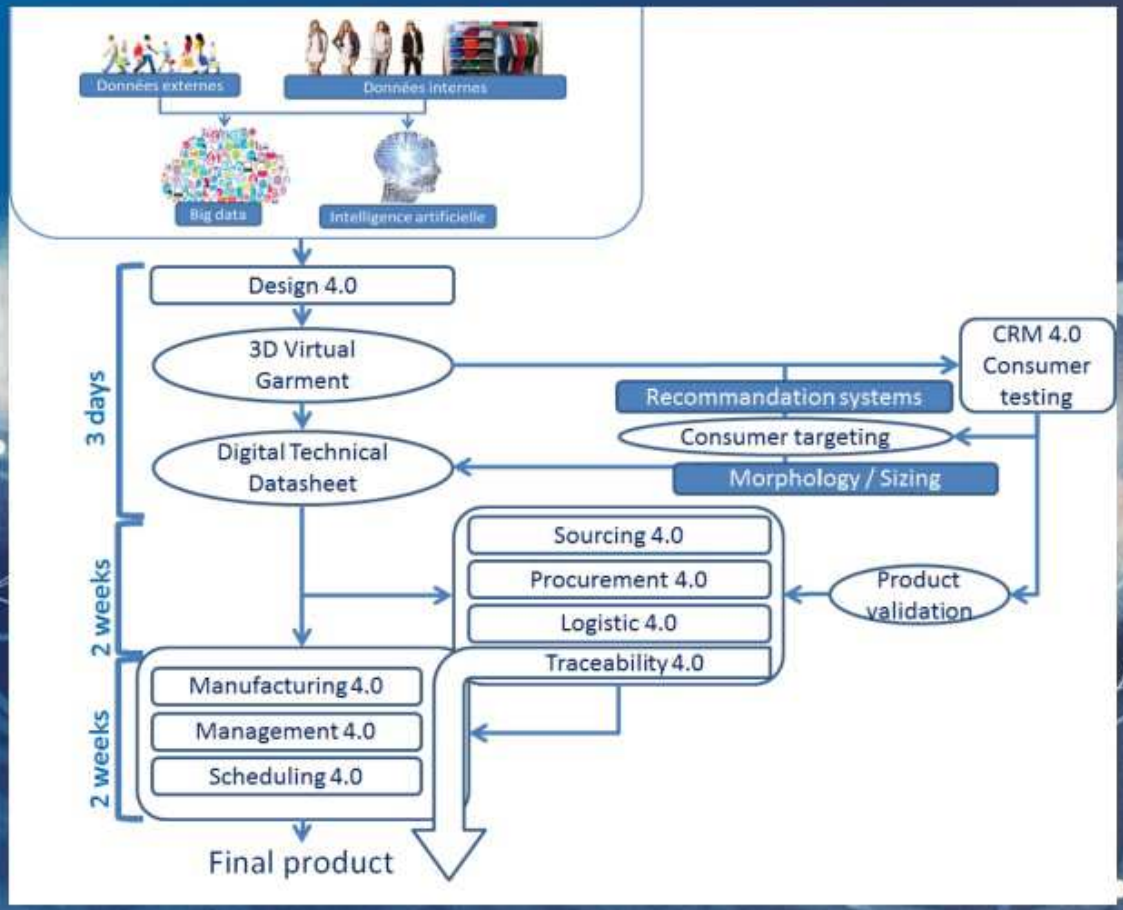
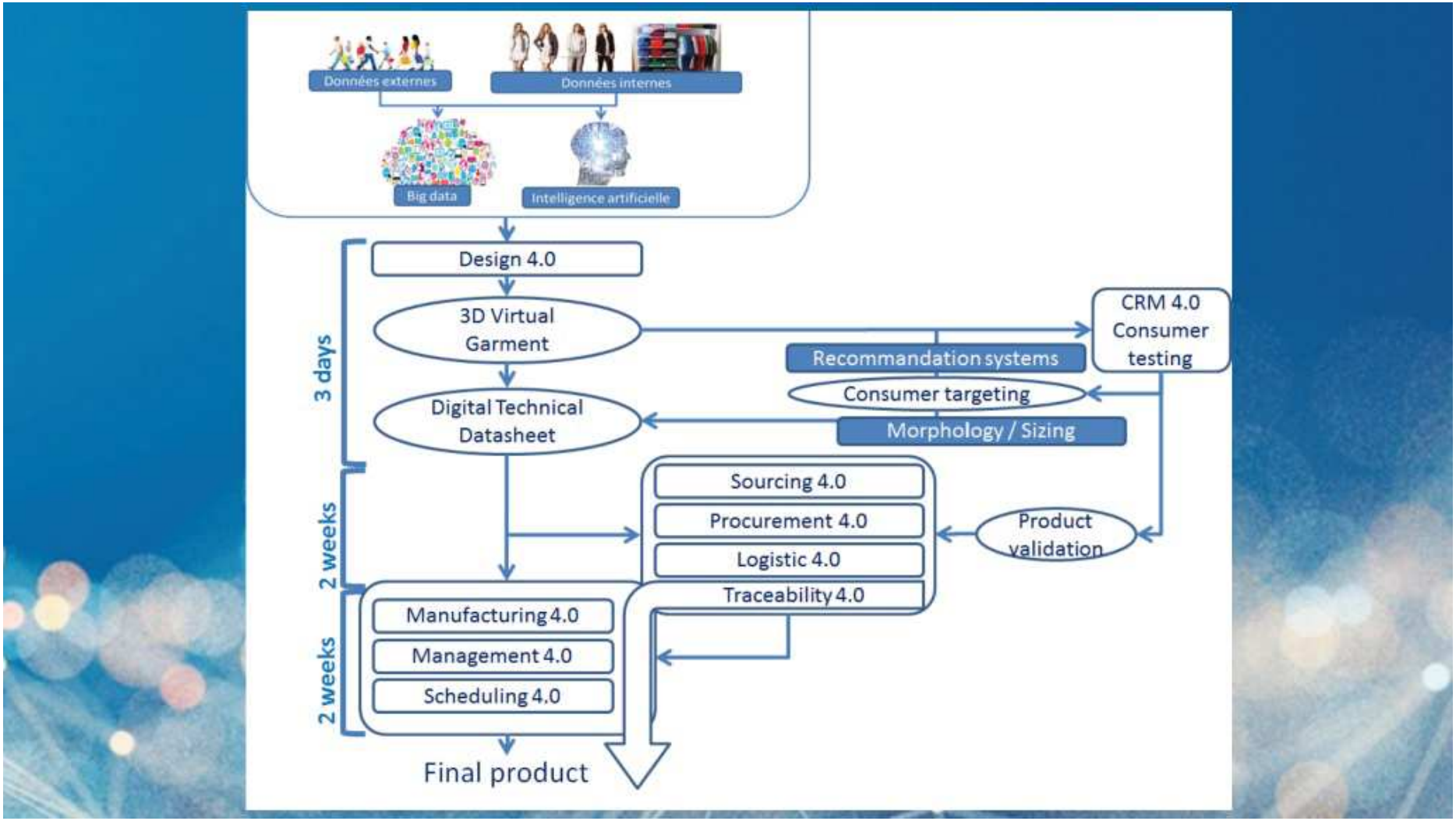
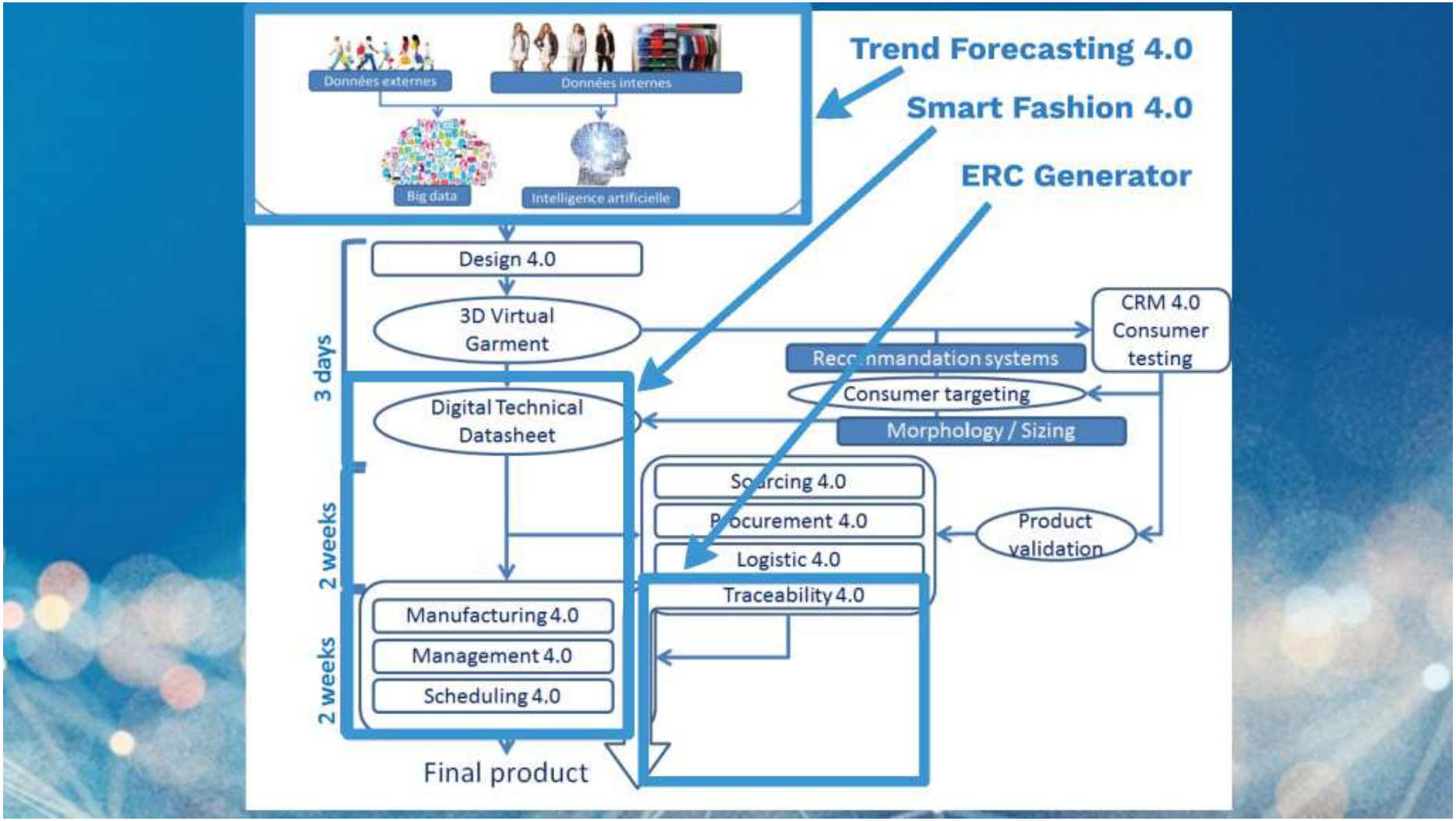



Données externes
Données internes
Big data
Intelligence artificielle
Design 4.0
3D Virtual Garment
Digital Technical Datasheet
3 days
2 weeks
2 weeks
CRM 4.0 Consumer testing
Recommandation systems
Consumer targeting
Morphology / Sizing
Sourcing 4.0
Procurement 4.0
Logistic 4.0
Traceability 4.0
Product validation
Manufacturing 4.0
Management 4.0
Scheduling 4.0
Final product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Smart Fashion 4.0
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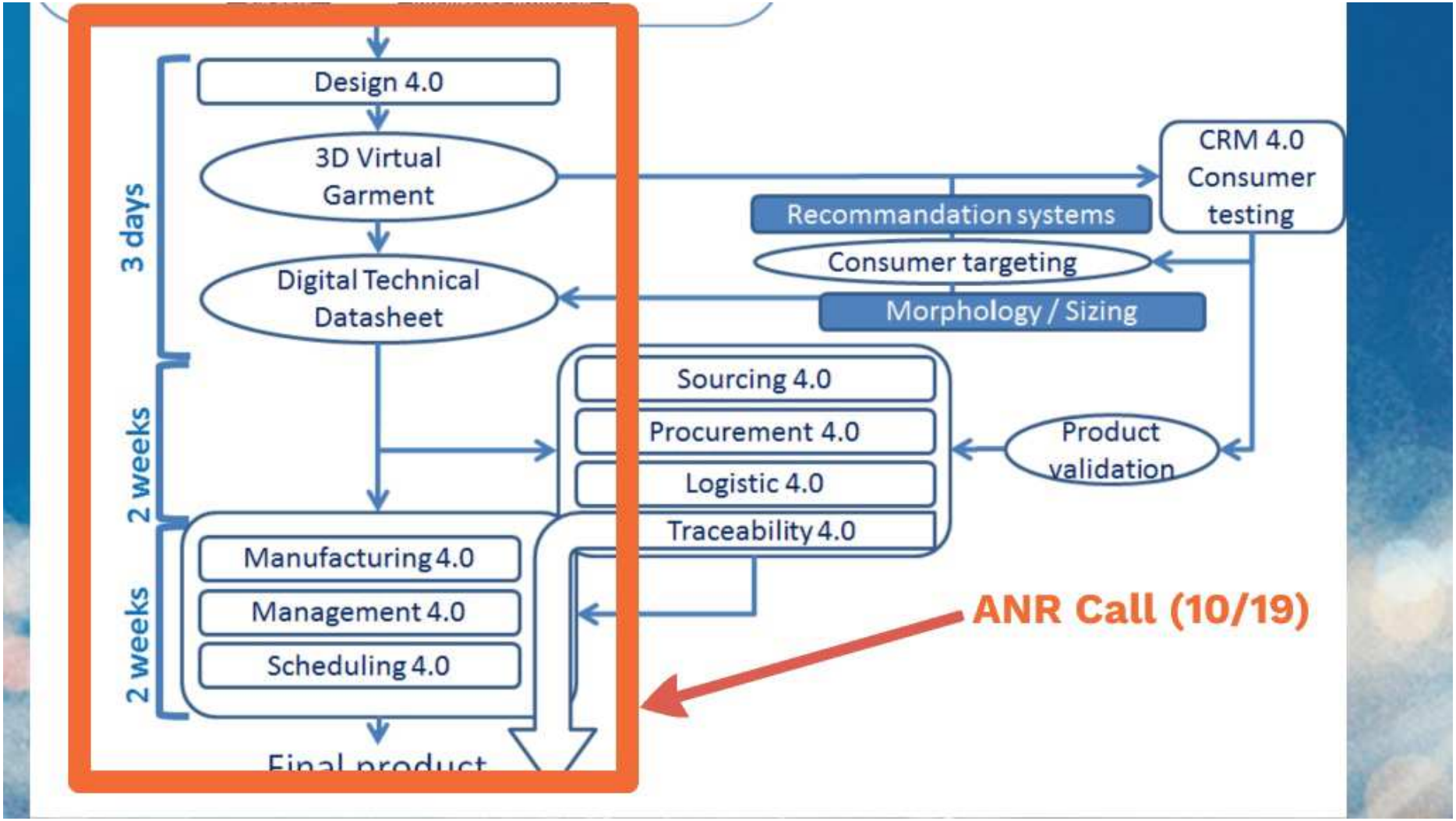
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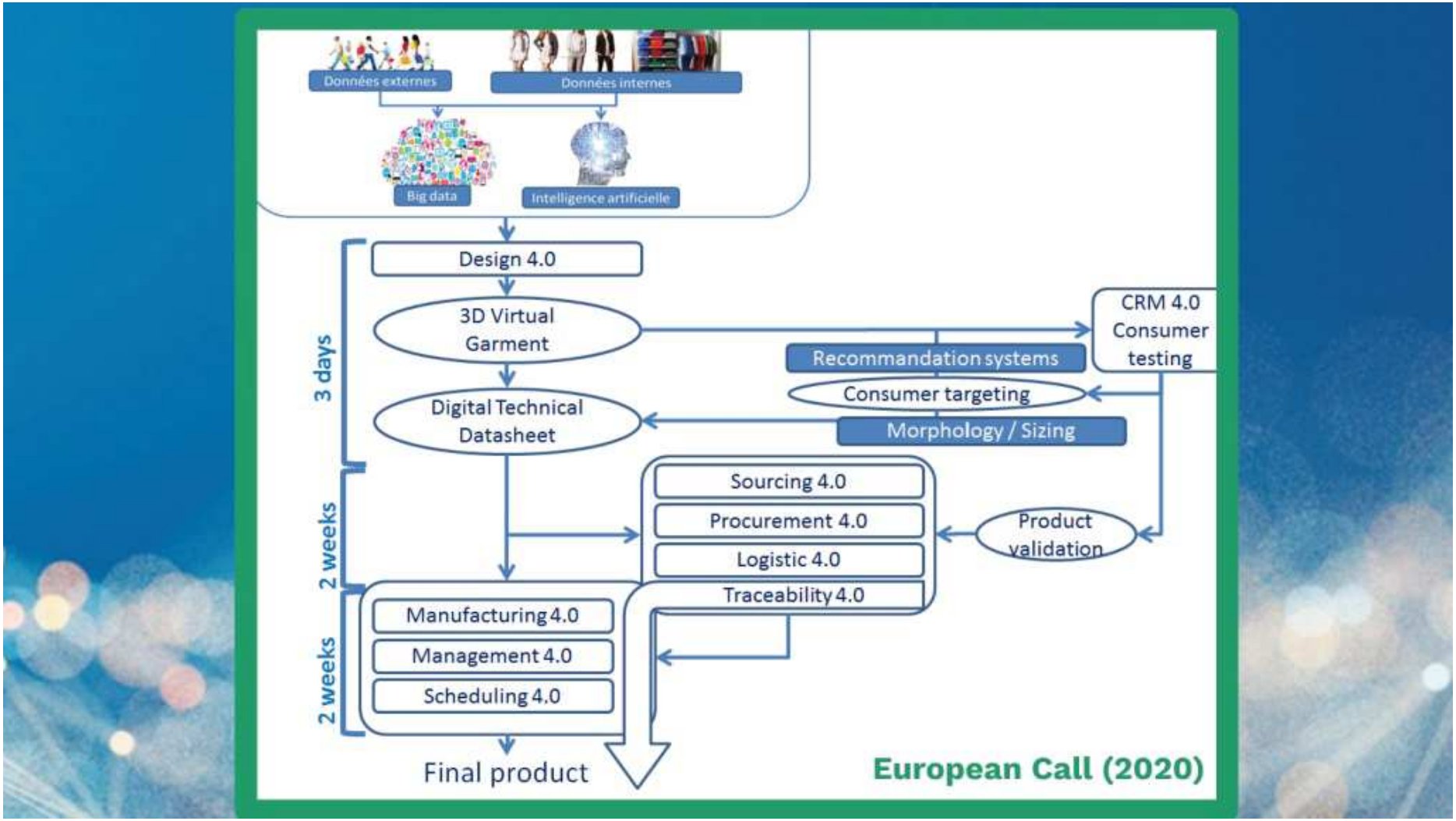
ANR Call (10/19)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European Call (2020)

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