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Industry 4.0 / Digital Transformation
Introduction to the 4th industrial revolution
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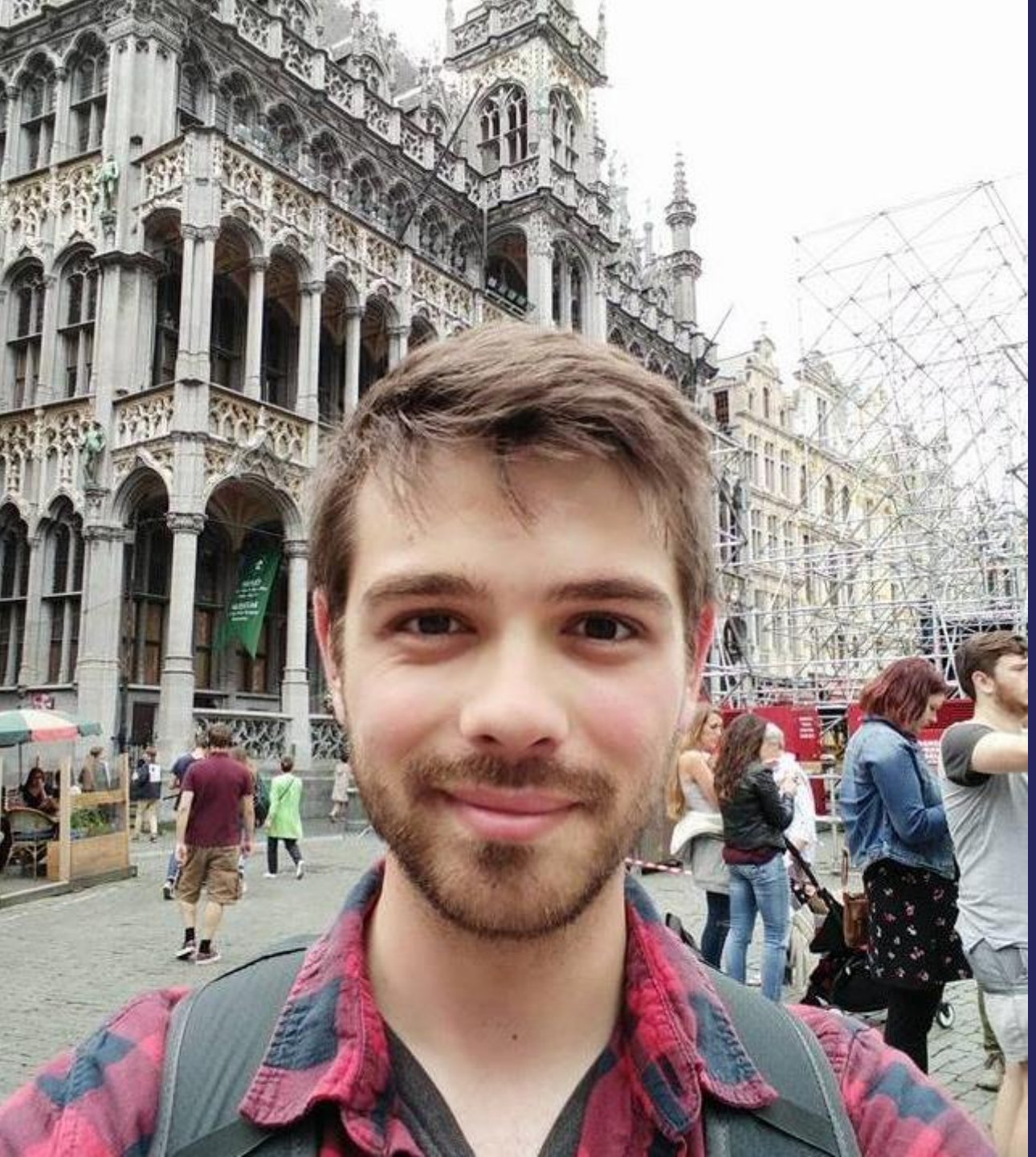

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Jonathan Brodeur
Eng., M.Eng.

- Bachelor’s Degree in Aerospace Engineering
- Master’s Degree in Project and Innovation Management
- PhD Candidate in Industrial Engineering
- 6 years of experience in project management
- 3 years of experience managing digital transformation projects

OUTCOMES + AGENDA

Outcomes :

- Success drivers of Industry 4.0
- How Project Management solutions can support digital transformation?

Agenda

- Industry 4.0 : Overview; Key drivers; Gains and Challenges
- Case Study: overview; results; Project Management impact
- MI-GSO Pcubed overview and support in Industry 4.0
- Panel Discussion: Questions and Next Steps for your Industry 4.0 Projects

Industry 4.0: Most accurate definition?

Industry 4.0: definition(s)

What is the most accurate definition of Industry 4.0?

1- Industry 4.0: Set of initiatives aimed at improving processes, products and services by enabling decentralized decisions based on real-time data acquisition (Danjou, Rivest, and Pellerin 2016)- Defintion of Quebec Province

2- Industry 4.0? I thought we were still in the 2.0! What happenned to 3.0?

3- Industry 4.0 is branch or sub-category of digital transformation targeting the manufacturing industry

4- There is no current consensus at worlwide level on a definition and the following terms are used alternatively: Industry 4.0 , digital transformation , digitalization , Manufacturing 4.0

FROM LEAST ADVANCED TO MORE ADVANCED

Connected Plant (“Beginner”)

- Focus mainly on data acquisition projects
- Put in place dashboards and basic KPIs about production performance
- Mainly choose the cheapest or easiest solutions available without having a clear architecture in place

Automated Plant (“Intermediate”)

- Put in place projects to automate standard processes within the manufacturing plant
- Has a clear vision and architecture of how the different systems will interact with each others
- Focus data analytic projects on bringing intelligence to the different level of the company

Smart factory (“Advanced”)

- Put in place projects to automate non-standard processes
- Possess an integrated architecture of their different systems and processes
- Focus project on specialised small gains opportunities (fine tuning)
- Focus data analytics on prediction

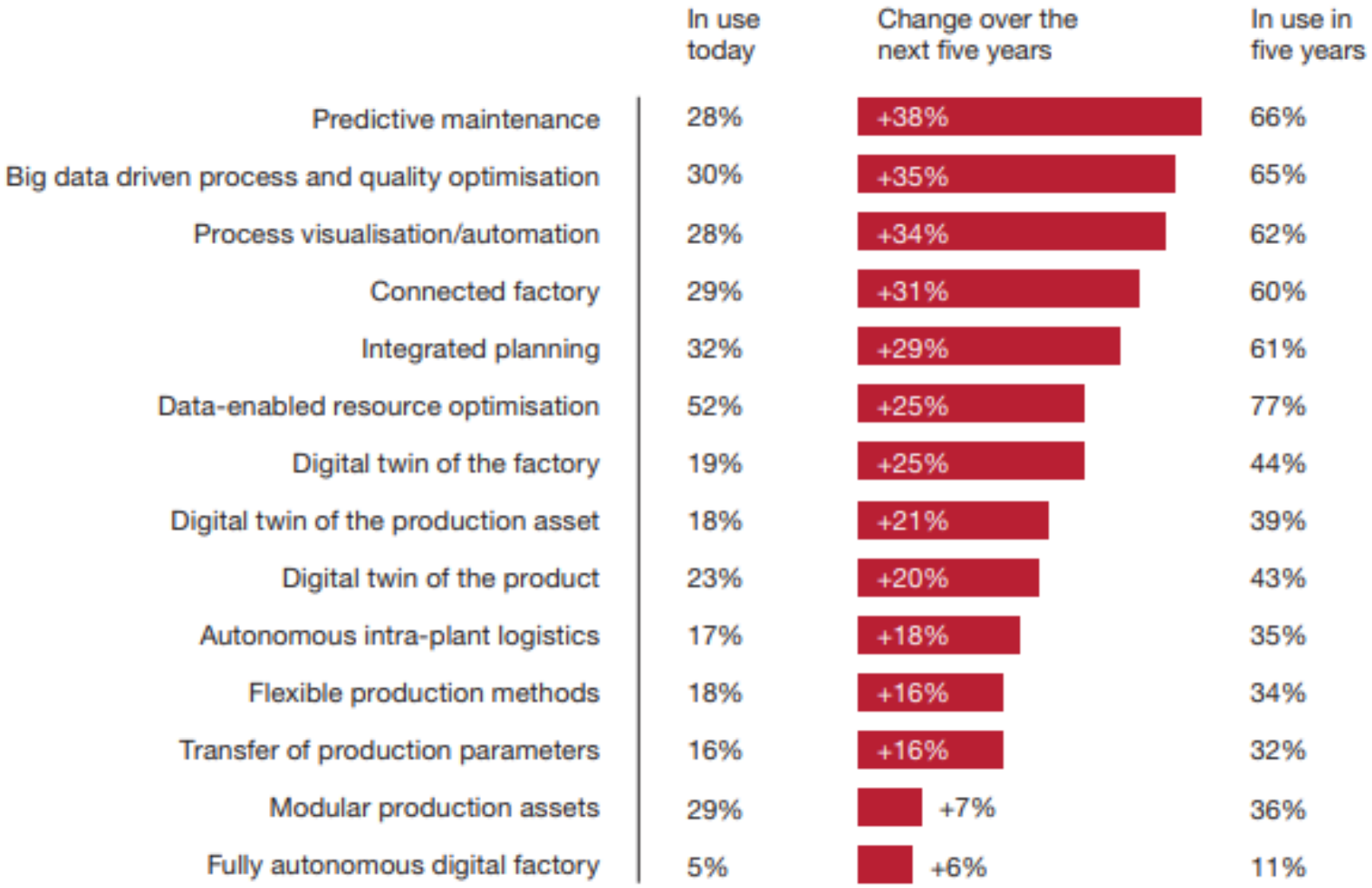
What category does your company fit in?

IND 4.0 MAIN INITIATIVES: 5 YEAR FORECAST (PWC, 2020)

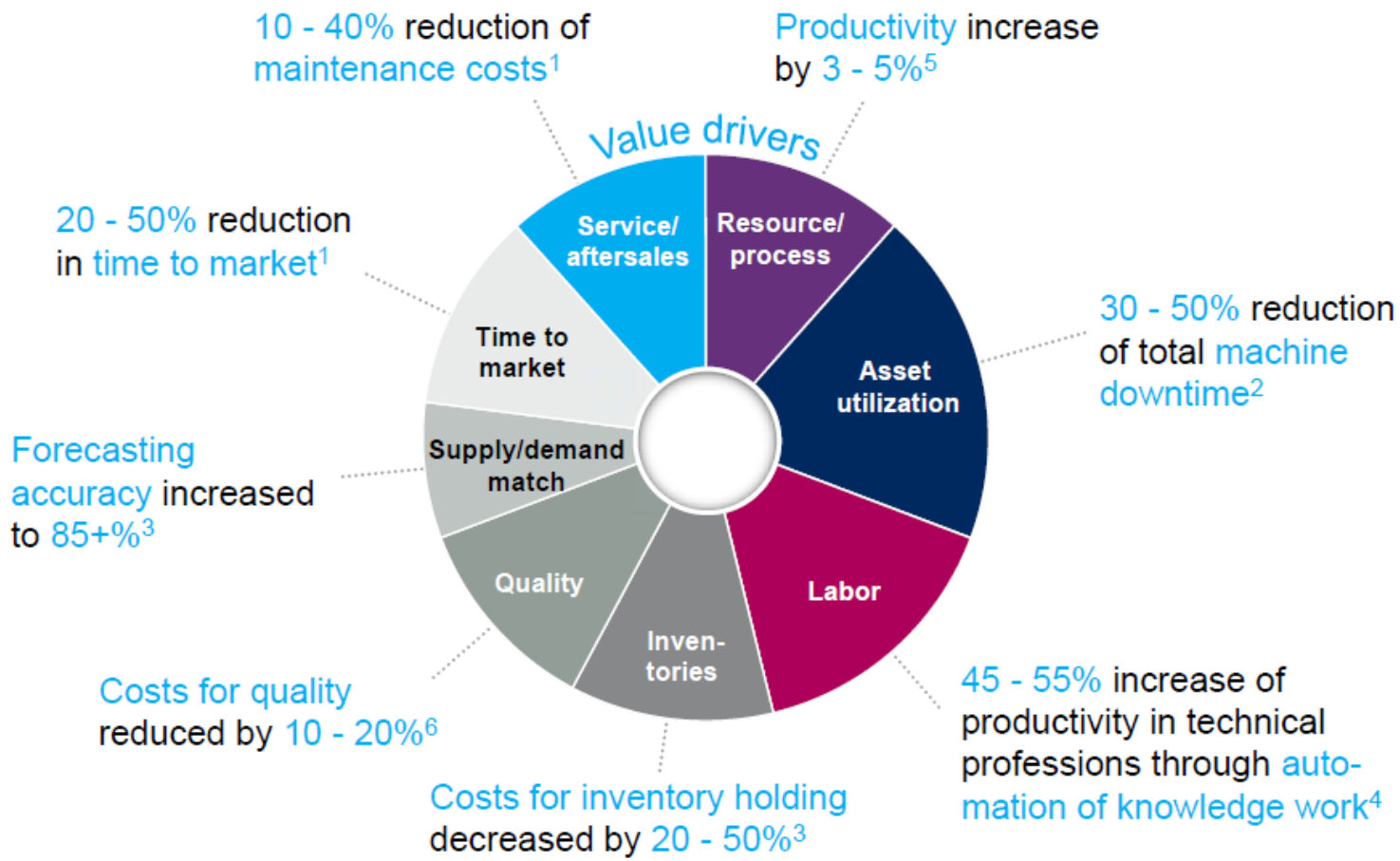
What Industry 4.0 initiative is your company more likely to invest in in the next 5 year?

-Predictive Maintenance
-Big Data driven process and quality optimization
-Process visualization/automation
-Connected factory
-Integrated Planning
-Data-enabled resource optimization
-Digital twin of the product
-Autonomous intra-plant logistics
-Flexible production methods
-Transfer of production parameters
-Modular production assets
-Fully autonomous digital factory

IND 4.0 MAIN INITIATIVES: 5 YEAR FORECAST (PWC, 2020)



INDUSTRY 4.0 POTENTIAL GAINS



1 Cf. McKinsey Global Institute: Big data: The next frontier for innovation, competition, and productivity 2 McKinsey analysis
3 McKinsey analysis 4 Cf. McKinsey Global Institute: Disruptive Technologies 5 See, for example, ABB case study
6 Cf. T. Bauernhansl, M. ten Hompel, B. Vogel-Heuser (Hrsg.): Industrie 4.0 in Produktion/Automatisierung/Logistik (2014)

SOURCE: McKinsey

And also:

- New products and services introduction
- Better supply chain coordination
- New business model
- Product Customization
- ….

(McKinsey, 2016)

Your Feedback?

INDUSTRY 4.0 CHALLENGES

What is the most relevant Industry 4.0 challenge if your company?

- Understanding of what is Industry 4.0
- Technology Selection and Integration
- How to launch and manage a digital transformation
- Availability of talents
- Upfront cost vs Operation cost
- Organizational Changes

Case Study

Aerospace Manufacturing Company

Disclaimer: Proprietary and Confidential information; do not disclose, share, print, without consent

Company overview

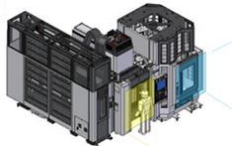
- Aerospace manufacturing company (larger Montreal area)
- Core business: machining, chemical treatments
- Family-owned company with 300+ employees divided into 4 sites
- M$100+ CAD Annual Sales
- 25% annual growth in last 3 years
- Innovation culture centered around exploring new solutions and technologies
- Industry 4.0 projects started in 2018 with 1 full-time project manager

INDUSTRY 4.0 STRATEGY

Objective: *Integrate digital technologies in order to improve and optimize our processes and procedures allowing the company to become a successful integrator within the Aerospace industry*

Strategic Growth Opportunities

Improve IT infrastructure



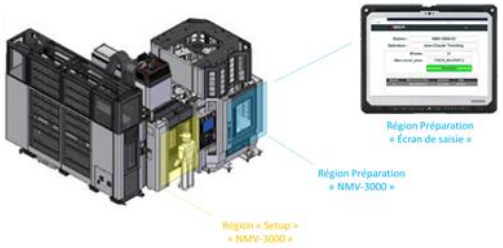
Real-time data acquisition

Data analysis and sense-making

Process automatisation

Project portfolio 2018-2021

Production data automated acquisition

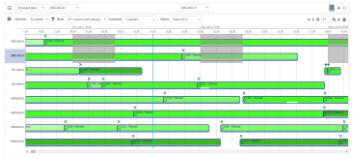


Cybersecurity

BI Dashboard and Platform

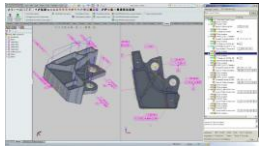
Material geolocation

Scheduling and ressource management



Digital Traveler

Quality data automated acquisition



SUCCESS DRIVERS VS CHALLENGES

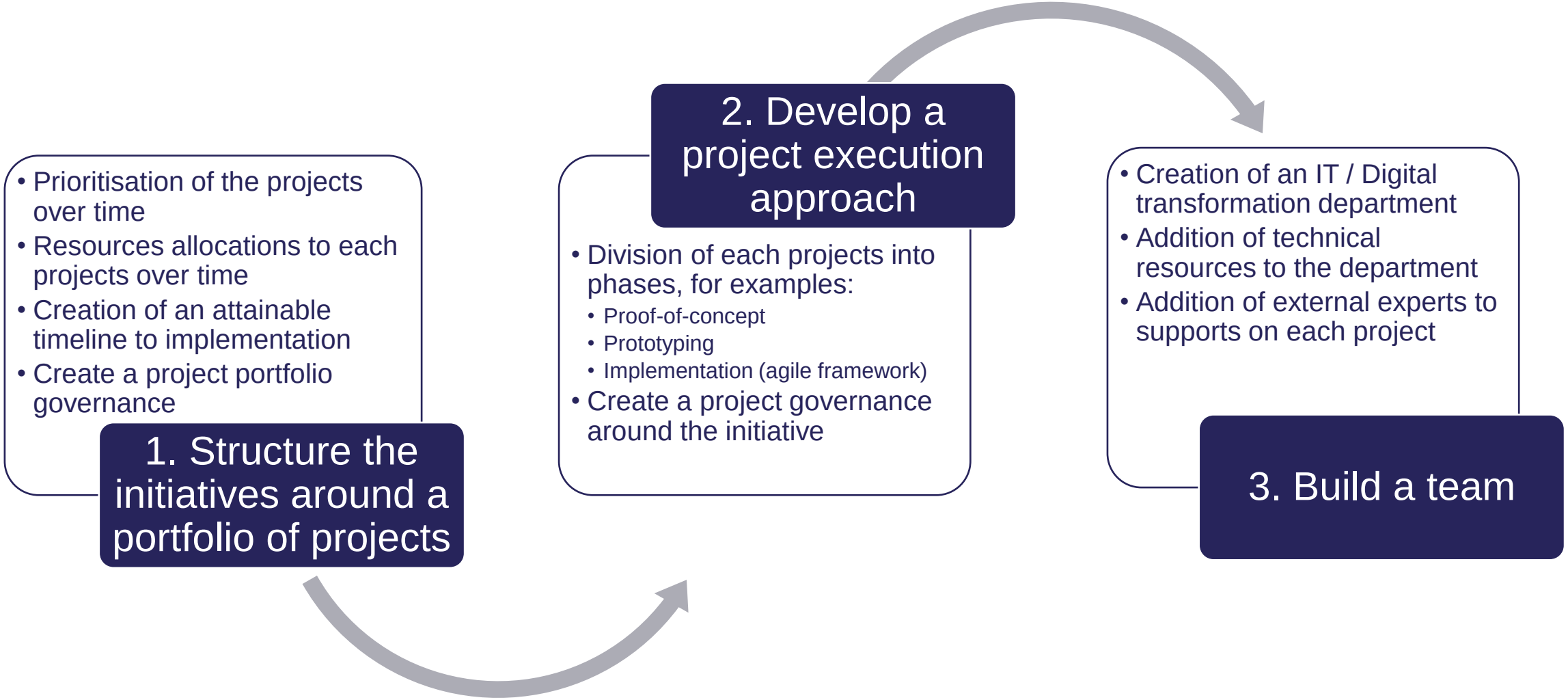
Success Drivers

- Good understanding of Industry 4.0 principles and architecture
- A Sponsor with authority (VP of Innovation and Infrastructure)
- Dedicated project manager
- Financial aid from provincial government

Challenges

- High number of projects compared to the resources capacity
- Prioritisation of Ind 4.0 projects was lower compared to industrial engineering projects
- Not enough technical experts available for the duration of the project and beyond
- Too many combination of solutions and technologies able to solved our business needs
- Buy-in of the change by employees and management

HOW CHALLENGES WERE MITIGATED



Project Management Solutions

How PM can support digital transformation

EXPERT IN PROJECT MANAGEMENT

MI-GSO | PCUBED is the world's leading consultancy dedicated to project, program, portfolio and change management.

> ***We support decision making and deploy teams of co-pilots to help you in your project delivery***

1. Delivery of highly efficient management and control systems

2. Monitoring and steering of every component of projects towards quality, time, cost and performance targets

FOCUS ON PMO SERVICES

- TIME MANAGEMENT
- COST MANAGEMENT
- QUALITY MANAGEMENT
- RESOURCES MANAGEMENT
- RISK MANAGEMENT
- SCOPE MANAGEMENT
- SUPPLIER MANAGEMENT

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FROM IDEATION TO EXECUTION OF YOUR PROJECTS: WE CAN HELP.

"**Think big, start small**. There's lots of ideas – you can never take them all and then turn them into beneficial and successful projects."

Alf Raju
VP @ MI-GSO | PCUBED USA

Some of our clients in Toronto

BOMBARDIER

THALES

SANOFI

APOTEX
Innovating for patient affordability

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Panel Discussion: How different are Industry 4.0 projects to your projects?

NEXT STEPS FOR YOUR INDUSTRY 4.0 TRANSFORMATION

- **Create a Digital Transformation strategy** as part of your business strategic plan
- **Define an Industry 4.0 vision and architecture** of what your business should look like in 5 to 10 years.
- **Breakdown** segment of this **architecture into projects** to create your digital transformation **project portfolio**
- **Build a team** to structure, manage and execute your project portfolio
- **Communicate** your digital transformation **plan and portfolio of projects** at the different level of your company to trigger the **organizational change** accompanying your digital transformation.

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Thank You!

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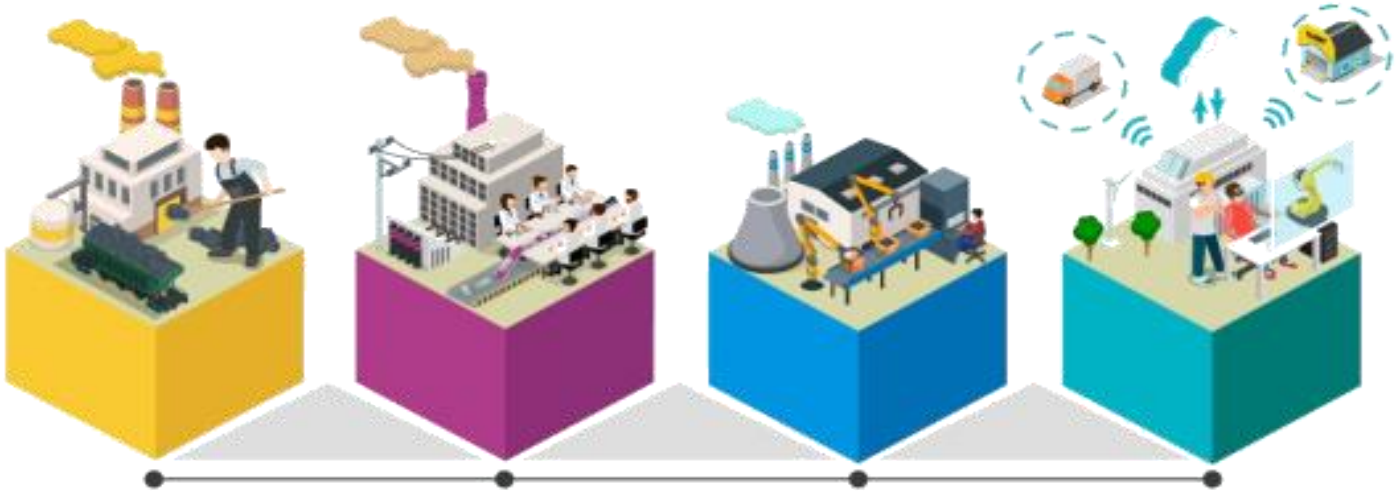
Industry 4.0: definition

Industry 4.0: *Set of initiatives aimed at improving processes, products and services by enabling decentralized decisions based on real-time data acquisition (Danjou, Rivest, and Pellerin 2016)*

Industry 4.0 vs digital transformation vs digitalization vs Manufacturing 4.0



1765
1st revolution
MECHANICAL PRODUCTION
Supported by Steam Machine

1870
2nd revolution
MASS PRODUCTION
Supported by electrical and petroleum energy

1969
3rd revolution
AUTOMATED PRODUCTION
Supported by electronic and computer

Today
4th revolution
AUTONOMOUS PRODUCTION
Supported by data-centric technologies (IoT, Cloud, AI, Cyberphysical systems)

4 levels of Ind 4.0 technologies: from Car…

1. Monitoring

- RPM
- Speed
- Oil level
- Temperature
- Check Engine

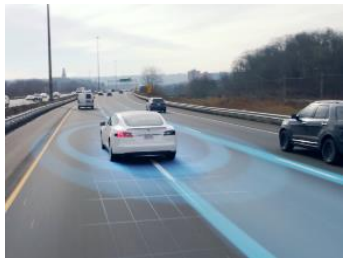
2. Control

- Automated Transmission
- All-wheel Drive
- Emergency Braking System

3. Optimisation

- « Sport/Eco » Mode
- « Snow/Rain/ Sand » Mode

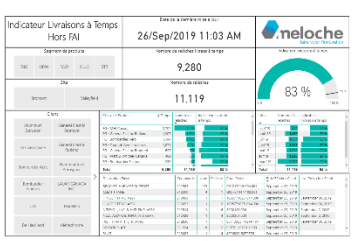
4. Autonomy



- Driverless car

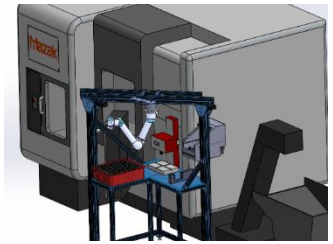
4 levels of Ind 4.0 technologies: …to companies

1. Monitoring



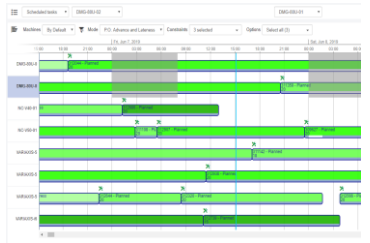
- Real-Time KPI
- Actual job number in progress
- Geolocation of material

2. Control



- Automation of simple manual process on the shop floor
- Automation of report creation
- Real-time work instruction

3. Optimisation



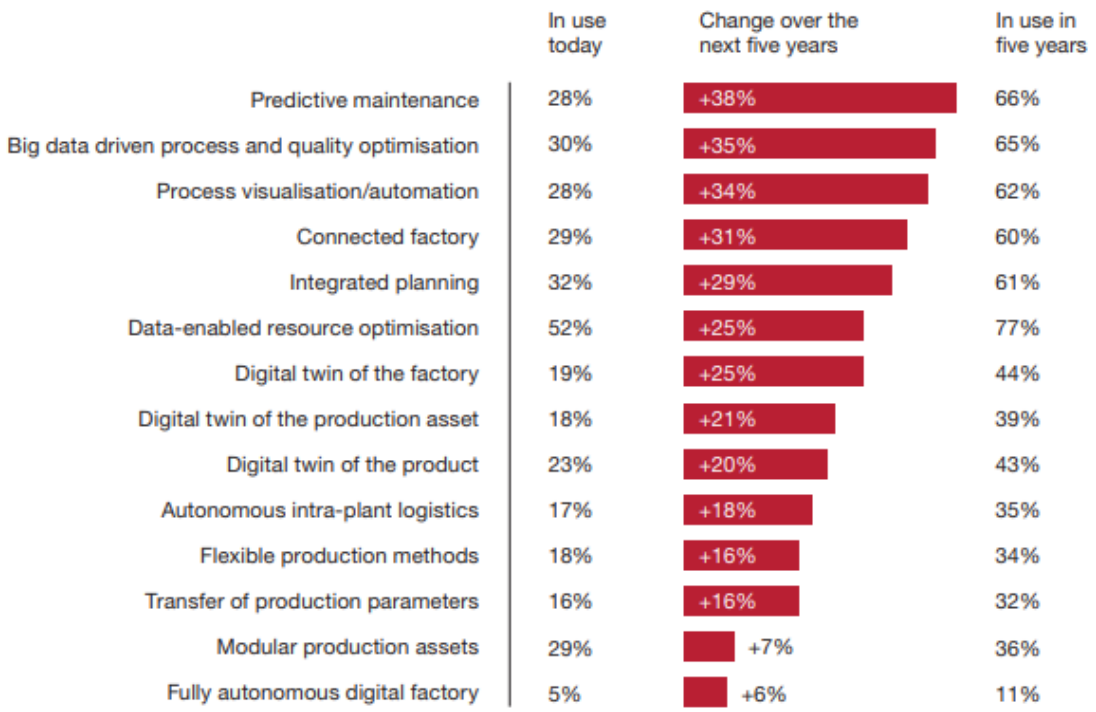
- Auto-compensation of manufacturing process
- Real-time re-optimization of job scheduling

4. Autonomy

- Fully autonomous manufacturing plant
- « Lights-out » principles

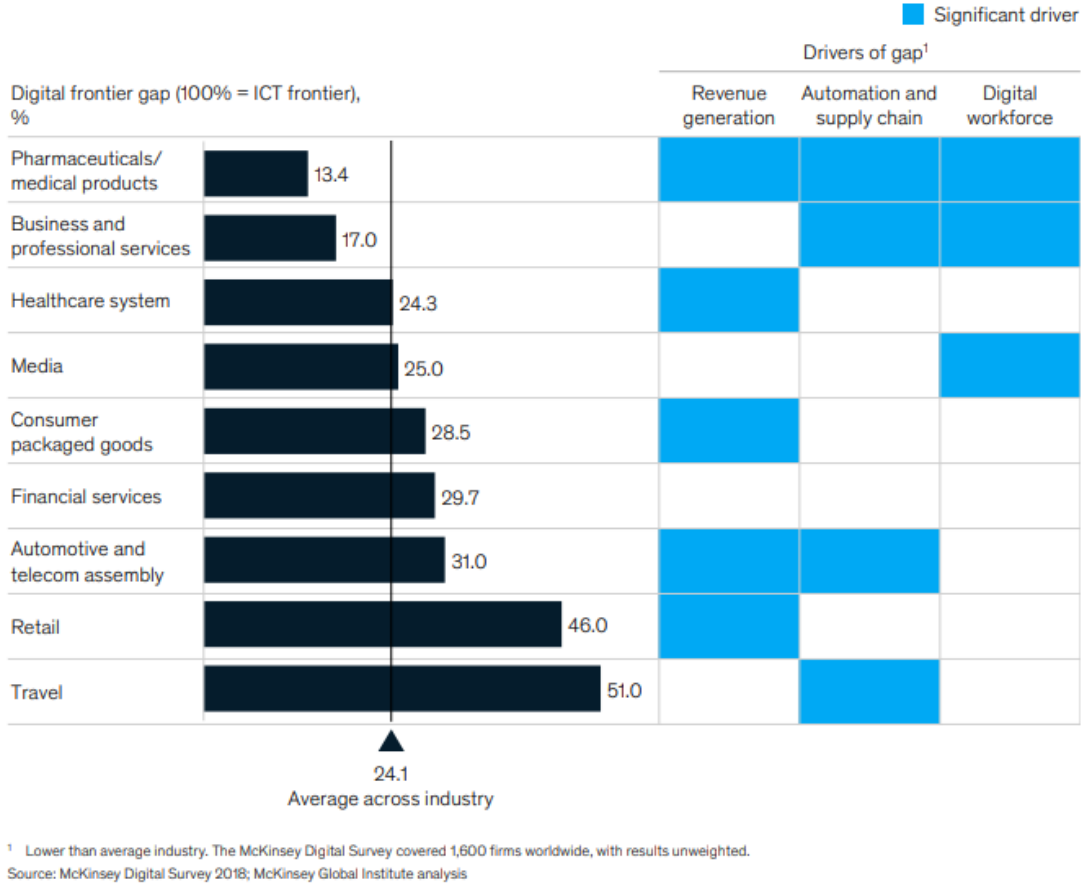
KEY DRIVERS

Ind 4.0 initiatives: 5 -year forecast



(PWC, 2020)

Industries drivers: breakdown



(McKinsey, 2019)