Looking to position France and Europe at the core of the global industrial landscape in the years to come, it is important to imagine what industries will look like at the end of this decade. This report is not about the digitization of existing industries, already well covered in many Industry 4.0 reports. It is about exploring the future of industries and analyzing the enablers of their successful development.

This report focuses on industries that rely on tangible assets. Services such as Finance and Insurance are not covered in this document, although they are undertaking profound transformation as well.
Executive summary

Entering the Smart Industries era

Smart Industries will emerge through the combination of breakthrough technologies and innovative business models. These Smart Industries will profoundly reshape the world of tomorrow and change competitive dynamics and the rules of doing business in Health, Food, Mobility, Energy, Things, Security & Safety and Cities.

They will help solve the increasingly pressing challenges that our societies are facing. For example, Smart Mobility should reduce traffic congestion and pollution in cities when it reaches maturity (e.g. through a reduction in number of personal vehicles and an increase in greener transportation).

They will represent tremendous opportunities for increased growth and employment. By 2030, they will represent a sizable share of global industries (e.g. Smart Mobility will account for ~15% of the global mobility market).

Therefore, enabling and investing in the development of these industries is imperative to capturing the societal and economic potential they offer.

New Smart Industries, new Smart Ecosystems

The digital revolution has initiated a shift in the way we organize businesses — from static, evolutionary, vertical and company-centric ways of working, to a more horizontal, disruptive and collaborative model leveraging digital ecosystems, and where platforms have thrived.

Smart Industries will take this shift to the next level and create a new business organization model around Smart Ecosystems. They differentiate from well-known digital ecosystems through two characteristics:

**Deep tech assets** — Smart Industries rely on breakthrough technologies with strong IP assets, high barriers to entry and require substantial funding and time to develop (and not only digital capabilities). We see seven areas of emerging R&D technology that are the most promising active fields and that will accelerate the development of these industries: artificial intelligence, advanced materials, quantum computing, gene engineering, generative design, augmented and virtual reality, robotics and drones (in addition to technologies already at scale such as connectivity and cloud computing).

**Industrial assets** — Unlike the digital revolution, whose digital applications came first, Smart Industries rely on both digital capabilities and vertical industry expertise with its physical assets and infrastructure. There is no separation between offline and online anymore, but a total integration. These technological and industrial assets evolve in a fragmented world due to high geographical, industrial and functional disparity. They involve cross-sector and cross-geography players that need to overcome the challenge of accessing these technological and industrial assets, and that need to be brought together.

A new governance model based on smart ecosystems of universities and R&D centers, corporations (from start-ups to large players), incubators and innovation centers, investors and governments is required to enable the rapid acquisition and sharing of resources. In order to be impactful, these ecosystems need to be orchestrated by a few leading large players who can leverage strong existing assets and market position.

These Smart Ecosystems will enable to:
- Share and acquire new capabilities (e.g. knowledge and technological assets, industrial capabilities, data)
- Secure substantial funding
- Scale fast to achieve critical mass (e.g. market access and network effect) and share risks
- Get the flexibility and resilience needed to adapt to fast-changing environments where consumer needs can be unpredictable and technological trajectories are uncertain.

These ecosystems can only thrive if regulators set the right conditions — those that allow for efficient use of data and real-life testing while building and reinforcing trust.

Europe has a critical role to play in accelerating the development of Smart Industries

So far, the U.S. and China have led the digital revolution and are betting on the industrial potential of emerging technologies. Yet Europe has tremendous capabilities to leverage to accelerate the development of Smart Industries:
- Its leading edge existing technological assets (including IP and talent pool) and its strong industrial background built upon a diversified and historical network of industries.
- Furthermore, Europe is leading the charge to tackle our societies’ most imminent challenges (such as climate change) that Smart Industries aim to solve.

To play its role in the next wave of Smart Industries, Europe should achieve market scale (One Europe) and set the right conditions for Smart Ecosystems orchestrators to emerge, while continuing to strengthen its deep tech and industrial assets.

**One Europe** — European countries must join efforts to overcome political, economic and social fragmentation to reach critical mass. They should:

1. **Think impact at European scale** — Stop promoting fragmented pilot projects in each country and collectively focus on building two or three competing Smart Ecosystems for each Smart Industry. European governments will have to accept that favoring their own national champions will not always result in the best outcome for the local economy.
2. **Set standards** — Intensify efforts to establish common norms and standards to simplify ways of doing business, unify markets and give long-term visibility.
3. **Develop industrial strategy** — Set common, focused industrial plans that allow leading players to compete on the orchestrator roles and take risks. When no natural leader is able to fill this role, Europe should proactively help orchestrators to emerge as it recently did in the battery sector.
4. **Adapt long term incentives** — Favor long term investment and support orchestrators in creating an attractive economic environment.

Leading deep tech and industrial assets — Europe must continue to invest in emerging technologies and create the right conditions to transform fundamental research into commercial and industrial applications. Europe should:

5. **Implement innovation-enabling regulatory framework** — Create nurturing regulation with long term visibility (for efficient use of data, real-life testing and trust).
6. **Enable funding** — Create an environment that enables private funding (from corporate and also VC funds) and provide ambitious and focused public investments.
7. **Educate citizens** — Develop awareness and reskilling programs about technologies for users and workers (not just top talent).

This coordinated and results-driven approach is Win-Win-Win:
- **Win for local governments**, which can foster job creation with the new Smart Industries.
- **Win for industry players**, which will benefit from Europe’s assets and market scale to experiment and develop new products and services. This will also reinforce the network of their ecosystems. For an orchestrator, this is the core asset to beat competition in the 2030s. And smaller companies can benefit from the ecosystems’ resources.
- **Win for our societies**, for which Smart Industries aim to solve the most pressing challenges.

All European countries should work together to embrace change and accelerate the development of the Smart Industries. In Choose France, we choose Europe as a leading innovation force for the world.
When technology meets innovative business models

Smart Industries will emerge through the combination of breakthrough technologies and innovative business models. These Smart Industries will reshape the world of tomorrow and bring drastic changes to our lifestyles — in how we nourish and nurture our bodies, how we get around, how we produce and consume energy, how we interact with the world around us, how we organize our cities.

New ways of doing business

When they emerge, these new Smart Industries disrupt current markets and reshuffle competitive dynamics. In Mobility for example, digital platforms and integrators offer new services and solutions to end users. They increasingly disintermediate the traditional car manufacturers and capture the customer interface. With the prevalence of electronics and software in modern vehicles, suppliers from other industries have entered the mobility space and compete directly with tier 1 incumbents on key technologies.

Illustration in mobility

Smart Mobility is reshaping the value chain, with new influencers, new comers, new suppliers from other industries that play a crucial role across key technologies.
Smart Industries for better societies

Our societies are facing increasingly pressing challenges, from climate change and resource scarcity, to densification of urbanization and demographical changes. Smart Industries will bring new solutions to the market to solve these challenges. As an example, the rise of connected platforms, electric powertrains and autonomous vehicles, coupled with on-demand shared mobility, is paving the way for new services to thrive, e.g. self-driving autonomous taxis and shared electric cars, bikes and scooters. Ultimately, these new ways of moving will help reduce the number of personal cars in cities, reducing traffic congestion and carbon footprint.

Smart Industries expected market size in 2030

- Smart Mobility: ~17% of the global mobility market in 2030. Smart Energy will comprise ~8% of global energy consumption.

It is critical that countries and companies build and develop enablers that will foster the development of these industries in order to capture the societal and economic potential they offer.

Opportunities to capture

The Smart Industries are the next industrial revolution and represent tremendous opportunities for increased growth and employment. In the next 10 years, we estimate the global smart markets to range from ~$0.9Tn to ~$2.3Tn. Smart Industries will represent a sizable share of global industries. As an example, Smart Mobility will account for ~17% of the global mobility market in 2030. Smart Energy will comprise ~8% of global energy consumption.

Illustration in Mobility

- Innovation in technology...
- ...solve key mobility challenges
- Connected Mobility
- Electric Mobility
- Autonomous Mobility
- Urbanization
- Traffic congestion
- Pollution
- Densification
- Accessibility

...and innovation in business models...

- Mobility-as-a-Service
Get to know the Smart Industries

**Smart Health**
What the future could look like

- **Towards better quality**
  - Cell & Gene Therapies
  - Quantum computing may allow faster drug discovery and improved diagnostic capability
  - Lymphocytes extracted from patient’s body
  - Lymphocytes re-engineered in a lab to target & kill cancer cells

- **Towards better coverage**
  - Consumer-driven digital health
  - Tele healthcare, especially for regions facing lower physicians to patient ratio

**Global market size ($B)**

- 2018: ~2,270
- 2025: ~470
- 2030: ~900

**Notes:**
- ~x2: ~2,220
- ~x3: ~1,270
- ~x4: ~840
- ~x5: ~540
- ~x6: ~330
- ~x7: ~220

**Products & Services:**
- Cancer and other disease treatments
- Digital health services
- Health analytics to foster early stage treatment

**Intersecting Industries:**
- Digital health systems
- eHealth
- mHealth

**Additional Industries:**
- Health analytics
- Wearables

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**Smart Food**
What the future could look like

- **Smart farming**
  - Drone major applications
  - Livestock monitoring & management
  - Precision crop farming using field sensors to gather data

- **Organic food**
  - Agriculture respected of land
  - Proteins alternative sources for nutrition such as plants, algae and insects to reduce meat consumption

**Global market size ($B)**

- 2017: ~668
- 2025: ~996
- 2030: ~1,370

**Notes:**
- x1: ~175
- x2: ~470
- x3: ~900
- x4: ~1,370

**Products & Services:**
- Livestock monitoring
- Precision crop farming
- Livestock monitoring & management
- Precision crop farming using field sensors to gather data

**Intersecting Industries:**
- Precision crop farming
- Livestock monitoring

**Additional Industries:**
- Livestock monitoring
- Precision crop farming
- Livestock monitoring & management
- Precision crop farming using field sensors to gather data

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**Smart Cities**
What the future could look like

- **Smart maintenance of equipment**
  - Interconnectivity & communication
  - Smart water management with smart meters & tap and flow sensing

- **Smart water management**
  - Smart maintenance of equipment
  - Interconnectivity & communication

**Global market size ($B)**

- 2018: ~515
- 2025: ~95
- 2030: ~45

**Notes:**
- x1: ~175
- x2: ~470
- x3: ~900

**Products & Services:**
- Access and security badge in, cameras, integration perimeter, doors
- Lighting occupancy sensing for efficient consumption of energy

**Intersecting Industries:**
- Access and security
- Lighting occupancy sensing

**Additional Industries:**
- Access and security
- Lighting occupancy sensing

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**Additional Notes:**
- Excluded from sizing, part of other Smart Industries resp. Energy for Lighting occupancy and Security & Safety for Access and security means.
Cybersecurity
• New AI-driven tools to provide improved detection of cyber vulnerabilities and more effective prevention and correction of cyber-attacks

Connected camera networks combine with image analysis to facilitate and improve security applications
• Facial recognition at gates
• Public place screening (train stations, airports)

Buildings / Public Safety & Security
• In-house sensor networks allow faster detection of suspicious activities and faster intervention from concerned services

Smart Safety
What the future could look like

Smart Mobility
What the future could look like

New delivery systems
Centralized charging & maintenance for AV fleets
New modes of (shared) transport, e.g., air taxis
Autonomous electric mobility

Connected camera networks combine with image analysis help reduce criminality
• Facial recognition at scale
• Public place screening (train stations, airports)

New AI-driven tools to provide response to greater cyber vulnerability amplified by IoT, cloud, social media and digitization

In-house sensor networks allow security enhancement, accident prediction and faster intervention from concerned services

More prevalent regulation especially through data privacy laws

Smart Things
What the future could look like

Retail
Personalized services / promotions based on customer preferences and transaction history
Smart inventory management based on real-time inventory tracking and order automation
Self-checkout with automatic basket price calculation and digital payment technologies
Predictive maintenance for malfunction prediction and servicing optimization of costly/critical equipment

Industry
Smart inventory management using digital tags, readers, store shelf sensors and video monitoring
Self-optimizing production thanks to real-time adjustment of production quantity and sensors on machines/environment

Global market size ($B)

Public Safety and Security
• New AI-driven tools to provide improved detection of criminal activities and more effective prevention and correction of criminal acts

Buildings / Public Safety & Security
• In-house sensor networks allow faster detection of suspicious activities and faster intervention from concerned services

Global market size ($B)

Smart Energy
What the future could look like

Wind power plant
Solar power plant
Water power plant
Hydro power plant

Storage system to improve electricity rates by
• storing the excessive solar/hydro power and releasing it when necessary
• stabilizing power output

Global market size ($B)
From digital revolution to Smart Industries

The digital revolution has initiated a shift in the way we organize businesses — from static, evolutionary, vertical and company-centric ways of working, to a more horizontal, disruptive and collaborative model leveraging digital ecosystems (notably built by GAFAs but also by several other tech giants), and where platforms have thrived.

Smart Industries will take this shift to the next level and create a new business organization model around Smart Ecosystems. They differentiate from well-known digital ecosystems through two characteristics:

Deep tech assets — Smart Industries rely on R&D intensive technologies and not only digital capabilities. We see seven areas of emerging R&D technology that are the most promising active fields and will accelerate the development of these industries: artificial intelligence, advanced materials, quantum computing, gene engineering, generative design, augmented and virtual reality, robotics and drones (in addition to technologies already at scale such as connectivity and cloud computing).

While these technologies have different maturity and market-readiness, they all have enormous potential to disrupt markets and create new ones. To name a few of the foreseen disruptions, 3D printing and generative design in the automotive industry are expected to bring a 75% reduction in materials, allowing for lower emissions, lower car weight and a reduction in inventories. Gene engineering will enable the design of seeds that don’t require fertilizers while maximizing the yield of cereal fields.

These emerging technologies are significant breakthroughs and their IP is hardly accessible. They require a long time and substantial capital to develop and to reach real-life applications.

Industrial assets — Unlike the digital revolution, whose digital applications came first, Smart industries rely both on digital capabilities and vertical industry expertise with its physical assets and infrastructure. There is no separation between offline and online anymore, but a total integration. Furthermore, all Smart Industries rely on the availability of fast and secure connectivity. The deployment of 5G network, for example, is imperative to supporting all Smart Industries.

These technological and industrial assets evolve in a fragmented world due to high geographical, industrial and functional disparity. They involve cross-sector and cross-geography players that need to overcome the challenge of accessing these technological and industrial assets, and that need to be brought together.

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*Typical innovation S-curve*

Today, we are in the acceleration phase, where the capacity to innovate is critical to enabling the development of Smart Industries.

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**New Smart Industries, new Smart Ecosystems**
Smart Ecosystems

A new governance model, based on smart ecosystems of universities and R&D centers, corporations (from start-ups to large players), incubators and innovation centers, investors and governments is required to enable a rapid acquisition, transfer, and sharing of resources to build not only individual products but the complete, innovative solutions of tomorrow.

These Smart Ecosystems serve that purpose by bringing together skills, knowledge, expertise, data, market access, relationships, funding, and tangible assets. This exchange of resources opens new areas of possibilities and sets up a conducive environment to build the products and services of tomorrow.

1. **Sharing and acquiring new capabilities** that can be too expensive or time-consuming to build internally (e.g., knowledge and technological assets, industrial capabilities, data).
2. **Substantial funding** to support all the phases of development, from early research to commercial application.
3. **Ability to scale fast** to achieve critical mass (e.g., market access and business guidance, network effect) and share risks.
4. **Flexibility & resilience** to enable high variety, capacity to evolve and improve adaptation to fast-changing environments where consumer needs can be unpredictable and technological trajectories are uncertain.

These ecosystems are complex and require coordinated governance, orchestrated by a few leading large players. On the one hand, everyone in the ecosystem will benefit from the orchestrators’ strong existing assets. On the other hand, orchestrators will have access to ecosystem resources as they cannot only rely on their internal capabilities to cope with the pace and the breadth of innovation. Interactions become dynamic and co-evolutionary.

The right regulatory conditions

Regulators must create the right conditions for these Smart Industries to become a reality. For example, aviation regulators around the world have adopted different approaches for testing drones. While the U.S. granted Amazon permission to test delivery drones only in 2019, the Civil Aviation Administration of China gave JD.com permission first in 2016. The Chinese e-retailer had a head start and now possesses the world’s largest drone delivery system, infrastructure, and capabilities. Also, data is a critical element for Smart Industries, and regulators will need to create the right conditions for data use and access while protecting users’ rights and privacy.

User buy-in is crucial for the development of the Smart Industries. Regulators need to adopt a cautious step-by-step approach to build citizen trust, ensure their safety and respect key principles such as privacy, data protection, data access and ethics (e.g., human genome editing). Those principles are also fundamental in B2B relations as trust is critical in ecosystems.
Europe has a critical role to play in accelerating the development of Smart Industries

Europe and its assets

So far, the U.S. and China have led the digital revolution and are betting on the industrial potential of emerging technologies. Yet Europe has tremendous capabilities to leverage to accelerate the development of Smart Industries.

Europe has leading edge existing technological assets. It is a land of choice for innovation. Along with its historical cultural radiance, Europeans have tremendous scientific background and talent. For example, Europe is the number one region when it comes to the absolute number of AI talent, and out of the top 40 universities in AI research, at least one-third are European.

Historical industrial revolutions have started in Europe and the continent has a strong industrial background built upon a diversified and historical network of industries. Furthermore, Europe is leading the change to tackle our societies’ most imminent challenges (such as climate change) that Smart Industries aim to solve.

A critical role to play

To play its role in the next wave of Smart Industries, Europe should achieve market scale (One Europe) and set the right conditions for Smart Ecosystems orchestrators to emerge, while continuing to strengthen its deep tech and industrial assets.

One Europe — European countries must join efforts to overcome political, economic and social fragmentation, to ensure seamless access to the entire European market in order to achieve scale and reach critical mass. They should

1. Think impact at European scale — Stop promoting fragmented pilot projects in each country and collectively focus on building two or three competing Smart Ecosystems for each Smart Industry. As an example, while the US, China or India have or plan to have a limited number of hubs of excellence (2-3 maximum per sector, as co-location is proven as a recipe for success), Europe has announced more than 200 hubs, and the number continues to grow. European governments will have to accept that favoring their own national champions will not always result in the best outcome for the local economy.

2. Set standards — Intensify efforts to establish common norms and standards to simplify ways of doing business, unify market and give long term visibility. As an example, GSM as a technological standard was critical for the development of telcos in Europe.

Illustration: European battery industry

Europe is joining forces to create its own battery industry... 7 countries will provide €3.2B in public funding to support a consortium of 17 companies that will share capabilities to master full battery value chain from raw material extraction to recycling... and implement projects orchestrated by industry leaders

PSA & SAFT are orchestrating the construction of 2 production sites in France & Germany by 2022

~3k jobs will be generated

Source: European Commission, Press Search

Illustration: European battery industry
6. Enable funding — Create an environment that enables private funding (from corporate and also VC funds) and provide ambitious and focused public investments for priority industries to fund the startup and scaling phase that can be recouped only once the ecosystem is fully established — and be ready to fail. A recent study by the BCG Henderson Institute found that fewer than 15% of the 57 ecosystems investigated were sustainable in the long run. Knowing when to recognize failure is key.

7. Educate citizens — Develop reskilling and awareness programs about technologies for workers and users (not just top talent). On the one hand, a large part of the labor market already need to be retrained or obtain new skills - 54% of the working population by 2022 according to WEF. And this should accelerate with Smart Industries. On the other hand, it is important to increase users’ practical understanding of new technologies to foster their adoption. For instance, the Finnish Government has launched a free online course on AI with the support of private companies that aims to teach European citizens the basics of AI.

A Win-Win-Win approach

This requires a results-driven and coordinated plan at the European level. This joint approach is Win-Win-Win:

• Win for local governments, which can foster job creation with the new Smart Industries.
• Win for industry players, which will benefit from Europe’s assets and market scale to experiment and develop new products and services. This will also reinforce the network of their ecosystems. For an orchestrator, this is the core asset to beat competition in the 2020s. And smaller companies can benefit from the ecosystems’ resources.
• Win for our societies, for which Smart Industries aim to solve the most pressing challenges.

All European countries should work together to embrace change and accelerate the development of the Smart Industries. In Choose France, we choose Europe as a leading innovation force for the world.