

Scientific progress can take many forms and concerns various fields: health, consumption, agriculture, energy, accommodation, communication, transportation, knowledge and environment. In the **race to innovation and performance, investments** are paramount to secure future economic prosperity and security. Ensuring global competitiveness requires coherent and ambitious policy framework as well as generous spending on research and development. And yet, Europe – one of the richest regions in the world – spends little on it: EU countries invest less than 2% of GDP on R&D every year, which is less than Japan, the US and China. Artificial intelligence (AI) is a foundational technology that can boost competitiveness, increase productivity, protect national security and help solve societal challenges. Despite China's bold AI initiative, the United States still leads in absolute terms. China comes in second and the European Union lags further behind.

New **ethical, scientific, environmental, human, political and economic challenges** are emerging due to climate change, genetic manipulation and bioengineering, GMOs, shale gas or automation. Should designer babies be considered as a viable and safe way of removing diseases or are they the harbinger of possible abuses and inequalities? Should GMOs be grown so as to feed a maximum of people and face overpopulation or should the precautionary principle prevail, taking the risk to let millions of people starve? Should machines be widely used in manufacturing or will they contribute to an explosion of unemployment and poverty?

In this context, developed countries struggle to **take the lead** of innovation but have to face **hurdles** resulting from the implementation of new societal models: e-trade and its destruction of traditional commerce, automation and its suppression of jobs, overconsumption and its waste spike, the expansion of digital giants and the risks for data security. **Transhumanism**, which advocates the transformation of the human condition by developing sophisticated technologies to enhance human intellect and physiology, is a case in point. It focuses on the applications of technologies to the improvement of human bodies at the individual level. Many transhumanists actively highlight the potential for future technologies and innovative social systems to improve the quality of all life, while seeking to ensure legal and political equality by eliminating congenital mental and physical barriers. For counter-humanists, on the contrary, it will give some people an unfair competitive edge and deepen inequalities.

Yet, technological progress holds **promises of major breakthroughs**, including stimulating artistic creation and widening the access to culture. Augmented reality, 3D printing, holograms and virtual reality offer a wide range of possibilities, from testing different materials, to recreating the past, customising products, creating works of art, interacting with humanoids and saving lives.

Not only are techniques and sciences impacting people at an individual scale but they are also **impulsing momentum** at a national and international level. Canada, the United Kingdom and New Zealand are implementing ground-breaking innovations to reduce CO₂ emissions. The COVID-19 pandemic has brought people closer together than ever; technology has helped art flourish, allowing performers to tap into their creativity to relay health guidelines and share messages of hope. At the scientific level, all countries have joined forces to find a coronavirus vaccine, even though national interests may prevail in being the first one to stop the virus.

→ FOCUS 1 Man versus machine

★ Les mots à connaître

- **Accurate** : exact/**accuracy** : précision
- **AI (artificial intelligence)** : IA
- **Automatable** : automatisable
- **Automation** : automatisation
- **Consumer** : consommateur
- **Decision making** : prise de décision
- **Digitisation** : numérisation
- **Efficient** : efficace/**efficiency** : efficacité
- **Engineer** : ingénieur
- **Factory = plant** : usine
- **Fast-paced** : effréné
- **Feasible** : réalisable
- **Fellow** : compagnon
- **Fewer errors** : moins d'erreurs
- **Flawless** : sans défaut
- **Inescapable = unavoidable** : inévitable
- **Intellectual job** : emploi intellectuel
- **IT (information technology)** : technologie de l'information
- **Law of supply and demand** : loi de l'offre et de la demande
- **Leap** : bond
- **Low-ranking job** : emploi à faible responsabilité
- **Low-skilled worker** : travailleur peu qualifié
- **Maintenance costs** : coûts d'entretien
- **Manual job** : emploi manuel
- **Manufacturing** : fabrication
- **Occupation** : métier, profession
- **Predictable** : prévisible
- **Productive** : productif
- **Profitable** : rentable
- **R&D (research and development)**
- **Repetitive** : répétitif
- **Retailing** : commerce de détail
- **Retraining measure** : mesure de reconversion
- **Round-the-clock** : 24 h/24
- **Self-driving car** : voiture sans chauffeur
- **Skill** : compétence/**skilled** : qualifié
- **Supply chain** : chaîne d'approvisionnement
- **Susceptible to** : vulnérable face à
- **To adapt to** : s'adapter à
- **To be on strike** : être en grève
- **To be unemployed = jobless** : être au chômage/**unemployment** = **joblessness** : chômage
- **To boost economic growth** : booster la croissance économique
- **To collect data** : collecter des données
- **To evolve** : évoluer
- **To fire = dismiss, make redundant, lay off** : renvoyer
- **To go on strike** : faire grève
- **To hack** : pirater
- **To implement** : mettre en place
- **To improve** : améliorer
- **To increase output** : augmenter la production
- **To interact with** : interagir avec
- **To make ends meet** : joindre les deux bouts
- **To optimise** : rentabiliser
- **To perform a task** : réaliser une tâche
- **To process data** : traiter des données
- **To reduce labour costs** : baisser les coûts de main-d'œuvre
- **To replace** : remplacer
- **To retrain** : se reconvertir
- **To serve as substitutes** : servir de substituts
- **To set up merchandise displays** : mettre en place les étalages
- **To suppress** : supprimer
- **To take over human activities** : remplacer des activités humaines
- **To threaten** : menacer
- **To transform processes** : changer de procédés
- **To waste time** : perdre du temps
- **To work one's fingers to the bone** : se crever à la tâche
- **UBI (universal basic income)** : revenu minimum garanti

DOC 1 Robots will destroy our jobs – and we're not ready for it

It's impossible to say exactly how many jobs have been lost by the deployment of automated machines but such innovations will be increasingly familiar in the US.

Once a characteristic of futuristic dystopian fictions, robotics promises to be the most deeply disruptive technological shift since the industrial revolution. Robots have been used in several industries - in particular the automotive and manufacturing fields - for decades, but experts now predict that robotic deployments are going to profoundly unsettle the developed world which isn't prepared for such a radical transition.

Every commercial sector will be affected by robotic automation in the next few years: construction, retail stores, agriculture...

The revolution is ongoing with an upsurge of robot sales. During the first half of 2016 alone, North American robotics technology vendors sold 14,583 robots worth \$817m to companies around the world. More than 265,000 robots are currently deployed at factories across the country, ranking the US third in the world in terms of robotics deployments behind only China and Japan.

The World Economic Forum forecasts that robotic automation will suppress over 5m jobs across 15 developed countries by 2020. It is estimated that 137m workers across Cambodia, Indonesia, the Philippines, Thailand and Vietnam – about 56% of the total workforce there – are at risk of displacement by robots, particularly people working in the garment manufacturing industry.

Supporters of robotic automation argue that robots cannot service or program themselves and this will create new, high-skilled jobs for technicians and programmers.

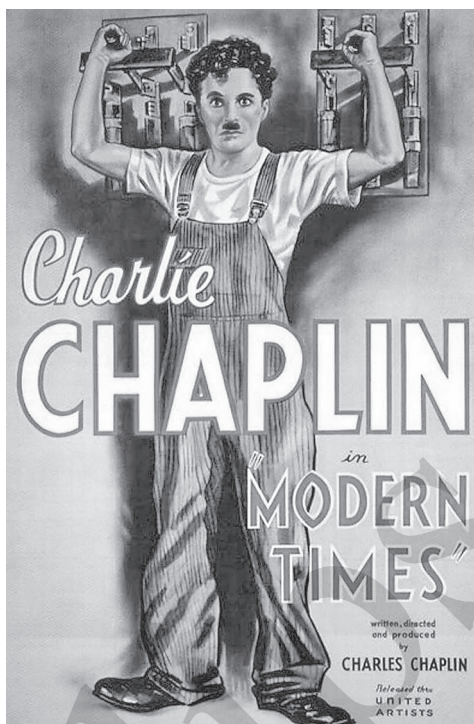
However, for every job created by robotic automation, several more will disappear entirely. At scale, this disruption will have a devastating impact on our workforce and jeopardize the livelihoods of millions of people. Automation will strike directly at lower-skilled people. The only way for them to survive is not to expect the government to protect their jobs from technology, but look for ways to retrain themselves.

By 2020, average salaries in the robotics sector are expected to increase by at least 60% – yet more than one-third of the jobs available in robotics will remain vacant owing to a lack of skilled workers.

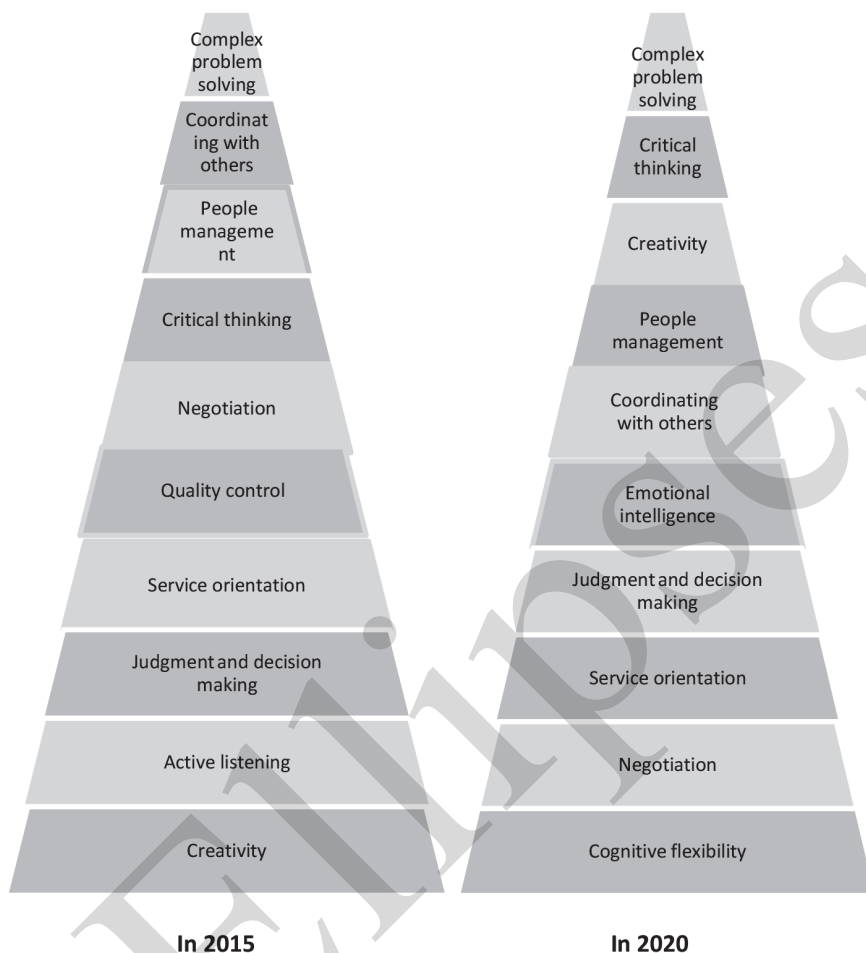
At first sight, the prevalence of robotics actually favors what Trump pledged to do on the campaign trail – bring manufacturing back to the US. Unfortunately, robots won't create new jobs for lower-skilled workers. If companies do not want to undergo higher labor costs in the US, they will have to automate low-skilled jobs. In other words, we can bring manufacturing back to the US or create new jobs, but not both.

With millions of jobs at risk and a worldwide employment crisis looming, education seems to be the solution to get ready. Unfortunately, most schools offering STEM courses are fairly selective and very expensive, which means they tend not to be serving populations that really need a leg up economically.

Adapted from *The Guardian*, Wed 11 Jan 2017

DOC 2 Charlie Chaplin in *Modern Times*

DOC 3 Top 10 skills required to keep pace with advances in technology



Graphique réalisé à partir des données fournies par *The World Economic Forum* (2016) et figurant sur ce site : <https://www.weforum.org/agenda/2018/08/here-s-how-vulnerable-to-automation-your-job-is/>

DOC 4 The effects of automation at work (Aug. 2017)

Survey among 200 business leaders and 200 employees from media & publishing, financial services & insurance, telecommunications & IT, and corporate retail

ADVANTAGES	Business leaders	Employees
Total advantages	99%	81%
A reduction in manual errors	52%	44%
Better quality work product	45%	30%
An increase in speed	43%	41%
Greater levels of productivity across experience levels	43%	24%
Increased availability for you and other employees	41%	34%
Increased utilisation and productivity levels	38%	21%
Decreased labour costs	31%	25%
No advantages	2%	19%

BUSINESS RISKS	Business leaders	Employees
Total business risks	92%	89%
Lack of personal touch	47%	52%
Potential for job loss	40%	48%
Employee inability to adapt to automation	36%	32%
Poor customer service	32%	37%
Lack of in-depth industry experience	23%	24%
Inaccuracies	2%	2%
No business risks	8%	10%

Tableaux réalisés à partir des données fournies par KRC Research et figurant sur ce site : <https://www.statista.com/chart/10659/risks-and-advantages-to-automation-at-work/>

Compréhension écrite

▶ Répondez aux questions suivantes en anglais, en utilisant vos propres mots.

 **Tips CE : Rechercher des informations précises**

- Identifiez les mots clés des informations à rechercher.
- Pensez à des synonymes possibles.
- Repérez des mots équivalents ou identiques dans le texte.
- Regardez l'environnement de ces mots dans la phrase.

DOC 1

1. How has the place of automation evolved?
2. What changes will it bring about?
3. To what extent can education thwart the negative impacts of automation?

DOC 2

Describe, analyse and interpret this illustration, placing it in its historical context.

DOC 3

What evolutions can we expect according to this document? How can you account for the changes?

DOC 4

1. What do these graphs represent?
2. What conclusions can you draw from the analysis of the document?

▶ Question de synthèse

Write a short commentary on the four documents (minimum 300 words). Analyse how they explore the promises and challenges of industrialisation and automation.

 **Expression écrite : Participer à un forum en ligne**

You participate in an online forum about the impacts of technology on society. Share your position (min. 200 words).

 **Tips EE : Exprimer une opinion en ligne**

- Adoptez un registre de langue ni trop formel ni trop familier.
- Ne vous contentez pas de donner une opinion mais argumentez et illustrez vos propos de façon concrète. Vous devez pouvoir prouver ce que vous dites.

 **Expression orale : Faire un discours**

You are the manager of a major company which plans to highly invest in the latest technological devices (AI, augmented reality, 3D printing, robots...). Break the news to the employees and explain the changes. Speak for 5 minutes.

 **Tips EO : Parler avec conviction**

- Pour rendre vos propos plus vivants, utilisez des tournures de phrase et des intonations changeantes, des intensifieurs et des adverbes, des figures de style.
- Mettez en avant un point de vue clair.
- Adressez-vous à votre auditoire pour capter l'attention jusqu'au bout.

 **Interaction : Répondre à des questions**

Answer the following questions orally.

1. Are some jobs more threatened by automation?
2. What place will robots have in the future?
3. Should robots have rights and duties?

 **Tips IO : Répondre à une yes-no question**

- Tâchez de nuancer votre position (*pros and cons*).
- Si vous n'êtes pas sûr de vous, proposez plusieurs possibilités en les expliquant.

 **LA GRAMMAIRE EN ACTION : IF + TEMPS**

 **CE QU'IL FAUT RETENIR**

- Les propositions subordonnées en *if* permettent d'exprimer différents degrés d'hypothèses quant à la réalisation d'une action.

Prédiction, certitude If + présent simple, ... futur simple	Irréel du présent If + prétérit modal, ... would + BV	Irréel du passé If had+ pp, ... would have + pp
<i>If you do a good job, you will get a good mark.</i> Si tu fais un bon travail, tu auras une bonne note.	<i>If you asked me, I would help you.</i> Si tu me demandais, je t'aiderais.	<i>If she had learnt her lessons, she wouldn't have failed her exam.</i> Si elle avait appris ses leçons, elle n'aurait pas raté son examen.

- Certains croisements sont possibles.
 - **If + prétérit modal/would have + pp**
*If I **were** you, I **would not have come*** (Si j'étais toi, je ne serais pas venu).
 - **If + had + pp/would + BV**
*If he **had listened** to us, we **would not have** all these problems* (S'il nous avait écoutés, nous n'aurions pas tous ces ennuis).

➤ **Cas particuliers**

Attention à l'utilisation des **modaux**. Il faut les remplacer par leurs équivalents au futur.

*will can	*will must	*will may
<i>will be able to</i> (pourra) capacité	<i>will have to</i> (devra)	<i>will be allowed to</i> (pourra) permission

► **Mettez les verbes entre parenthèses au bon temps.**

1. If I (have) money, I would travel a lot.
2. If you (wake) up earlier, you would not have missed the train.
3. If he (be) angry, they would immediately tell you.
4. If I were 18, I (can) go to a nightclub.
5. She (win) if she had trained more.
6. If she were friendlier, she (not feel) so lonely.
7. If she had invited you, (you/come)?
8. If you listen carefully, you (can) hear the birds sing.
9. If you failed your exam, you (must) repeat a year.
10. I (not/answer) if she shouts.

ENTRAÎNEMENT À LA TRADUCTION

► **Version**

Traduisez le passage suivant, tiré du document 1.

It's impossible to say exactly how many jobs have been lost by the deployment of automated machines but such innovations will be increasingly familiar in the US. Once a characteristic of futuristic dystopian fictions, robotics promises to be the most deeply disruptive technological shift since the industrial revolution. Robots have been used in several industries - in particular the automotive and manufacturing fields - for decades, but experts now predict that robotic deployments are going to profoundly unsettle the developed world which isn't prepared for such a radical transition.

► **Thème**

1. Si le rythme d'automatisation continue à s'accélérer, les travailleurs peu qualifiés pourraient tous se retrouver au chômage.
2. Si les chefs d'entreprise avaient imaginé l'impact de l'automatisation, ils auraient mieux anticipé la crise.
3. Si le gouvernement met en place des mesures de reconversion, il peut freiner le chômage.
4. Les employés n'auraient pas besoin de se crever à la tâche si les machines faisaient le travail pénible à leur place.
5. Si les travailleurs ne s'étaient pas mis en grève, ils n'auraient pas eu autant de mal à joindre les deux bouts.