Auteurs :
- Frank Beysson, Ligue de l'Enseignement de la Loire
- Martine Olivi, Inria, équipe Factas

Activity 10: Eco-citizen: being well informed to make informed choices

5G is a subject of great tension between "pro" and "anti" 5G because it is a central technology in the development of a digital future. For some, it is indispensable and unavoidable, for others it is useless, futile and even dangerous. Indeed, from the imaginary of a digital future making our cities more ecological, safer and more pleasant to that of a future of widespread surveillance and manipulation, destructive of life and social relations, multiple visions are possible. What truths? What lies? What doubts?

In order to create a society, we must think on the basis of solid, verified information. In the digital age, the best and the worst information circulates, and this is at the heart of the debates that are igniting the 5G!

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When 5G sets minds on fire! In 2021, the 5G, a new generation of mobile phones, landed in France. 5G technology will provide access to far more than 4G throughputs, with very short latency times and high reliability, while increasing the number of simultaneous connections per area covered [1]. These technical prowess raise the enthusiasm of some, others denounce risks to the environment, health and democracy. Between the rush of policies and the time needed for research, the debate rages in the media, on social networks... Source : [1] : 5G, features, Wikipedia	**When 5G sets minds on fire!** In 2021, the 5G, a new generation of mobile phones, landed in France. 5G technology will provide access to far more than 4G throughputs, with very short latency times and high reliability, while increasing the number of simultaneous connections per area covered [1]. These technical prowess raise the enthusiasm of some, others denounce risks to the environment, health and democracy. Between the rush of policies and the time needed for research, the debate rages in the media, on social networks... Source : [1] : 5G, caractéristiques, Wikipedia
True or False? **True or False?** It's not always obvious to untangle the true of the fake! Especially that sometimes the answer doesn't exist yet! We will offer you a dozen sentences on 5G. For each of them, say whether, in your opinion, it is true, false or if we don't have the answer...	**True or False?** It's not always obvious to untangle the true of the fake! Especially that sometimes the answer doesn't exist yet! We will offer you a dozen sentences on 5G. For each of them, say whether, in your opinion, it is true, false or if we don't have the answer..

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1 / 12 True or False? **As a first step, 5G is mainly intended for companies.** The 5G is currently deployed to the general public, with strong publicity encouraging the purchase of a new mobile phone and a 5G package. For the time being, the increased flow rate does not bring much to users, as the press in the pioneer countries shows. The real promises of 5G hold more in the time of extremely reduced latency and the standardisation of communications protocols for the Internet of Things. These technical characteristics are primarily of interest to the industry because they offer the possibility of optimising logistics, making the organisation of factories more flexible, developing robotisation, etc. We talk about *factories of the future.* Sources : Tour du monde des réseaux mobiles 5G : les particuliers ne sont pas conquis, Le Monde, 09/2020 À quoi sert la 5G ? Martin Koppe, Journal du CNRS, 01/2021 Qu'est-ce que la 5G ? Neuf réponses pour tout savoir, Le Figaro, 03/2021	**1 / 12** **True, False or We don't know?** **As a first step, 5G is mainly intended for companies => TRUE** **Feedback** The 5G is currently deployed to the general public, with strong publicity encouraging the purchase of a new mobile phone and a 5G package. For the time being, the increased flow rate does not bring much to users, as the press in the pioneer countries shows. The real promises of 5G hold more in the time of extremely reduced latency and the standardisation of communications protocols for the Internet of Things. These technical characteristics are primarily of interest to the industry because they offer the possibility of optimising logistics, making the organisation of factories more flexible, developing robotisation, etc. We talk about factories of the future. Sources : Tour du monde des réseaux mobiles 5G : les particuliers ne sont pas conquis, Le Monde, 09/2020 À quoi sert la 5G ? Martin Koppe, Journal du CNRS, 01/2021 Qu'est-ce que la 5G ? Neuf réponses pour tout savoir, Le Figaro, 03/2021 [consultées le : 03/01/2022]

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2 / 12 True or False? 5G will drive an industrial revolution 5G is presented by policies as an issue of economic strategy, international competition. It would be the pillar of the 4th industrial revolution after those of coal, oil, electricity and computer science. The technical promises are there, but in reality nothing is operational yet. The government has launched a call for projects and telecom operator Orange has opened 9 "5G" labs to help companies develop products and services based on this technology. For the time being, this is a question of a will on the part of politicians and economic actors. Sources : La France en quête d'usages pour la 5G, Le Figaro, 02/2021 Les bénéfices de la 5G, Orange	**2 / 12** **True, False or We don't know?** **5G will drive an industrial revolution => "WE DON'T KNOW"** **Feedback** 5G is presented by policies as an issue of economic strategy, international competition. It would be the pillar of the 4th industrial revolution after those of coal, oil, electricity and computer science. The technical promises are there, but in reality nothing is operational yet. The government has launched a call for projects and telecom operator Orange has opened 9 "5G" labs to help companies develop products and services based on this technology. For the time being, this is a question of a will on the part of politicians and economic actors. Sources : La France en quête d'usages pour la 5G, Le Figaro, 02/2021 Les bénéfices de la 5G, Orange [consultées le : 03/01/2022]
3 / 12 True or False? By 2025, there will be 50 billion connected objects worldwide.	**3 / 12** **True, False or We don't know?** **By 2025, there will be 50 billion connected objects worldwide => "WE DON'T KNOW"** **Feedback** Almost non-existent ten years ago, the number of connected objects increased by 10 % per year to reach 19 billion in 2020. The potential applications are multiple (smart cities,

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Almost non-existent ten years ago, the number of connected objects increased by 10 % per year to reach 19 billion in 2020. The potential applications are multiple (smart cities, agriculture, telemedicine, wearables, industry, e-commerce, autonomous vehicles, home automation) and "make appetite for digital giants". As we have seen, the 5G standards are designed to meet the needs of these applications. Studies have made projections to estimate the number of connected objects worldwide in 2025. According to the GreenIT report, this could indeed be 50 billion, a little less for G. Roussille, which still confirms the trend. But it is only an estimate and it will of course depend on our collective choices. Sources : Empreinte environnementale du numérique mondial, GreenIT.fr, Frédéric Bordage, 09/2019 La controverse de la 5G, Gauthier Roussilhe, 08/2020	agriculture, telemedicine, wearables, industry, e-commerce, autonomous vehicles, home automation) and "make appetite for digital giants". As we have seen, the 5G standards are designed to meet the needs of these applications. Studies have made projections to estimate the number of connected objects worldwide in 2025. According to the GreenIT report, this could indeed be 50 billion, a little less for G. Roussille, which still confirms the trend. But it is only an estimate and it will of course depend on our collective choices. Sources : Empreinte environnementale du numérique mondial, GreenIT.fr, Frédéric Bordage, 09/2019 La controverse de la 5G, Gauthier Roussilhe, 08/2020 [consultés le : 03/01/2022]
4 / 12 True or False? The development of autonomous cars will reduce overall greenhouse gas emissions. **Feedback**	**4 / 12** **True, False or We don't know?** **The development of autonomous cars will reduce overall greenhouse gas emissions => "WE DON'T KNOW"** **Feedback** The answer to this essential question is not obvious to date. On the one hand, electric motorisation and automatic driving should have a positive impact. But if you do a life cycle analysis, it's less clear. The gray energy used to make an electric vehicle is more important than for a conventional

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The answer to this essential question is not obvious to date. On the one hand, electric motorisation and automatic driving should have a positive impact. But if you do a life cycle analysis, it's less clear. The gray energy used to make an electric vehicle is more important than for a conventional vehicle, and digital infrastructure must also be taken into account. In addition, switching to the electric car and automatic driving could lead to a preference for the individual car, and disaffection with other more sober means of transport. It's typically a rebound effect. The choice of model for the autonomous mobility of tomorrow (individual, collective and shared mobility, or collective focus on private services) thus plays a crucial role and must be done collectively. Sources : La voiture autonome : découvrez tout sur le véhicule du futur, Le magazine des objets connextés et innovants Objetconnecte.net, 01/2017 Véhicule autonome : quelle contribution à la décarbonation de la mobilité ? Carbone 4. Stéphane Amant, 11/2018	vehicle, and digital infrastructure must also be taken into account. In addition, switching to the electric car and automatic driving could lead to a preference for the individual car, and disaffection with other more sober means of transport. It's typically a rebound effect. The choice of model for the autonomous mobility of tomorrow (individual, collective and shared mobility, or collective focus on private services) thus plays a crucial role and must be done collectively. Sources : La voiture autonome : découvrez tout sur le véhicule du futur, Le magazine des objets connextés et innovants Objetconnecte.net, 01/2017 Véhicule autonome : quelle contribution à la décarbonation de la mobilité ? Carbone 4. Stéphane Amant, 11/2018 [consultés le : 03/01/2022]
5 / 12 True or False? In China: too energy intensive, the 5G is off at night. **Feedback**	**5 / 12** **True, False or We don't know?** **In China: too energy intensive, the 5G is off at night. => false (but biased)** **Feedback** The 5G antennas are well off at night in China, but this is not for the energy overconsumption denounced in the source article of a polemic. They are simply put on standby when they are not used. This is one of the specific features of the 5G standard, which saves energy. The Figaro has dedicated a

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The 5G antennas are well off at night in China, but this is not for the energy overconsumption denounced in the source article of a polemic. They are simply put on standby when they are not used. This is one of the specific features of the 5G standard, which saves energy. The Figaro has dedicated a rehab article on this subject in response to an article by the South China Morning Post that ignited social media. Sources : 5G towers are consuming a lot of energy, so China Unicom is putting some of them to sleep overnight, South China Morning Post, abacus, 08/2020 Pourquoi les antennes 5G sont-elles éteintes la nuit ?, Le Figaro, 09/2020	rehab article on this subject in response to an article by the South China Morning Post that ignited social media. Sources : 5G towers are consuming a lot of energy, so China Unicom is putting some of them to sleep overnight, South China Morning Post, abacus, 08/2020 Pourquoi les antennes 5G sont-elles éteintes la nuit ?, Le Figaro, 09/2020 [consultées le : 03/01/2022]
6 / 12 True or False? **5G will reduce the carbon impact of digital technologies.** **Feedback** This may be true when using equal data, but rebound and induced effects must be taken into account. For example, if we imagine that by 2030 5G is 40 times more efficient than 4G, but we transmit 100 times more data, the gain is not obvious at all. This trend of increasing data traffic (without sticking to the exact order of magnitude given for the example) is quite possible due to the multiplication of connected objects that should accompany 5G. In addition, if in rebound this technology leads to a multiplication of connected objects, given the share of significant emissions related to their manufacture, can we really consider that 5G will "reduce the carbon impact of digital"? The High Climate Council has quantified the carbon impact of 5G deployment: it could rise in France from 2.7 Mt CO2 eq to 6.7 Mt CO2 eq depending on the scenarios chosen. The current carbon footprint of the digital is about 15 Mt CO2 eq. Sources : La 5G : l'efficacité énergétique "by design", Orange, 02/2020 Pourquoi la 5G gonflera notre consommation d'énergie, Alain Cappy, The conversation, 11/2020 Maîtriser l'impact carbone de la 5G, Haut conseil pour le climat, 12/2020	**6 / 12** **True, False or We don't know?** **5G will reduce the carbon impact of digital technologies => "WE DON'T KNOW"** **Feedback** This may be true when using equal data, but rebound and induced effects must be taken into account. For example, if we imagine that by 2030 5G is 40 times more efficient than 4G, but we transmit 100 times more data, the gain is not obvious at all. This trend of increasing data traffic (without sticking to the exact order of magnitude given for the example) is quite possible due to the multiplication of connected objects that should accompany 5G. In addition, if in rebound this technology leads to a multiplication of connected objects, given the share of significant emissions related to their manufacture, can we really consider that 5G will "reduce the carbon impact of digital"?

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7 / 12 True or False? **5G is dangerous to health.** **Feedback** To answer this question, ANSES (National Agency for Food, Environmental and Labour Health Security) was tasked with assessing the risks associated with exposure of the population to electromagnetic fields arising from this technology. Although captured in July 2018, Anses estimated in January 2020 that it did not have sufficient data to assess the potential risks associated with frequencies around 3.5 GHz and involved operators. But this will depend much on the uses and deployment scenarios adopted. What can be said at this stage is that it does not seem more or less dangerous than 3G or 4G. Sources : La 5G arrive en France, mais les autorités notent « un manque important de données sur ses effets sanitaires », Le Monde, 01/2020 5G : pas de risques nouveaux pour la santé au vu des données disponibles, Anses, 04/2021	**7 / 12** **True, False or We don't know?** **5G is dangerous to health => "WE DON'T KNOW"** **Feedback** To answer this question, ANSES (National Agency for Food, Environmental and Labour Health Security) was tasked with assessing the risks associated with exposure of the population to electromagnetic fields arising from this technology. Although captured in July 2018, Anses estimated in January 2020 that it did not have sufficient data to assess the potential risks associated with frequencies around 3.5 GHz and involved operators. But this will depend much on the uses and deployment scenarios adopted. What can be said at this stage is that it does not seem more or less dangerous than 3G or 4G. Sources : La 5G arrive en France, mais les autorités notent « un manque important de données sur ses effets sanitaires », Le Monde, 01/2020 5G : pas de risques nouveaux pour la santé au vu des données disponibles, Anses, 04/2021 [consultés le : 03/01/2022]
8 / 12 True or False? **A city or region may prohibit 5G.** **Feedback**	**8 / 12** **True, False or We don't know?** **A city or region may prohibit 5G => false** **Feedback** It should be noted that the introduction of 5G technology is subject to the system of technological neutrality provided for in the European Communications Code, which establishes a

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It should be noted that the introduction of 5G technology is subject to the system of technological neutrality provided for in the European Communications Code, which establishes a "general authorisation" to provide electronic communications networks and services. The public regulator does not have to rule on the "why 5G" but only on the "how" of its deployment. Exceptions exist, whether health or technical, but not explicitly environmental or climate (HCC Report). However, many French cities (Strasbourg, Lyon, Tours, Bordeaux, Poitiers, Marseille, Grenoble and Besançon, Blois, Bourg-en-Bresse, etc.) have been deprived of the possibility of blocking at local level. This is also the case with the Citizen Convention for Climate and other citizen groups. Sources : Une ville ou une région peuvent-elles interdire la 5G ?, Le Monde, 09/2020 Rapport du Haut Conseil pour le Climat, Maitriser l'impact carbone de la 5G, 12/2020	"general authorisation" to provide electronic communications networks and services. The public regulator does not have to rule on the "why 5G" but only on the "how" of its deployment. Exceptions exist, whether health or technical, but not explicitly environmental or climate (HCC Report). However, many French cities (Strasbourg, Lyon, Tours, Bordeaux, Poitiers, Marseille, Grenoble and Besançon, Blois, Bourg-en-Bresse, etc.) have been deprived of the possibility of blocking at local level. This is also the case with the Citizen Convention for Climate and other citizen groups. Sources : Une ville ou une région peuvent-elles interdire la 5G ?, Le Monde, 09/2020 Rapport du Haut Conseil pour le Climat, Maitriser l'impact carbone de la 5G, 12/2020 [consultés le : 03/01/2022]
9 / 12 True or False? 5G will allow the development of technologies for remote medicine. **Feedback**	**9 / 12** **True, False or We don't know?** **5G will allow the development of technologies for remote medicine. => true** **Feedback** Indeed, the technical characteristics of 5G make it a valuable asset for the development of remote surgery and telemedicine. If these technological prowess arouse admiration, and may be very useful in some cases, the generalization of these uses can rightly be questioned. Faced with the rise of telemedicine, which did not wait for 5G, some doctors are worried about a "uberisation" of the health system

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Indeed, the technical characteristics of 5G make it a valuable asset for the development of remote surgery and telemedicine. If these technological prowess arouse admiration, and may be very useful in some cases, the generalization of these uses can rightly question. Faced with the rise of telemedicine, which did not wait for 5G, some doctors are worried about a "uberisation" of the health system following its commodification. They deplore the lack of warmth and clinical contact. Will telemedicine solve the problem of medical deserts or create more inequalities in care? Not sure, even if good coverage of white areas is part of the agreement signed between the state and the operators, they risk delaying because they are subject to profitability. Sources : Des chirurgiens opèrent pour la première fois à l'aide de la 5G, Sciences et Avenir, 02/2019 Travail, famille, Wi-Fi, Le Monde diplomatique, 06/2020	following its commodification. They deplore the lack of warmth and clinical contact. Will telemedicine solve the problem of medical deserts or create more inequalities in care? Not sure, even if good coverage of white areas is part of the agreement signed between the state and the operators, they risk delaying because they are subject to profitability. Sources : Des chirurgiens opèrent pour la première fois à l'aide de la 5G, Sciences et Avenir, 02/2019 Travail, famille, Wi-Fi, Le Monde diplomatique, 06/2020 [consultés le : 03/01/2022]
10 / 12 True or False? With the 5G, tomorrow, all watched? **Feedback**	**10 / 12** **True, False or We don't know?** **With the 5G, tomorrow, all watched? => "WE DON'T KNOW", but what does it mean watched?** **Feedback** "Smart" video surveillance, a reality in some countries where 5G has been deployed, does not leave indifferent. While it reassures some by promising a safer city, many are alarmed about its use in China, the United States and Europe. This is a choice of society. Large-scale collection of data in a legal or non-legal manner poses a privacy issue. Arcep recalls that telecom networks are subject to French law (GDPR). But the law is difficult to apply, for example to "data brokers", these companies that sell our consumer data for targeted advertising.
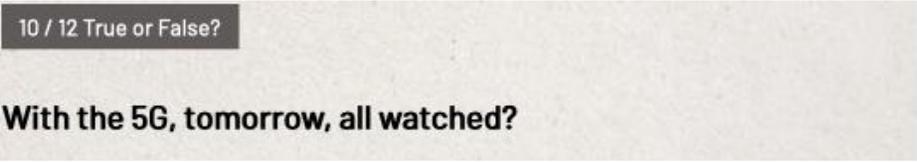
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11 / 12 True or False? After 5G, 6G? **Feedback** *5G is simply the fifth generation of mobile phones. It follows logically the 4G and precedes the 6G,* as we can read in the Figaro. The difference between 3G, 4G, 5G generations is in the frequency bands used and media access techniques. 5G is an evolutionary technology that will gradually enrich as standards evolve at global level. And yes, scientists are already beginning to talk about 6G, even if they don't yet know what this future generation will understand. A new generation is born every ten years. The networks are piled up, the new one expanding the previous ones. Stéphane Richard, CEO of Orange, talks about turning off 2G by 2025, in Europe, at least for the general public. Sources : Qu'est-ce que la 5G ? Neuf réponses pour tout savoir, Le Figaro, 03/2021 A quoi sert la 5G ?, Le Journal du CNRS, Martin Koppe, 01/2021	**11 / 12** **True, False or We don't know?** **After 5G, 6G? => true** **Feedback** *5G is simply the fifth generation of mobile phones. It follows logically the 4G and precedes ...the 6G*, as we can read in the Figaro. The difference between 3G, 4G, 5G generations is in the frequency bands used and media access techniques. 5G is an evolutionary technology that will gradually enrich as standards evolve at global level. And yes, scientists are already beginning to talk about 6G, even if they don't yet know what this future generation will understand. A new generation is born every ten years. The networks are piled up, the new one expanding the previous ones. Stéphane Richard, CEO of Orange, talks about turning off 2G by 2025, in Europe, at least for the general public. Sources :

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12 / 12 True or False? **5G accelerated the Covid 19 a pandemic.** **Feedback** At the beginning of the pandemic, conspiracy theories emerged, spread across social networks and travelled around the world. More or less radical, these theories spread the rumor of a connection between 5G and the pandemic. They claim that the virus does not exist, that it is the electromagnetic waves of 5G that poison the body which then gives birth to the virus, or that these waves warm the body and prevent the immune system from functioning. These theories, denied by Inserm, of course have no scientific basis. Hoaxbuster: The collaborative platform against disinformation is working to verify and limit the spread of such rumors online. Sources : Ces théories du complot qui connectent la 5G et le coronavirus, France Télévisions, 04/2020 Des ondes 5G responsables de la pandémie de Covid-19, vraiment ?, Inserm, Yves Le Dréan, 04/2020 Hoaxbuster, La plateforme collaborative contre la désinformation	**12 / 12** **True, False or We don't know?** **5G accelerated the Covid 19 a pandemic => false** **Feedback** At the beginning of the pandemic, conspiracy theories emerged, spread across social networks and travelled around the world. More or less radical, these theories spread the rumor of a connection between 5G and the pandemic. They claim that the virus does not exist, that it is the electromagnetic waves of 5G that poison the body which then gives birth to the virus, or that these waves warm the body and prevent the immune system from functioning. These theories, denied by Inserm, of course have no scientific basis. Hoaxbuster: The collaborative platform against disinformation is working to verify and limit the spread of such rumors online. Sources : Ces théories du complot qui connectent la 5G et le coronavirus, France Télévisions, 04/2020 Des ondes 5G responsables de la pandémie de Covid-19, vraiment ?, Inserm, Yves Le Dréan, 04/2020

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Conclusion Dominique Boullier, a specialist in digital uses, recently called for "beyond the Manichean opposition progress-antiprogres. (...) Make these [connected] objects work for the common good. And, above all, take the time for a real debate on its [the 5G] deployment. However, this nuanced framing suggests that it would be possible to select these uses freely. However, the issue of technological choices is still largely beyond democratic deliberation. 5G is a highly debated topic between "pro" and "anti" because it is a central technology in the development of a digital future where visions of greener and more secure cities on the one hand are opposed, the widespread surveillance and destruction of living and social relations on the other. Source : Avec la 5G, demain, tous surveillés, Reporterre, 2021 [accessed on: 03/01/2022]	**Conclusion** Dominique Boullier, a specialist in digital uses, recently called for« beyond the Manichean opposition progress-antiprogres. (…) Make these [connected] objects work for the common good. And, above all, take the time for a real debate on its [the 5G] deployment. » However, this nuanced framing suggests that it would be possible to select these uses freely. However, the issue of technological choices is still largely beyond democratic deliberation. 5G is a highly debated topic between "pro" and "anti" because it is a central technology in the development of a digital future where visions of greener and more secure cities on the one hand are opposed, the widespread surveillance and destruction of living and social relations on the other. Source : Avec la 5G, demain, tous surveillés, Reporterre, 2021 [consulté le : 03/01/2022]

If you wish to go deeper into certain concepts

5G overview recalls the context of 5G and why it is difficult to estimate the environmental impacts of 5G with models that clash depending on the scope, the reference data and the scenarios studied.

Digital technology: concepts and definitions to make it more ecological introduces the concepts of efficiency vs. sobriety, digital sobriety, low-tech for a responsible or eco-responsible digital.

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Authors :
- Frank Beysson, Ligue de l'Enseignement de la Loire
- Martine Olivi, Inria, équipe Factas

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A co-production of Class'Code / Inria

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Pedagogical team :
- Laurence Farhi, Tatiana Khomenko, Inria Learning Lab
- Sophie de Quatrebarbes, S24B for Class'Code

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With the support of the Minister of National Education, Youth and Sport and UNIT.

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