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Territorial Impact Assessment

A Drone Strategy 2.0

Staff working document



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Territorial Impact Assessment **A Drone Strategy 2.0**

Disclaimer

This territorial impact assessment report is the outcome of an expert workshop held by the European Committee of the Regions and ESPON EGTC on the European Commission communication on *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe*.

This report was produced by the secretariat of the European Committee of the Regions (CoR), to assist rapporteur Władysław Ortyl (PL/ECR), President of the Podkarpackie Region, in preparing his opinion on *A Drone Strategy 2.0*. This report will be shared with the European Commission, the European Parliament and the Council of the European Union.

This report and the maps represent views and experiences of the participants of the workshop. It is meant to be used for decision support only and does not necessarily reflect the opinion of the members of the CoR or the ESPON 2030 Monitoring Committee. The findings of this report are not binding on the CoR and do not prejudice the final content of its opinions.

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Authors

Florence Thomé (CoR)

Bernd Schuh, Roland Gaugitsch, Chien-Hui Hsuing (ÖIR GmbH)

Acknowledgements

Zintis Hermansons (ESPON EGTC)






Workshop participants

Władysław	Ortyl	CoR rapporteur, President of the Podkarpackie Region
Aneta	Łobodzinska	Rapporteur's expert
Jukka	Savo	DG MOVE, European Commission
Péter	Balogh	Hungarian Army
Luca	Casciola	Unified International
Vidmantas	Kairys	Asociacija DRONEA
Miket	Nogues Ruiz	Basque Police ("Ertzaintza")
Zoltán	Nyikes	Hungarian Army
Rafael	Pecos Macias	ENAIRE
Christoph	Raab	Airport Regions Council
Cristina	Ramos Pagès	I2CAT Private Foundation Digital Catalonia Alliance
Richard	Rio	Drone Alliance Europe (DAE)
John	Stewart	UECNA
Zoltán	Nyikes	Hungarian Army
Roland	Gaugitsch	ÖIR
Bernd	Schuh	ÖIR
Zintis	Hermansons	ESPON EGTC
Cécile	Eclache	CoR, COTER commission secretariat
Florence	Thomé	CoR, COTER commission secretariat
Lucy	Tober	CoR, COTER commission secretariat
Edgar	Szewczyk	CoR, ECR Group secretariat
Sara	Ott	CoR, Greens Group secretariat


Acronyms and legend

CoR	European Committee of the Regions
EP	European Parliament
ESPON	European Observation Network for Territorial Development and Cohesion
LRA	Local and Regional Authority
MS	Member State(s)
NUTS	Nomenclature of territorial units for statistical purposes
ÖIR	Austrian Institute for Spatial Planning
TIA	Territorial Impact Assessment

Effects of the strategy – colour code

	Positive effects
	Minor positive effects
	Neutral
	Minor negative effects
	Negative effects

Legend – direction of effects

	Increase
	Decrease

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1 Introduction

1.1 Context

The EU's green and digital agendas highlight the need to leverage new actions for more sustainable mobility and innovation, to improve the efficiency of the overall economy. The EU Green Deal aims to achieve climate neutrality by 2050, with a significant contribution required from the decarbonisation of the transport sector. The digitalisation of the economy is intended to strengthen the Union's competitiveness and empower people with a new generation of technologies, leaving no one behind, in line with the European Pillar of Social Rights.

With current and future potential applications in a range of civil, industrial, security and defence use-cases, drones¹ are considered to have the potential to contribute to improving competitiveness and service provision in such sectors as agriculture, construction, surveillance, healthcare and energy, as well as contributing to the decarbonisation agenda in the transport and mobility sector in particular.

In this context, and following its 2014 Communication which set out the foundations for a comprehensive EU policy in the field of drones² and the 2015 *Aviation Strategy for Europe*,³ the European Commission published in November 2022 a Communication on *A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe*. The Communication aims to build on the achievements and experience to date, and take into consideration new policy priorities and new challenges, as well as recent technological, regulatory and commercial developments.

The communication also highlights the importance of optimising synergies between the civil and military use of drones, including counter-drone technologies, as an important factor for the competitiveness of the European drone ecosystem, as well as the Union's defence capabilities. It calls in particular for increased synergies between civilian and defence drone testing centres, and for a wider distribution of test sites across the EU.

The communication identifies ten key areas for the development of the drone ecosystem. Areas that are of particular relevance to local and regional authorities (LRAs) include: regional planning in both urban and rural areas, and creation of dedicated infrastructure such as vertiports; development of drone testing and demonstration sites at regional level; introduction and implementation of the U-space⁴ concept and regulatory framework; promoting citizens' awareness and fostering social acceptance for example by addressing concerns such as noise and visual pollution; addressing the risks of misuse; and training and skills development for regulatory experts at local and regional level.

¹ As mentioned in the EC Communication "*A Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe*", the term "drone" is the layman term for "Unmanned Aircraft Systems" which means an unmanned aircraft and the equipment to control it remotely.

² COM(2014) 207 final, *A new era for aviation - Opening the aviation market to the civil use of remotely piloted aircraft systems in a safe and sustainable manner*

³ COM(2015) 598 final, *An Aviation Strategy for Europe*

⁴ Introduced by the European Commission in 2016, the U-space concept aims at ensuring the safe and secure integration of drones into the EU airspace; it is a bespoke, fully digital and automated traffic management system designed to enable the efficient and affordable scaling up of drone services. The regulatory framework for the U-space was adopted in April 2021 and has been applicable since 26 January 2023.

1.2 Political mandate

This workshop was organised in support of the CoR's opinion on *A Drone Strategy 2.0*.

The CoR's Political Priorities for 2020-2025 include the objectives of supporting local and regional authorities in making the most of new digital technology instruments and anticipating how the energy, mobility and digital transformations will affect communities at local and regional level. They call for support in the formulation of strategies and their swift implementation to maximise positive effects and reduce negative local impacts. They also highlight the need to address the digital divide, promote increased digital skills and the digitalisation of local and regional public services.

The Political Priorities also provide for supporting LRAs in the preparation of the EU's zero pollution and carbon-neutrality objectives, notably by preparing and supporting the implementation of the EU's ambitious targets for zero air-pollution and by contributing to the urban mobility transition, as well as preparing public transport authorities to respond to exogenous threats against the provision of safe and secure mobility services. They also highlight the need to promote innovation and modernisation initiatives for rural areas, and to adopt a strategy for sustainable and intelligent mobility for such territories.

The potential of a wider deployment of drones to contribute to these objectives should now be examined more closely from a local and regional perspective, both on account of the competences of LRAs in the development of the regulatory framework, and their particular role in ensuring public understanding of this evolving technology and in supporting societal acceptance, as well as risk mitigation. The different impacts and challenges for different types of EU territories should also be assessed, so as to avoid exacerbating territorial fragmentation, and ensure an inclusive approach where all types of territories are able to access the benefits of the EU's vision for the development of the deployment of drones in the EU.

1.3 Past work of the CoR on this topic

CoR opinion on [Aviation Strategy](#), rapporteur Ulrika Carlefall Landergren (SE/ALDE), 2016 (including a reference to a previous TIA on Drones under point 20).

2 Methodology: ESPON TIA Quick Check

The concept of territorial impact assessment (TIA) aims to show the regional differentiation of the impact of EU policies.

The ESPON TIA Tool⁵ is an interactive web application that can be used to support policymakers and practitioners in identifying potential ex-ante territorial impacts of new EU Legislation, Policies and Directives (LPDs). The 'ESPON TIA Quick Check' approach combines a workshop setting for identifying systemic relations between a policy and its territorial consequences, with a set of indicators describing the sensitivity of European regions.

This approach helps to steer an expert discussion about the potential territorial effects of an EU policy proposal, by checking all relevant indicators in a workshop setting. The results of the guided expert discussion are judgements about the potential territorial impact of an EU policy, in different thematic fields (economy, society, environment, governance) for a range of indicators. These results are fed into the ESPON TIA Quick Check web tool.

The web tool translates the combination of the expert judgements on exposure with the different sensitivity of regions into maps showing the potential territorial impact of EU policy at the NUTS3 level. These maps serve as a starting point for further discussion of different impacts of a specific EU policy on different regions. Consequently, the experts participating in the workshop provide important input to this quick check on the potential territorial effects of an EU policy proposal.

The workshop on *A Drone Strategy 2.0* was held on 8 May 2023 in the form of a physical event in Brussels, and brought together a number of experts representing different organisations and LRAs.

Two moderators from the ÖIR, provided by ESPON, prepared and guided the workshop and handled the ESPON TIA tool.

⁵ https://www.espon.eu/main/Menu_ToolsandMaps/TIA/

Figure 1: Workshop discussion



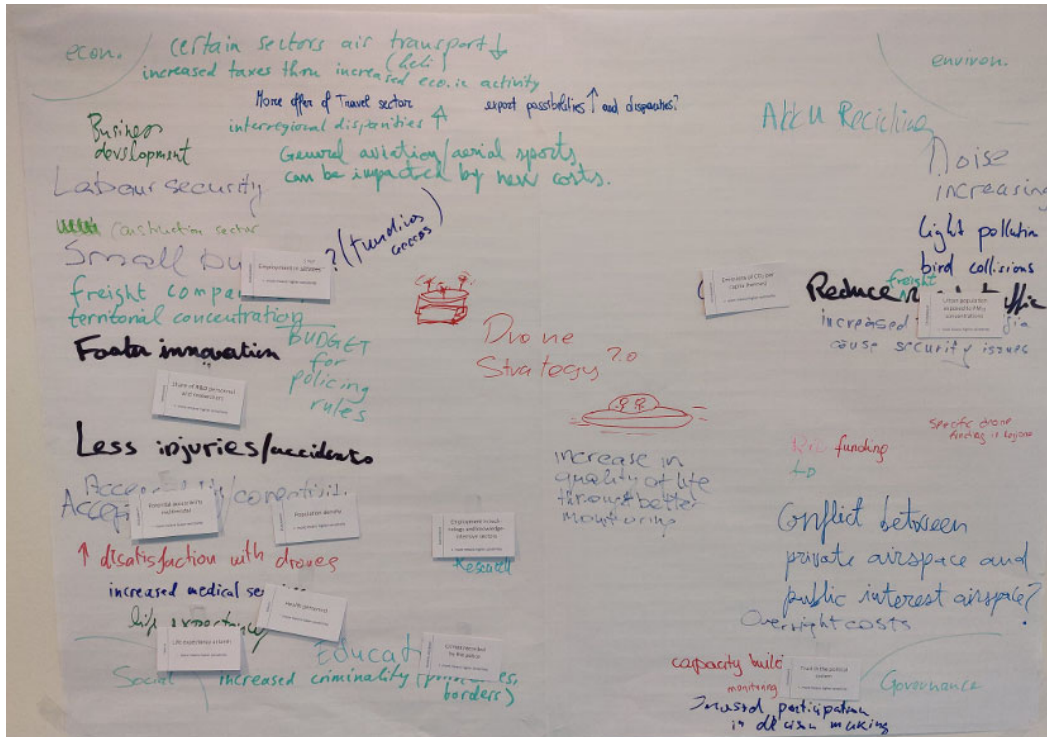
Source: Territorial impact assessment expert workshop, 8 May 2023

2.1 Identifying the potential territorial effects in terms of economic, societal, environmental and governance-related aspects – drafting a conceptual model

In the first step of the TIA workshop, the participating experts discussed the potential effects of the *Drone Strategy 2.0*, using a territorial or place-based approach.

This discussion revealed potential territorial impacts of the *Drone Strategy 2.0*, using economic, societal, environmental and governance-related indicators. The participants identified potential linkages between implementation of the strategy and the effect on territories, including interdependencies and feedback loops between different effects (see figure below).

Figure 2: Workshop findings: Systemic picture



Source: Territorial impact assessment expert workshop, 8 May 2023, OIR

2.2 Picturing the potential territorial effects through indicators

In order to assess the potential effects pictured in the conceptual model, suitable indicators needed to be selected for the parameters that the experts discussed in the fields of economy, environment, society and governance. The availability of data for all NUTS 3 regions poses certain limitations on the indicators that can be used. From the available indicators that the ESPON TIA Quick Check web tool offers, the experts chose the following indicators to describe the identified effects.

Picturing potential territorial impacts in terms of economic indicators:

- Employment in technology and knowledge-intensive sectors
- Potential accessibility multimodal

Picturing potential territorial impacts in terms of environmental indicators:

- Emissions of CO₂ per capita
- Urban population exposed to PM₁₀ concentrations

Picturing potential territorial impacts on the basis of societal indicators:

- Health personnel
- Life expectancy at birth
- Crimes recorded by the police

Furthermore, the experts agreed that the following indicators, which are not included in the ESPON TIA Quick Check web tool and not yet available via official sources, are also relevant to describe the identified effects:

- Attainment level of training in the field of drone-related technology -> differentiation public/administration
- Number of air space violations
- Trust in the peaceful use of drones
- Ambient noise by drones -> “specific pitch”
- Number of crimes caused by drones reported to authorities

2.3 Judging the intensity of the potential effects

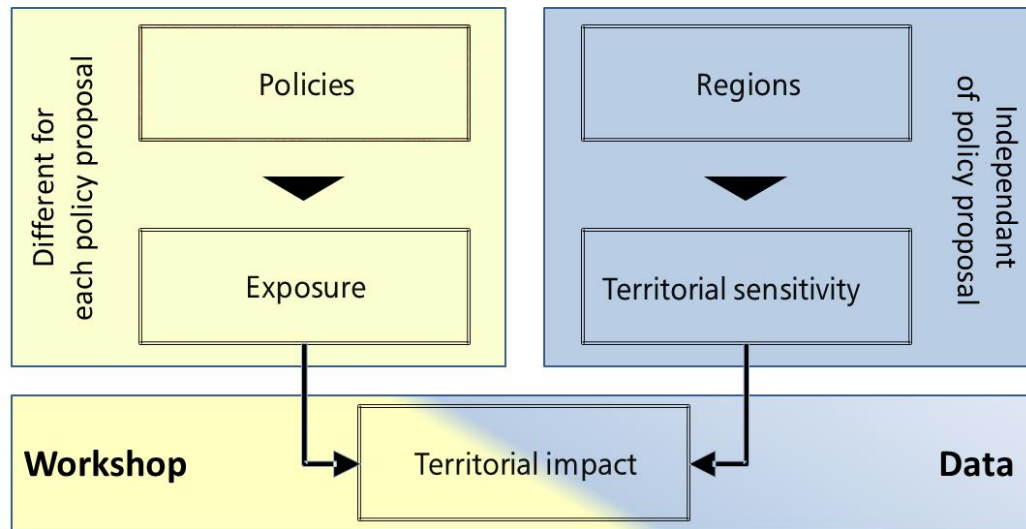
The workshop participants were asked to estimate the potential effects of the *Drone Strategy 2.0*. They judged the potential effect on the territorial welfare along the following scores:

- ++ strong advantageous effect on territorial welfare (strong increase)
- + weak advantageous effect on territorial welfare (increase)
- o no effect/unknown effect/effect cannot be specified
- weak disadvantageous effect on territorial welfare (decrease)
- strong disadvantageous effect on territorial welfare (strong decrease)

2.4 Calculating the potential ‘regional impact’ – Combining the expert judgement with regional sensitivity

The ESPON TIA Quick Check combines the expert judgement on the potential impact of the Drone Strategy 2.0 (**exposure**) with indicators describing the sensitivity of regions, resulting in maps showing a territorially differentiated impact. This approach is based on the **vulnerability concept** developed by the Intergovernmental Panel on Climate Change (IPCC). In this case, the effects deriving from a particular policy measure (exposure) are combined with the characteristics of a region (**territorial sensitivity**) to produce potential territorial impacts (see illustration below).

Figure 3: Exposure x territorial sensitivity = territorial impact



Source: OIR, 2015.

- 'Territorial Sensitivity' describes the baseline situation of the region according to its ability to cope with external effects. It is a characteristic of a region that can be described by different indicators regardless of the topic analysed.
- 'Exposure' describes the intensity of the potential effect of the Drone Strategy 2.0 on a specific indicator. Exposure illustrates the experts' judgement, i.e. the main findings of the expert discussion at the TIA workshop.

2.5 Mapping the potential territorial impact

The result of the territorial impact assessment is presented in maps. The maps displayed in Chapters 4, 5 and 6 show potential territorial impacts based on a combination of the expert judgement on exposure (qualitative judgement on a more or less strong effect, either advantageous or disadvantageous, on territorial welfare) with the territorial sensitivity of a region, described by an indicator at NUTS 3 level (quantitative indicator).

3 Debate and qualitative analysis

3.1 Introductory remarks

The workshop started with a statement by **Włodysław Ortyl**, CoR rapporteur for the opinion on *A Drone Strategy 2.0*. Mr Ortyl first emphasised that the European Commission's efforts to harmonise the drone regulation in the EU have significantly increased the EU's position in the global market for unmanned systems technology, which is developing very dynamically. Mr Ortyl pointed out that the actions described in the EC *Drone Strategy 2.0* are an appropriate response to the demand of the drone market, but that most solutions presented relate to the future, while tailor-made answers are needed right now.

Mr Ortyl underlined the great potential and role of local and regional authorities in preparing and building a new drone reality, notably:

- Building public trust and social acceptance for a growing number of drones in the sky.
- Building U-Space infrastructure (e.g. vertiports, landing sites, charging stations).
- Creating dedicated drone education paths.
- Supporting the development of technologies.
- Cooperating in building air corridors for drones.
- Coordinating activities related to the development and integration of aeronautical information systems.
- Preparing the economy for a larger use of drones.

From his bilateral meetings so far with stakeholders, the rapporteur identified some issues related to the points mentioned above (e.g. sources for funding for technological development) as well as other issues related to current and future EU Regulation (pace of adapting national laws, harmonised interpretation in all Member States), to safety or to the quality of life and citizens and the environment.

Second speaker **Jukka Savo**, Policy Advisor in the Aviation Safety Unit of DG MOVE/European Commission, underlined that it was widely recognised that the European Union has taken the lead on the world stage in providing a regulatory framework on drones. He referred to the U-Space Regulation—which was adopted in April 2021 and entered into force in January 2023—providing an airspace management system for drones ensuring safe and scalable operations, to the communication on Sustainable and Smart mobility (December 2020), and to the Action Plan on Synergies (February 2021), which included a flagship action on drones.

The European *Drone Strategy 2.0* aims to develop a thriving drone ecosystem in the Union, with drones being a part of the life of EU citizens, at the centre of mobility policies—it is estimated that 70% of the world's population will live in cities by 2050. The vision set out in the strategy envisaged that Innovative Air Mobility (IAM) services will ensure regular transport services of goods and passengers by 2030, first using manned aircraft, then remotely piloted aircraft and ultimately fully autonomous aircraft. The current transition phase is for testing test autonomous flights.

The strategy contains 19 flagship actions grouped into two objectives:

- to build the Union drone service market, and
- to strengthen the Union's civil, security and defence industry capabilities and synergies.

Mr Savo explained that the Strategy had been designed with the involvement of a large number of stakeholders, including LRAs, and mentioned Flagship Action 7 as particularly relevant for LRAs: the EC intends to fund the creation of an online platform to support a sustainable IAM implementation by authorities, communities, municipalities, industry and stakeholders. A first version of the platform is expected to be available by the end of 2023.

The workshop proceeded with the experts engaging in a brainstorming exercise.

3.2 Social benefits and public trust

The experts identified several ways in which the quality of life of EU citizens could be improved as a result of the *Drone Strategy 2.0*.

Medical services could be improved, in particular in relation to emergency medical services (including transport of people to hospitals) and delivery of medical services and medicine in rural and remote areas. Combined with a possible decrease of traffic injuries due to reduced road traffic, this could contribute to an overall increase in life expectancy, at least in the short term. One expert raised the question of the uncertainty of the long-term effects of a large number of drones in the sky – if flying at low altitude - for the health of citizens, which would require monitoring in 10 or 20 years' time. Also, the wider use of drones would increase the accessibility of regions with poor transport connectivity, such as islands. It could also facilitate the lives of people who rely heavily on transport connections (rural areas).

However, the experts also expressed concerns in relation to possible invasion of privacy and potentially increased crime, especially in cities, around ports and borders.

The issue of social acceptance of drones was also discussed. The experts considered that trust and acceptance cannot be assumed or acquired automatically. One way to mitigate citizens' dissatisfaction with drones could be to involve them in decision-making on aspects that need to be decided at local and regional level (see section 3.5).

Also, the experts considered that acceptance can develop overtime. If citizens have a negative bias against drones (fear of privacy intrusion, link between drones and conflicts/wars), positive outcomes need to be experienced. This requires capacity-building in public administration as well as knowledge-building in the population.

3.3 Economic effects, SMEs vs "big players" and territorial cohesion

The experts largely agreed that the *Drone Strategy 2.0* provides opportunities for increased business development in general; the increased economic activity could result in higher taxes income.

Among the "winning" sectors, the construction sector was mentioned, as there is a need to build the U-space infrastructure (e.g. vertiports) and wide deployment and cost-saving potential for the use of drones for maintenance and surveillance tasks in this sector. The travel sector could also develop a wider offer, with drones acting as a possible addition to main aviation routes and enabling better connectivity of more remote locations.

The "losing out" or disrupted sectors identified by experts include freight companies and helicopter operators. Also, there could be increased costs for the general aviation sector and aerial sports since detection technologies would need to be implemented.

The experts also suggested that the drone strategy would be likely to boost research and innovation.

The experts discussed the issue of small businesses vs big players as well as possible territorial concentration. There, a distinction was made between the "production" side and the "services" side.

- On the "production" side, experts agreed that high-technology ecosystems tend to favour "big players". Strengthening "big players" may prevent small companies from entering the market and benefitting—although it may be relevant for the global position of the EU. Therefore, financial support for SMEs may be needed, as well as support in capacity-building and reduction of entry costs and other barriers in the production sector. In this respect, the Strategy's flagship action number 3 in the strategy on reducing the burden for low- and middle-risk operations may be a facilitator.
- On the "services" side, the lower entry barriers do not mean that there should not be long-term support for SME innovation and access to funding for SMEs. Experts considered that it is difficult to anticipate everything, that the strategy needs to be implemented and monitored to see if it needs adjustment.

There is a strong territorial dimension to the debate as there may be more market participants in urban areas, with small companies in rural areas facing specific obstacles entering the market if they do not come in clusters. The workshop participants reflected on possible acceptance of a level of territorial concentration linked to high-technology developments (on the "production" side mainly) provided that the resulting services can benefit a region as a whole (social benefits vs economic viability).

Generally, funding was identified as one of the enablers in the *Drone Strategy 2.0*, but one expert pointed out that the funding rules are not specific to the strategy and that the application of the standard EU rules meant that accessing such funding would be beyond the capacity of many SMEs (heavy administrative burden, etc.); it was emphasised that if SMEs continue to experience difficulties meeting the conditions to access funding for the development of drones, it may be appropriate to consider changes to the eligibility and application rules for Horizon Europe or specific funding programmes (see also section 3.6).

3.4 Environmental effects

The experts discussed the effects of the EC *Drone Strategy 2.0*—linked with an increased number of drones in the airspace—on the environment.

Possible negative effects were mentioned: increased noise, light pollution and possible collisions with birds. The workshop participants had diverging views on whether the strategy sufficiently addressed possible nuisance to the local fauna. Some experts considered that the legislation provides for the definition of environmentally important areas and of the conditions for flying over them, and that the strategy could help encourage Member States to safeguard minimum standards.

On the positive side, road traffic could be expected to reduce, with passengers using drone transport instead of private cars; as private cars are mostly fuel-based and as traffic jams may be reduced, this could lead to a reduction of CO₂ emissions.

3.5 Governance: resources and capacity-building at local and regional level

More drones in the airspace could lead to conflicts between private and public airspace, if not well prepared. Some experts considered that even if city planning comes late, it is easier to "reorganise the sky" than to "reorganise the land".

The experts agreed on the important role of local and regional authorities in preparing and adapting to the development of drones, implementing the regulatory framework and monitoring it, which all requires capacity-building and resources.

For instance, cities will have to ensure a multimodal urban planning, including vertiports, volumes of U-space airspace or corridors for drones, etc. Cities and regions will also need to be able to define "no-fly" zones. They will be competent for revoking licenses, which will require effective means to follow up on complaints from citizens, identify drone operators violating the rules and deal with conflicts—this is directly linked to social acceptance, where it will be important to show from an early stage that if infractions are committed there are commensurate consequences. When it comes to the threat of malicious drones, not only do (technical) solutions need to be developed, but cities and regions also need the resources to counter such drones.

In view of the significant range of responsibilities expected to be assumed by the local and regional level as described above, the experts considered that LRAs should be provided with dedicated resources to facilitate the deployment of the EU Drone Strategy. The experts also considered that the EU should develop assessment mechanisms to ensure that LRAs use such resources in accordance with the actions indicated in the Strategy.

Increased public funding will also be needed to fund research and development.

While the EU Drone Regulation sets out a common framework for the skills and training paths of drone pilots, the experts noted that further support⁶ could be provided for those training entities and individuals which provide voluntary training for new drone operators. Currently, there is no targeted programme to enhance the capacity of these entities and individuals. In a field where both the technology and the regulatory context are evolving rapidly, the experts considered essential that support mechanisms should be available to ensure appropriate support for trainers in keeping pace with latest developments and maintaining their knowledge and skills in all relevant areas, in order to guarantee the quality of skills and competences passed on in turn to the professionals being trained. It was considered that the EU level should provide further detailed guidance and/or a mechanism for conformity assessment to specify the minimum skills and knowledge that drone operators should have.

⁶ In addition to the information and guidance provided by the EASA and national competent authorities, for example on the certificate of competency (including theoretical knowledge and practical skills). A remote pilot must hold the certificate issued by the competent authority or by an entity that is designated or recognised by the competent authority of a Member State under the supervision of EASA. The relevant information on the requirements and other guidance material are already available on the websites of EASA and the National Competent Authorities.

3.6 Safety, liability and link with other regulations

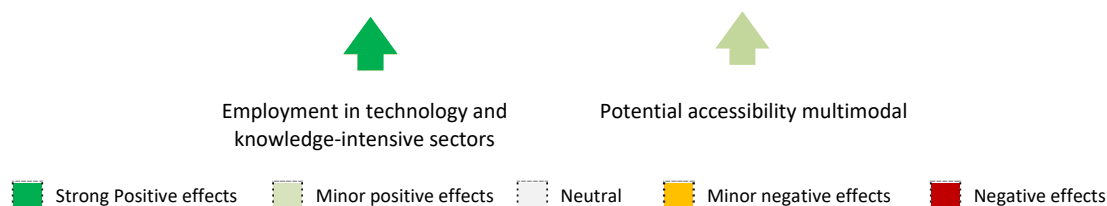
The question of insurance/liability for different drone services was raised, depending on the type of operations (higher risk hence greater safety standards for drones carrying passengers).

The experts considered that not all aspects need to be specified in the drone strategy but that the strategy needs to be carefully articulated and aligned with other policies and regulations, for instance with the regulation on commercial aviation, the cybersecurity legislation, and EASA's Artificial Intelligence Roadmap 2.0⁷, but also concerning other aspects (e.g. conditions to access funding).

⁷ Published shortly after the workshop, [EASA's Artificial Intelligence Roadmap 2.0](#) addresses the safe integration of new and emerging technologies in aviation, including drones and the U-Space

4 Expected economic effects

Two indicators were selected by the experts, both of which are expected to see a positive effect of different magnitudes:



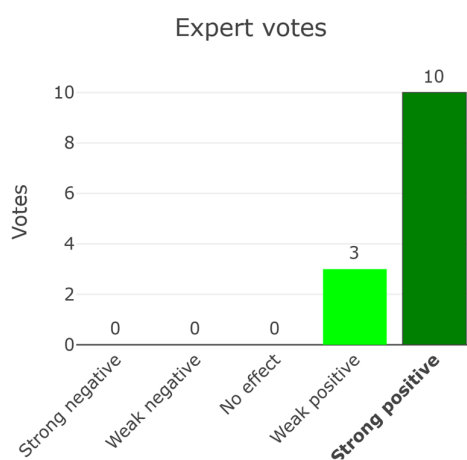
4.1 Employment in technology and knowledge-intensive sectors

The indicator depicts the share of employment in technology and knowledge-intensive sectors (reference year: 2019).

The experts agreed that the further development of the drone technology, even taking into account some constraints on drone use, would promote research in this field. As more specific indicators are not available, the experts concluded that this could lead to an increase of employment in technology and knowledge-intensive sectors in general.

All experts agreed that the *Drone Strategy 2.0* would have a positive effect (ten strong, three weak) on employment in these sectors.

Figure 4: Result of the expert judgement: employment in technology and knowledge-intensive sectors and the impact of the *Drone Strategy 2.0*

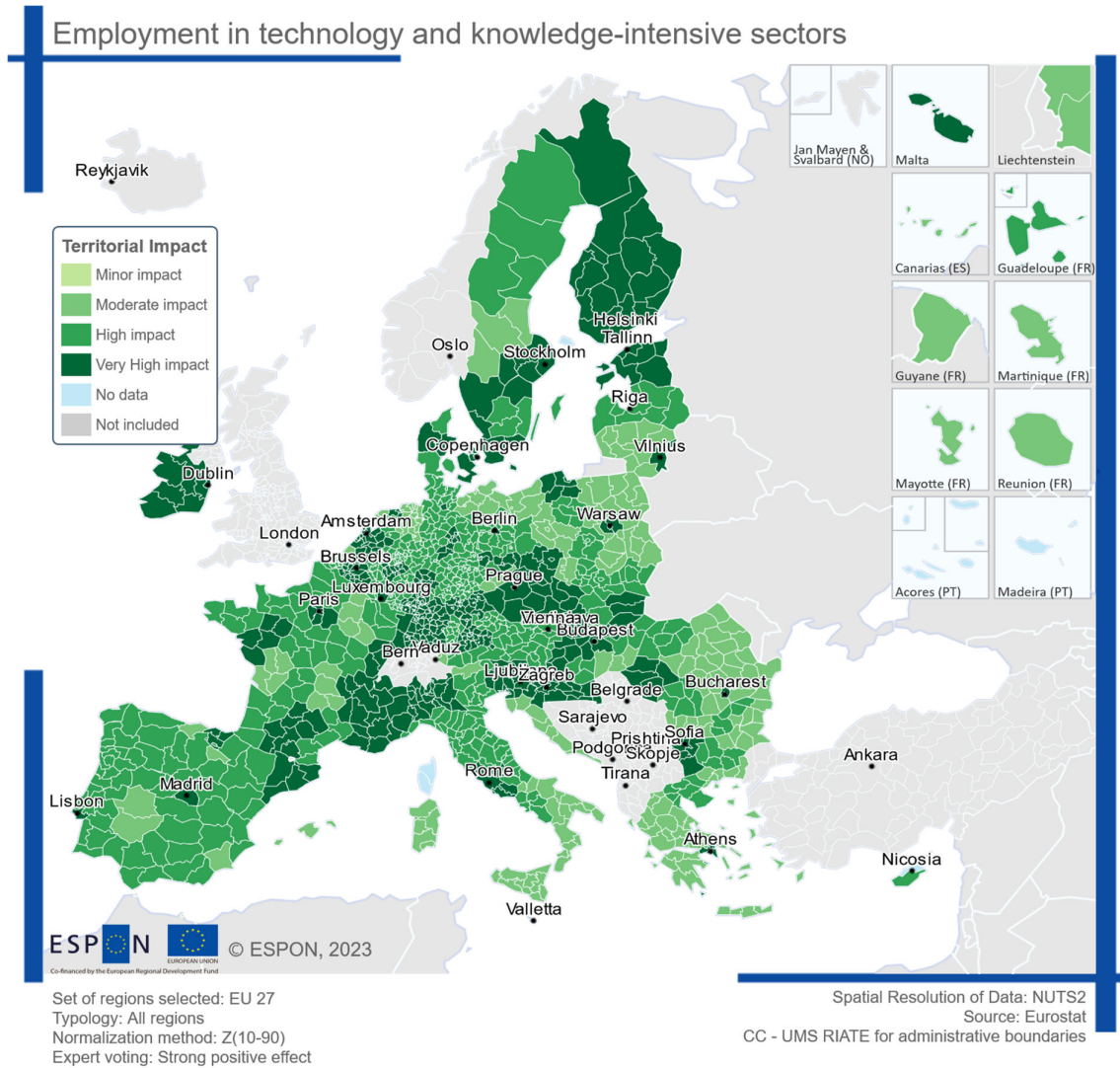


Source: Territorial impact assessment expert workshop, 8 May 2023

Regions with a higher share of jobs in technology and knowledge-intensive sectors are expected to be affected positively by the *Drone Strategy 2.0*. Sensitivity is thus directly proportional to the share of the total workforce employed in technology and knowledge-intensive sectors.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering the employment technology and knowledge-intensive sectors. It combines the expert judgment of a strong positive effect with the given sensitivity of regions.

Map 1: employment in technology and knowledge-intensive sectors and the impact of the *Drone Strategy 2.0* – expert judgement: strong positive effect



Source: Territorial impact assessment expert workshop, 8 May 2023

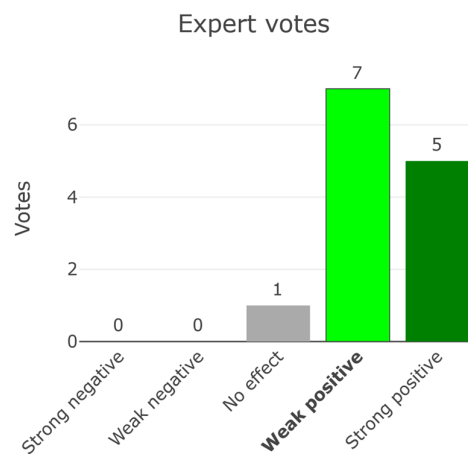
The impact on 37% of the regions is estimated to be very high positive. Many larger cities and their agglomerations are expected to experience the highest impact as well as large parts of Finland, Estonia, Ireland, Czechia and the Netherlands. Parts of southern France, northern Italy, Germany, Slovenia and Sweden could be also highly affected. 46% of regions would benefit from a high positive impact and 19% from a moderate positive impact.

4.2 Potential accessibility multimodal

The indicator “potential multimodal accessibility” is calculated by weighting the population in all destination regions for each NUTS 3 regions by the multimodal travel time to reach the region. Then the weighted population is aggregated to the indicator value for the accessibility potential of the original region. Multimodal accessibility is composed of the aggregated accessibility by road, rail and air. The indicator is expressed as an index relating to the ESPON average (reference year: 2014).

The use of drones in public transport is expected to increase the accessibility in regions with poor transport connectivity. Drone services could reach remote regions more easily more quickly and could lead to an improvement of e.g. delivery services as well as individual personal transport. The positive effects in relation to public transport functions are more prominent than in relation to individual transport in this area, with experts considering a higher likelihood of implementation of drone mobility in public transport and service than in individual drone mobility. In particular in relation to MaaS (Mobility as a Service) developments, the potential for peripheral regions was estimated to be positive. Consequently, most of the experts judged the effect on accessibility as positive (five strong, seven weak). One expert did not see the effect as relevant.

Figure 5: Result of the expert judgement: Potential accessibility multimodal and the impact of the *Drone Strategy 2.0*

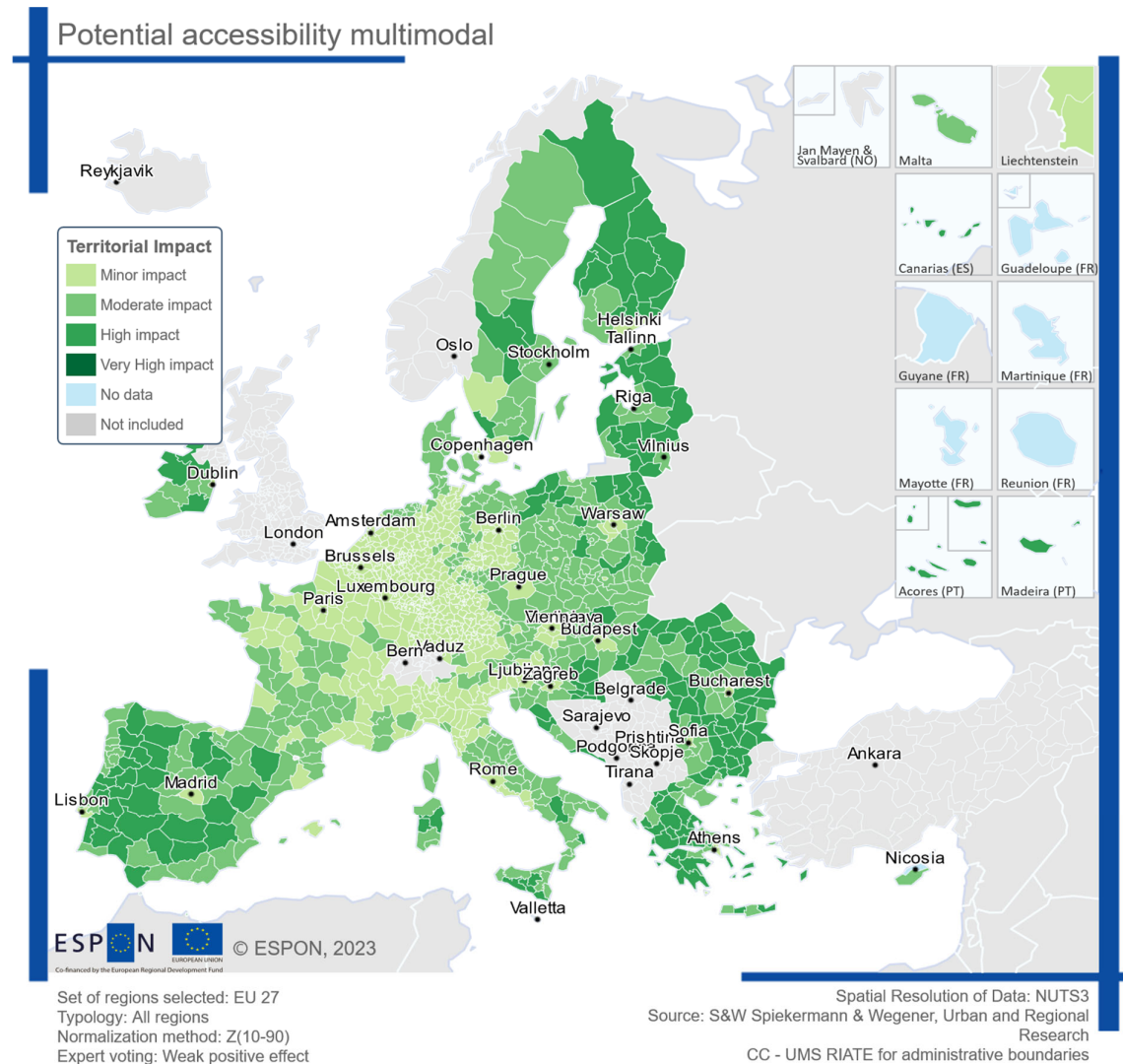


Source: Territorial impact assessment expert workshop, 8 May 2023

Regions with a lower potential multimodal accessibility are expected to be influenced more by the *Drone Strategy 2.0*. Sensitivity is thus indirectly proportionate to the potential multimodal accessibility.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering the potential multimodal accessibility. It combines the expert judgment of a weak positive effect with the given sensitivity of regions.

Map 2: Potential accessibility multimodal and the impact of the *Drone Strategy 2.0* – expert judgement: weak positive effect

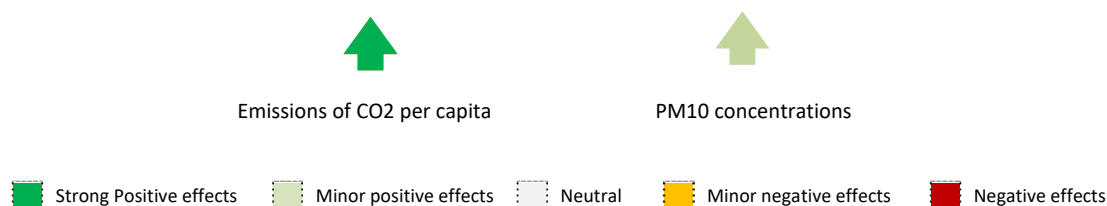


Source: Territorial impact assessment expert workshop, 8 May 2023

It is expected that 17% of the regions could experience a high positive impact. Most of these regions are located in the Eastern part of Europe and in the Iberian Peninsula. Several regions in Ireland, Sweden and Italy would be also highly affected. 33% of the regions would experience a moderate positive impact and 51% only a minor positive impact. Most of the regions in Central Europe as well as larger cities where public transport is usually well developed would be least affected.

5 Expected environmental effects

Two indicators were selected by the experts, both of which are expected to see a positive effect of different magnitudes:



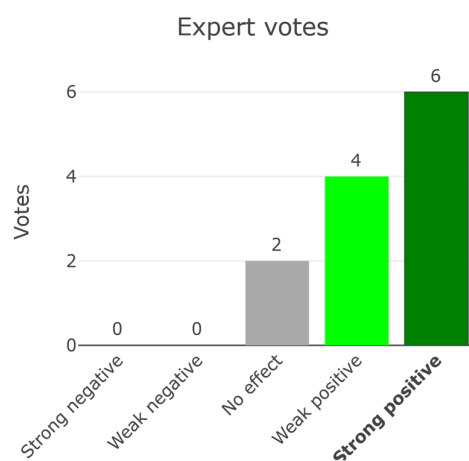
5.1 Emissions of CO2 per capita

The indicator pictures the sensitivity of a region according to the yearly emissions of CO2 in tonnes per capita (reference year: 2020).

Most of the experts agreed that some activities in the transport sector currently undertaken via individual, mostly fuel-based vehicles could be replaced by drone transport. It was assumed that overall, this would include a large share of electricity-powered drones and thus contribute to the reduction of energy use and fuel burnt. Apart from the reduction of individual vehicle emissions, a reduction of traffic jams could further reduce emissions throughout the system⁸.

Six experts agreed that the effect of using drones would likely have a positive effect on the reduction of this pollutant and voted for positive (six strong, four weak). Two experts did not see any relevant effects.

Figure 6: Result of the expert judgement: emissions of CO2 per capita and the impact of the *Drone Strategy 2.0*



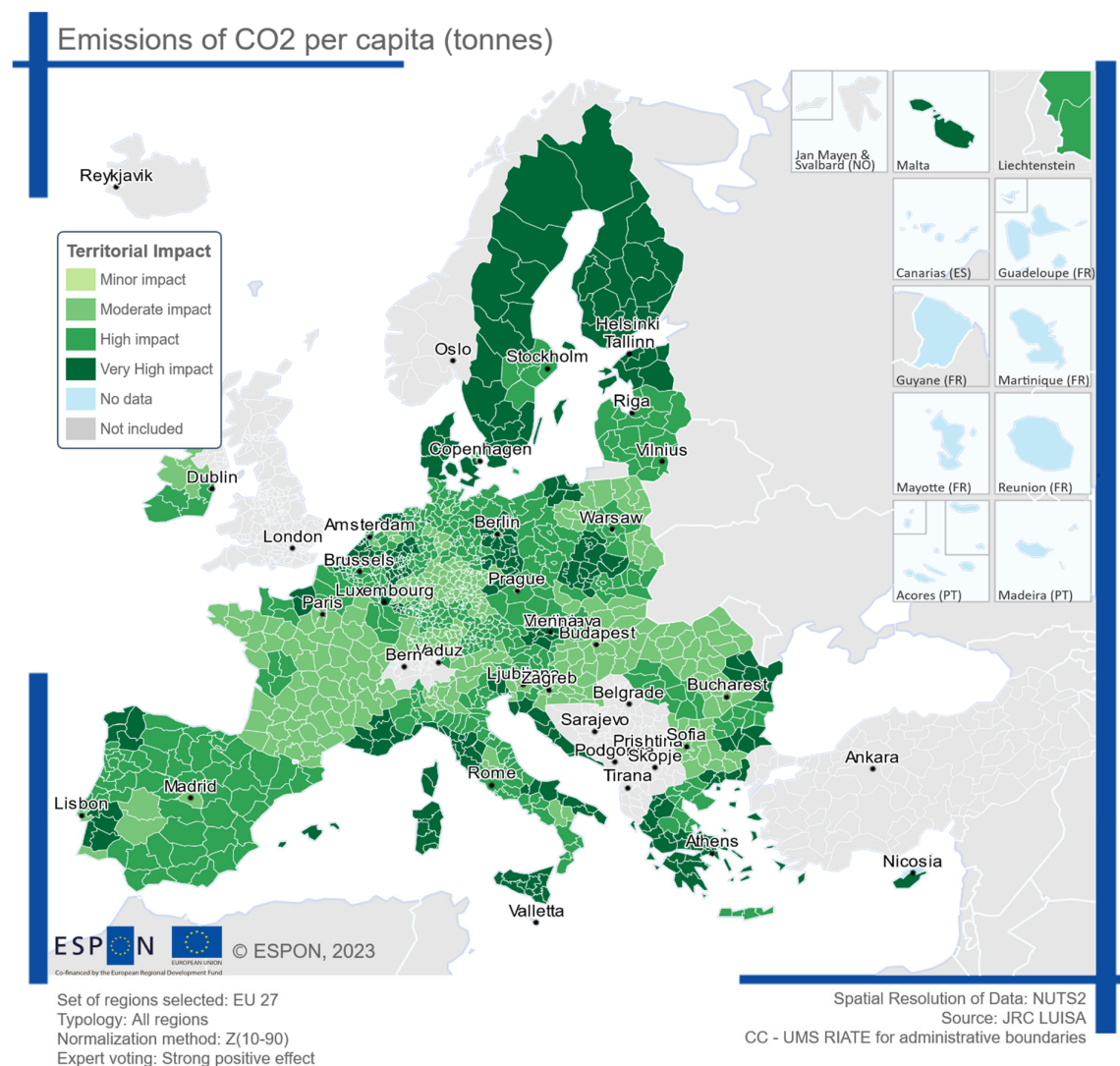
Source: Territorial impact assessment expert workshop, 8 May 2023

⁸ After the workshop, an expert commented that the environmental impact of the production and processing of drone batteries and components at the end of their lifecycle should also be taken into account when assessing the overall impact of drones on CO2 emissions.

Regions showing higher concentrations of CO₂ per capita are expected to be more sensitive due to a higher potential for reduction. Sensitivity is thus directly proportionate to the emissions of CO₂ per capita.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering the emissions of CO₂ per capita. It combines the expert judgment of a strong positive effect with the given sensitivity of regions.

Map 3: emissions of CO₂ per capita and the impact of the *Drone Strategy 2.0* – expert judgement: strong positive effect



Source: Territorial impact assessment expert workshop, 8 May 2023

26% of the regions could benefit from a very high positive impact, 42% would see a highly positive impact and 32% a moderate positive impact. Many of the regions that would experience the highest impact in terms of reduction of CO₂ emissions are port regions or industrial regions. Sparsely populated regions with high CO₂ emissions per capita in Sweden and Finland also showed high impacts due to the low numbers of inhabitants and longer transport distances, resulting in a high level of CO₂ per capita.

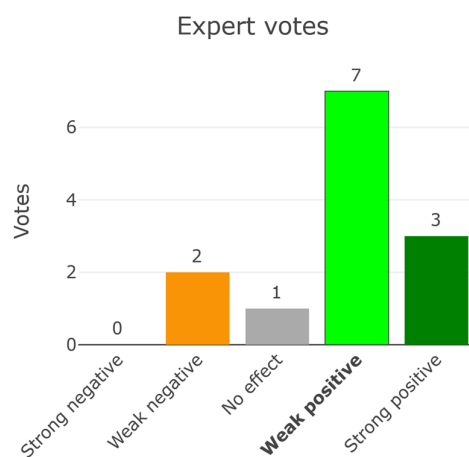
5.2 PM10 concentration

This indicator depicts the annual average PM10 concentration in $\mu\text{g}/\text{m}^3$. The data has been interpolated and weighted by the number of population (reference year: 2018).

Similar to CO₂ emissions, the experts deemed that the use of drones could lead to a reduction of PM10 concentrations. The expected reduction of local traffic jams and shift from fuel-powered towards electricity- and potentially hydrogen-based modes of transportation would even more exert positive impacts on local communities.

Ten experts saw the effect as positive (three strong and seven weak). However, two experts saw the opposite effect and voted for weak negative. One expert deemed that there would be no relevant effect.

Figure 7: Result of the expert judgement: urban population exposed to PM10 concentrations and the impact of the *Drone Strategy 2.0*

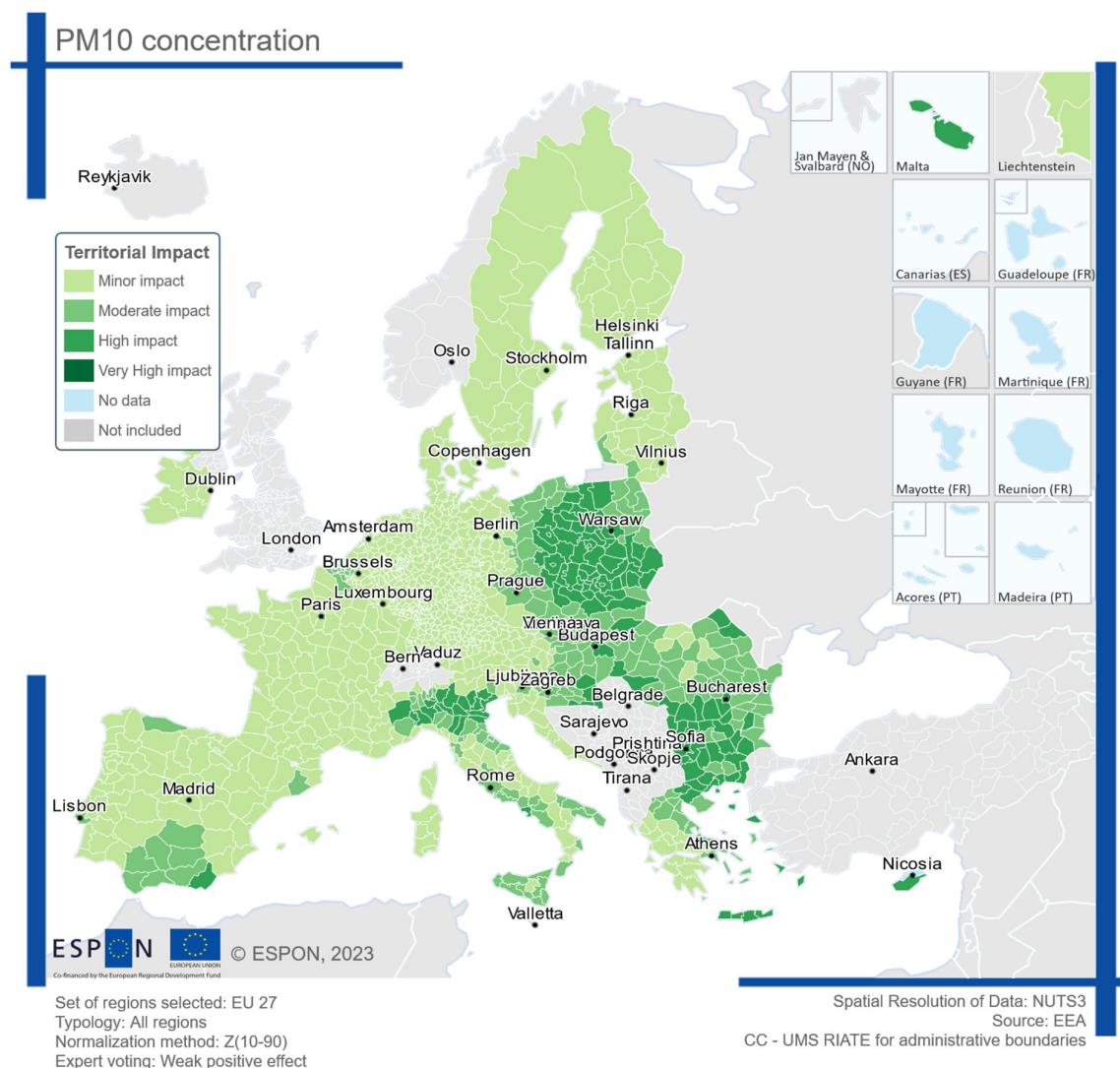


Source: Territorial impact assessment expert workshop, 8 May 2023

Regions with a higher PM10 concentration relative to the population are expected to be influenced more by the *Drone Strategy 2.0*. Sensitivity is thus directly proportionate to the concentrations of this pollutant.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering the PM10 concentration. It combines the expert judgment of a weak positive effect with the given sensitivity of regions.

Map 4: urban population exposed to PM10 concentrations and the impact of the *Drone Strategy 2.0* – expert judgement: weak positive effect

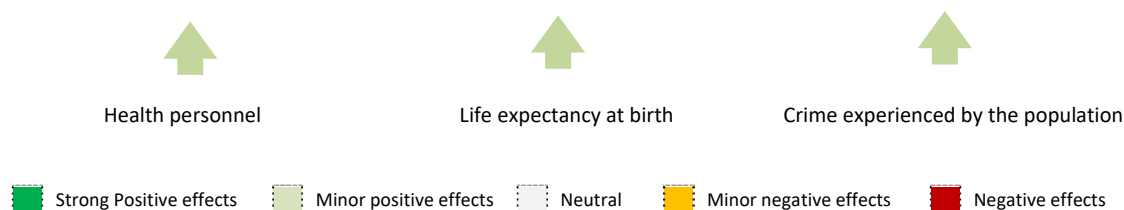


Source: Territorial impact assessment expert workshop, 8 May 2023

12% of regions are expected to experience a high positive impact. Stronger impacts are concentrated in central and southern Europe. A larger cluster of regions experiencing the highest impact can be detected in Poland, the northern part of Italy as well as parts of Romania, Bulgaria and Greece. Spain, the Czech Republic, Slovakia, Hungary would be also highly affected at regional level. 18% of regions would have a moderate positive impact. Most regions (70%) are expected to see a minor positive impact.

6 Expected societal effects

Three indicators were selected by the experts, all of which are expected to see minor a positive effect:



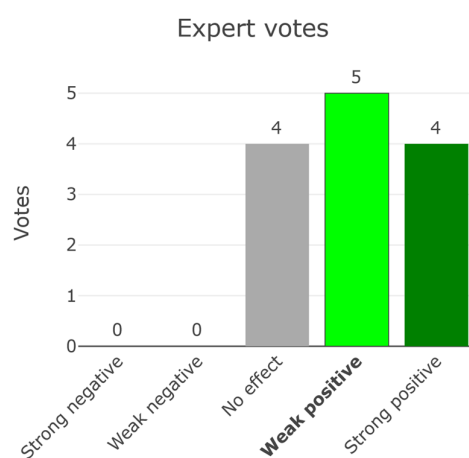
6.1 Health personnel

This indicator shows the number of medical doctors per 100,000 inhabitants (reference year: 2018).

Experts in the workshop expected that developments in the drone sector would lead to improved medical services in particular in relation to Emergency Medical Services and pre-clinic medicine. Use of drones in ambulance services are likely to reduce both response times as well as transport times to hospital. Furthermore, the accessibility of remote locations can be significantly improved, reducing the reliance on air medical services via fuel-based helicopter. The availability of health personnel to the general public thus would be improved through the implementation.

The result of the experts' voting however was ambiguous. Nine experts voted for positive (four for strong positive and five for weak positive) effects, while four did not see a relevant effect.

Figure 8: Result of the expert judgement: health personnel and the impact of *the Drone Strategy 2.0*

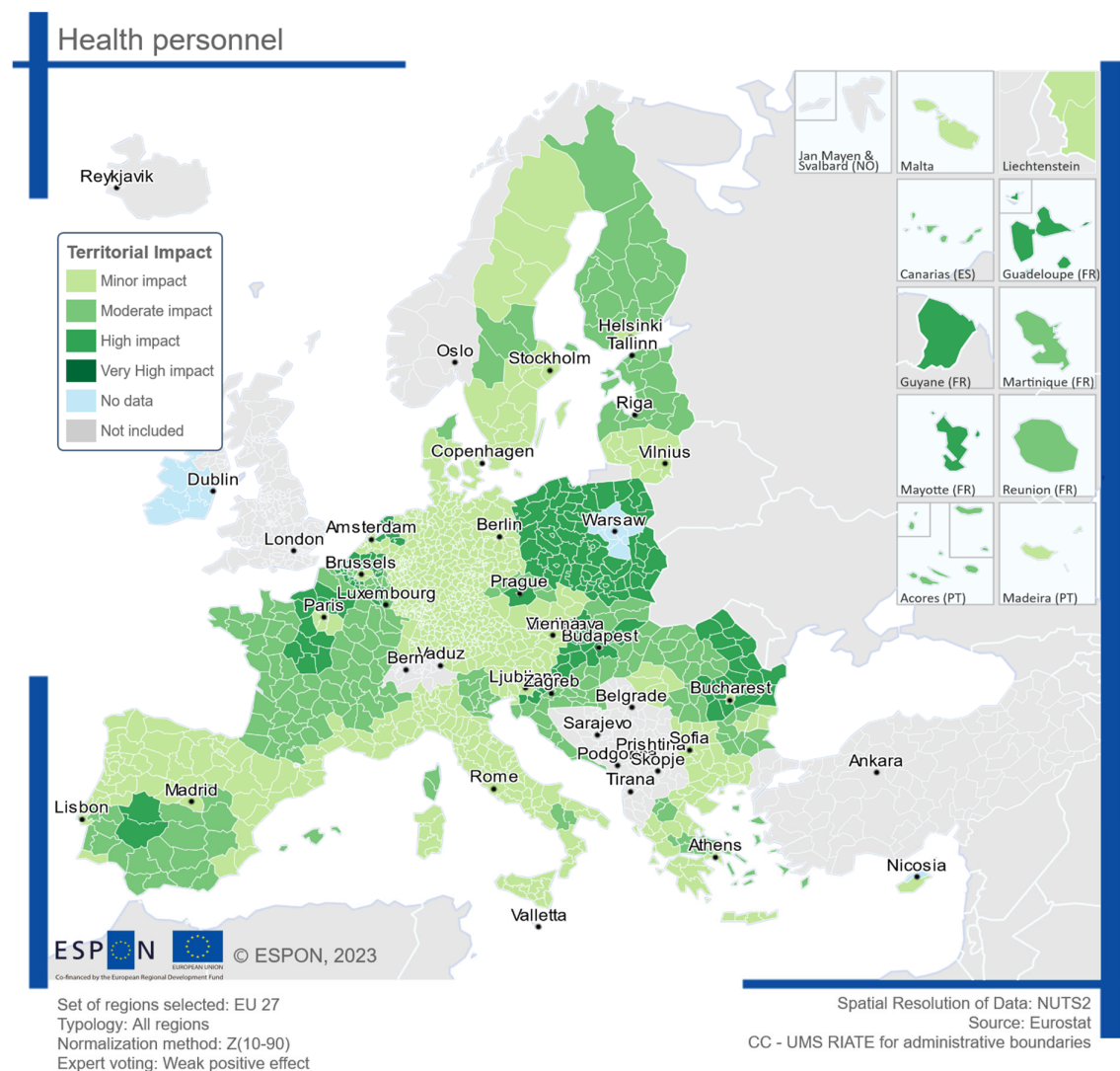


Source: Territorial impact assessment expert workshop, 8 May 2023

Regions with a low number of health personnel are more likely to be affected positively by the *Drone Strategy 2.0*. Sensitivity is thus inversely proportionate to the number of medical doctors per 100,000 inhabitants.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering the number of health personnel. It combines the expert judgement of a weak positive effect with the given sensitivity of regions.

Map 5: health personnel and the impact of the *Drone Strategy 2.0* – expert judgement: strong positive effect



Source: Territorial impact assessment expert workshop, 8 May 2023

14% of regions could potentially experience high positive impact. These regions tend to be in Eastern Europe mostly (Poland, central Czech Republic, Slovakia, Hungary, border regions of Romania and central regions of Slovenia) as well as the Netherlands, Belgium, parts of France and Spain. The other regions would either experience moderate positive impact (21%) or minor positive impact (65%), while showing no distinct patterns or concentrations.

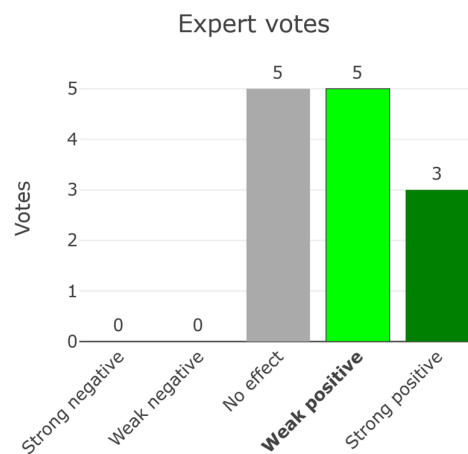
6.2 Life expectancy at birth

This indicator depicts the life expectancy at given exact age (reference year: 2018).

The experts expect that a combination of several different factors may contribute to improvements in life expectancy. Positive effects on the availability of ambulances and health personnel, reduction of local air pollutants from replacement of vehicles with drones as well as a reduction in traffic jams and thus local pollution were the key drivers identified by the experts. Several experts however mentioned that these effects even in combination are not enough to have a measurable impact on the selected indicator.

Consequently, five experts voted for no effect. Five further experts expected a weak positive effect, while three voted for a strong positive effect.

Figure 9: Result of the expert judgement: life expectancy at birth and the impact of the *Drone Strategy 2.0*

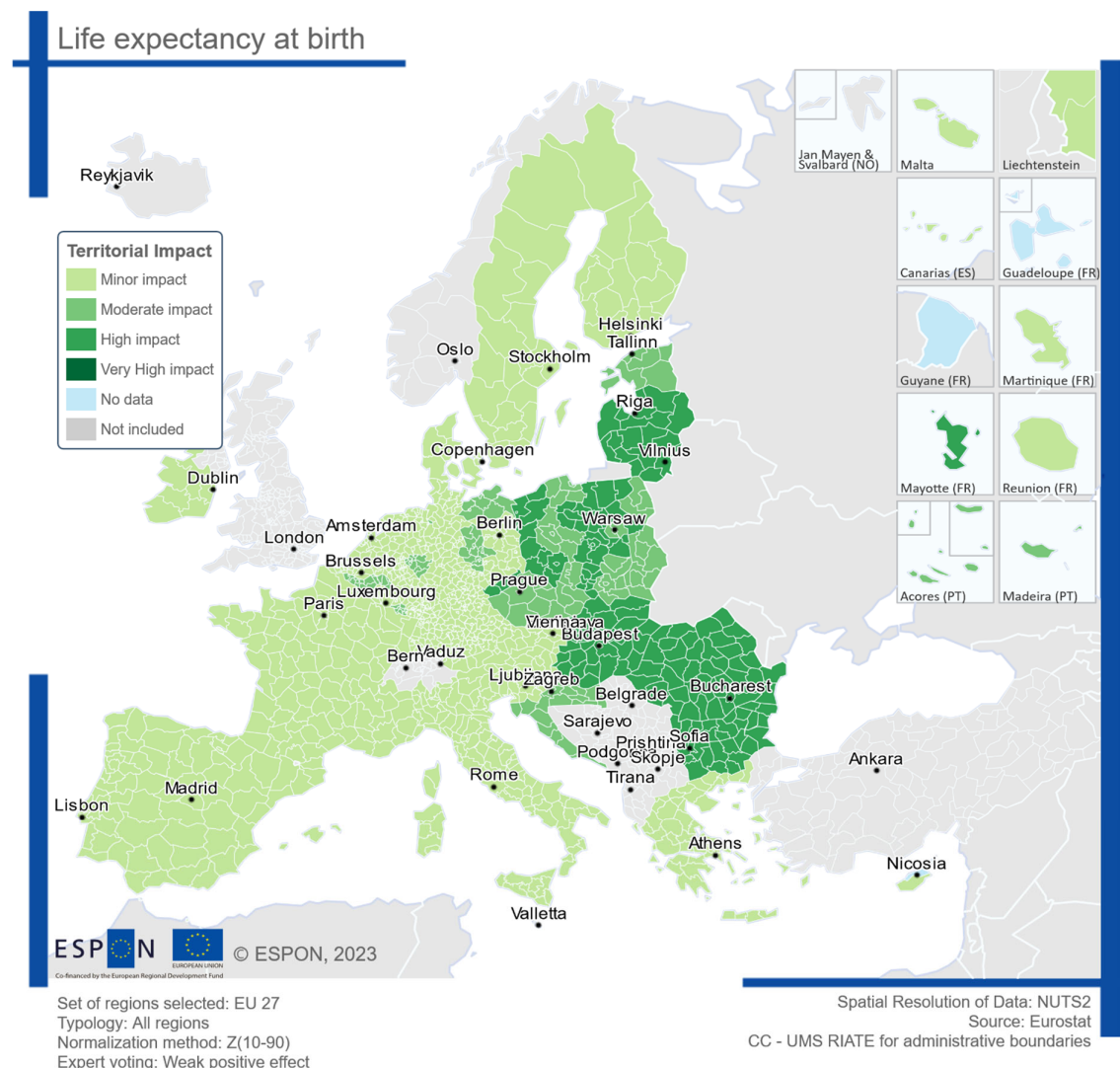


Source: Territorial impact assessment expert workshop, 8 May 2023

Regions in which life expectancy is lower are assumed to benefit more from the *Drone Strategy 2.0*. Sensitivity is thus inversely proportionate to life expectancy at birth.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering life expectancy at birth. It combines the expert judgment of a weak positive effect with the given sensitivity of regions.

Map 6: life expectancy at birth and the impact of the *Drone Strategy 2.0* – expert judgement: weak positive effect



Source: Territorial impact assessment expert workshop, 8 May 2023

13% of regions would experience a high positive impact and 12% a moderate positive impact. The majority of these regions can be found in Eastern Europe. A few regions with a moderate positive impact are located in southern Belgium and in Germany. 75% of regions covering mainly central, southern and northern Europe are expected to have a minor positive impact.

6.3 Crime recorded by the police

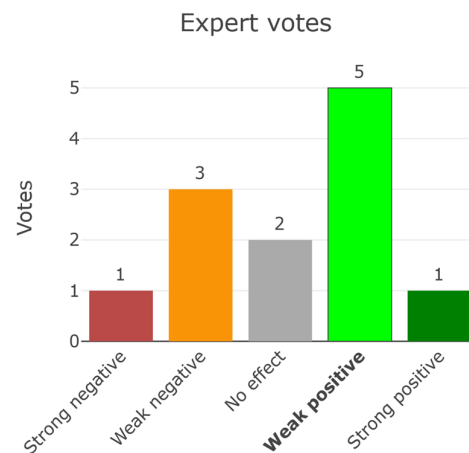
The indicator depicts the crime recorded by police (intentional homicide, robbery, burglary of private residential premises, theft of a motorised land vehicle) per 1,000 inhabitants.

The effects of the implementation of the *Drone Strategy 2.0* on crime were estimated both in positive and in negative ways, which are not mutually exclusive of each other. The support that could be provided by drones in crime prevention and policework was estimated to lead to a positive effect, allowing for a more effective approach replacing or supporting existing aerial observation methods. On the other hand, more widespread use of drones by individuals is assumed to contribute to privacy

invasions in particular. Furthermore, experts assumed that the required and expected restrictions for drone use, e.g. in populated areas, nature protection areas etc. may not be universally respected, and thus are likely to increase overall crime rates.

Consequently, the vote was split with four experts voting for negative effects (one strong, three weak negative) and six experts voting for positive effects (five weak and one strong). Two experts did not expect a relevant effect.

Figure 10: Result of the expert judgement: crime experienced by the population and the impact of the *Drone Strategy 2.0*

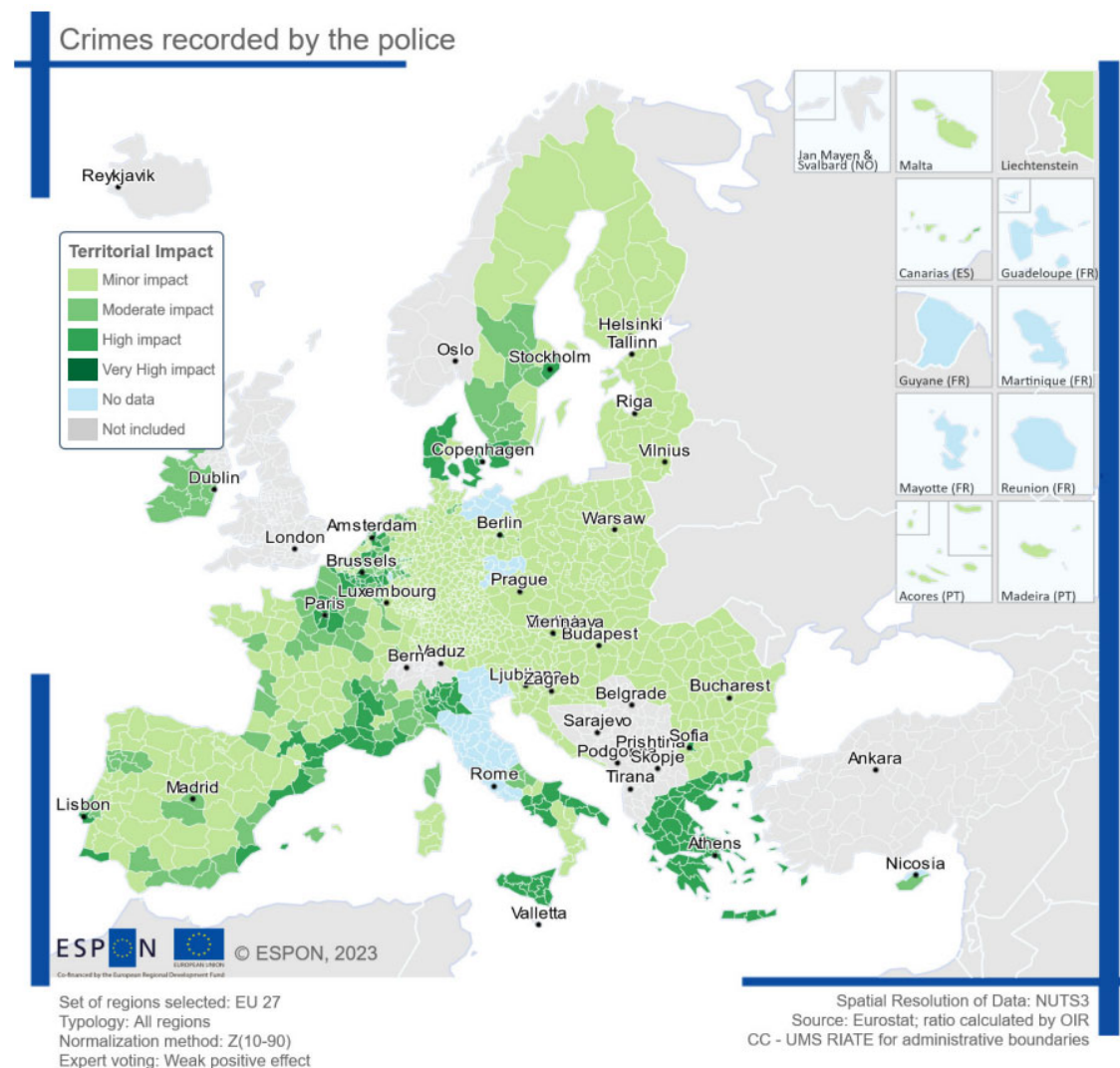


Source: Territorial impact assessment expert workshop, 8 May 2023

Regions with a higher percentage are expected to be affected more positively by the *Drone Strategy 2.0*. Sensitivity is thus directly proportionate to the share of persons who experienced crime-related incidents.

The following map shows the potential territorial impact of the *Drone Strategy 2.0* considering crime experienced by the population. It combines the expert judgment of a weak positive effect with the given sensitivity of regions.

Map 7: crimes recorded by the police and the impact of the *Drone Strategy 2.0* – expert judgement: weak positive effect



Source: Territorial impact assessment expert workshop, 8 May 2023

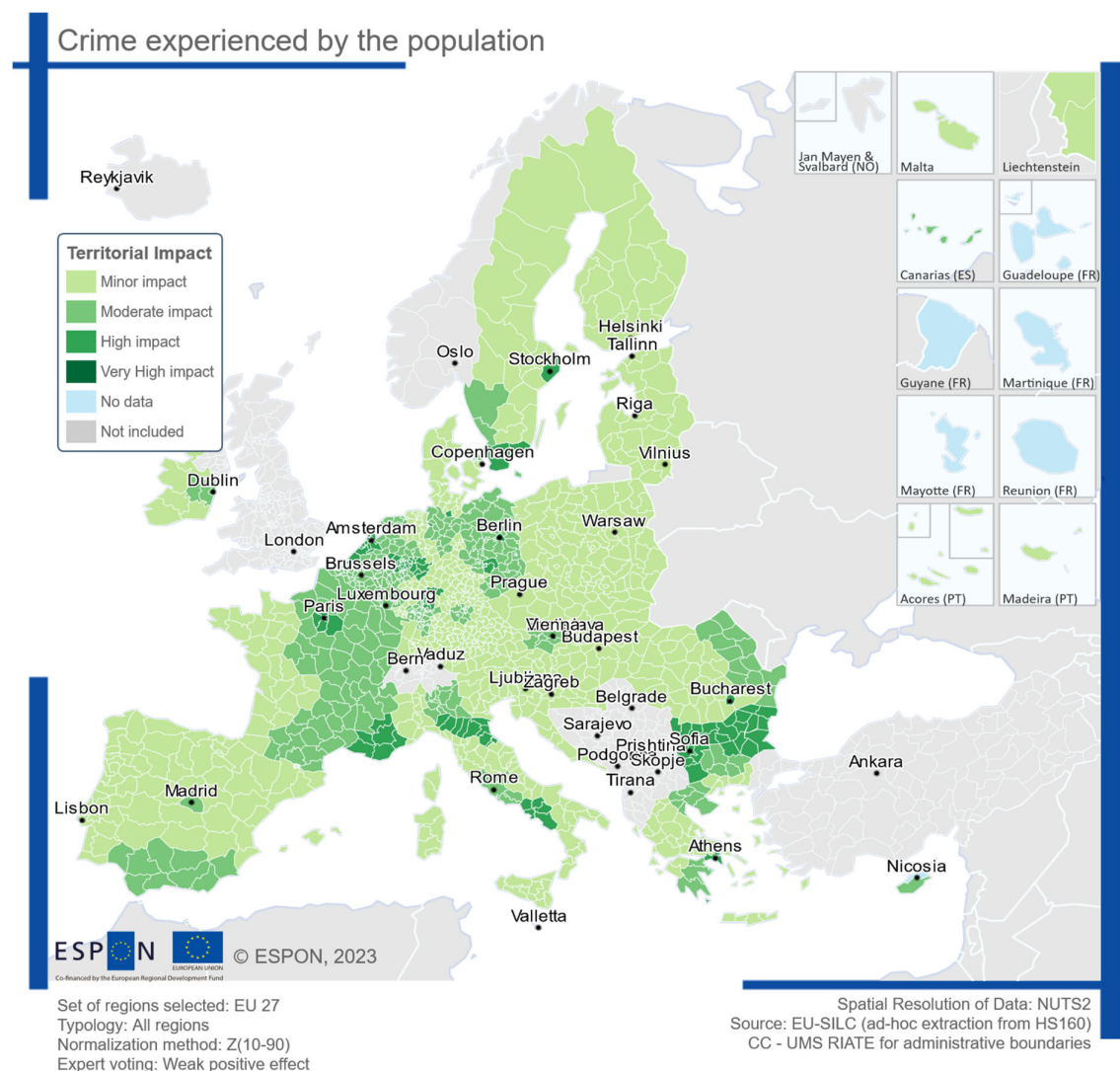
As there were a number of regions with "no data" for the indicator, another indicator related to crime was found after the workshop: **the crime experienced by the population**.

This indicator is defined as the share of people who stated in an EU-SILC survey that they had faced the problem of crime, violence or vandalism in the local area (reference year: avg. 2017-18).

It might exclude some of the crimes recorded by the police, such as drug smuggling, which can be tackled by using drones and counter measures. However, the data for EU regions is more complete.

Overall, the resulting map is quite similar to the previous map on crimes recorded by the police.

Map 8: crime experienced by the population and the impact of the *Drone Strategy 2.0* – expert judgement: weak positive effect



Source: Territorial impact assessment expert workshop, 8 May 2023

11% of regions could experience a high positive impact and 29% a moderate positive impact. These regions are larger cities and, in some cases, their agglomerations as well as most parts of Bulgaria and a considerable share of French and Dutch regions. The majority of the regions (60%) are expected to have a minor positive impact.

7 Conclusions and policy recommendations

7.1 Regular revision and alignment of drone regulatory framework

- The *Drone Strategy 2.0* sets a vision for 2030, not beyond. Generally, the experts recommend a regular revision of regulations and policies related to drones to keep up with technological developments, the implementation of services and the market development, and to adjust to public opinion (see also section 7.3).
- Drones should not be treated as a silo topic; other strategies and legislation should be aligned with the *Drone Strategy 2.0* (e.g. EASA's Artificial Intelligence Roadmap 2.0, security aspects, conditions for accessing research and innovation funding).
- A unified framework on drones at EU level should continue to allow for differentiation at regional level; high-level strategies should be adapted into actions at local and regional level (keeping up with environmental legislation and keeping the promise to the public that their privacy and their security are guaranteed).

7.2 Foster the potential for rural and remote areas

The development of the drone market is an opportunity for territorial cohesion, which could enable allowing rural and remote areas to catch up some of their development delay.

Remote areas can benefit from the "production" side if they are able to pick up technologies, but they can mainly benefit from the implementation of services (transport of persons, delivery of goods).

For this to happen, Cohesion Policy should take account of the opportunities provided by drones, provide funding and support capacities for picking up technologies and implementing services.

7.3 Build capacity at local and regional level

Many of the competences required to implement and monitor the Strategy are rooted at the local and regional level, but this will require capacity-building in local and regional authorities, also to increase the acceptance of drones (enforcing local rules and handling infractions are one way in which LRAs may be able to develop public trust).

For all activities falling in their remit (e.g. multimodal urban planning, definition of volumes of U-space airspace or corridors for drones, "no-fly" zones, countering malicious drones but also funding of Research & Development...), LRAs will need increased personnel, funding and knowledge.

The experts pointed to skills gaps in particular in drone operations, Artificial Intelligence and Internet of Things (IoT).

The experts also saw a need to develop the skills of those training entities and individuals providing voluntary training for drone operators and other relevant actors, for example on conformity assessment, including the minimum skills and knowledge that drone operators should have.



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Rue Belliard/Belliardstraat 101 | 1040 Bruxelles/Brussel | BELGIQUE/BELGIË

Tel. +32 22822211 | e-mail: visuals@cor.europa.eu | www.cor.europa.eu

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