



RECIPROCITY

Policy Paper on Drones

Photos: Unsplash | Ryan Parker, Mario Calvo, Paul Fielder



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Introduction

The RECIPROCITY project aims to address the challenges posed by urbanisation, climate change and digitalisation in the field of mobility. To this end, the project employs an innovative four-stage replication approach aimed at showcasing and disseminating best practices in urban development and mobility. As RECIPROCITY progresses, it becomes increasingly evident that facilitating a continuous flow of knowledge and information among cities, municipalities, and policy makers is important to ensuring the widespread replication of successful mobility solutions in the future.

One of the core objectives of RECIPROCITY is to stimulate conversations and foster learning between various stakeholders, including cities, municipalities and policy makers. To achieve this, the project has implemented a range of strategies, including the organisation of webinars and workshops between cities, municipalities and regions and policy makers. Additionally, the project recognises the importance of position papers as a powerful tool for facilitating exchange with policy and regulation entities. Therefore, these recommendations reflect the opinions of various stakeholders within RECIPROCITY.

Through this position paper, RECIPROCITY presents a comprehensive set of recommendations aimed at aiding local and regional authorities and European institutions in supporting **the use of drones for passengers and goods transportation at local level**. RECIPROCITY highlights the importance of regulatory frameworks, sandboxes and financial support to effectively facilitate the seamless integration of drones into urban airspace. It also stresses the importance of launching awareness campaigns to educate communities and promote the benefits and safety measures associated with drone operations. Moreover, RECIPROCITY underscores

the necessity of establishing EU partnerships to ensure common standards, regulations, and interoperability, thereby facilitating cross-border drone operations and enabling harmonised and effective integration in European urban areas. Based on the principles of performance-based regulation, standards should largely come from industry organisations, such as EUROCAE or ISO.

RECIPROCITY acknowledges the vital role of decision-makers with political mandates to shape the future of mobility. In summary, RECIPROCITY's position papers serve as an instrument to disseminate the project's learnings and recommendations for policy and regulation. By capturing the valuable insights gained from the replication projects and engaging with decision-makers, RECIPROCITY aims to have an impact on the future of smart and clean mobility in European cities.

The use of drones for **passengers and goods transportation** has the potential to revolutionise urban transportation systems. Drones can address many of the current challenges faced by the local transport sector. However, there are several barriers, both legislative and technical, that hinder the development and widespread adoption of drones in Europe. This policy paper aims to address the current challenges in local transportation, explore how drones can overcome these challenges, identify barriers to drone deployment, and provide recommendations to European institutions, local authorities and other stakeholders interested in adopting innovative transportation solutions.

Current challenges in local transportation

Local transportation systems in urban areas often face various challenges, including traffic congestion, limited infrastructure capacity, high costs and environmental concerns. These challenges lead to inefficient and unsustainable transport networks, resulting in increased travel times, pollution and negative impacts on quality of life.

Additionally, peri-urban and rural areas often lack efficient and reliable transportation options, making it difficult for residents to access essential services such as healthcare facilities, educational institutions and markets. This limited accessibility can significantly impact the quality of life and economic opportunities for individuals residing in these areas. Moreover, roads and public transportation networks might be poorly developed or insufficient, making it challenging to establish efficient and cost-effective transport routes.

Delivering goods and services to remote locations in peri-urban and rural areas can be particularly problematic. Traditional delivery methods may be time-consuming and costly, leading to logistical inefficiencies and delays. This issue is especially critical for urgent medical supplies, perishable goods, and other time-sensitive deliveries.¹

¹ According to the European Commission's 'European Innovation Partnership on Smart Cities and Communities', peri-urban and rural areas face specific challenges in transport and mobility, requiring tailored solutions to overcome these limitations (European Commission, <https://eu-smartcities.eu/>). The European Transport Policy Atlas provides insights into the transportation challenges faced by different regions in Europe, including peri-urban and rural areas (European Transport Policy Atlas, <https://www.transportpolicy.net/>).

The role of drones in overcoming mobility challenges

Drones offer unique capabilities that can help overcome the challenges of local transportation while providing numerous benefits:

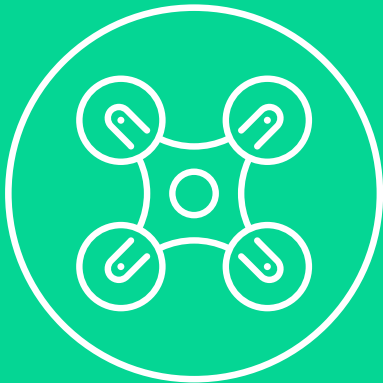
**Traffic
alleviation**

**Better
connections**

**Infrastructure
flexibility**

Cost-effectiveness

**Environmental
sustainability**



Drones can bypass ground congestion, using airspace as a new transportation medium. This can significantly reduce travel and delivery times, particularly for time-sensitive or emergencies.

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Traffic
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sustainability



Drones have the potential to connect villages, rural areas and remote regions, increasing accessibility to underserved communities. Make the difference between life and death in case of urgent medical deliveries.

The role of drones in overcoming mobility challenges

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Traffic
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Drones do not require extensive ground infrastructure, such as roads or railways, making them adaptable to various terrains and enabling direct point-to-point transportation.

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Drones have the potential to reduce transportation costs by optimising routes and minimising the need for large-scale infrastructure investments. They also have the potential to reduce costs for ground infrastructure construction and maintenance. However, to fully achieve economic benefits, some operations should be fully autonomous, without requiring a remote pilot. As highlighted by the Flying Forward 2020 project, operators could instead employ fleet managers with greater efficiency.

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Traffic alleviation

Better connections

Infrastructure flexibility

Cost-effectiveness

Environmental sustainability



Electric drones produce zero direct emissions, offering a greener alternative to traditional transportation modes, thereby reducing carbon footprints and improving air quality.

Shifting a portion of urban transportation from ground to air can yield benefits such as reducing greenhouse gas emissions, enhancing personal mobility and logistics, decreasing travel times and congestion, and providing urgent delivery options for goods, including medical supplies. Drones also have the potential to significantly improve monitoring and data collection processes, such as traffic control and pedestrian mobility data gathering. They represent a convergence of artificial intelligence, electric mobility and Mobility as a Service (MaaS).

Drones, also known as Unmanned Aircraft Systems (UAS), are aircraft that can operate autonomously or be controlled from the ground without a human pilot on board. They come in various sizes and shapes, equipped with sensors and cameras for data collection and performing specific tasks.

The European Commission is working to establish regulations² for the safe and secure integration of drones into European airspace while promoting innovation, economic growth, and privacy protection.

The European Commission (EC) recognised the emerging trends of digitalisation and decarbonisation in *the Smart and Sustainable Mobility Strategy* adopted in 2020. The EC expressed its support for drone deployment as part of the transition to sustainable and resilient mobility. This endorsement was reinforced in *the New European Urban Mobility Framework* adopted in December 2021, which emphasised the use of drones in urban logistics systems. Additionally, synergies between civil defence, space industries and drones have been recognised, with

flagship actions on EU drone technologies integrated into *the EU Drone Strategy 2.0*.

The EU Drone Strategy 2.0, adopted in November 2022, envisions the drone ecosystem in Europe by 2030 and includes flagship actions to achieve these objectives. The strategy aims to promote coherent policy frameworks that facilitate the market development of drones and electric Vertical Take-Off and Landing (eVTOL) aircraft. The strategy explores different business models, including commercial operations with small drones, larger drones, and eVTOL for the transport of people and goods. Overall, the EC aims to boost the development of a large-scale EU drone market, ensuring that drones become an integral part of the lives of EU citizens by 2030.

Considering these factors, it becomes imperative for EU institutions, local and regional authorities, and other stakeholders to recognise the potential benefits of drones in transportation and work towards **creating an enabling regulatory environment**. This includes revisiting current restrictions and addressing the legislative, technical, regulatory and financial barriers to drone deployment. By doing so, Europe can capitalise on the **advantages of drones**, unlocking their full potential in transforming urban mobility, enhancing connectivity and promoting sustainable transportation solutions.

2. The European Commission has established a regulatory framework for drones: the Commission Delegated Regulation (EU) 2019/945 on technical requirements for drones, the Commission Implementing Regulation (EU) 2019/947 on operational requirements for drone operations and operators, the Commission Implementing Regulation (EU) 2021/664 on the regulatory framework for U-Space, and the Commission Implementing Regulation (EU) 2021/664 on U-Space. This regulation is important for the development of Urban Air Mobility (UAM) and entered into force on January 26 2023.

Barriers to the development of drones in urban areas

Some drone projects, including pilot programmes and demonstrations, are currently underway in European cities. These projects are typically driven by entrepreneurs, technology startups, national bodies or universities.

**AIRTAXI FORPASSENGERS
(AUSTRIA)**

**AIRMOUR and CITYAM
(FINLAND)**

**URBAN AIRPORT
COVENTRY (UK)**

**ZARAGOZA
(SPAIN)**



The Airtaxi for passengers project in Austria aims to implement autonomous air taxis for passenger flights in Linz. The collaboration involves the Austrian companies FACC and LINZ AG, along with EHang from China. Linz was chosen as the location due to its tech-friendly environment and existing technological initiatives. The project envisions drones flying predetermined routes with a capacity for two passengers. The main challenges involve regulatory and bureaucratic processes, and workshops have been conducted to address various aspects, such as business models, public acceptance, ticketing, and safety regulations.

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Helsinki has embraced drones for various purposes through projects like **AIRMOUR** and **CITYAM**. **AIRMOUR** focuses on sustainable air mobility in emergency medical services, aiming to promote safe, secure, and socially accepted urban air mobility. The project involves real-life demonstrations in multiple locations. **CITYAM**, on the other hand, aims to prepare cities for urban air mobility through transnational cooperation, addressing challenges related to regulations, city planning and public acceptance.

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The Urban AirPort Project in Coventry aims to create a small-scale airport using drones and eVTOL aircraft for transportation, logistics, and medical supply distribution. The project, known as Air-One, is a partnership between Urban AirPort, Hyundai Motor Group, Coventry City Council and the UK Government. It involves the establishment of vertiports, rapidly deployable operational hubs, with Coventry serving as the pilot location. The project has provided valuable insights and learnings, attracted potential investors and promoted the city. Collaboration with stakeholders and compliance with regulations has been crucial. The project has the potential to boost the aviation and manufacturing sectors, create jobs, and establish a UK UAM Centre of Excellence.

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Project FF2020 has carried out flight demonstration with UAS for transport or surveillance purposes in Estonia, Finland, Italy, the Netherlands and Zaragoza (Spain). The Project has found that to make applications available 24/7 economically sustainable, such as transport of urgent medical material, the flight should be fully autonomous and hence supervised by a Fleet Manager, without requiring a Remote Pilot. Furthermore, the Project has found difficulties, in particular in Zaragoza, in liaising with authorities different from the competent civil aviation authority.

However, despite progress, several significant challenges still need to be addressed in the integration and widespread adoption of drones. One of the primary obstacles is the presence of **legislative and regulatory barriers**. The current regulatory framework in Europe imposes strict limitations on drone operations, particularly in urban areas. Restrictions on airspace usage, flight altitude and beyond-visual-line-of-sight (BVLOS) operations and other factors hinder the widespread implementation of drones for transportation purposes. Issues such as determining drone routes, establishing insurance obligations, pilot certification and training requirements, and defining accountability for drone owners need to be addressed within the regulatory framework.

Moreover, a **lack of knowledge among municipalities** and other stakeholders adds to the barriers to drone development. The roles and responsibilities of cities and other actors in integrating drones into existing traffic management and urban planning frameworks, including the identification of suitable landing sites, are not yet fully defined. Flying drones in urban environments also carries inherent risks, further complicating their integration.

Another challenge is linked to the **public perception** and societal anxiety about automation and drones. Citizens often express concerns about drones' safety and the noise they generate. Public acceptance plays a major role in future drone acceptance.

Environmental concerns also pose challenges. Drones can pose risks to wildlife and generate visual and noise pollution. Therefore, concerns need to be addressed to ensure the widespread use of drones in the future.

Additionally, several **technical obstacles** need to be addressed for the successful integration of drones into urban airspace. These include robust communication networks, effective air traffic management systems capable of handling a large number of drones simultaneously and addressing challenges related to bad weather conditions, obstacle avoidance, accurate drone tracking and limited flight range.

Furthermore, **financial constraints** pose a significant challenge. The high costs—especially the high initial costs—associated with drone development, infrastructure setup and operational maintenance pose significant financial challenges for both public and private entities interested in adopting drone solutions.

Policy recommendations for the integration of drones in urban areas

To effectively implement and deploy drones, collaboration and knowledge-sharing among all relevant stakeholders is central. This includes actively engaging with regulatory and governmental organisations to facilitate the scalability of projects and establish a robust drone ecosystem and European market. Sharing best practices and lessons learned and promoting cross-sector partnerships can accelerate the development and adoption of drone solutions.

Regulatory framework

Investment and funding

Infrastructure development and technical obstacles

Public awareness and citizens' involvement

City-level knowledge exchange

International collaboration



To enable the safe integration of drones into urban airspace, European institutions should revise and develop regulatory frameworks and sandboxes: a less bureaucratic approach is recommended. This includes allowing beyond visual line of sight (BVLOS) operations, defining clear flight corridors and take-off/landing points, and establishing guidelines for low-altitude airspace management. To fly inside these corridors, drones would need to achieve a standardised Required Navigation Performance (RNP). Standardisation of RNP would greatly reduce the compliance cost for medium and small sized enterprises. It is essential to develop a clear certification timeline, set at the national or EU level, to provide certainty and encourage industry participation. Efforts should be made to digitalise air traffic management and achieve harmonisation at the EU level, finding a way to merge the legacy of conventional aviation with new aviation concepts. By embracing these measures, European institutions can foster innovation, ensure safety, and facilitate the seamless integration of drones into urban airspace.

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To enable the development and deployment of drones, it is crucial for all governance levels to provide financial support and incentives. This can be achieved through various means, such as funding research and development initiatives and offering tax breaks or subsidies for drone manufacturers and operators. Addressing the challenges of funding drone initiatives requires exploring innovative financing models and establishing effective public-private partnerships. It is important to identify the potential economic benefits and employment opportunities associated with the deployment of drones. By doing so, governments can attract investment, stimulate economic growth, and foster the deployment of drone technologies.

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Local authorities should collaborate with stakeholders to invest in infrastructure supporting drone operations, such as designated landing zones, charging stations, communication networks and effective air traffic management systems capable of handling the growing number of drones in urban airspaces. Additionally, there is a need to create dedicated test environments where solutions can be showcased, tested, and their impact on people can be assessed. Streamlining the permission process and clarifying responsibilities among regulatory bodies is necessary to reduce uncertainty and enable efficient infrastructure development. By prioritising infrastructure development and addressing technical obstacles, governments can create an enabling environment for the successful integration of drones into urban areas. This will contribute to improved efficiency, safety, and effectiveness of drone operations, unlocking their full potential for various applications and benefiting both public and private sectors.

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To ensure the success of drone projects, public awareness and citizens' involvement are vital. Authorities should launch public awareness campaigns to address concerns, educate communities about drone operations' benefits and safety measures, and involve citizens in the decision-making process. Public acceptance is a key aspect that needs to be addressed. It is essential to acknowledge and address concerns related to safety, privacy and the potential impact of automation on employment. Engaging with the public and promoting transparency in the use of drones can help build trust and acceptance among communities. By actively involving the public and addressing their concerns, authorities can foster a positive perception of drones and facilitate their integration into society.

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To address the lack of knowledge among local authorities, it is essential to bridge the knowledge gaps. Local authorities should prioritise the establishment of platforms for collaboration and knowledge exchange. This can be achieved through workshops, forums, and working groups where different actors can come together to share experiences, best practices, and lessons learned. By actively engaging in these collaborative initiatives, municipalities can enhance their understanding of drone technologies, operational requirements and potential benefits. This knowledge exchange will facilitate informed decision-making and effective implementation of drone operations in urban areas. Furthermore, these collaborative platforms will enable municipalities to stay updated on the latest technological advancements, regulatory developments and industry trends. This ongoing exchange of knowledge will empower municipalities to make informed decisions, adapt their strategies, and effectively address any emerging challenges or opportunities related to urban drone operations.

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European institutions should engage in international collaborations to establish common standards and regulations for drones. This would promote interoperability and facilitate cross-border operations.

Annex - RECIPROCITY case studies focusing on Drones

Three RECIPROCITY case studies focusing on Drones are analysed to give an overview about the key elements for Urban Air Mobility deployments and good practices.

AIR TAXI FOR PASSENGERS (AUSTRIA)

The Airtaxi for passengers project in Austria involves collaboration between two Austrian companies, FACC and LINZ AG, and *EHang* (China) with the aim of implementing autonomous air taxis for passenger flights in Linz (Upper Austria). The choice of Linz as the location for the Airtaxi for passengers project is influenced by several factors. Linz is known as a tech-city, boasting various technological initiatives such as software parks, code schools, and the Ars Electronica centre. This technological environment provides a conducive setting for exploring innovative solutions like autonomous air taxis.

The project envisions drones flying along predetermined routes to and from designated locations, allowing passengers to choose their entry and destination points. Each drone will have capacity for two passengers.

While air taxis are already operational in some countries like China, the main challenges lie in the regulatory and bureaucratic processes for testing such solutions in Europe. Workshops have been conducted to address various aspects, including business models, public acceptance,

AIRMOUR (FINLAND)³

ticketing, and safety regulations. Linz AG and FACC are currently awaiting a permit to conduct drone tests without passengers in a restricted area. Once these tests are completed, further planning and workshops can proceed.

Currently, in April 2023, there are still many regulatory questions that need to be resolved by local and EU authorities to obtain the necessary testing permit. FACC and Linz AG are actively engaging with relevant stakeholders and providing the required information and tests to meet the regulatory requirements.

URBAN AIRPORT COVENTRY (UK)

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From 2020 to 2022, Helsinki has embraced drones for various purposes, showcasing their versatility and potential. Key use cases include inspections of rooftops and construction sites by Stara, the city's logistics and maintenance company; fire assessments and search and rescue missions by Rescue Services; environmental monitoring tasks such as inventorying invasive plants and mapping storm damage by the Environmental Department. Helsinki has also explored drones for 3D modelling, traffic counting, pharmacy product delivery, emergency medical services, meal deliveries in partnership with Google Wing, and law enforcement operations.

The city is actively involved in EU-funded projects, including AiRMOUR for sustainable air mobility in emergency medical services and CITYAM for preparing cities for urban air mobility. These initiatives highlight Helsinki's commitment to innovation, efficiency, and sustainability through the use of drones.

AIRMOUR (FINLAND)³

The CITYAM project aims to promote responsible and sustainable urban air mobility in the Baltic Sea Region through transnational cooperation. It addresses challenges related to regulations, city planning, and public acceptance. The project provides tools and strategies to integrate drones into traditional urban mobility systems and enhance sustainability. By sharing knowledge and best practices, CITYAM aims to lead the way in shaping a responsible and sustainable use of air in cities. The project is funded by the Interreg Baltic Sea Region.

The AiRMOUR project (Enabling sustainable AiR MObility in URban contexts via emergency and medical services) is dedicated to researching and validating innovative concepts and solutions that promote safe, secure, quiet, green, more accessible, affordable and socially accepted Urban Air Mobility (UAM).

3. <https://airmour.eu>

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AIRTAXI FOR PASSENGERS (AUSTRIA)

The project, coordinate by Teknologian Tutkimuskeskus VTT OY (Finland), aims to address the needs of cities in integrating air mobility into their urban planning processes and equipping them with suitable tools. By engaging urban communities, operators, regulators, academia, and businesses, AiRMOUR seeks to enhance the understanding and implementation of near-future actions in the realm of UAM.

The project conducts real-life demonstrations in Stavanger (Norway), Helsinki (Finland), and the North Hesse region (Germany), along with simulation exercises in Luxembourg, to test and validate personal air vehicles for doctors and medical supplies.

AIRMOUR (FINLAND)³

The project's main deliverables include the UAM Guidebook, which provides valuable insights for cities, operators, and other stakeholders; the UAM GIS Tool, designed specifically for urban planners; and the UAM Training Programme and Masterclasses. With the aid of these tools, local aviation and urban clusters across Europe can effectively support their own UAM implementation efforts.

URBAN AIRPORT COVENTRY (UK)

³. <https://airmour.eu>

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AIRMOUR (FINLAND)³

URBAN AIRPORT COVENTRY (UK)

The Urban Airport Project in Coventry, West Midlands (UK), is an innovative initiative focused on utilising drones and electric Vertical Take-Off and Landing (eVTOL) aircraft, to create a **small-scale airport** that can be deployed in **urban areas**. The project aims to support **transportation and logistics** operations, serve as a freight hub, and facilitate the distribution of medical supplies or parcels using autonomous drones.

The project, known as Air-One, is a partnership between Urban AirPort, Hyundai Motor Group, Coventry City Council, and the UK Government. It aims to showcase the concept of a pop-up airport and the supporting technology, with Coventry serving as the pilot project location. Air-One was successfully launched in April 2022, demonstrating the capabilities of vertiport technology for drones and eVTOL aircraft.

Urban Air Port has ambitious plans to establish over 200 vertiports globally within the next five years. These compact and rapidly deployable operational hubs will provide essential services such as aircraft command and control, charging/refueling facilities, and cargo and passenger loading capabilities.

The project has provided valuable insights and learnings, including the benefits for Coventry City Council, attracting potential investors, and promoting the city as a business destination. The funding for the project comes from the UK government's Future Flight Challenge, amounting to £1.2 million.

To reduce overall costs, the project explores the possibility of resource-sharing with various organisations such as emergency services, medical organisations, logistics operators, local authorities. **Engaging with stakeholders and authorities, including legal and civil aviation entities**, has been crucial to ensure compliance with regulations and operate safely in an urban environment. **Citizen engagement** has been an integral part of the project, with Coventry University conducting public engagement activities that received positive feedback from over 15 000 visitors.

The Urban Airport Project has the potential to attract customers, boost the aviation and manufacturing sectors, create new jobs, advance environmental goals, and establish a UK Urban Air Mobility (UAM) →

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AIRTAXI FOR PASSENGERS (AUSTRIA)

Centre of Excellence. It aims to drive innovation, improve connectivity, productivity, and transform cities.

Nevertheless, the current regulations and policies in the UK impose restrictions on drone flights, requiring them to be within visual line of sight (VLOS). Collaboration with authorities such as the Civil Aviation Authority (CAA) and airports is necessary to develop flights for beyond visual line of sight (BVLOS) operations.

For replication, it is important to engage with local authorities, interested operators, and airspace users to minimise conflicts. Collaboration with end users and urban planners can aid in integrating the development seamlessly into the urban environment.

AIRMOUR (FINLAND)³

URBAN AIRPORT COVENTRY (UK)

RECIPROCITY (Replication of innovative concepts for peri-urban, rural or inner-city mobility), coordinated by R-Tech Regensburg (Germany), involves 10 partners including clusters, regional development agencies, innovation accelerators and universities. The project started in February 2021 and will run for 32 months.



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