

D8.1 Ethics requirements

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Abstract	This document discusses the ethics issues appraised during self-assessment and the measures micro-ROS will apply to mitigate ethical risks.



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1 Acronyms

Acronym	Explanation
EU	European Union
ROS2	Robot Operating System 2
UAV	Unmanned Aerial Vehicle

2 Introduction

2.1 Purpose of document

In this document, we identify and discuss ethical risks of the project and the measures that will be taken to mitigate them. This follows up the processes started with the ethics self-assessment [2], based on the Ethics for Researchers guidelines [3].

2.2 Partners involved

Short name	Full Name	Role
eProxima	Proyectos y Sistemas de Mantenimiento SL	Task lead
Bosch	Robert Bosch GmbH	Contributor
ALR	Acutronic Link Robotics AG	Contributor
PIAP	Przemyslowy Instytut Automatyki i Pomiarow PIAP	Contributor

3 Context

The intended results of the project are the generation and dissemination of robotic software technology, the micro-ROS platform. The micro-ROS platform consists of a software framework and tools which provide the means of seamless integration of microcontrollers in a ROS2 ecosystem, with minimum effort and cost.

The outcome of this project is intended to be used by developers as a building block for fully functional robotic application.

4 Ethic assessment

4.1 Key Areas of Concern assessment

Area	Potential for misuse anticipated
Agents and technologies that could be misused in a weapons context	No
Information that could be misused for criminal, terrorist or unethical military activities	No
Information that could result in stigmatization or discrimination	No



Area	Potential for misuse anticipated
Surveillance technologies that could be misused	Yes
Data mining and profiling technologies that could be misused	No

4.2 Detailed assessment

In general, software robotics systems are classified as having the potential for misuse.

The micro-ROS framework is one component of software robotic systems, it does not in itself constitute a complete system, nor does it contain autonomy functions. It uses established security approaches for communications middleware that are currently considered appropriate to protect privacy and defend against hacker attacks (citation?). Moreover, middleware frameworks such as micro-ROS are not usually considered an “emerging technology” (see Stahl et al [4]), so we do not anticipate novel ethics issues in this respect.

Other products of this research are use-cases and their dissemination, developed by each consortium partner to validate the suitability of the micro-ROS platform to different domains. Consortium partners are exposed to ethical issues that can arise from development of these use-cases. Some use-case could potentially be modified towards misuse as detailed below, resulting in possible violations of existing laws regarding privacy, security and data protection:

Use-case	Potential misuse
Autopilot Drone	While the use-case does not involve any kind of surveillance, the platform is suitable for it. The drone can be misused to spy on humans and locations. Surveillance applications are common in the drone domain, and with small modifications this kind of application could be developed from the autopilot Drone use-case.
Domestic Outdoor Robots	The potential issues for this product are addressed by the product development process in use at Bosch.
Modular Arm	This use-case will focus on modular robots and how these adaptable machines can be extended with inexpensive and resource constrained plug-and-play sensors that interoperate through the use of micro-ROS. We don't see any possible misuse without major changes to the use-case, other than how the micro-ROS platform could be misused in general.
Smart Warehouse	The platform used to showcase this use case is based on a security-oriented, modular robot. The platform used is not a dual-use technology since the entire setup is oriented towards research projects. However, with significant modifications to the platform and development of new modules, the potential misuses for military or harmful applications exist.
Joint use case with FIWARE context Broker	The use-case focuses on demonstration of a joint robotic system integrated with Context Broker as data storage and source. While within the use-case there is no storing or sharing of any sensitive or personal data, the setup allows for it if modifications are made to what kind of data is required and to introduce a dissemination mechanism.



5 Measures

In this section, we describe the measures we plan to take to minimise risks.

5.1 micro-ROS platform

The micro-ROS framework will be released with an open source license, which does not restrict fields of use. As a consortium, however, we won't provide any support, technical or otherwise, for applications violating ethical standards.

5.2 Use-cases

All the consortium partners will be following these mitigation measures when developing use-cases:

- Comply with specific laws and regulations across the EU applicable to use-case domains.
 - Drones should follow current regulations.[5][6]
 - Robots as a general product, are regulated by a variety legislative framework which each partner should be acknowledged of, applied to their use case and outcomes. [7][8][9][10][11]
- Develop use cases minimising the acquisition and usage of any sensitive data. In case of sensitive data acquisitions, it will be handled according to current European laws [12]. If for any reason a need for acquisitions of sensible data arises during the project (which we do not foresee), a revised version of this ethics document will be issued.
- Perform use-cases tests and showcases within secure environments minimising safety risks.
- In the Domestic Outdoor Robot use case, all experiments with the modified hardware and software will be conducted only by engineers who underwent a safety briefing as defined by Bosch internal safety regulations in accordance with national and international laws and the regulations of the BGFE (Accident Prevention and Insurance Association for Electro Technics and Fine Mechanics in Germany).
- In case of Smart Warehouse, the platform will only be equipped with modules that create no safety or other ethical issues.
- Robotic platforms deployed for Smart Warehouse and Domestic Outdoor use-cases robot are already developed and not outcomes of the project and they will not be distributed as such, which limits the possibility of their misuse.
- All consortium partners will make sure that any software or information distributed within their work on use-cases has minimal risk to be misused and follows applicable laws.
- Regarding surveillance misuses, European and national legislation protects citizens from external intrusions, considering them illegal. Following those legal requirements is mandatory for those use-cases where privacy, protection or security of individuals could be compromised and consortium partners will make sure to comply.

References

- [1] Dronerules consortium, 'Drone rules'. [Online]. Available: <http://dronerules.eu>
- [2] 'Horizon 2020 programme – guidance - how to complete your ethics self-assessment'. European Commission – Directorate-General for Research; Innovation, 21-2018 [Online]. Available: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-self-assess_en.pdf
- [3] E. C. – Directorate-General for Research and Innovation, 'Ethics for researchers'. 2013.



- [4] B. C. Stahl, J. Timmermans, and C. Flick, 'Ethics of emerging information and communication Technologies On the implementation of responsible research and innovation', *Sci Public Policy*, vol. 44, no. 3, pp. 369–381, Jun. 2017 [Online]. Available: <https://academic.oup.com/spp/article/44/3/369/2525576>. [Accessed: 22-Jun-2018]
- [5] EASA, 'European aviation safety agency'. [Online]. Available: <https://www.easa.europa.eu/easa-and-you/civil-drones-rpas>
- [6] R. in the field of civil aviation Regulation and establishing a European Aviation Safety Agency, 'Regulation (ec) no 216/2008 of the european parliament and of the council of 20 february 2008 on common rules in the field of civil aviation and establishing a european aviation safety agency, and repealing council directive 91/670/eec, regulation (ec) no 1592/2002 and directive 2004/36/ec', *Official Journal of the European Union (OJ)*, vol. 16, pp. 1–49, 2008.
- [7] D. on Liability for Defective Products, 'Council directive 85/374/eec of 25 july 1985 on the approximation of the laws, regulations and administrative provisions of the member states concerning liability for defective products', *Official Journal of the European Union (OJ)*, vol. 210, pp. 29–33, 1985.
- [8] P. S. Directive, 'Directive 2001/95/ec of the european parliament and of the council of 3 december 2001 on general product safety', *Official Journal of the European Union (OJ)*, vol. 11, pp. 4–17, 2002.
- [9] L. V. Directive, 'Directive 2014/35/eu of the european parliament and of the council of 26 february 2014 on the harmonisation of the laws of the member states relating to the making available on the market of electrical equipment designed for use within certain voltage limits text with eea relevance', *Official Journal of the European Union (OJ)*, vol. 11, pp. 4–17, 2002.
- [10] R. E. Directives, 'Directive 2014/53/eu of the european parliament and of the council of 16 april 2014 on the harmonisation of the laws of the member states relating to the making available on the market of radio equipment and repealing directive 1999/5/ec text with eea relevance', *Official Journal of the European Union (OJ)*, vol. 153, pp. 62–106, 2014.
- [11] E. Parliament, 'Civil law rules on robotics'.
- [12] G. D. P. Regulation, 'Regulation (eu) 2016/679 of the european parliament and of the council of 27 april 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing directive 95/46', *Official Journal of the European Union (OJ)*, vol. 59, pp. 1–88, 2016.