# H2020 COVR FSTP LIAISON – D1.2 Report on usefulness of LIAISON

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COVER

LIAISON

# D1.2 Report on usefulness of LIAISON

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# CONTENTS

# SUMMARY

While robots should be safe, robot regulatory frameworks do not always frame technology development accurately. LIAISON investigates to what extent compliance tools, in this case, the COVR toolkit, could be used as data generators for policy and standard makers to unravel an optimal regulatory framing for existing and emerging robot technologies and improve robot technology overall safety and market entrance ease. As such, LIAISON aligns with the overall COVR goal to reduce complexity in safety certifying robots.

New technologies sometimes question and challenge existing norms, breathing into existence the need for legal change. While the pace of technology dramatically accelerates, however, legal responsiveness does not always follow as a consequent step. As no formal communication process between robot developers and regulators from which policies could learn has been established yet, a stepback mechanism for robot governance as novel as that introduced by LIAISON is yet to be introduced to all stakeholders involved, in particular robot developers and policy/standard makers. To prove the feasibility and added value of creating this link between robot developers and relevant regulators, for the LIAISON project, we focus on three particular standards: ISO 13482:2014 on personal care robots, IEC 80601-2-78:2019 on rehabilitation robots, and EN ISO 18497:2018 on agricultural machinery and tractors.

In this report, we present the results, considerations, and conclusions derived from our assessment of the usefulness of LIAISON based on Toolkit user feedback and the broader community of relevant stakeholders. As such, this report brings together the responses to a survey on the usefulness of LIAISON addressed to and distributed among a predefined pool of stakeholders (including, but not limited to, robot developers, policymakers, and academia, and interested groups); the responses obtained throughout a set of interactive workshops at the European Robotics Forum 2021 (ERF2021) and the European Commission; the comments and feedback received from engagement with Digital Innovation hubs, including their work package leaders on standardization and ethics, and the findings derived from three formal exploratory meetings held with relevant policy and standard makers (D1.3) on the feasibility, usefulness, and acceptability of LIAISON.

Overall, LIAISON has proven to be very useful in achieving its envisioned goals and objectives. Through its activities regarding stakeholder engagement and knowledge extraction, LIAISON has shed light on the gaps and inconsistencies in current robot regulatory frameworks. These findings have been stored and will be shared with relevant policy/standard makers to provide compliance guidance further, explain unclear concepts or uncertain applicability domains to improve legal certainty and inform future regulatory developments for robot technology use and development at the European, National, Regional, or Municipal level. Moreover, while there is room for improvement concerning stakeholder engagement, LIAISON has elucidated the misalignment between robot developers, policymakers, and other relevant stakeholders and affected parties. Beyond room for improvement, the results and accompanying considerations based on our activities throughout the first milestone have highlighted several avenues for expansion.

# 1. INTRODUCTION

COVR stands for "being safe around collaborative and versatile robots in shared spaces", and is a European H2020 Project which aims to reduce the complexity in safety certifying cobots significantly. In this respect, the project has developed the COVR Toolkit, an online tool that guides developers in their legal compliance process, from helping them find relevant technical standards/directives/protocols to guide them on performing a risk assessment.

Assessing risks through experimentation is essential to ensure robot safety and compliance with existing norms. However, standards do not always frame technology development accurately. LIAISON investigates to what extent compliance tools (tools that help comply with the legislation, such as the COVR toolkit) could be used as data generators for policy and standard makers to unravel an optimal regulatory framing (including change, revise, or reinterpret) for existing and emerging robot technologies. LIAISON is a crucial stepback mechanism to help align robot and regulatory development and improve robot technology's overall safety and market entrance ease. As such, LIAISON aligns with the overall COVR goal to reduce complexity in safety certifying robots by providing policy and standard makers with the necessary knowledge about legal inconsistencies, new categories, or new safety requirements (including psychological) to update existing frameworks where necessary and to ensure that the next generation of robots is 'safe' to the full extent of the word. In this way, LIAISON contributes to the COVR mission by adding a link to public and private regulators to complete the cobot value chain.

To prove the feasibility and added value of the creation of a link between robot developers and relevant regulators, for the LIAISON project, we focus on three particular standards: ISO 13482:2014 on personal care robots, IEC 80601-2-78:2019 on rehabilitation robots, and EN ISO 18497:2018 on agricultural machinery and tractors. To ensure all parties are heard, LIAISON aims to include robot developers, policy and standard makers, and interested groups (e.g., ANEC). In this report, we present the results, action points, considerations, and conclusions derived from our assessment of the usefulness of LIAISON based on Toolkit user feedback and the broader community of relevant stakeholders.

As such, this report brings together the responses to a survey on the usefulness of LIAISON addressed to and distributed among a predefined pool of stakeholders (including, but not limited to, robot developers, policymakers, and academia), the responses obtained throughout a set of interactive workshops at the European Robotics Forum (ERF) and the European Commission, the comments and feedback received from engagement with Digital Innovation hubs, including their work package leaders on standardization and ethics, and the findings derived from three formal exploratory meetings held with relevant policy and standard makers (D1.3) on the feasibility, usefulness, and acceptability of LIAISON. To this end, we explain the background, methods, goals, and objectives of LIAISON in section 2. In section 3, we provide an overview of the methods and preparation concerning assessing the usefulness of LIAISON. Section 4 sets the usefulness of LIAISON - presenting the results, considerations, and conclusions.

# 2. LIAISON

## 2.1. BACKGROUND

*“The art of progress is to preserve order amid change, and to preserve change amid order” – Alfred North Whitehead.*

Robot technology is one of the many technologies that challenge the regulatory framework in various ways, including ethics and security for responsible innovation, privacy, and responsibility allocation. As products, robots widely differ in embodiment, capabilities, context of use, intended target users, and many regulations may already apply to them. Having tools such as the COVR Toolkit can be of help. However, new applications may not fit into existing (robot) categories, legislation might be outdated and confusing categories, and technology-neutral regulations may be hard to follow for developers concerned about their particular case. A recent open consultation launched by the European Commission, for instance, acknowledges that current European Harmonized Standards do not cover areas such as automated vehicles, additive manufacturing, collaborative robots/systems, or robots outside the industrial environment, among others (Spiliopoulou-Kaparia, 2017). In light of all the issues this technology arises, part of the literature accentuates the need for an issue manager. Marchant and Wallach (2015) proposed the creation of "Governance Coordinating Committees (GCC)" for the governance of emerging technologies like AI.

Furthermore, the European Parliament proposed creating a European Agency for Robotics and Artificial Intelligence early in 2017, and Schatz put forward the creation of an emerging technology policy lab within the US general services administration in 2018. However, what lacks in robot governance is a backstep mechanism that can coordinate and align robot and regulatory development (Fosch-Villaronga & Heldeweg, 2018). Overlooked in the latest review of "the grand challenges of science robotics," this challenge has already been raised in the literature, albeit only more recently (Yang et al. 2018), and relates to the idea of how policies can frame the rapid development of robotics. LIAISON contributes to these approaches by proposing the *modus operandi* of issue managers, if they were ever to exist, and revolves around the following main research question:

*Could the use of compliance tools, such as the COVR Toolkit, as data generators for robot policy purposes reduce emerging robot governance complexity?*

LIAISON envisions an iterative regulatory process for robot governance, a theoretical model that represents a practical step forward in the coordination and alignment of robot and regulatory development, called the Iterative Learning Governance Process (ILGP). This research project conceives an effective way to extract compliance and technical knowledge from compliance tools (tools that help comply with the legislation such as the COVR toolkit) and direct it to policy and standard makers to unravel an optimal regulatory framing (including change, revise, or reinterpret) for existing and emerging robot technologies. The primary outcome of the LIAISON Research Project will be the design concept for liaising robot development and policymaking to increase overall robot safety.

This design concept will further develop the *Iterative Regulatory Process for Robot Governance*, which was ideated as a theoretical model that links technology impact

assessments to legislative ex-post evaluations via shared data repositories to create evidence-based policies that can serve as temporary benchmark for future and new uses or robot developments (Fosch-Villaronga & Heldeweg, 2018, 2019). Part of the 'technical challenge' is to put such a theoretical model into practice and in the context of the COVR project. Explained further in figure 1 (see annex), such iterative regulatory process for robot governance stresses that in the light of a new robot development or use, and after assessing all the impacts (and incorporating the findings into the robot itself), it is essential to compile all the Regulation-to-Technology uncovered barriers and constraints that do not allow the roboticists to proceed with their creation. Having collected those constraints in a Technology-to-Regulation manner, the regulator can act thereupon supported by the accountability tool's information, in this case, the COVR Toolkit.

### 2.2. METHOD

Seeing regulation (broadly understood) as a tool to advance social goals and subject to adjustments towards this end, LIAISON discusses different regulatory approaches to use iterative governance processes for robot governance. For that purpose, LIAISON aims to engage with representatives from the industry, standardization organizations, and policymakers to present compliance tools as a potential source of information for policy action and understand what information would be helpful to them (e.g., through exploratory meetings, surveys, and workshops). Applying such a novel and interdisciplinary methodology is instrumental in identifying unregulated and underestimated challenges (e.g., over-time integrative and adaptive systems' safety, cyber-physical safety, psychological harm) that regulations should cover, and in gauging the response to, support for, and perceived necessity among relevant stakeholders of the introduction of the LIAISON model.

Following the ideal that lawmaking 'needs to become more proactive, dynamic, and responsive,' LIAISON proposes the formalization of a communication process between robot developers and regulators from which policies could learn, as depicted in figure 2 (see annex), thereby channeling robot policy development from a bottom-up perspective towards a hybrid top-down/bottom-up approach. This is novel, as most approaches have been top-down solely, disregarding the richness field knowledge could provide in helping identify gaps and inconsistencies in frameworks governing the technology (Fosch-Villaronga, 2019). In practice, LIAISON builds on the COVR toolkit, a compliance tool built as part of the COVR Project, by envisioning and assessing the usefulness of the proposed model based on the theoretical model of an *Iterative Regulatory Process for Robot Governance*. Following through the COVR Toolkit in the capacity of a robot developer, the Toolkit offers a section on standards and directives, allowing robot developers to filter their search results based on domain and appearance. The Toolkit then presents the relevant regulations, directives, and standards which can be freely accessed or purchased by robot developers. After robot developers have assessed the relevant documents, LIAISON enters into the picture. Focussing specifically on standards in 3 domains of application (rehabilitation, personal care, and agriculture), LIAISON aims to uncover the gaps and inconsistencies in the relevant policy documents.

For this purpose, we have created two feedback loops to assess 1) regulatory gaps and inconsistencies in the relevant policy documents; and 2) the usefulness of LIAISON based on Toolkit user feedback and the broader community of stakeholders. To this end, we

created a survey to match each feedback loop and distributed these among a predetermined pool of stakeholders through various means and on a variety of platforms. Concerning the first feedback loop, the assessment of the identified gaps and inconsistencies in the relevant policy documents was refined through a set of interactive workshops, community engagement, and formal meetings with relevant people working for policy and standard organizations. The data retrieved from these surveys have been channeled to a so-called 'shared data repository', currently comprising a comprehensive Google sheets file. This shared data repository will be made accessible to policymakers in due time, who are encouraged to use the relevant data to change, revise, or reinterpret existing frameworks. Once again, these will be presented in the COVR Toolkit, allowing the iterative regulatory process for robot governance to restart.

### 2.3. GOALS & OBJECTIVES

LIAISON supports the idea that the regulatory cycle is truly closed when it starts — or allows it to be started — again upon new challenges/technologies. LIAISON tests the theoretical model of a dynamic, iterative regulatory process in practice, aiming to channel robot policy development from a bottom-up perspective towards a combined top-down/bottom-up model, leaving the door open for future modifications. The above-envisioned process will clarify what regulatory actions policymakers have to take to provide compliance guidance, explain unclear concepts or uncertain applicability domains to improve legal certainty and inform future regulatory developments for robot technology use and development at the European, National, Regional, or Municipal level. Within this regard, LIAISON takes the lead in tackling the existing regulatory challenge, thereby linking robot development and policymaking to reduce the complexity in robot legal compliance. Moreover, by explicitly shedding light on the standardization activities in the abovementioned domains, LIAISON aims to create awareness about the barrier to access for robot developers and other relevant stakeholders concerning such activities.

In the long-term, the expected project results will complement the existing knowledge on the 'ethical, legal, and societal (ELS)' of robotics by providing clarity on how to address pressing but still uncovered safety challenges raised by robots and represent a practical, valuable tool to advance social goals in a robotized workplace. Overall, advances in safety robot legal oversight will provide a solid basis for designing safer robots, safeguarding users' rights, and improving the overall safety and quality of efficiency delivered by robots (Fosch-Villaronga, 2019).

# 3. METHODS & PREPARATION

## 3.1. METHODS

Several methods were utilized to assess the usefulness of LIAISON, namely surveys, workshops, community engagement, and policy/standard maker institutional meetings. Below, these methods are further elaborated.

### 3.1.1. SURVEYS

LIAISON aims to uncover the gaps and inconsistencies in the relevant policy documents. To assess the usefulness of LIAISON based on Toolkit user feedback and the broader community of stakeholders, we created a survey to match the second feedback loop (see figure 2, annex).

To avoid having a low response rate from robot developers as announced by some of the relevant policymakers in our formal meetings (*see* D1.3) and also increase the focus of the responses, LIAISON engaged with two major European networks on healthcare robotics (the Digital Innovation Hub (DIH) on Healthcare Robots[1] and the Digital Innovation Hub on agricultural robots,[2] from now on DIH HERO/DIH AGROBOFOOD) (*see* further below in section 3.1.3). We distributed these surveys among the predetermined pool of stakeholders from the DIHs and the H2020 COVR Project, including several dedicated emails to their networks, and on a variety of platforms (including Twitter, Linkedin, and stakeholder websites).[3]

The feedback survey on the usefulness of LIAISON covers a general assessment, an assessment of the validity, usefulness, feasibility, acceptance of LIAISON, and leaves room for concerns, improvement, and feedback. A link to this survey can be found in the table below.

| **LIAISON SURVEYS** | | |
|---|---|---|
| **SURVEY** | **URL** | **OVERVIEW** |
| USEFULNESS LIAISON | CLICK HERE | CLICK HERE |

### 3.1.2. WORKSHOPS

#### *3.1.2.1. WORKSHOP WITH THE EUROPEAN COMMISSION*

In continuation of the exploratory meeting with representatives of the European Commission, we attended the European Commission workshops "Trends and Developments in Artificial Intelligence: Standards Landscaping and Gap Analysis on the Safety of Autonomous Robots" to present the LIAISON Research Project.[4] These workshops were part of the Study

[1] *See* https://dih-hero.eu/.
[2] *See* https://agrobofood.eu/.
[3] E.g., see here for collaboration with DIH-HERO, here for collaboration with DIH-AgROBOfood, and here for collaboration with COVR.
[4] *See* here for the workshop presentation.

on Trends and Development in Artificial Intelligence: Standards Landscaping and Gap Analysis on the Safety of Autonomous Robots Controlled by Artificial Intelligence currently conducted by the European Commission. The workshops were envisioned to gather feedback from the involved stakeholders on the results from various project tasks and the conducted interviews, analyze the stakeholder's (potentially conflicting) position, and incorporate the lessons learned in the final study report.

We were invited to present the LIAISON Research Project, participate in the ongoing discussion, and exchange thoughts and ideas on (tackling) gaps and inconsistencies in existing technology regulatory frameworks. The workshops focussed, among other things, on the domains of healthcare and agriculture. For an overview of the workshop timetable, see table 1 (annex).

The results from this workshop have shown how important it is to have a mechanism that could align the different stakeholders linked in robot development. While there is currently a link between some of the stakeholders, the process is very complex, and its intricate inner workings prevent the free access and participation of key affected stakeholders, which is not desirable from public policymaking.

#### *3.1.2.2. ERF WORKSHOP*

As part of the ERF 2021, LIAISON was part of two workshops throughout the event - a guest presentation at the DIH-HERO workshop op Robotics in healthcare: Future perspectives[5], and the hosting party at the workshop on LIAISON: Liaising robot development and policy making.[6] The latter comprised an interactive webinar to gain an insight into the challenges that the relevant robot developers face when applying standards concerning rehabilitation, personal care, and agricultural robots. In particular, the webinar will focus on identifying challenges roboticists (including developers, policymakers, or ethicists) found in ISO 13482:2014 on personal care robots, IEC 80601–2–78–2019 on rehabilitation robots, and ISO 18497:2018 on agricultural machinery and tractors. The goal is to know how to build an information link between different communities to create norms that frame robot development in key sectors adequately.[7] Moreover, both sessions were geared towards obtaining a better insight into the usefulness of LIAISON based on the wider stakeholder community. Moreover, to ensure maximum community participation in the individual ERF workshop by LIAISON, the COVR Project was involved in promoting this event.

**The European Robotics Forum**

The ERF is the most influential meeting of the robotics community in Europe, organised annually by euRobotics under SPARC, the Public-Private partnership for Robotics in Europe. After its start in San Sebastian in 2010, the European Robotics Forum has grown into a major annual event with hundreds of attendees every year. The ERF2021 covers all aspects and current themes related to the field of robotics. It welcomes a wide range of stakeholder groups (including researchers, engineers, managers, and a growing number of entrepreneurs, business people, and public funding officers from all over Europe) to discuss technology push and market pull and how innovation in robotics and robotics-related AI can

[5] *See* here for the workshop presentation.
[6] *See* here for the workshop presentation.
[7] For an overview of the workshop program, see table 2 (annex).

be accelerated.

### 3.1.3. ENGAGEMENT WITH SEVERAL COMMUNITIES

To map the existing gaps and inconsistencies in current robot regulatory frameworks and gain insight into the potential and usefulness of LIAISON, we have extensively engaged with the European Digital Innovation Hubs in the domains of healthcare and Agriculture, namely DIH-HERO and DIH-AgROBOfood. More specifically, within these Digital Innovation Hubs, we have engaged with involved researchers and work package leaders on standardization and ethics. Moreover, we have established collaboration between LIAISON and both Digital Innovation Hubs to engage their respective communities in the LIAISON activities. This included their active support in the distribution and refinement of the above feedback surveys, a collaborative workshop at the ERF, and possibilities for further joint domain-specific webinars at a later date, domain-specific discussion on identified issues in current robot regulatory frameworks (e.g., CEMA industry expert discussion on ISO 18497:2018). Likewise, we have further expanded on the partnership with the COVR Project for the same purposes.

Finally, we actively engaged with relevant stakeholders in our networks (including robot developers, policymakers, and academia) to expand the reach of LIAISON. Examples include PAL Robotics, the Robotics4EU Project - which aims to increase awareness about ethics, legal, socio-economic, cybersecurity, data protection and further non-technological aspects of robotics -, Agreenculture - a French company that designs, develops and produces autonomous solutions for the agricultural world -, the European Agricultural Machinery Association (CEMA), EC representatives, academia, and the wider community present at the above ERF workshops.

### 3.1.4. POLICY AND STANDARD MAKING INSTITUTIONAL MEETINGS

To prove the feasibility and added value of the creation of this link between robot developers and relevant regulators, for the purposes of the LIAISON project we focus on three particular standards: ISO 13482:2014 on personal care robots, IEC 80601-2-78:2019 on rehabilitation robots, and EN ISO 18497:2018 on agricultural machinery and tractors. To ensure all parties are heard, LIAISON aims to include robot developers, policy and standard makers, and interested groups (e.g., ANEC). As part of LIAISON, three formal meetings were held with relevant policy and standard makers at an early stage of the project to explore how LIAISON is perceived by them and how they can contribute to LIAISON in helping relevant policy and standard makers frame robot development adequately. The policy and standard makers involved for this purpose represent both private standardisation organisations and the European Commission.[8]

## 3.2. PREPARATION & TIMELINE

With regard to the above methods, below an overview if provided of the related preparation and timeline:

[8] Personal names are anonymised for the purpose of this report.

| OVERVIEW PREPARATION & TIMELINE | | |
|---|---|---|
| **ACTIVITY** | **TIMELINE** | **PREPARATION** |
| Survey(s) | March-April 2021 | The feedback survey on the usefulness of LIAISON is powered by the Qualtrics software, and consists of four individual assessment sections: 1) General; 2) Validity, usefulness & feasibility; 3) Acceptance; and 4) Concerns, improvement & feedback. The survey covers a total of 14 questions. |
| Workshop(s) | March-April 2021 | The above workshops took place virtually, and included a Google Slide presentation on LIAISON in line with the surveys that match feedback loops 1 and 2. Moreover, the ERF workshops included an interactive element powered by the Mentimeter polling software. |
| Community engagement | January-April 2021 | Community engagement covered a range of formats, including telco meetings, additional events, and emails. Persons of interest were retrieved from our existing networks and through events that we attended or obtained by reference. |
| Policy and standard making institutional meetings | January-March 2021 | For the purposes of conducting exploratory meetings with relevant standard makers, we employed the format of two online exploratory meetings during which we discussed the feasibility, usefulness and acceptability of LIAISON as a means to align robot and regulatory development and improve robot safety standards and legal frameworks from the perspective of the relevant standard makers. For a further overview of the meeting agenda, see tables 3 and 4 (annex). The meetings covered a range of topics in line with those presented in the feedback surveys matching feedback loops 1 and 2, and the meetings took place through the Virtual Conferencing platform Microsoft Teams. |

### 3.3. DATA ANALYSIS

The data obtained through the above means was collected, stored, and analyzed according to their format. Data retrieved through the LIAISON surveys and the accompanying data obtained through the interactive ERF workshops has been stored in our storage. During the

research, this project uses the safe storage of the University ICT department (ISSC) network to store all the generated data. At Leiden University, each scientist has a personal folder with exclusive access where to organize projects named ‘university personal network storage (p:).’ This project will use p:, and it will be managed by the IT Services of Leiden University. A backup is made regularly. Access is limited to the researchers involved in the project. Upon termination of the project, the researchers will store all data on the university server for a limited period of time.

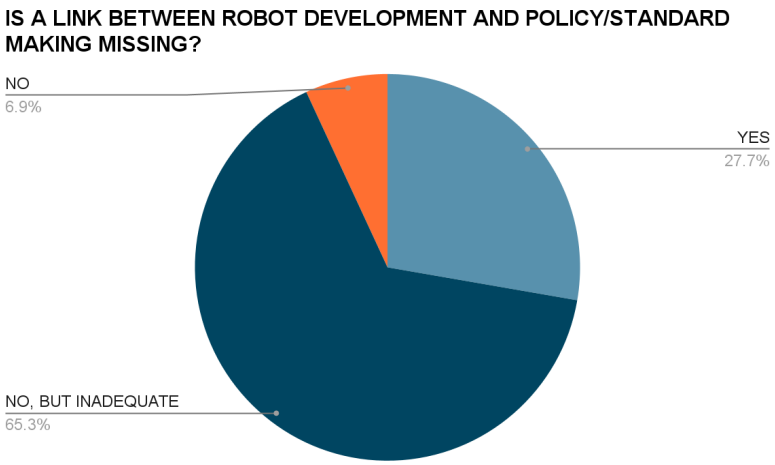
The feedback obtained through community engagement and exploratory meetings has been captured and stored in various separate formats, including meeting minutes, additional project notes, and email threads. The results of the analysis of these data are presented in the following section.

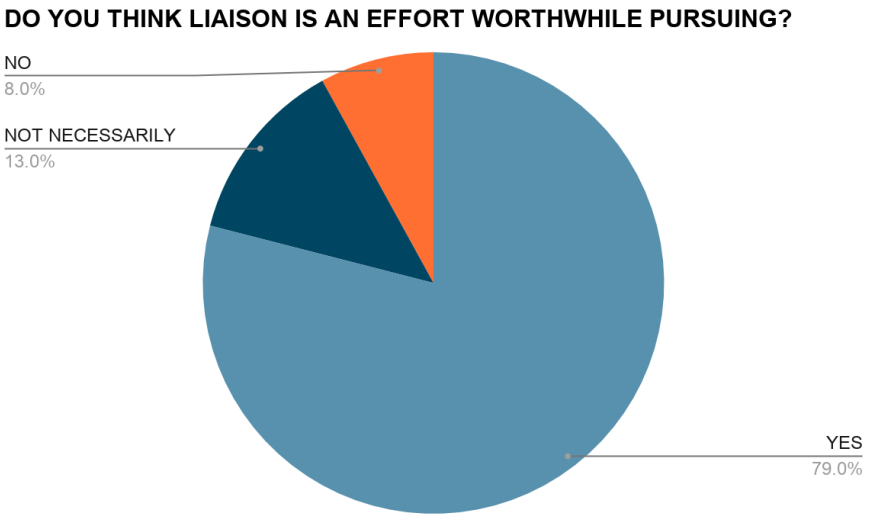
# 4. USEFULNESS OF LIAISON

## 4.1. RESULTS

With regard to the assessment of the usefulness of LIAISON, the data obtained through the above methods have led to the main results as illustrated in the table below. These results are based on the responses obtained through the methods described in section 3.1. As the surveys and interactive sessions at the relevant ERF workshops were built upon the same sets of questions, we combined both to provide a representative and complete overview of stakeholder responses. Where further elaboration is provided, the results obtained through the other methods are also integrated.

Since we were using different interactive tools (surveys in qualtrics and mentimeter), some questions had more respondents than others. This makes it a bit difficult to say, in total, how many respondents participated. Still, we have indicated these numbers in more detail for each of the questions and statements here below, where relevant.

| USEFULNESS LIAISON \| RESULTS | |
|---|---|
| **RESULT** | **DESCRIPTION** |
| **Missing link in policy/standard making** | The results gained from the survey on the usefulness of LIAISON and the interactive sessions at the ERF are very revealing. While 28% of the 27 respondents believe that currently there is no link between robot development and policy/standard making, 66% believe that such a link does exist but that this link is either far too complex, too complex and lacks openness, or only exists between robot development and policy/standards making. This, while a small 7% of respondents believe that such a link already exists between robot development and policy/standard making.   **Fig. 3** Is a link between robot development and policy/standar making missing? |

| | |
|---|---|
| | More specifically, in response to the question whether a link between robot development and policymaking is currently missing, a range of responses were provided, namely 1) Yes, currently there is no such a link between robot development and policy/standard making (28%); 2) No, there is already such a link between robot development and policy/standard making but it is too complex (38%); 3) No, there is already such a link between robot development and policy/standard making but it is too complex and lacks openness (21%); 4) No, but the link is only between developers and standard organizations (7%); and 5) No, there is already such a link between robot development and policy/standard making (7%).<br><br>Moreover, with regard to the feasibility, usefulness and acceptability of LIAISON from the perspective of standard making and standard makers, the exploratory meetings with relevant policy/standard makers indicated that within the context of robot regulation, there is a large ecosystem involving public policymakers (link: harmonization), standard organizations (link robot developer/safety), robot developers/manufacturers, and end users, which is not sufficiently aligned. |
| **LIAISON is worthwhile pursuing** | The results gained from the survey on the usefulness of LIAISON and the interactive sessions at the ERF have provided a clear positive indication as to whether LIAISON is worthwhile pursuing.<br><br>More specifically, in response to the question of whether LIAISON is an effort worthwhile pursuing, the 22 respondents provided a number of responses, namely: 1) Yes, currently there is no such a link between robot development and policy/standard making (79%); 2) Yes, but it is not necessary (13%); and 3)<br><br>No, the current way of policy/standard making is already well (8%).<br><br>  <br> |

| | |
|---|---|
| | **Fig. 4.** Do you think LIAISON is an effort worthwhile pursuing?<br><br>Furthermore, concerning the exploratory meetings with relevant policymakers, the above finding indicated the importance of bringing together all stakeholders to align their efforts into making current and future robots safe to use. In addition, these exploratory meetings led to the finding that while LIAISON's exact usefulness and feasibility from the perspective of standardization is difficult to express at such an early stage, it is clear that LIAISON can be beneficial in certain regards. Robot manufacturers have a set of many standards that they use in developing and manufacturing their products. Together, these standards will cover all regulations, but each one individually covers only a part. As robot manufacturers ought to prove that they are compliant with each of the applicable standards, they need to know which standards apply to their products. Especially for new robot manufacturers (a more specific version of), the COVR Toolkit could be very useful and valuable (taking inspiration from the US Regulatory Robot). LIAISON can also add to this by providing a mechanism for improved and continuously improving robot regulation.<br><br>Finally, following our engagement with the Digital Innovation Hubs - DIH-HERO and DIH-AgROBOfood, it became clear that LIAISON is a highly relevant initiative from the perspective of the Digital Innovation Hubs, especially considering their focus on standardization work activities led by their respective work packages. |
| **Diverse stakeholder involvement** | The results gained from the survey on the usefulness of LIAISON and the interactive sessions at the ERF indicate that for the regulatory approach proposed through LIAISON to be valuable and effective, a diverse group of stakeholders should be involved. These stakeholders include robot developers, manufacturers, policymakers, standardization organizations, legal scholars, and ethicists. Moreover, concerning the adequacy of standards, the involved pool of 10 respondents believed that standards should shift from mono-impact to multi-impact, including factors related to ethics, environmental sustainability, liability, accountability, privacy and data protection, and psychological aspects. This further indicates the need for a multi-disciplinary multi-stakeholder approach.<br><br>Finally, the involved Digital Innovation Hubs also stress this need for diverse stakeholder involvement. For instance, engagement with DIH AgROBOfood has presented the need for robot developers to pay attention to ethical, legal, and many other issues to determine if a robot will survive in a practical setting. |
| **Need for cooperation and** | As presented above, respondents have indicated the need for stakeholder involvement in LIAISON. However, respondents also |

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|---|---|
| **collaboration** | stress the need for cooperation among different stakeholders. The results gained from the survey on the usefulness of LIAISON and the interactive sessions at the ERF, based on the responses of a pool of 13 respondents, show that there is a serious need for cooperation between 1) major policymakers and standardization institutes; 2) major standardization institutes (ISO, BSI, CENELEC); and 3) user group initiatives and policy/standard makers.<br><br>In addition, the exploratory meeting with standard makers clarified the value of LIAISON in liaising standardization activities and robot development. More specifically, during one of the policy and standardmaking institutional meeting, a representative of ISO Technical Committee TC299 (Robotics) Working Group 02 on Service Robot Safety standardization stressed that establishing a relationship of cooperation between ISO/TC299/WG2 and LIAISON could be very useful and valuable. On the one hand, ISO/TC299/WG2 could provide LIAISON with the necessary input from standard making. On the other hand, looking at its goal, LIAISON could offer WG2 the relevant knowledge on inconsistencies and gaps in ISO 13482:2014 from the perspective of robot developers.<br><br>Moreover, engagement with the Digital Innovation Hubs DIH-HERO and DIH-AgROBOfood has brought forward the finding that it would be valuable for these Digital Innovation Hubs and LIAISON to strengthen further cooperation and collaboration for the overall benefit of robot governance. For this reason, both Digital Innovation Hubs offered to contribute to the goals and objectives of LIAISON and opened up the discussion for potential future funding for this and similar initiatives. |
| **Lacking legal comprehension** | The results gained from the survey on the usefulness of LIAISON and the interactive sessions at the ERF indicate an over lack in legal comprehension among robot developers, thereby adding emphasis to the first finding of a clear missing link between robot developers and policymakers. More specifically, the obtained data highlights this on three points: 1) experience with standards; 2) knowledge about the difference between public and private policymaking, and 3) experience with applying standards. 23% of the 33 respondents indicated to have never used a standard before, against 77% who suggested having experience with standards. At the same time, while all respondents - based on a pool of 15 respondents - indicated being aware of and understanding the difference between standards and the law, approximately 33% showed to be still confused regarding this difference. |

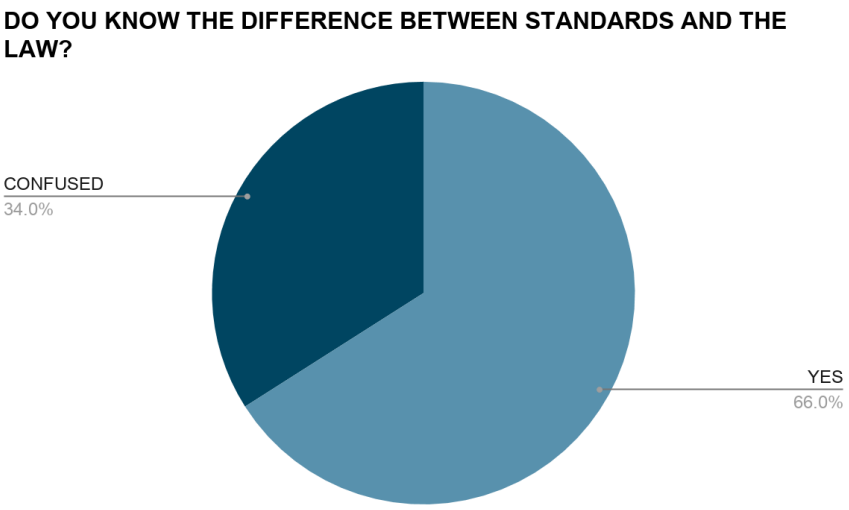


**Fig. 5.** Do you know the difference between standards and the law?

Interestingly, with regard to respondents' experience with standards - based on a pool of 26 respondents -, we were presented with a variety of responses, namely: 1) Run multiple standards for my devices (70%); 2) My robot does not fit into the standard category (45%); 3) Do not know if my robot is a medical device (40%), and 4) Do not know the difference between standard and regulation (10%).

Moreover, various meetings with the Digital Innovation Hubs DIH-HERO and DIH AgROBOfood have indicated this confusion among their community and the lack of legal comprehension. It was indicated that smaller and younger companies often lack the necessary knowledge and understanding concerning the applicable legal frameworks and the difference between private and public policymaking within this context. For this reason, these Digital Innovation Hubs stressed the value that LIAISON could also offer and the valuable insights that their community could provide policymakers within this respect. This has led to further discussions on the possibility of organizing domain-specific webinars at a later stage in the LIAISON Research Project.

### 4.2. CONSIDERATIONS

Following these results and the overprocess that led us to these results, we consider the following:

- Overall, LIAISON has proven to be a useful tool to facilitate effective robot governance, as indicated by relevant stakeholders, because of its all-encompassing nature. Possible avenues for expansion relate to active involvement in standardization organizations, focus on harmonization activities, and legal and educational participation in Digital Innovation Hubs to create more legal awareness among the involved communities of robot developers.

- The above results have highlighted the importance of and need for active stakeholder involvement in robot governance. However, currently, the link between robot development and policy making is complex, and it lacks openness, transparency, and free access. Access to standardization activities is not always accessible due to high costs, and there is a lack of clarity concerning public policymaking activities and their relation to private policymaking. This requires a reconsideration of how policy/standard makers engage with stakeholders in the policy/standard-making process.

- Moreover, the above results have indicated the need to seek active participation of affected parties (e.g., NGOs, user group initiatives - e.g., patients organizations and consumer networks -, and other interested groups). These parties should not only be involved at the end of the development and policy/standard-making chain. They form an integral part of the non-neglectable process and should be engaged in these activities from an early stage to provide input and feedback that will consider the needs and concerns of the wider public.

- While the data obtained through the above methods throughout the first milestone of the LIAISON Research Project have proved to provide valuable insight into the usefulness of LIAISON, further possibilities should be explored regarding outreach and effective stakeholder involvement in practice. Interestingly, while the surveys are very clear, compact, and user-friendly, and despite outreach having been sought through various means and platforms, the response rate to these surveys has remained very limited. As such, we confirm the findings derived from our meetings with policy and standard makers, and our engagement with the wider community of robot developers, which indicated that a potential pitfall of LIAISON could be a low response rate from the addressed communities. Simultaneously, actively and interactively involving stakeholders through workshops has proven to be a valuable and appreciated format for engagement with the broader community of stakeholders. Interactive workshops or webinars could allow relevant stakeholders to interact with one another and contribute to discussions on ongoing issues in robot governance. This would enable stakeholders to hear and be heard while also building upon the findings and opinions of one another.

### 4.3 CONCLUSIONS

With regard to the assessment of the usefulness of LIAISON, all the above has led us to conclude as follows:

| **USEFULNESS LIAISON \| CONCLUSIONS** | |
|---|---|
| **CONCLUSION** | **DESCRIPTION** |
| **LIAISON can be a useful tool in linking all the** | As elaborated on in section 2, LIAISON aims to bring clarity to what regulatory actions policymakers have to take to provide compliance guidance, explain unclear concepts or uncertain applicability domains |

| | |
|---|---|
| **stakeholders in the robot development chain, including affected parties** | to improve legal certainty, and inform future regulatory developments for robot technology use and development at the European, National, Regional, or Municipal level. Within this regard, LIAISON takes the lead in tackling the existing regulatory challenge, thereby linking robot development and policymaking to reduce the complexity in robot legal compliance. LIAISON has shed light on the gaps and inconsistencies in current robot regulatory frameworks through its activities regarding stakeholder engagement. These findings have been stored and will be shared with relevant policy/standard makers to provide compliance guidance further, explain unclear concepts or uncertain applicability domains to improve legal certainty and inform future regulatory developments for robot technology use and development at the European, National, Regional, or Municipal level. LIAISON has thus proven to be highly useful in this regard.<br><br>Moreover, by explicitly shedding light on the standardization activities in the abovementioned domains, LIAISON aims to create awareness about the barrier to access for robot developers and other relevant stakeholders concerning such activities. While there is room for improvement in stakeholder engagement, LIAISON has elucidated the misalignment between robot developers, policymakers, and other relevant stakeholders and affected parties. LIAISON has thus also proven to be highly useful in this regard. |
| **There is room for improvement** | Room for improvement can be found in the implementation of stakeholder involvement in practice. Throughout the first milestone of the LIAISON project, various formats for stakeholder involvement have been piloted - surveys, workshops, community engagement, and exploratory meetings. As the above results have indicated, engaging with relevant stakeholders and affected parties is of utmost importance for effective regulatory oversight. However, given the limited active participation from stakeholder groups, current engagement mechanisms leave room for desire. Over the course of its action, LIAISON realized that stakeholders are often very busy and do not see the value in filling surveys. There are simply too many of them. For LIAISON to reach its envisioned goals and objectives, it will be necessary to establish the most efficient and effective format for stakeholder and affected party engagement, for instance, through specialized webinars for targeted audiences. |
| **There is opportunity for expansion** | Beyond room for improvement, the results and accompanying considerations based on our activities throughout the first milestone have highlighted several avenues for expansion. These avenues will be further explored throughout the second milestone and compel the original actions envisioned for LIAISON. |

# 7. REFERENCES

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# 8. ANNEX

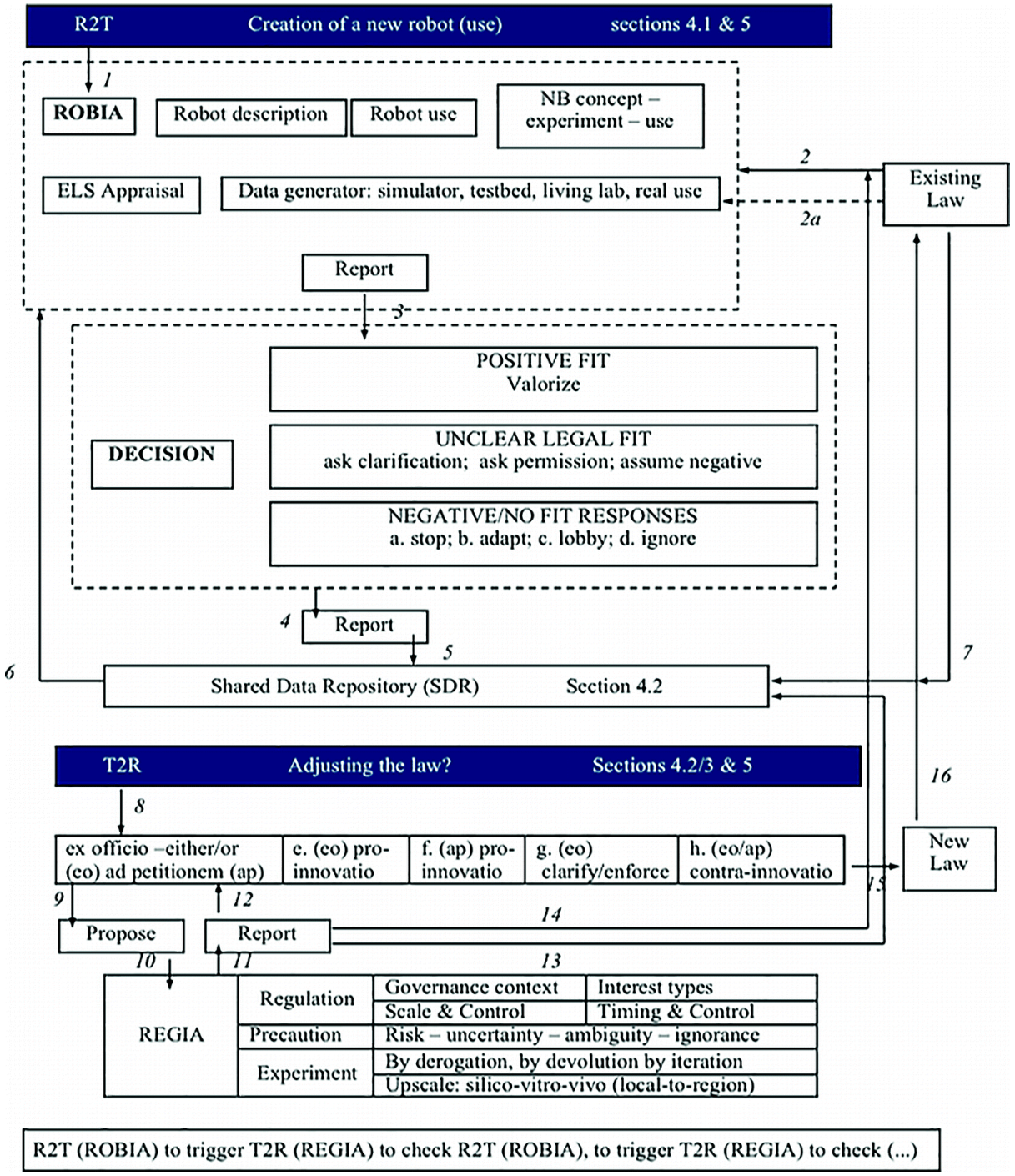


**Figure 1:** Preliminary iterative process for robot governance[9]

[9] As regards the meaning of arrows: #1. signifies that upon the initiative to develop a new robot (use) the ROBIA process commences; #2 and #2a are about information about existing law/legal space being fed into the ROBIA fit to regulation process; #3 outcomes of ROBIA are reported to initiators to decide if and if so, how the development process can be continued; #4 and #5 concern reporting the decision and making information available to the SDR system; #6 is about how (changes in) information in SDR are a source of information to the ROBIA process – as shared learning; #7 is about information about existing law with relevance to robotics is also part of the shared date in SDR (#2 is about specific legal information to a specific ROBIA procedure; #7 about the general updating of legal info in SDR); #8 expresses that upon R2T events a process about possible legal adjustments is started; #9 and #10 when it is decided (ex officio/ad petitionem) that some legal change may be called for, a (basic) proposal is formulated whereupon the REGIA procedure is initiated; #11 and #12 show that outcomes of the REGIA procedure are reported back and feed into the decision on legal change; #13 Information in the report is also fed into SDR to update regulatory information; #14 REGIA report can feed ROBIA without passing via the Existing law> box, as the

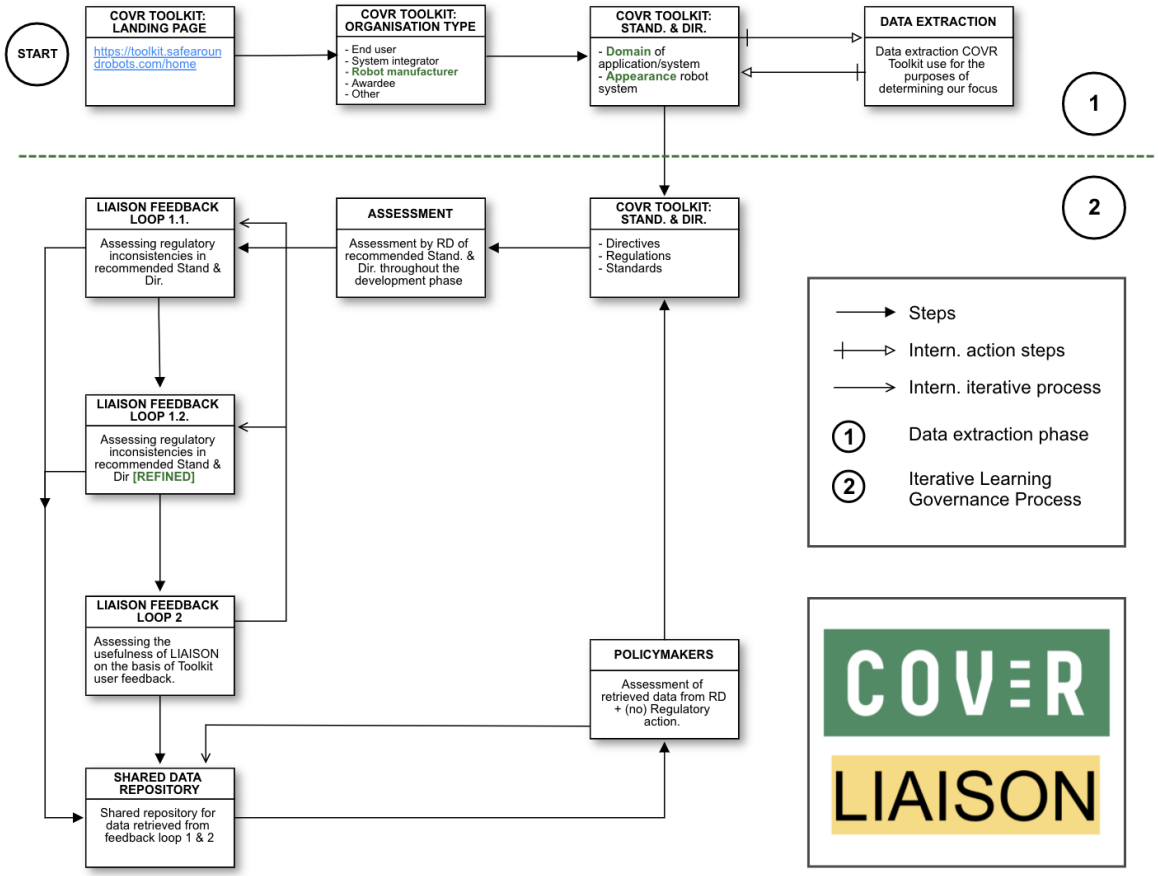


**Figure 2:** LIAISON Research Project mechanism

| EC WORKSHOP PROGRAM | | |
|---|---|---|
| **TIME** | **WHO** | **WHAT** |
| 09:00 – 09:10 | IDATE | Short welcome, presenting the agenda |
| 09:10 – 09:20 | EC | Short presentation on the study by EC (e.g. relevance, vision) |
| 09:20 – 09:30 | LIAISON | Introductory presentation on LIAISON: Liaising robot development and policy making |
| 09:30 – 09:55 | IDATE / FOKUS | Presentation on preliminary outcomes of the study : Feedback on going relevant standardisation efforts for safety standards and concerns/developments around robotics use cases in medical industry |

REGIA report will say something about pros and cons of possible legal change, but should that change follow, then this will communicate via the <New law> box; #15 signifies adjustments in the law; #16 expresses that new law changes and becomes part of existing law.)

| | | |
|---|---|---|
| | | Focus on surgical robots, telepresence in healthcare and rehabilitation skeletons |
| 09:55-10:00 | **BREAK** | |
| 10:00 – 11:30 | ALL | Discussion on use cases, related safety standards, potential gaps<br>Roundtable format including participants (tbc) from EC, ISO, CENELEC, IEEE, academics and from medical robotics providers/labs (Hocoma, Bristol Robotics Lab, PAL Robotics |
| 11:30 – 12:00 | IDATE | Summary of discussion, definition of next steps, closing of workshop |

**Table 1:** Program European Commission workshops "Trends and Developments in Artificial Intelligence: Standards Landscaping and Gap Analysis on the Safety of Autonomous Robots"

| **PROGRAM ERF WORKSHOP LIAISON** | |
|---|---|
| **TIME** | **TOPIC** |
| 15h40-15h45 | Welcome & Introduction |
| 15h45-16h | **LIAISON**<br>Aims and goals of the H2020 COVR Award |
| 16h-16h20 | **Standards, robots, and developers**<br>General interactive session |
| 16h20- 16h40 | **Personal care, rehabilitation, and agricultural robots**<br>Specific interactive session |
| 16h40-16h55 | **Discussion** |
| 16h55-17h | **Wrap-up** |

**Table 2:** Program ERF Workshop LIAISON: Liaising robot development and policy making

| **MEETING AGENDA** | |
|---|---|
| **TOPIC** | **TIME** |
| **Personal introductions** | **+/- 5 mins** |
| **Presentation LIAISON Research Project** | **+/- 10 mins** |

| | | |
|---|---|---|
| **Explanation LIAISON mechanism** | | **+/- 5 mins** |
| **Usefulness & feasibility LIAISON** | **Initial thoughts on usefulness and feasibility LIAISON** | **+/- 15 mins** |
| | **Standard making, inconsistencies and current approach in standard making** | |
| | **Opportunities and potential pitfalls LIAISON** | |
| **Exploring synergies** | **How can LIAISON be of help?** | **+/- 15 mins** |
| | **How can policy/standard makers be of help?** | |
| | **Views on long-term cooperation and feasibility** | |
| **Moving forward + wrap-up** | **Next steps LIAISON** | **+/- 15 mins** |
| | **Action-points meeting** | |
| | **Follow-up** | |

**Table 3:** Meeting agenda exploratory meetings 1 and 2 with representatives of private standardisation organisations.

| **MEETING AGENDA** | | |
|---|---|---|
| **TOPIC** | | **TIME** |
| **Personal introductions** | | **+/- 5 mins** |
| **Presentation LIAISON Research Project** | | **+/- 10 mins** |
| **Explanation LIAISON mechanism** | | **+/- 5 mins** |
| **Usefulness & feasibility LIAISON** | **Initial thoughts on usefulness and feasibility LIAISON** | **+/- 15 mins** |
| | **EU legislation and safety standards uncovered challenges & harmonisation gap** | |
| | **Opportunities and potential pitfalls LIAISON** | |
| **Exploring synergies** | **How can LIAISON be of help?** | **+/- 15 mins** |
| | **How can policy/standard makers be of help?** | |
| | **Views on long-term cooperation and feasibility** | |
| **Moving forward + wrap-up** | **Next steps LIAISON** | **+/- 15 mins** |
| | **Action-points meeting** | |

| | | |
|---|---|---|
| | **Follow-up** | |

**Table 4:** Meeting agenda exploratory meeting 3 with representatives of the EC.