Rossini

RObot enhanced SenSing, INtelligence and actuation to Improve productivity and job quality in manufacturing

D9.2 1st Interim PEDR

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0.5	CRIT	Final Deliverable	2019/11/29

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Abbreviations

Data Management Plan	DMP
Intellectual Property Rights	IPR
Open Research Data Pilot	ORDP
Key Performance Indicators	KPI
European Commission	EC
Findable, accessible, interoperable and re-usable data	FAIR
European Union	EU
General Data Protection Regulation	GDPR
European Factories of the Future Research Association	EFFRA
Human Robot Collaboration	HRC
Dissemination and Exploitation Manager	DEM
Plan for Exploitation and Dissemination of project results	PEDR

DISCLAIMER

The sole responsibility for the content of this publication lies with the ROSSINI project and in no way reflects the views of the European Union.

Abstract

This document is the first version (M14) of the **Plan for Exploitation and Dissemination of Results (PEDR) of ROSSINI** project. The contents of the first release include an overview of the Communication, Dissemination and Exploitation strategies and action plans that the consortium will follow to promote the project, to foster the knowledge of its results and to ensure their uptake for future business opportunities. **Communication, dissemination and exploitation activities all aim to help maximize the impact of Research and Innovation actions.**

More into detail the document is structured in two sections:

- **PART 1: Communication and Dissemination Strategy.** This section outlines the objective of the communication and dissemination strategy, the target stakeholders and group that will be addressed to raise awareness of project results. The channel and tools that the consortium is adopting for communication actions are described, together with a list of KPIs that the communication strategy should meet to be efficient in spreading ROSSINI knowledge.
  Among the tools described there are: the logo, the website, the calendar for the events attended or to be attended by project partners, the social media account already set up, the press releases, and the marketing material like roll-up and posters. This section of the document includes also a part dedicated to dissemination with a list of possible upcoming conferences and workshop that the consortium may attend in the next months, a list of journals where article and scientific publication of ROSSINI could be published and a list of conferences and workshop attended so far by the partners. Synergies with other project are also listed and described.
- **PART 2: Exploitation.** The third section of the document describes the exploitation plan of ROSSINI project. It is outlined the exploitation strategy and the guidelines that the consortium will follow in terms of characterization of the individual exploitable results, characterization of the joint result "Rossini Collaborative Platform", IP management, market analysis and monitoring, standardization and data management. Furthermore, this first release of the PEDR contains a preliminary characterization of the exploitable results that the project partners have identified. However, in the next months of the project the characterization will be implemented and further investigated to go deeper in defining which can be the suitable exploitation strategies. Intellectual Property rights, Foreground IP and Background IP and all the IP claims or IPR management issues on project results will be addressed in the next release of the PEDR as well as marketing and standardisation activities.

The Plan for the Dissemination and Exploitation of Results will be constantly updated during the project to guarantee the quality of the implementation and several internal versions of the document will be reviewed by the project consortium. The final plan will be delivered by M42 and it will be the most critical and important deliverable for the impact of ROSSINI and the further exploitation of its results beyond the project lifetime.

Scope

The present document has the scope to outline the strategy and activities followed by the consortium with regards to the communication, dissemination and exploitation actions, in order to promote the project, foster the knowledge of its results and to ensure their uptake for future business opportunities. **Communication, dissemination and exploitation activities all aim to help maximize the impact of Research and Innovation actions.**

1 Communication and Dissemination Plan

The communication and dissemination plan is a powerful tool for the effective communication of the ROSSINI results. Communicate and disseminate ROSSINI results and their benefits for the stakeholders, to the widest possible audience internationally, contributes to the maximization of the impact of the project beyond its lifetime.

Communication aims at raising awareness of the EU initiatives, promoting the project and its results to an audience ranging from stakeholders and investors to the media and general public. Dissemination is focused on fostering the transfer of knowledge created within the project to make results available for the scientific community, industrial partners and policymakers. However, **the boundaries between communication and dissemination are often blurry and sometimes overlap depending on the content to be delivered and the recipient.** ROSSINI communication and dissemination plan foresees a close and interwoven relation between communication and dissemination activities.

1.1 Objectives

It will be imperative to communicate ROSSINI results and their benefits for the stakeholders, to the widest possible audience internationally. Communication and dissemination activities will have 5 main objectives:

1. Prepare content, graphical identity and effective communication instruments,
2. Promote ROSSINI to all target groups in EU and beyond;
3. Collect feedback from additional potential end-users and other target groups,
4. Establish and reinforce the brand-name of ROSSINI as a key-player in the robotics market.

1.2 Raise awareness on ROSSINI philosophy to scientific and standardisation communities. Strategy

ROSSINI will take a structured approach to identify the most relevant stakeholders and target groups at each stage of the dissemination strategy, their motivations for pursuing project results, and identifying their favoured communication approaches. The dissemination strategy will target different audiences:

1. For the industrial stakeholders (manufacturers, robot integrators, third parties, etc) the strategy is aiming at creating technical and business interest in the opportunities created by the project's results;
2. For the scientific and standardisation communities the strategy is aiming at highlighting ROSSINI validated results beyond the state of the art, incl. results with potential for contribution to standards.

The website will provide up-to-date information about the project and a strong representation on relevant social media will be established. Traditional channels such as newspapers and industrial magazines will also be used; Publications will be prepared and participation in relevant events will be pursued.

1.3 Target stakeholders and groups

The communication and dissemination plan will set out specific target stakeholders and groups covering the full range of potential users in manufacturing value chains as well as industrial and R&D communities. Each communication activity will be tailored to the specific group:

1. Manufacturing and process companies: Food & Beverage, Electronics, Rubber/Plastics, etc.
2. Industrial research communities, EFFRA, ICT and FoF research communities; Standardisation bodies.
3. Robot Integrators and suppliers of robot components and/or related services
4. National/international societies and umbrella organisations, such as IFR, euRobotics AISBL, etc.

1.4 Timeline

This is structured in three main phases:

Phase1 – Initial awareness (M1-M12) aims at: Agreeing upon communication strategy and future activities; Creating initial awareness in markets related to Project's scope and objectives.

Phase2 – Targeted awareness (M13-M36) aims at: informing targeted stakeholders and groups; Informing target market about the technological breakthroughs and business benefits of ROSSINI.

Phase3 – Strategic phase (M37-M42) aims at: Maximizing target market and industry awareness regarding the ROSSINI platform and its exploitable products;

Figure 1 ROSSINI Dissemination Timeline

1.5 Communication Matrix

The dissemination and communication activities will be monitored through a set of quantitative and qualitative success indicators. The evaluation of dissemination activities will determine the degree to which the dissemination objectives have been reached, and the relationship between the outcomes and the efforts made to reach the goals. This analysis will help the project to better understand facilitators and barriers of a successful dissemination and will serve to refine the dissemination activities accordingly. In the upcoming dissemination reports the project will update each indicator set and identify gaps where more effort must be spent to reach the planned dissemination activities. There are indicators, which monitor the successful deployment of a set of dissemination instruments to different stakeholders.

The ROSSINI Communication Matrix matches target stakeholder categories with Communication Supports and Channels.

Table 1 ROSSINI Communication Matrix

Communication Supports & Channels	KPIs	Target Stakeholders (✓=Main Target, ○=Secondary)		
		R&D&I, Other Prof. Communit. (Groups-2,5)	End-Users (Group-1)	Facilitators (Groups-3,4)
Project documentation				
Leaflet	1 initial version + update	✓	✓	✓
Poster	1 initial version + update	✓	✓	○
Reference PPT presentation	1 initial version + update	✓	✓	✓
Project publications				
Press releases	At least 2 per year	✓	✓	✓
Articles and proceedings	9 publications (1+3+3+2)	✓	✓	○
Project deliverables	See list of deliverables	✓	○	○
Open access repository (RDR)	1 deposit per year	✓	○	✓
Project videos (incl. YouTube presence)	1initial version + update	✓	✓	✓
Online presence				
Project website	1 website, monthly updated	✓	✓	✓
LinkedIn	At least 1 monthly update	✓	✓	✓
Twitter	At least 2 monthly updates	✓	✓	✓
Events				
Presentation sessions	6	✓	○	✓
Thematic events	3 workshops + 1 conference	✓	✓	✓
Participation at relevant External events	30+	Depending on specific event		

2 Communication channels and activities

2.1 The ROSSINI logo

Multimple logo proposals were made for the logo and logotype of ROSSINI. The logo was designed by an internal designer at CORE. The idea behind each logo was explained, in order to help the partners to vote for their favourite. Figure 2 The ROSSINI logo shows the selected logotype for the ROSSINI project. The whole selection procedure for the logo with the two different versions and the explanation behind their design is given in Annex 11.1.

Figure 2 The ROSSINI logo

The design idea takes inspiration from a simplified representation of a human or robot arm. The idea of collaboration between the two is introduced by the multiplicity and the circular shape. We chose a red-orange palette as a dynamic combination that could also suggest some relation with the colour red in ROSSINI's name.

The logo in combination with the ROSSINI text create a logotype. This logotype will be used in all project-related communication and all communication material will be designed according to this, following all its specific characteristics, e.g. the colour palette.

2.2 The ROSSINI Website

The website is accessible at: https://www.rossini-project.com/.

ROSSINI deliverable D9.1 describes in detail the website created for external and internal communication about and on the project.

The website was designed and developed by an internal designer at CORE, and content was created, edited and developed internally by CORE. CORE will continue to maintain and update the website in cooperation with the other project partners throughout the course of the project. The website represents the project's primary method of communication within the Consortium and with external stakeholders and the wider public.

The website is intended as an aggregator of news and events that are related to the topic of collaborative robotics, which may raise the interest of the visitors and increase the public knowledge of this matter. The information on the website will grow with the proceedings of the project. Each event and achievement will be disseminated to the public via social networks and website.

2.2.1 Main Pages and Essential Interactive Elements

All sections of the website have on left top the ROSSINI logo and in footer reference to the HORIZON 2020 funding by the European Union, the Coordinator, the Communication Manager, and the Partners. Links to the main pages "Rossini" (Home), "Concept", "Methodology", "Platform", "Partners" area are included on the header, i.e. a navigation pane accessible from all sub-pages.

The 1st version of the website was developed and released on M4 and a new page about "news and events" was added by M7.

ROSSINI project web contents are divided into 5 main sections as shown in Figure 3 Main Menu - Navigation Pane on Header.

1. *Rossini*: It provides the main goal of the project, its vision, and its objectives.
2. *Concept*: This page contains the main concept of the project, an overview of state-of-the-art technologies in Europe and ROSSINI's approach
3. *Methodology*: This section describes the main technologies of ROSSINI
4. *Platform*: This section describes the ROSSINI Platform architecture and the ROSSINI Demonstration activities through 3 use cases
5. *Partners*: Introduction of the consortium partners, with a short description, their logo, and link to their websites
6. *News and events*: A new page added which includes Press Releases, Public Deliverables, Events Calendar and the Twitter Feed

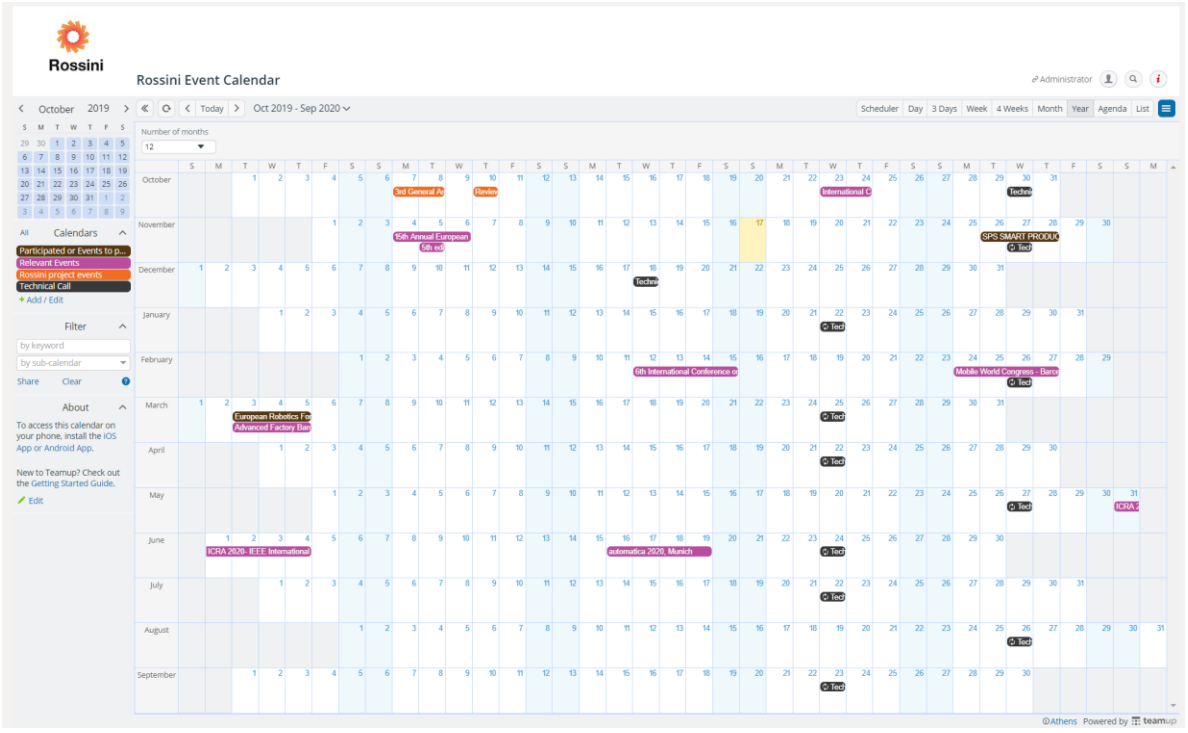
Figure 3 Main Menu - Navigation Pane on Header

2.3 The ROSSINI Event Calendar

In order to keep track of related events (exhibitions, conferences, fairs, workshops, etc.) that provide possible dissemination opportunities for the ROSSINI project proceedings, the Rossini Event Calendar has been created. To accommodate this, we have used the teamup.com online tool for the creation of online shareable group calendars. This tool is free of charge and interoperable with all common calendars that each partner may use (iCalendar, Google Calendar, Outlook Calendar, etc.).

Teamup provides a visual tool where all partners can have access, add new events and get informed about events added by others. It also comes with a mobile app, so that anyone can have access from their mobile device.

Figure 4 ROSSINI Event Calendar

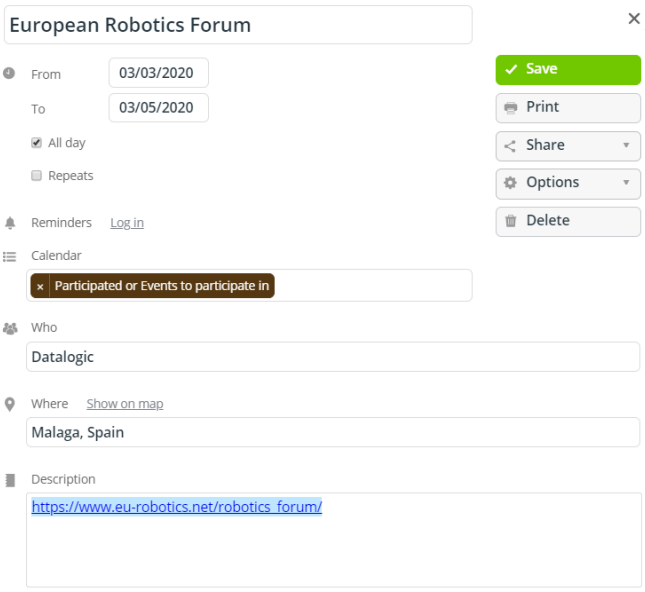


So far, the events have been categorized in four categories to enable visual/chromatic identification:

1. Participated events or events to participate for dissemination purposes
2. Relevant events to the industry and the project
3. Rossini project events - this category includes the events organised by project partners, such as project meetings, focus group meetings, stakeholder engagement workshops, the final conference, etc.
4. Technical Calls among partners

The tool will also be used as a reporting tool for monitoring the participation of ROSSINI partners in several events. Figure 5 Example of an event information formshows a form detailing the information for each event inserted in the Calendar:

Figure 5 Example of an event information form



1. Title of the event
2. Dates and duration
3. Calendar - which type of calendar it is related to
4. Who - Name of partner that plans to participate
5. Where - location of the event
6. Description - useful information of the event (e.g. web link)

The event information can be easily exported to spreadsheets for easier handing and more efficient reporting.

2.4 The ROSSINI Social Media

The management of the website will be backed up also by an intense social media strategy, making usage of different social networks (LinkedIn, Twitter and YouTube). The existing social network channels of the consortium partners will be widely exploited to enhance the dissemination of project activities and results towards the target audiences.

The following social media accounts have been setup for the project:

Figure 6 ROSSINI Twitter account

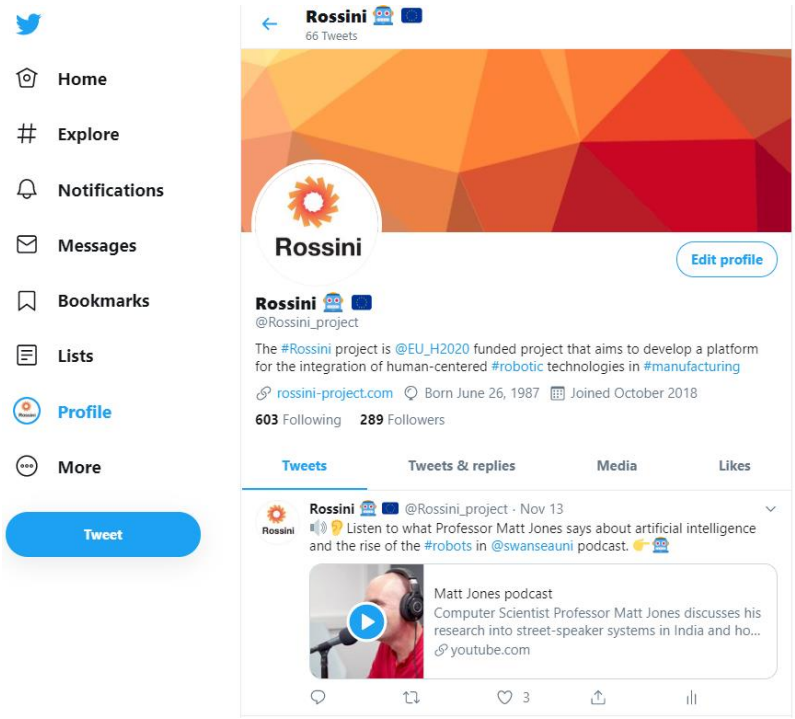
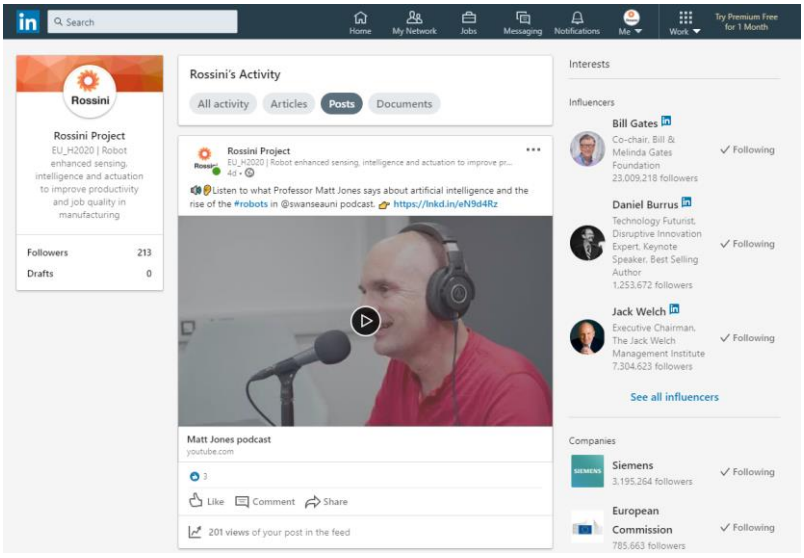


Figure 7 ROSSINI LinkedIn account



2.5 The ROSSINI Newsletter

Due to the complexity of the GDPR Privacy Policy, the consortium decided not to use newsletters as a marketing tool and to publish instead more press releases. Rossini's news and events will be highly promoted through the social media accounts which are already very active. Moreover, press releases sent to an external audience will serve as a marketing tool to promote the project, and their function is related more to news and results dissemination.

2.6 The ROSSINI Press Release

Press releases are dissemination and communication tools which can present the ROSSINI project to a wider audience through magazines or e-press. Press releases are made when there is progress to report, or when a project's event is about to be organised. They are circulated the same way as newsletters and additionaly through the website and social media accounts. Their purpose is the media and target groups engagement in the dissemination of the project's achievements and milestones.

The first Rossini Press release informs about the project's 2nd General Assembly held on 9-10 April in Ostfildern-Germany, was published in April 2019 and can be found in electronic version at project's website in section "News & Events".

The second Rossini Press Release announces IRIS' achievement in the modelling of Whirlpool use case by skeletonizing the human body. The main idea is to launch a series of press releases about the advances in all the layers. It can also be found in electronic version at project's website in "News & Events" section.

2.7 The ROSSINI Marketing Material

As a support to communication and dissemination activities, brochures, posters, banners and other forms of collaterals have been developed and will be updated following the evolving needs of the project. All material is produced in English and will be translated by the other partners into the languages of the participating countries according to the needs of local events.

As a rule, the project will privilege electronic information means, due to better scalability, easy updates and respect to the environment. The project is however aware that printed information is still the principal instrument for informing specific groups of stakeholders (e.g. participants to fairs, conferences and workshops). Therefore, a reasonable amount of marketing material will be printed for the better dissemination of the project at events and conferences (The ROSSINI Marketing Material).

The .pdf files is already distributed to the partners and uploaded to the ROSSINI cloud so that they are able to print the needed material.

Partners will take in due consideration alternative ways of supporting the dissemination of the project. Depending on the needs that may arise, other modalities could be deployed, such as electronic factsheets, delegates packs at conferences or other events, other types of gadgets. Such decisions will be taken when details of participation to events are worked out and an executive planning for those is being elaborated.

We have prepared:

- the brochure
- the poster
- the banner
- a presentation template for internal and external use
- the presentation of the project: provides the main goal of the project, its vision, and its objectives and is designed to be used both as a standalone document in a monitor/screen (in a loop) and with a presenter to share more details.

The templates are included in Annex 11.4

3 KPI and Impact Assessment

By implementing ROSSINI's communication and dissemination plan we expect to communicate relevant outcomes to each of the target groups, as well as to attract their interest and generate engagement that will influence the overall impact of the project.

For the purposes of evaluation of ROSSINI communication and dissemination activities, quantitative indicators and associated metrics were set up where applicable. A numerical target has been estimated as a cumulative estimate based on individual partners' inputs. These targets will be periodically reviewed by the DEM in collaboration with the whole Consortium.

Table 2 Action Plan M18 M30 M42 Website

Communication tool/channel	Indicator	Target number M12	M30	M42	Action Plan
Website	No of unique visitors to the website	1500	3500	4500	Promoting the web site in social networks
Printed Brochure	No of brochures distributed	200	800	1000	Distribution via participation to and organization of dedicated events and partners network

Communication tool/channel	Indicator	Target number M12	M30	M42	Action Plan
Social networks (LinkedIn, Twitter, YouTube) (LinkedIn, Twitter, YouTube)	No of members on LinkedIn	150	250	300	Keeping ROSSINI profiles on such networks active via regular posting and monitoring, integrate the social networks in the website
	No of followers on Twitter	150	400	500	
	No of views on YouTube	0	100	200	
Publications	No of submitted scientific papers/ articles in industry journals and magazines	8			Encourage partners to publish papers in peer-reviewed and indexed journals, find appropriate events, search for additional channels
Attendance of events	No of attended conferences and fairs	30/at least five major international conferences			Find alternative events, contact organizers, identify further industrial fairs of interest to the project.
Organization of events	No of Advisory Board meetings organized	2 meetings/year (physical or virtual)			Actions according to GA
	No of workshops organized	3 workshops + 1 Conference			

4 Dissemination channels and activities

4.1 Publications

The industrial and academic partners will individually and in collaboration publish and present scientific advances in technical papers as well as in journals (peer reviewed or not) and magazines. Scientific publications are an effective way to disseminate high level project information and to attract the interest of representatives of the various target groups. Publications in specialised magazines, papers sent to related events will attract the attention of technicians and researchers as well as to give the opportunity to collaborate within the purposes of ROSSINI. In addition, this may encourage the birth of collaboration for the realization of future projects. Publications will mainly include open access journals and self-archiving to non-open access journals in order to comply with the Horizon2020 Guidelines on Open Access. In order to further support this activity, whenever possible, project publications will be archived or linked on the ROSSINI website. The following conferences, journals and magazines are especially relevant for the communication strategy of the project.

Table 3 Indicative list of journals and conferences

Media (Journal or Conference)	Details	Website (if applicable)
IEEE Transactions on Robotics	covers both theory and applications on topics including kinematics, dynamics, control, and simulation of robots and intelligent machines and systems.	https://ieeexplore.ieee.org/Xplore/home.jsp

Media (Journal or Conference)	Details	Website (if applicable)
International Journal of Robotics Research	IJRR offers incisive and thought-provoking original research papers and articles, perceptive reviews, and lively editorials on ground-breaking trends issues, technical developments, and theories in robotics by the outstanding scholars and practitioners in the field. The Journal covers more than just narrow technical advances-it embraces a wide variety of topics.	https://journals.sagepub.com/home/ijr
Autonomous Robots	Autonomous Robots reports on the theory and applications of robotic systems capable of some degree of self-sufficiency. It features papers that include performance data on actual robots in the real world.	https://www.springer.com/journal/10514
IEEE Transactions on Mechatronics	It encompasses all practical aspects of the theory and methods of mechatronics, the synergetic integration of mechanical engineering with electronic and intelligent computer control in the design and manufacture of industrial products and processes.	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=3516
Elsevier Mechatronics	Mechatronics is the synergistic combination of precision mechanical engineering, electronic control and systems thinking in the design of products and manufacturing processes.	https://www.journals.elsevier.com/mechatronics
IEEE Transactions on Cybernetics	The scope of the IEEE Transactions on Cybernetics includes computational approaches to the field of cybernetics. Specifically, the transactions welcomes papers on communication and control across machines or machine, human, and organizations.	https://ieeexplore.ieee.org/xpl/aboutJournal.jsp?punumber=6221036
Robotics and Computer Integrated Manufacturing	The emphasis of the journal Robotics and Computer-Integrated Manufacturing is on disseminating the application of research to the development of new or improved industrially-relevant robotics, manufacturing technologies, and innovative manufacturing strategies.	https://www.journals.elsevier.com/robotics-and-computer-integrated-manufacturing

Media (Journal or Conference)	Details	Website (if applicable)
ERGOMOMICS	An international refereed publication, with a 60-year tradition of disseminating high quality research. Original submissions, both theoretical and applied, are invited from across the subject, including physical, cognitive, organisational and environmental ergonomics.	https://www.tandfonline.com/toc/terg20/current
Journal of Biomechanics	The Journal of Biomechanics publishes reports of original and substantial findings using the principles of mechanics to explore biological problems.	https://www.journals.elsevier.com/journal-of-biomechanics
IEEE International Conference on Robotics and Automation (ICRA)	The conference joins experts in the field of robotics and automation for technical communications through presentations and discussions. The conference creates a remarkable environment to indulge all the delegates in the frontier of science and technology in robotics and automation.	https://www.ieee-ras.org/conferences-workshops/fully-sponsored/icra
IEEE/RSJ International Conference on Intelligent robots and systems (IROS)	IROS provides an international forum for the international robotics research community to explore the frontier of science and technology in intelligent robots and smart machines. In addition to technical sessions and multi-media presentations, IROS conferences also hold panel discussions, forums, workshops, tutorials, exhibits, and technical tours to enrich the fruitful discussions among conference attendees.	https://www.ieee-ras.org/conferences-workshops/financially-co-sponsored/iros

4.1.1 Open Access of publications

All projects receiving Horizon 2020 funding are required to make sure that any peer-reviewed journal article they publish is openly accessible, free of charge.

Every partner should send the consortium the content and materials they wish to disseminate at least 30 days before their publishing, for the PSC approval.

ROSSINI and its members have agreed to participate in a green open access policy, which states that scientific publications and public deliverables must be uploaded to an online repository. Self-archiving ('green' open access) means that a published article or the final peer-reviewed manuscript is deposited in an online repository before, alongside or after its publication. Repository software usually allows authors to delay access to the article ('embargo period') If this route is chosen beneficiaries must ensure open access to the publication within a maximum of six months (twelve months for publications in the social sciences and humanities). OpenAIRE (website link) is an online archive powered by the European Commission that provides open science services for different stakeholders in Europe and beyond. The purpose of this repository is to ensure interoperability

between researchers, content providers, research administrators and funders, build global open access bridges and facilitate open innovation. In addition, OpenAIRE can also be linked to other repository platforms, such as Zenodo (website link). This repository is a safe and intuitive platform to share all research outputs (i.e.: documents, GitHub datasets, etc.) among different communities, integrating them to the European Commission funded projects via OpenAIRE. All ROSSINI scientific papers, datasets and public deliverables are included in OpenAIRE via Zenodo if not previously included in OpenAIRE's connected databases.

4.2 Organization and participation in conferences, workshops and activities

The consortium will target to disseminate the knowledge produced through several relating European and international organisations. Partners of Rossini, hold close connections with the following organisations: EFFRA – The European Factories of the Future Research Association (http://www.effra.eu), ManuFuture – EU European Technology Platform (http://www.manufuture.org), IMS – Intelligent Manufacturing Systems Global Research and Business Innovation Program (http://www.ims.org), The International Federation of Robotics (www.ifr.org), euRobotics AISBL – Association Internationale Sans But Lucratif (https://www.eu-robotics.net).

Rossini partners plan to participate in many conferences and workshops in order to disseminate the project's outcomes and activities.

Additionally, the consortium will identify at least five major international conferences in its lifetime. Participation to such events should start as of the first semester of Y2 and continue with one per semester until the end of the project.

Table 4 Future participation in conferences, workshops and activities

Title of the event	Date of the event	Location of the event	Description of the event
6th International Conference on Mechatronics and Robotics Engineering	12-15.02.2020	Barcelona, Spain	6th workshop on hybrid systems in the European Robotics Forum
Mobile World Congress	24.02.2020	Barcelona, Spain	https://www.mwcbarcelona.com/
European Robotics Forum	3-5.03.2020	Malaga, Spain	https://www.eu-robotics.net/robotics_forum/
Advanced Factory	3-5.03.2020	Barcelona, Spain	Fair about Industry 4.0, automation in industry, industrial digitization, etc. https://www.advancedfactories.com/en/visita/barcelona/
HANNOVER MESSE	20-24.04.2020	Hannover, Germany	https://www.hannovermesse.de/home
SPS IPC Drives Italia 2020	26-28.05.2020	Parma, Italy	https://www.spsitalia.it/en/home

Title of the event	Date of the event	Location of the event	Description of the event
ICRA 2020- IEEE International Conference on Robotics and Automation	31.05-4.06.2019	Paris, France	The 2020 International Conference on Robotics and Automation (ICRA) is the IEEE Robotics and Automation Society's biggest conference and one of the leading international forums for robotics researchers to present their work. http://icra2020.org/
Automatica 2020	16-19.06.2020	Munich, Germany	Automatica is the leading trade fair for smart automation and robotics. It features the world's largest range of robotics, assembly systems, machine vision systems and components. This is where participants from all branches of industry come to find future-proof solutions for manufacturing higher-quality products. https://automatica-munich.com/about-the-fair/exhibition-profile/index.html

During the first period (M14), partners attended 14 events in total (Table 5 Current State (M14) of participation in conferences and workshops). Since the project will have more outcomes to demonstrate in the second year, partners intend to attend more events with target to disseminate the knowledge produced through Rossini Project.

Table 5 Current State (M14) of participation in conferences and workshops

Title of the event	Date of the event	Location of the event	Description of the event	Attendance
European Robotics Forum 2019 - 10th edition	20.03.2019	Bucharest, Romania	6th workshop on hybrid systems in the European Robotics Forum	DATALOGIC
4th Annual Smart Manufacturing Summit	21.03.2019	Barcelona, Spain	industrial summit on Smart Manufacturing organized by Luxatia International. https://www.luxatiainternational.com/product/	WHR

Title of the event	Date of the event	Location of the event	Description of the event	Attendance
			4th-annual-smart-manufacturing-summit	
ITKAM Colloquim 2019	2.04.2019	Hannover, Germany	Workshop on Artificial Intelligence - Key Driver of Economic Development	UNIMORE
6th IRACON Training School on Machine and Deep Learning Techniques for (Beyond) 5G Wireless Communication Systems	8-11.04.2019	Barcelona, Spain	Application to signal processing and data transmission, neural networks for encoding/decoding and information transmission	IRIS
La Robotica Collaborativa – L'uomo al centro della fabbrica 4.0	10.05.2019	Reggio Emilia, Italy	The Clust-ER Mechatronics and Motoring Department of the Emilia-Romagna Region, in collaboration with CRIT, organized the workshop "Collaborative Robotics - The man at the center of the factory 4.0". The event was hosted by Elettric80 and BEMA, multinationals specialized in the creation of integrated and automated logistics solutions for large-scale retailers.	CRIT and DATALOGIC
SPS drive	28.05.2019	Parma, Italy	International automation fair	SUPSI
Visit to Fanuc Switzerland	13.06.2019	Bienne, Switzerland	Workshop	SUPSI
Workshop on the future of industrial robotics	1.07.2019	Brussels, Belgium	Recent advancements in Industry	DATALOGIC and IRIS

Title of the event	Date of the event	Location of the event	Description of the event	Attendance
			digitalization, Robotic and Automation	
Visit at Bachmann AG (Roboti q+UR)	7.08.2019	Zofingen, Switzerland	Workshop	SUPSI
Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing - Giornata Nazionale di lancio del bando 2020	18.09.2019	Rome, Italy	The event was hosted by INAIL (National Institute for Insurance against Workplace Accidents) and promoted by MIUR (Ministry of Education, University and Research).	DATALOGIC
Workshop on the future of industrial robotics	26.09.2019	Brussels, Belgium	Discussion on common topics and challenges experienced across multipe EU projects on Hman-Robot Collaboration	TNO and DATALOGIC
Big Data & AI Congress	17.10.2019	Barcelona, Spain	Strategic session about technological advancements in the fields of AI and BD	IRIS
Human Robot Collaboration in manufacturing Horizon 2020 today and Horizon Europe tomorrow Workshop "Human Robot Collaboration in manufacturing"	23.10.2019	Brussels, Belgium	Workshop "Human Robot Collaboration in manufacturing"	UNIMORE and DATALOGIC
Universal Robots (UR) and Mobile Industrial Robots (MiR) Tecno Tour	24.10.2019	Odense, Denmark	CRIT organized the Tecno Tour in Universal Robots and Mobile Industrial Robots Facilities for the companies of its network to see the production plants and	CRIT, IMA and DATALOGIC

Title of the event	Date of the event	Location of the event	Description of the event	Attendance
			to explore the potential of collaorative robotics. Crit took part to the Tour for exploitation purposes in order to monitor the collaborative robotics market.	
Evento innovazione auto	13.11.2019	Svizzera, Italy	Presentation of innovation projects of companies located in Ticino.	Schindler

4.3 Synergies with similar projects and initiatives

Rossini partners have liaised with several projects which have the same or similar thematic and could benefit through the exchange of ideas and outcomes.

Table 6 Synergies with similar projects and initiatives

Partner involved	Type of contact	Date of contact	Description of activity and outcome
DATALOGIC	In person contact with FoF-2 Effective Industrial Human-Robot Collaboration (RIA) in European Robotics Forum in Romania	03.2019	Collaboration between Projects
IMA	European Manufacturing industry for Euroc - Europena Robotics Challange	29.06.2019	Project launched by the European Manufacturing industry. Teams were required to benchmark use cases on standard robotic platforms. After a mid-term evaluation with public competition, the teams advanced to showcasing the use case in a realistic environment. Six Challenge Finalists were admitted to run pilot experiments in a real environment at end-user sites to determine the final EuRoC Winner.
IMA	MaXima - Multiple Actions for Innovation in Machine Automation	29.06.2019	The MaXima project had the main objective of promoting a new industry model according to the Industry 4.0 paradigm, in the context of the development of industrial processes and plants. One of the areas of the project was focused on the development of robotic production cells.
IMA	Sugar Network Alma Mater Studiorum/Almacube Standford University	1.11.2019	SUGAR is a global network that brings together students, universities and companies for the future of innovation through a new learning experience. Within this project, IMA proposed a problem focused on improving the man-machine relationship and a joint team of University of Bologna and Standford University students must

Partner involved	Type of contact	Date of contact	Description of activity and outcome
			find possible solutions to the problem.
TNO	TKI Dinalog Man and Robot in the Warehouse	on going	TNO people involved in ROSSINI are also involved in similar projects and collaborate with them
TNO	HORSE, Horizon 2020 No 680734 (http://www.horse-project.eu/)	on going	TNO people involved in ROSSINI are also involved in similar projects and collaborate with them
TNO	SMITZH Phase 3 (www.smitzh.nl)	on going	TNO people involved in ROSSINI are also involved in similar projects and collaborate with them
CORE	Liaison with other projects funded under the same call, to maximize our impact (Thomas, Coroma, COLLABORATE, HR-Recycler, Sherlock, Sharework)	on going	CORE has been in contact with the other projects funded under the same call, to organize integrated communication and dissemination activities

5 Exploitation Plan

Communication, dissemination and exploitation are different activities taking place on a common playground: the **results of the project**. The concept standing behind the definition of exploitation, which is also the ultimate feature of the activity itself, is indeed the **effective and concrete use** of the achieved **project outcomes**.

The exploitation plan is a strategic tool for the valorisation of the project results and for the creation of a concrete impact of the project on the stakeholders' community and on the market. The plan collects the outcomes of ROSSINI, the analysis of their features and potentialities, the strategy and rules for their exploitation, the intellectual property (IP) issues and rights management approach, the knowledge and management approach.

The identification of the exploitable results is an ongoing process that starts at the proposal stage, when a preliminary list of expected results is outlined. Some of the foreseen outputs become available throughout the course of the project, some towards the end, some may result not to be feasible, some new may be identified. Therefore, **project progresses** are closely monitored to analyse already identified exploitable results and to find new outcomes not foreseen at the beginning of the project, to **follow up and manage** them through the whole lifetime of the project.

The exploitation plan is an evolving report that will be periodically updated according to the emerging results of the project, the changes in the stakeholders or work context and their potential use during the project lifetime.

5.1 Objectives

The overall objective of the exploitation plan is to maximize the impact of the project results so that they can be used and implemented beyond the lifetime of the project. This challenging final goal can be expressed as a list of sub-goals to be reached:

- Reach a synergyc approach between communication, dissemination and exploitation in order to reach the stakeholders
- Indentify of the innovations and characterize them;
- Define how to get the expected innovations "out of the lab" and into (or at least closer to) the market and identify possible, most appropriate exploitation routes for the expected key exploitable results corresponding to the nature of the different results and their target users;
- Choose concrete exploitation measures to ensure that results will meet real needs and thus will be taken up. What are the relevant steps within the project's lifetime and beyond?
- Reflect on potential barriers/obstacles, and how to overcome them.
- Consider including dedicated formats (workshops, questionnaires, etc.) to capture and assess exploitation opportunities in the project.
- Plan and describe adequate internal structures safeguarding effective knowledge, IP and innovation management, helping to create, capture and manage research results.

5.2 Strategy

The ROSSINI impact enhancement plan follows a strategy based on the:

1. Characterization of the exploitable results
2. Market analysis and assessment
3. IP management and protection
4. Data management
5. Standardization

5.2.1 Characterization of the exploitable results coming from the project.

ROSSINI follows a systematic approach to the characterization of the exploitable results that provides for reference points and benchmarks.

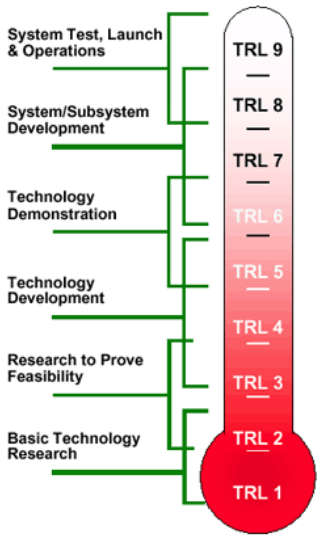
The first reference point is the category to which the exploitable results belongs represents a reference point for the identification of the nature of the outcome lays the foundation for a correct exploitation plan. Contrary to common belief, exploitable results do not necessarily correspond to a product or a service, but can be classified as:

- Equipment – the machinery or tools needed to carry out a job; a set of physical tools, devices, kit assembled for a specific purpose.
- Processes – A systematic series of mechanized or chemical operations that are performed in order to produce something.
- Products – something that is made to be sold, usually something that is produced by an industrial process (as a custom but may be personalized upon request).
- Services – offering the above products, processes, equipment, or knowledge as a help to perform a work.
- Knowledge & IP – understanding of or information about a subject that you get by experience or study, either known by one person or by people generally
- Other forms of knowledge – Platform, publications, patent.

The Technology Readiness Level (TRL)[1] is a reference tool to assess the technology maturity of the project results.

[1] European Commission (2017), H2020 Work Program 2018-2020, General Annexes, Annex G, Technology readiness levels (TRL), https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-g-trl_en.pdf

Figure 8. Technology Readiness Levels

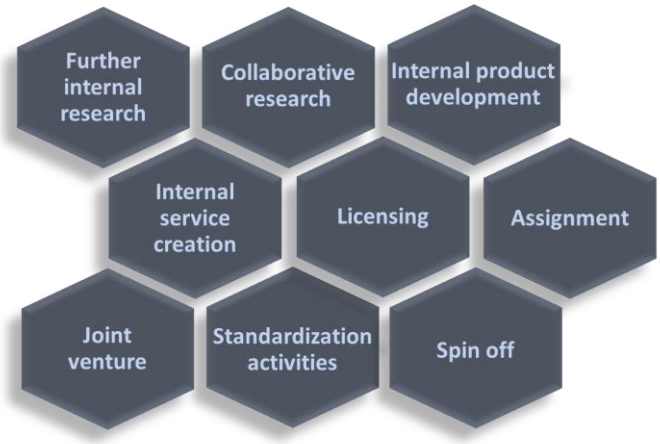


The TRL tools may not apply to all kinds of exploitable results coming from ROSSINI project. However, it is a helpful instrument for managing the progress of research and development activities since it provides a measure of the current readiness of the exploitable results and a common understanding of their technology status.

Turning innovation actions into concrete value and impact for society is also a matter of **thinking ahead**. Nevertheless, identifying, shaping and classifying the exploitable results coming from the project do not ensure their use beyond the lifetime of the project. To **provide a future to project outcomes**, it is of outmost importance to have a **clear vision** for their exploitation and a **customised strategy** to follow depending on the nature of the results.

Depending on the TRL reached, there are several routes for carrying out further exploitation, which are presented in the figure below:

Figure 9. Exploitation visions



The characterization of ROSSINI outcomes addresses the individual exploitable results obtained by project partners but also the joint and common result “ROSSINI Collaborative Robotics Platform".

5.2.1.1 Exploitation Strategy and Tools for Individual Results

Following the refences points cited above and guided by the DEM, the consortium will outline a systematic and harmonized characterization of the individual exploitable results describing:

- The results and how it is related with project activities
- The innovation content of the result
- The development status of the innovation
- The category to which the result belongs to

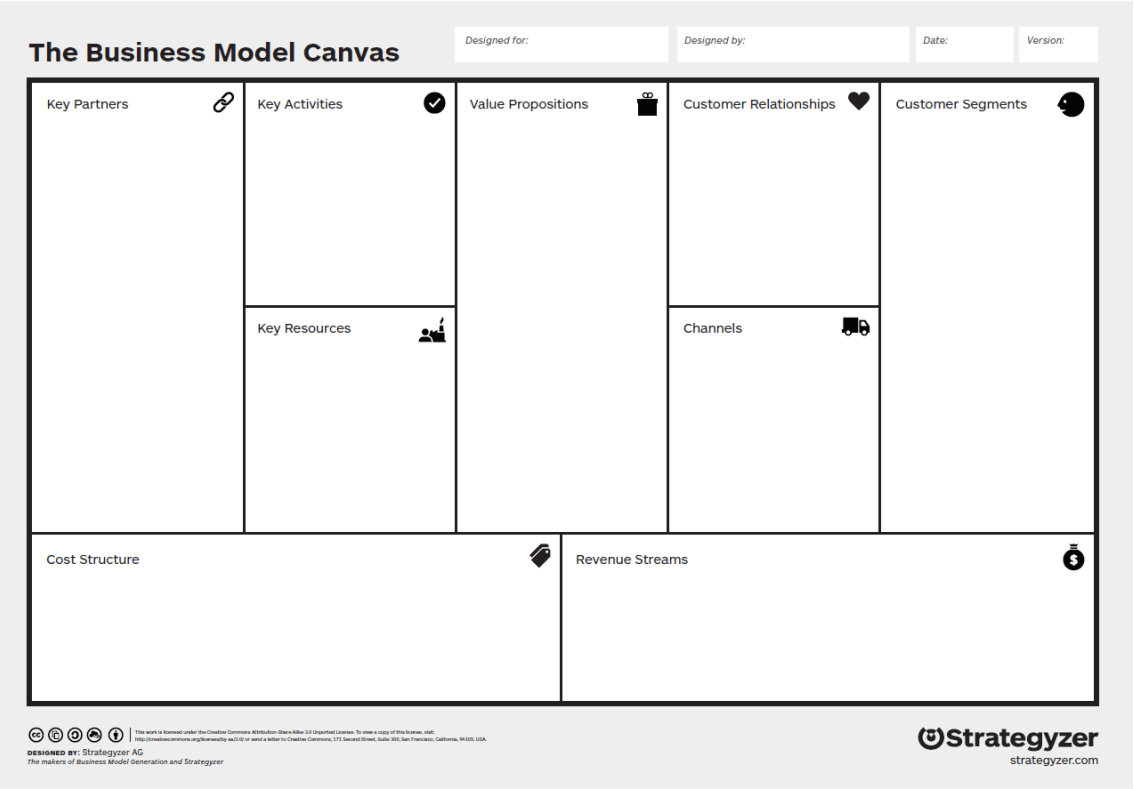
- The ownership of the result
- The expected TRL to be reached
- The exploitation vision and the necessary steps to bring the innovation closer to the market
- The stakeholders to be involved to achieve the exploitation vision
- The intellectual property behind the developed innovation

The characterization of the exploitable results is a process expected to last for the whole duration of ROSSINI project. The information will be enriched at each stage of the project and correctly updated according to the developments and implementations carried out by the technological partners.

5.2.1.2 *Exploitation Strategy and Tools for Joint Results*

The joint result "ROSSINI Collaborative Robotics Platform" will be characterized using the Business Model Canvas (BMC) tool, the consortium will work on the Value Proposition (VP) and Customer Segments (CS) boxes.

Figure 10 Business Model Canvas Template



The VP segment describes the bundle of products and services that create value for the customer as they help them solving a problem or satisfy their needs. The technology providers will work together in groups to outline the ROSSINI Collaborative Platform VP focusing on five questions:

- What is ROSSINI collaborative platform?
- Who is the intended user of ROSSINI?
- Is the ROSSINI collaborative platform a modular or unique platform?
- Which parts are offered as extra features?
- Which information can the user access and how?

The CS block defines the groups of (profitable) people or organisations a company reaches and serves through its products and services. The use cases (IMA, WHIRPOOL, Schindler) will analysed this block focusing on four questions:

- What do we expect from ROSSINI?
- Understanding the end user and the customer:
  a. Who are they (needs, characteristics, activities)?

b. What do they want to see?
- What is essential vs what is nice to have?

The characterization of the joint solution will be performed within a dedicated workshop were partners can directly interact with each other. Possibly, at later stages of the project, also the characterization of the joint solution will allow to analyse the remaining boxes of the canvas.

5.2.2 IP management and protection

The market uptake of the results of the project often requires further activities and considerable investments, which might not be encouraging unless outcomes are well protected through **IP**. In increasingly competitive economic systems, intangible assets have a strategic role. The protection of the generated innovations is therefore a priority for companies who want to maximize their economic value. In an high technology sector, like the one in which is Rossini, innovation is the only way to become leader, and it's of the utmost importance to protect and commercialize what generated. From the research institutes and universities point of view it will be of outmost importance to protect the intellectual properties behind the scientific articles published during ROSSINI project. Therefore, a crucial point of IP strategy is the alignment between the needs of scientific community and the requirements of the companies that have to be consistent and synchronized in order to avoid any breaches of secrecy.

During a H2020 project, each partner of the consortium might be called to share his knowledge, experience and technological innovations to finalize the project idea. This means that the participants might contribute with some tangible and non-tangible assets giving rise to intellectual rights, that need to be protected through confidentiality agreements between the applicants.

ROSSINI consortium has already established a set of rules to manage Intellectual property within the Grant Agreement of the project. ROSSINI IP management strategy aims to recognize from the beginning any potential disputes arising from the implementation of the project. To be effective in achieving this goal, the approach followed by the consortium includes:

a. A **preliminary training session on IP and its relationship with the exploitable results** will be carried out by the Dissemination and Exploitation Manager (DEM) indicatively during M10. The webinar will deal with the consolidated methodology that the consortium will use for the exploitable results and IP assets characterization. The training will be organized into two sections. The first one will address Exploitable Results-related concepts: what they are, what type of information project partners should report for a more detailed characterization, who are the right organization profiles to be involved in their definition/assessment, etc. The second section will be oriented to IP issues: background and foreground concepts will be introduced, the rules of H2020 program on IP will be explained to create awareness among the partners on IP issues and the importance of their contribution towards the maximization of the project impact.
b. Each partner will be **individually asked** to provide information on the forms of protection that intends to adopt.
c. The **BFMULO Matrix** will be implemented to determine the involvement of project partners in each of the Exploitable Results (ER).
In a BFMULO Matrix partners indicate their intentions corresponding to each of the ERs through writing letters B, F, M, U, L and O. The letters stand for:

- **B** = IPRs on background information:

Information excluding foreground information, brought to the project from existing knowledge, owned or controlled by project partners in the same or related fields of the work carried out in the research project.

- **F** = IPRs on foreground information:

Information including all kind of exploitable results generated by the project partners or 3rd parties working for them in the implementation of the research project. To have an F in an exploitable result it is necessary that a partner has a task(s) in the project related to that very result.

- **M** =Making the results:

Making the products, manufacturing and selling or directly implementing it through own facilities and skills.

- **U** = Using the result,

Using the result, implemented with own knowledge to develop new ranges of products or newer processing. Furthermore, the direct or indirect utilization of foreground in further research activities other than those covered by the project, or for developing, creating and marketing a product or process, or for creating and providing a service.

- **L** = Licensing the result:

Earning from a negotiation towards third parties outside the consortium.

- **O** = Other exploitation means:

Any other exploitation means (e.g.: consultancy, provide services, etc).

d. A final matrix will summarize the previous ones highlighting potential synergies or eventual criticalities like partners that claim the intention to exploit nearly all the exploitable results even by means of activities that are not typical of a the organization they belong to, that declare the intention of exploiting the project outcomes in any possible way apparently without any specific business model in their mind, possibility of arising disputes on the ownership.

5.2.3 Market investigation and assessment

Starting from the State of the Art assessed at the very beginning of the project, a deeper analysis of the market of collaborative robotics will be performed. Market analysis reports will be used as a support for the activity in order to investigate:

- Collaborative Robotics market: dimension and geographical location
- Market Trends, barriers, growth drivers and end-users needs
- Competitive scenario: already available and existing solution, competitors value proposition and business models.

Input from the technology partners and the end users collected during the workshop on BMC will be used to check if and how well the VP of the project aligns with the expectations of the main customer segments that will be identified. A further comparison between the product functionalities the customers wish to have and the current product design will enable to develop improvement suggestions for the technology partners.

A detailed and weighted SWOT analysis will be performed to better understand the potential of ROSSINI results and platform in the market. Partners will be asked to provide input on the Strengths and Weaknesses of their individual results, while also reporting the Opportunities and Threats that push or respectively hinder the adoption of their results. The inputs on the strengths and weaknesses provided will be analysed and clustered in key areas. The above-mentioned steps will enable to define the positioning of ROSSINI results within the market.

5.2.4 Data management

The amount of data generated is continuously increasing while the use and re-use of data to derive new scientific findings is more or less stable. This information would be useful in the future if data is well documented according to accepted and trusted standards which enable the recognition of suitable data by negotiated agreements on standards, quality level and sharing practices. For this purpose, the Data Management Plan (DMP) defines strategies to preserve and store the data over a defined period of time in order to ensure their availability and re-usability after the end of ROSSINI project.

DMP will define how this data will be managed and shared by project partners, and also, how this information will be curated and preserved during and after the project duration. According to the Guidelines of Open Research Data in Horizon 2020[2], as part of making research data findable, accessible, interoperable and re-usable (FAIR), a DMP should include information on:

[2] https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm

- The handling of research data during & after the end of the project.
- What data will be collected, processed and/or generated.
- Which methodology & standards will be applied.
- Whether data will be shared/made open access.
- How data will be curated & preserved (including after the end of the project).

With the aim of collecting this information and suggestion, CRIT prepared a questionnaire for all the ROSSINI consortium at early beginning of the project. To ensure that the information given at early stages of the project is continuously updated, partners have been asked to check and updated the questionnaire.

In the WP development process, data related to the scientific and technical content and objectives might be generated. This data can be object of analysis and evaluation and it may contribute to the global knowledge generated. The mentioned questionnaire that aims at identifying and gathering all the data sets to be generated by all consortium partners during the lifetime project, covers the following aspects:

1) **Scope**

- State the purpose of the data generation/collection
- Explain the relation to the objectives of the project/WP/Task

2) **Types**

- Are the data digital/hard copies or both?
- What types of data will the WP generate/collect? Specify the types and formats of data generated/collected (for example .xls files, .ppt files, emails, .doc files)
- Is the data generated or collected from other sources under certain terms and conditions?
- How is generated/collected? Specify the origin of the data and instruments/tools that will be used.
- State the expected size of the data (if known)
- Standards

3) **Ownership**

- Is another organization contributing to the data development?

4) **Reuse of existing data**

- Specify if existing data is being re-used (if any)

5) **Data use**

- How will this data be exploited and/or shared/made accessible for verification and re-use? Outline the data utility: to whom will it be useful

6) **Dissemination Level of Data**

- Confidentiality/ Sensitive data. If data cannot be made available, explain why. Who will have access?

7) **Storage and disposal**

- How will this data be stored?
- How long is it required to keep the data? Expire date. Will revisions be kept?

8) **Rules for Data naming**

- Standards or internal rules

These data can be object of analysis and evaluation and may contribute to the global knowledge generated.

Some of these data will be public while some other are expected to be confidential, only accessible for ROSSINI consortium, or sensitive data, only accessible for certain partners.

The kind of data collected are:

- Feedback and data from demonstration activities within the three use cases. The types of information are:
  - KPI's and some data files on performance of machines.
  - .xls files, .ppt files and/or .doc files. for reports.
  - Rtf documents for user acceptance questionnaires/online instruments doc files and .xls files.
- Algorithms to be used for diagnosis and predictive maintenance.
- Data to be feed into the cognitive monitoring embedded system.

5.2.5 Standardization

The DEM will assess and monitor which are the already existing standards on collaborative robotics. The objective is to investigate where ROSSINI innovations could give their contribution in terms of standardisation and possibly bridge gaps. For this purpose, the DEM will be in contact with the national standardisation UNI. Moreover, with the help of the other partners of the consortium and, thanks to the liaison with the other HRC project funded under H2020, the task leader will establish contacts with standardization entities in Europe.

6 Exploitable results characterization

This section of the document is dedicated to the characterization and deep analysis of the individual and joint exploitable results achieved by the project.

Based on the definition of EU Horizon 2020, the 'Results' of the project is any tangible or intangible output of the action, such as data, knowledge and information, whatever their form or nature, whether or not they can be protected". The exploitable results can be used by the project partners or by other stakeholders, after their agreement.

As previously stated, it is essential to start with the identification and characterization of the exploitable results. Indeed, not all of what has been achieved throughout course of the project is likely to have an exploitation route. Exploitable results are only those having a potential scientific, economic and social significance. During the project these outcomes provide a mechanism to capture and quantify impact, while, by the end of the project, a way to achieve impact beyond project's completion.

The identification of the exploitable results is an ongoing process that starts at the proposal stage, when a preliminary list of expected results is outlined. Some of the foreseen outputs become available throughout the course of the project, some towards the end, some may result not to be feasible, some new outputs may be identified.

Table 1 below lists the exploitable results of the ROSSINI project at the proposal stage. These results will be used as starting reference point for the identification of the concrete results and for their characterization.

Table 7 ROSSINI proposal exploitable results

Type of ER	Exploitable result	WP	ER Manager	Involved partner(s)	Exploitation vision
Product	New Safety 3D flexible **cameras**; Advanced **SLS cluster**;		DATALOGIC	PILZ	Product sales
Product	New **Radar Sensor**s; Safe **communication bus**	3	PILZ	DATALOGIC	Product sales; Engineering service
Equipment	RS^4: a **Sensor Fusion System** able to properly monitor the working space	3	PILZ	DATALOGIC	Product sales; Software License; Engineering
Knowledge & IP	**Semantic Scene Map**: a tool enabling danger awareness that can be added to robot control	4	IRIS	UNIMORE; PILZ	Software License; Engineering
Knowledge & IP	**Safety Aware Control Architecture**: tool enabling safe task optimisation to be added to robot control	4	PILZ	IRIS; UNIMORE	Software License; Engineering; Embedded in PRIMO robotic controller
Knowledge & IP	**Semantic Scene Map**: a tool enabling danger awareness that can be added to robot control	4	IRIS	UNIMORE; PILZ	Software License; Engineering service
Knowledge & IP	**Safety Aware Control Architecture**: tool enabling safe task optimisation tp be added to robot control	4	PILZ	IRIS; UNIMORE	Software License; Engineering; Embedded in PRIMO robotic controller
Knowledge & IP	**Dual-drive** robot joint design; **Dual-encoder** robot joint design;	5	SUPSI	PILZ	Patent; Embedded in ROSSINI Manipulator; License
Product	**Collaborative by Birth Robot Arm:** new concept of low inertia, high performance cobot	5	PILZ	SUPSI	Product Sales
Knowledge & IP	**Human-Robot Mutual Understanding Framework** Software Suite for integrators	6	MACHINEBOUW	TNO; PILZ; UNIMORE;	Software License; Engineering service
Knowledge & IP	**Model-based collision measurement method** enabling quick ramp-up and higher robot speed	7	IFF	PILZ	Standardization; Engineering Service

Type of ER	Exploitable result	WP	ER Manager	Involved partner(s)	Exploitation vision
Equipment	**ROSSINI Design Tool:** desktop-based design tool for robot integrators	7	IRIS	PILZ; DATALOGIC;	Software License; Engineering Service
Process	**HRC Workcells** for domestic appliances & electronic components	8	WHIRLPOOL, SCHINDLER	PILZ, DATALOGIC, MACHINEBOUW	Use in company processes; market replication
Process	**Collaborative mobile platform** for food packaging	8	IMA	PILZ, DATALOGIC	Engineering and turnkey plant sales

During year 1 of ROSSINI, project partners have carried out a preliminary characterization of exploitable results in terms of innovation content, category of result, partners involved and market proximity estimations. This preliminary work will be further

The following tables illustrates the preliminary characterization of project results:

6.1 Cluster of Safety Laser Scanners managing occlusions due to multiple objects in the scene

ER Name	Cluster of Safety Laser Scanners managing occlusions due to multiple objects in the scene	
ER Owner	DATALOGIC	
WP involved	The result will be achieved in WP3. Safety warnings and alarms will be passed to WP4 and WP5. The entire system will be tested on the use cases of WP8.	
ER category	Improved product	
ER Innovation Content	A cluster of Safety Laser Scanners will be used to guarantee the safety of automatic machines operators working in complex areas where one or more scanners could be occluded by one or more objects. The system will rise an alarm in case an operator enters in a forbidden area or if the occlusions don't allow this check.	
Exploitation vision	**On Going**	**Planned**
	Prototyping in laboratory environment	Technology transfer
	Feasibility study	Market study
		Prototyping in real world environment
		Complying with existing standards
		Business plan
Time to market	Between 1 and 3 years	
IP rights	The result will be protected by means of patents.	

6.2 Safety system for collaborative robotics based on 3D cameras

ER Name	Safety system for collaborative robotics based on 3D cameras	
ER Owner	DATALOGIC	
WP involved	The result is related to WP3. The data acquired by the system will be passed to the robot control algorithms developed in WP4. These data will contain both raw images/depth maps and processed data like safety alarms or object speeds and distances. Safety alarms will be passed to the low-level robot controller of WP5. The entire system will be tested on the use cases of WP8.	
ER category	New product	
ER Innovation Content	A set of 3D cameras will be used to guarantee the safety of operators working with robots based on "Method 3: speed and separation monitoring" of ISO/TS 15066. The system will rise an alarm to the robot controller in case of danger. Based on this alarm the robot will be stopped or its speed will be drastically reduced.	
Exploitation vision	**On Going**	**Planned**
	Prototyping in laboratory environment	Technology transfer
	Feasibility study	Market study
		Prototyping in real world environment
		Pilot, Demonstration or Testing activities
		Complying with existing standards
		Business plan
Time to market	Between 3 and 5 years	
IP rights	The result will be protected by means of patents.	

6.3 Safety system for collaborative robotics using multiple sensing technologies including 3D vision, 3D radar, laser scanners, proximity sensors and more.

ER Name	Safety system for collaborative robotics using multiple sensing technologies including 3D vision, 3D radar, laser scanners, proximity sensors and more.
ER Owner	DATALOGIC and PILZ
WP involved	The result is related to WP3. Datalogic will develop the safety controller, the safety 3D cameras and an improved version of its safety laser scanners. Pilz will develop a 3D radar and other proximity sensors. Pilz will also experiment a new type of safe fieldbus to connect the sensors, the safety controller and, if necessary, the robot controller. The data acquired by the safety controller will be passed to the robot control algorithms developed in WP4. Safety alarms will be passed to the low-level robot controller of WP5. The entire system will be tested on the use cases of WP8.

ER category	New product	
ER Innovation Content	Information coming from sensors based on different technologies will be fused to guarantee the safety of operators working with robots based on different methods of ISO/TS 15066. The number and type of sensors will be defined based on the application but will include 3D cameras, 3D radar, safety laser scanners and many others, even coming from different vendors.	
Exploitation vision	**On Going**	**Planned**
	A partner's research team and business units are both engaged in activities relating to this innovation	Technology transfer
	Prototyping in laboratory environment	Market study
	Feasibility study	Prototyping in real world environment
		Pilot, Demonstration or Testing activities
		Complying with existing standards
		Business plan
Time to market	Between 3 and 5 years	
IP rights	The result will be protected by means of patents.	

6.4 A novel safety aware control architecture for collaborative robotic cells

ER Name	A novel safety aware control architecture for collaborative robotic cells	
ER Owner	UNIMORE, DATALOGIC, PILZ, IRIS, SUPSI	
WP involved	The safety aware control architecture is related to the following workpackages: WP4 will develop the main body of the safety aware control architecture, i.e. the semantic map, the cognitive layer, the flexible execution layer, the safety layer and their integration to form the safety aware control architecture WP3 will provide the safety certified sensing layer that will be the main perception source used to build the semantic map WP6 will provide the human related data that will be exploited within the cognitive layer WP8 will provide the information necessary for testing the safety aware contro architecture in real world scenarios, i.e. the ROSSINI use cases.	
ER category	Significantly improved product	
ER Innovation Content	The safety aware control architecture is a novel control system for a collaborative robotic cell. It allows to treat safety as a constraint to satisfy rather that an unexpected phenomenon to react to. In this way it is possible to optimize efficiency while satisfying safety. Human factors are explicitly taken into account in order to plan the behavior of the collaborative cell.	
Exploitation vision	**On Going**	**Planned**

	Prototyping in laboratory environment	Technology transfer
	Prototyping in real world environment	Pilot, Demonstration or Testing activities
	Feasibility study	Complying with existing standards
Time to market	Between 3 and 5 years	
IP rights	The result will be protected by means of patents.	

6.5 Perception and data fusion layer for optimum collaborative robot control with artificial intelligence techniques

ER Name	Perception and data fusion layer for optimum collaborative robot control with artificial intelligence techniques	
ER Owner	IRIS, DATALOGIC, UNIMORE, PILZ	
WP involved	WP4 with interdependencies to WP3 and WP7	
ER category	Significantly improved process	
ER Innovation Content	The perception layer receives input from a calibrated set of different sensors and performs a data fusion, followed by object identification, position, speed/direction, and key indicators such a distance alert between robot and human, all processed in a timely manner as a unified vision. State of the art AI techniques are used for object and position identification.	
Exploitation vision	**On Going**	**Planned**
	A partner's research team and business units are both engaged in activities relating to this innovation	
	Prototyping in laboratory environment	
	Prototyping in real world environment	
	Pilot, Demonstration or Testing activities	
	Feasibility study	
	Complying with existing standards	
	Contribution to standards	
Time to market	Between 3 and 5 years	
IP rights	NDA with collaborators, clients and 3rd party. Patent and Intellectual Properties to be agreed with the other partners who participate to the development and integration.	

6.6 "Collaborative by Birth" robotic arm with enhanced safety features, performance and advanced human robot interface.

ER Name	"Collaborative by Birth" robotic arm with enhanced safety features, performance and advanced human robot interface.
ER Owner	SUPSI
WP involved	Interdependencies to WP5
ER category	Significantly improved product

ER Innovation Content	SUPSI will design a "Collaborative by Birth" robot. A natively Collaborative Robot which will feature safe axis position signaling via double communication channels, and an innovative solution for coupling brushless motors within robot joints, thus speeding up the robot braking and retraction. An advanced human robot interface will allow a more natural behavior from the operator.	
Exploitation vision	**On Going**	**Planned**
	A partner's research team and business units are both engaged in activities relating to this innovation	
	Market Study	
	Prototyping in laboratory environment	
	Prototyping in real world environment	
	Pilot, Demonstration or Testing activities	
	Feasibility study	
	Complying with existing standards	
	Contribution to standards	
Time to market	Between 3 and 5 years	
IP rights	NDA with collaborators, clients and 3rd party. Patent and Intellectual Properties to be agreed with the other partners who participate to the development and integration.	

6.7 Technology to evaluate and monitor the job quality underlying variables that are relevant for the adoption of collaborative robots in manufacturing

ER Name	Technology to evaluate and monitor the job quality underlying variables that are relevant for the adoption of collaborative robots in manufacturing	
ER Owner	TNO, UNIMORE, SUPSI	
WP involved	Interdependencies to WP4 and WP6	
ER category	New service	
ER Innovation Content	Effects of the use of collaborative robots on job quality are: (1) often not clear beforehand, (2) can be diverse for different underlying variables and (3) depend on the (context of) application rather than the robot itself. The aimed technology will be integrated in the Rossini platform to enable the measurement of physical, cognitive and psycho-social variables, to evaluate and monitor the effects on job quality, and also to be able to intervene if necessary.	
Exploitation vision	**On Going**	**Planned**
		Prototyping in laboratory environment
		Prototyping in real world environment
		Pilot, Demonstration or Testing activities
		Feasibility study
Time to market	Between 1 and 3 years	

IP rights	The result will be protected, but the approach needs to be discussed.

6.8 Dynamic model of the human body to determine the transient contact behavior of HRC applications

ER Name	Dynamic model of the human body to determine the transient contact behavior of HRC applications
ER Owner	Fraunhofer IFF
WP involved	The work is related to WP 7.1. It is intended to be used within the ROSSINI Platform solution. It will be an input for WP 7.3 (Platform integration).
ER category	New process and service
ER Innovation Content	In the closest form of Human Robot Collaboration (HRC) the robot and the human complete common tasks simultaneously. In order to guarantee safety to the human worker, the operation mode Power and Force Limiting (PFL) in combination with biomechanical limit values is applied. Depending on the contact situation, there are different limit values for quasi-static and transient contact used for a free or clamping contact situation. In order to ensure that the biomechanical limit values are not exceeded the impacts are tested within a risk assessment using a biofidel force-measurement device. This kind of measurement device must be fixed to a stiff structure to work properly. However, for free transient contacts this setup does not represent the real condition, where the human body part is free, resulting in higher force values. For the application this means, that the robots velocity must be reduced and the system works less efficient. Within the ROSSINI project, Fraunhofer IFF develops a method to transform the force values of a fixed measurement device into a free transient contact. For this purpose, Fraunhofer IFF develops a model, which calculates the apparent mass of the colliding human body part with respect to the impact direction and body posture. The method can be integrated into third-party software and will make HRC applications significantly more economical.
Exploitation vision	Only deployed as new to the organisation/company. It will be used for new internal processes implementation.
Time to market	Between 1 and 3 years
IP rights	The result will be protected, but the approach needs to be discussed.

6.9 Using of HF, capacitive and tactile sensors to reach qualitative improvements at HRC applications

ER Name	Using of HF, capacitive and tactile sensors to reach qualitative improvements at HRC applications
ER Owner	PILZ
WP involved	The work is related to WP 7.1. It is intended to be used within the ROSSINI Platform solution. It will be an input for WP 7.3 (Platform integration).
ER category	New product
ER Innovation Content	Vision systems are one of the most used systems in industry sector for both application and safety aspects. The performance and costs of the

	components and the limitations of the vision system under certain conditions, like dusty environment or extreme lighting conditions could be improve or complement with the use of different sensor technologies working together with vision systems. This could be a very smart solution for the deployment of new solutions for the HRC applications	
Exploitation vision	**On Going**	**Planned**
		Prototyping in laboratory environment
		Prototyping in real world environment
		Pilot, Demonstration or Testing activities
		Complying with existing standards
		Contribution to standards
		Business Plan
Time to market	Between 3 and 5 years	
IP rights	After research of current and future standards and patents will be checked the possibility to protect the result. The result will be protected according to the PILZ`s IPR procedures/policies.	

6.10 Mobile collaborative robotic solution for raw material feeding and machine tending with high speed capabilities by using dynamic safety.

ER Name	Mobile collaborative robotic solution for raw material feeding and machine tending with high speed capabilities by using dynamic safety.
ER Owner	IMA, DATALOGIC, PILZ
WP involved	The result are related to WP8 (demonstration) and WP3 (development of the Rossini Smart Safe Sensing System) as the improvement of the efficiency is mainly due to the monitoring of the environment performed by the safe sensors. Interdependencies with the other WP: • WP1 Ethics Requirement. Mandatory. • WP2 Technical Requirement. State of the art, requirements and use case design are essential to define the technical information to start the activities. • WP4 Safety Aware Control Architecture. The semantic map, the scheduler and planner developed within this WP will be used for task allocation and trajectory optimization within the IMA use case. • WP5 Collaborative by Birth Robot Arm. The information gained from the development of the Collaborative by Birth Robot Arm will be exploited to move the robotic arms used in the IMA use case. • WP6 Human-Robot Mutual Understanding. The information coming from the Job quality analysis will be exploited to promote the solution among the IMA customers. • WP7 Integration Layer. The Method for assessing the transient contact will be exploited during the definition of the speed limits of the robotic arms. The Platform integration will be essential to integrate the safe sensors of WP3 in the robotic platform. • WP9 Impact Enhancement. Mandatory.

	• WP10 Management. Mandatory.	
ER category	Significantly improved product	
ER Innovation Content	The innovation consists in the integration of a mobile robotic solution in a real shop floor, where people, AGV and cobots are collaborating/cooperating, this is achieved by using innovative safe sensors that guarantee the safety of operators and enable the usage of equipment at the best of their capability. These sensors will be fix positioned. The velocity and trajectory of the platform will be adjusted based on the position and speed of human workers adopting a dynamic security system capable of meeting the safety requirements.	
Exploitation vision	**On Going**	**Planned**
	Technology transfer	Pilot, Demonstration or Testing activities
	Prototyping in laboratory environment	Feasibility study
		Complying with existing standards
Time to market	Between 1 and 3 years	
IP rights	The result will be protected by means of patents.	

6.11 Collaborative work cell for the production of electronic components.

ER Name	Collaborative work cell for the production of electronic components.	
ER Owner	SCHINDLER, SUPSI, DATALOGIC, PILZ	
WP involved	As use case provider the result is related to all the precedent work packages. The innovations developed within the other work packages will be part of the sought result.	
ER category	Significantly improved process	
ER Innovation Content	Production of Electronic Components using a developed collaborative work cell to optimally combine the repetitive performance of robot with the individual strong skills and high ability level of people.	
Exploitation vision	**On Going**	**Planned**
	Prototyping in laboratory environment	A partner's research team and business units are both engaged in activities relating to this innovation
		Prototyping in real world environment
		Pilot, Demonstration or Testing activities
		Feasibility study
		Complying with existing standards
		Business plan
Time to market	Not defined yet	
IP rights	The result will be protected according the defined Schindler Group's procedures, using the Schindler certified services and respecting the Group IPR policy.	

6.12 Workstation for assembly heavy loads in Washing Machine factory implementing a collaborative robot with an improved cognitive perception of the working environment

ER Name	Workstation for assembly heavy loads in Washing Machine factory implementing a collaborative robot with an improved cognitive perception of the working environment
ER Owner	WHIRPOOL, DATALOGIC, PILZ
WP involved	WP7, Strong interaction in WP2
ER category	Significantly improved process
ER Innovation Content	The innovative workstation will use a native collaborative robot or an industrial robot capable to manipulate heavy loads (> 10kg) in a strict cooperation with a human worker by integrating operational and environmental data coming from supervision system, local and distributed sensor. The robot will assist human worker in assembly a part weighting 14kg into the washing machine by taking the part from a container and moving it close to the final position and then, in a hand-guided modality, the human will drive the fine position and release of the part. The robot will use intensively all the data available to adapt its behavior according to the specific situation (part and product position, human identity and biometric data, work-cycle phase, environmental and safety) facilitating the human work and reducing ergonomic risk.
Exploitation vision	Not defined yet
Time to market	Between 3 and 5 years
IP rights	None.

6.13 Software design to improve the integration of man-robot collaboration applications.

ER Name	Software design to improve the integration of man-robot collaboration applications.
ER Owner	MACHINEBOUW, SUPSI, DATALOGIC, PILZ
WP involved	MACHINEBOUW will coordinate Task 2.3 (Use Case Design), and will support the implementation of Work Package 7 (Platform Integration) and Work Package 8 (Demonstration), providing the skills and knowledge of experienced robot integrators, including risk assessment and validation.
ER category	Significantly improved service
ER Innovation Content	The specific software code will be developed in order to facilitate human robot cooperation. By using components and innovations developed by the consortium we will integrate these in one software application.
Exploitation Vision	Not defined yet
Time to market	Between 1 and 3 years
IP rights	None

7 IP management

The corner stones of the IPR and Exploitation management of ROSSINI will be the Consortium Agreement (CA) and the Plan for Exploitation and Dissemination of Results (PEDR).

Some principal rules have been already established in the proposal of ROSSINI project:

- Patents. Partners who will develop patentable knowledge will be encouraged to apply for patent or similar form of protection and shall supply details of each such application to the other partners.
- Access Rights. Partners grant to each of the other partners royalty-free access right to knowledge generated in the project to the extent needed to successfully perform the project. Access rights to a partners pre-existing knowledge for use outside the project is, when needed and only to the extent necessary to make use of the project result, given on preferential conditions to the other partners. Any details concerning the access rights to will be defined in the Consortium Agreement.
- Ownership of Knowledge. Knowledge is owned by the partners who carried out the work generating it, or on whose behalf such work was carried out. If a partner wishes to assign any knowledge to a third party he should inform the other partners and request their consent, which should not unreasonably be withheld.
- IP Ownership. Foreground IP shall be owned by the project partner carrying out the work leading to it. If any Foreground IP is created jointly by at least two project partners and it is not possible to distinguish between the contributions of each of the project partners, such work will be jointly owned by the contributing project partners. The same shall apply if, while carrying out work on the project, an invention is made having two or more contributing parties contributing to it, and it is not possible to separate the individual contributions. Any such joint inventions and all related patent applications and patents shall be jointly owned by the contributing parties.

The Consortium Agreement (CA) provides the legal basis for the internal relationships and responsibilities among the beneficiaries. The CA has been signed and gives details of IPR management including terms and conditions of protection and transfer IPR; access rights to background or foreground for carrying out the project or for use of a beneficiary´s own foreground, etc.

During the first 12 months of ROSSINI project the DEM carried out a **preliminary training session on IP and its relationship with the exploitable results**. The webinar illustrated to the partners what exploitable results are, what type of information project partners should report for a more detailed characterization, the strategy and methodology that the consortium will follow to exploit project outcomes. The webinar also introduced the concepts of background and foreground, the possible approaches to manage the IP and the issues associated with it.

Further activities will be performed in the next months while project outcomes will become more defined.

8 Market analysis and assessment

Not started yet.

9 Standardization

At this stage of the project, the DEM has been in contact with the national UNI and the consortium has established a liason with other project Preliminary contacts with standardisation. This should ensure a good level of information flow and mutual awareness between the project and the standardization bodies to which some project representatives may belong to, in order to assess standardization opportunities and sharing knowledge and best-practices that foster the uptake of technologies. Representing bodies of such projects will be invited to participate in workshops and other dissemination activities to further enhance cooperation levels among projects.

10 Conclusions

The document has outlined the strategy to be followed by the consortium with regards to the communication, dissemination and exploitation activities. The aim of the plan is to lay the foundation to maximize the impact of the project during its duration and beyond its lifetime. This first draft of the deliverable has been focused on the description of the steps to reach the stated goals and it includes the activities carried out so far and a preliminary description of the exploitable results.

Communication activities have been very intense and many communication tools have been deployed to raise awareness of project ROSSINI. The consortium has already attended 18 conferences and workshop on collaborative robotics.

So far, thirteen project results have been collected and among these 3 are improved processes, 7 are new or significantly improved products, 3 are new services. The project partners have already expressed the will to protect their results by means of patents or the will to license their services. The next actions will be focused on monitoring the progresses of the results and to update the description of their features. Once the results and the partners involved will be more precisely defined, IP right will be managed and issues will be addressed. Market analysis activities will also start to understand which market ROSSINI results will have to face and a market report will be used as reference point.

11 Annex

11.1 The ROSSINI logo guide

Proposal A

This design idea takes inspiration from a simplified representation of a human or robot arm. The idea of collaboration between the two is introduced by the mupliplicity and the circular shape.

We propose a red-orange pallete as a dynamic combination that could also suggest some relation with the colour red in Rossini's name.

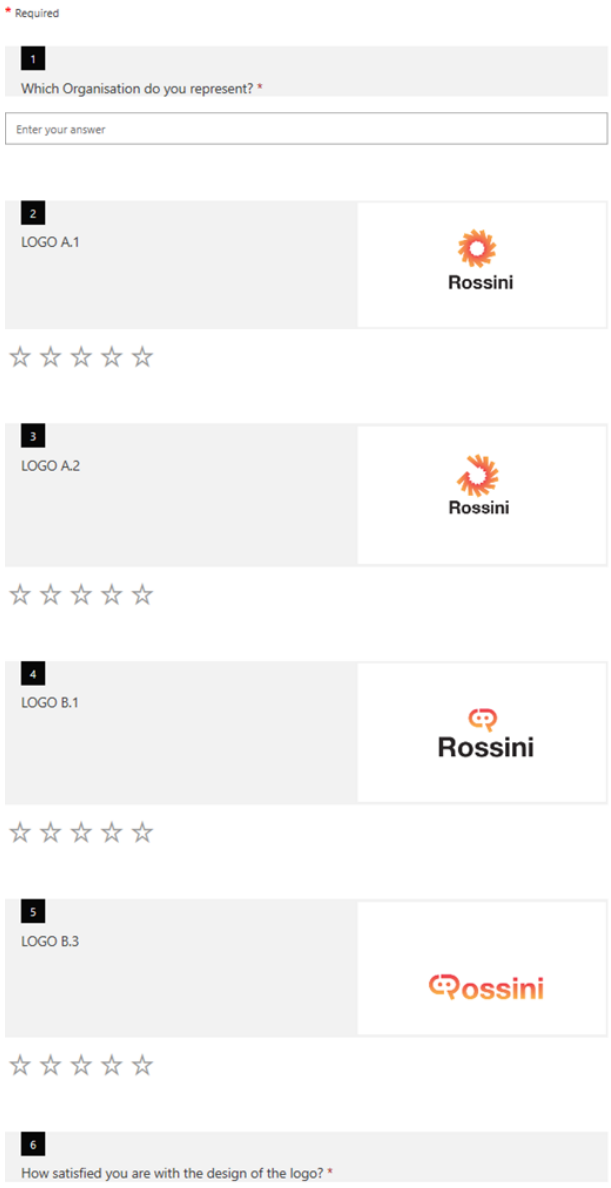
Proposal B

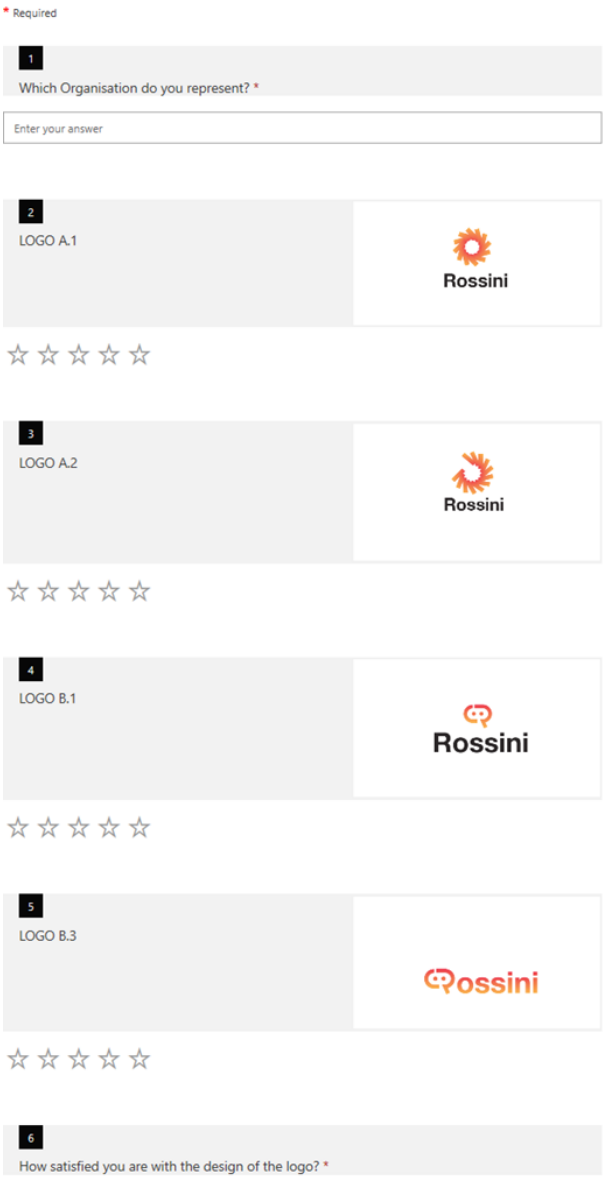
The same idea in different implementations.

Proposal B

The same idea in different implementations.

11.2 The ROSSINI logo selection





11.3 Press Releases

PRESS RELEASE
Athens, 15 April 2019
For immediate release

Rossini

H2020 ROSSINI 2nd General Assembly held on 9-10 April in Ostfildern-Germany

Researchers and representatives from all the organisations participating in the ROSSINI project attended the 2nd General Assembly which was organized by Pilz Automation Company.
The progress achieved in the different work-packages was assessed and discussed in several presentations conducted by the respective ROSSINI work-packages leaders. Participants shared the faced challenges as well as the related findings during the previous months of the project.

1 This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818087.

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About the project

ROSSINI is a project funded by Horizon2020 EU's research and innovation programme, with an aim to design, develop and demonstrate a modular and scalable platform for the integration of human-centred robotic technologies in industrial production environments.

The ROSSINI project aims to develop a disruptive, inherently safe hardware-software platform for the design and deployment of human-robot collaboration (HRC) applications in manufacturing. By combining innovative sensing, actuation and control technologies (developed by world market leaders in their field), and integrating them in an open development environment, the ROSSINI platform will deliver a set of tools which will enable the spread of HRC applications where robots and human operators will become members of the same team, increasing job quality, production flexibility and productivity.

Details

Project title: RObot enhanced SenSing, INtelligence and actuation to Improve job quality in manufacturing

Project ID: 818087

Start Date: 01/10/2018

Project Duration: 42 months

Project Consortium:

For additional information please contact

Project Coordinator: DATALOGIC

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Dissemination & Exploitation Manager: CRIT

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PRESS RELEASE

Athens, 3 September 2019

For immediate release

Rossini

Rossini's recent advances in the perception layer for collaborative robot control

Fig 1. Depth

The *Rossini* project aims to develop a collaborative robot platform, with human safety and work quality as a priority. Making it possible for robots to work in proximity with human operators in overlapping space requires solving and guaranteeing a lot of safety measures.

Traditionally, industrial robots must be confined in restricted areas away from humans, in order to avoid contact and accidents. Project partner IRIS, an advanced engineering & technology SME, specifically focuses on the "perception layer" of the platform, which receives a data stream from a diversity of different sensor types (the "sensor layer"), and from this data identifies where the key objects are (humans, robot, products and components being assembled) and what they are doing.

This requires a diversity of data processing techniques, such as deep learning for object recognition and labelling, data fusion, skeletonization of the human form and defining capsules around the human parts, as well as the robot components. All of this must be done in real time at about 30 frames per second. As an integrated platform, it embodies state of the art SLAM technology like that being used in the automobile industry for the future generation of self-driving vehicles.

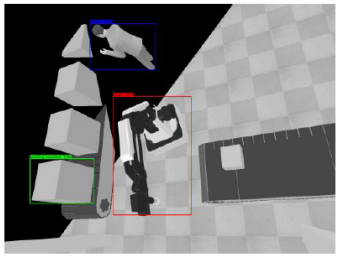

Fig 2. Convolution Neural Network identifies the key objects and labels them

The following figures show the current software simulation of the human-robot work area for one of the use cases being implemented in the project. The data processing software is "ROS" enabled so that it can be switched from the simulation to the real sensors when they go online. In the processing, each human is recognised and skeletonized in real time. The robot picks up counterweights from the bin and takes them to the human operator in front of the washing machine assembly line. The "perception layer" of the Rossini platform passes the key situation awareness

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Fig 3. Video Simulation is post processed to define skeletons (1)

information up to the next layer of the platform (the "cognitive layer") which is responsible for deciding what to do (revise action list) based on the situation.

For example, the robot could pick up the weight and describe its habitual trajectory to move it to the human operator who should be in front of the washing machine.

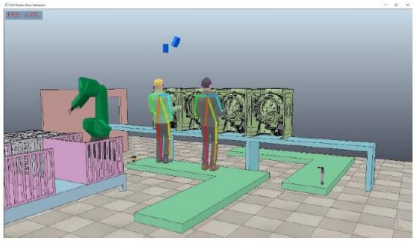

Fig 4. Video Simulation is post processed to define skeletons (2)

However, if the human for some reason is not there, or is much closer to the robot than expected, the system must detect this and re-plan the robot's actions – for example, taking a different movement trajectory to avoid colliding with the human, or waiting until the human is in the expected position.

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Project Consortium:

DATALOGIC Whirlpool SUPSI PILZ Fraunhofer IRIS IMA crit Schindler UNIMORE TNO CORE INNOVATION

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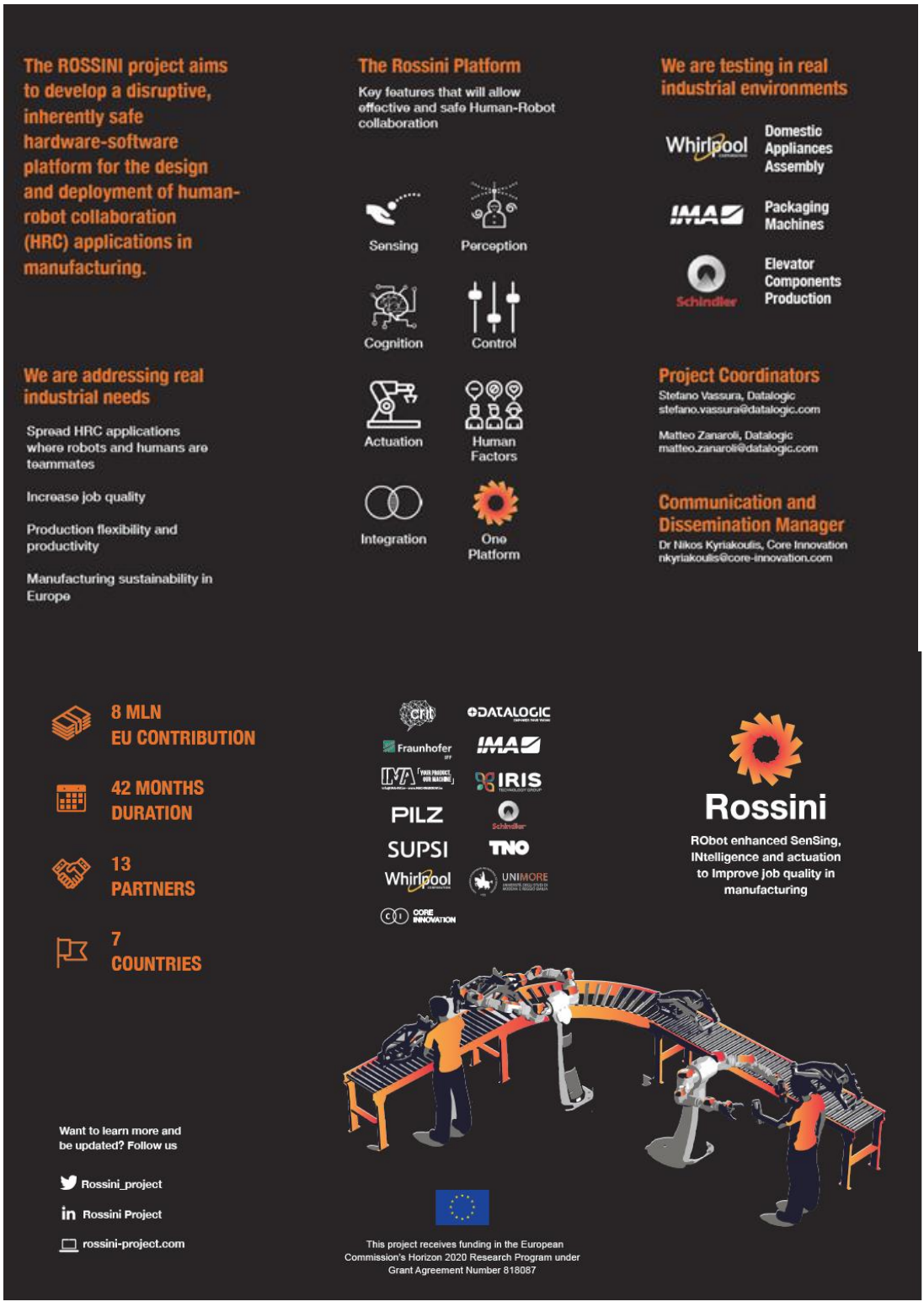
11.4 The ROSSINI Marketing Material

11.4.1 The ROSSINI Leaflet



11.4.2 The ROSSINI Poster

11.4.3 The ROSSINI Banner

11.4.4 Presentations / Example of slides