



A coordinated framework for cyber resilient supply chain systems over complex ICT

infrastructures

# D7.3 Report on dissemination, standards and exploitation (Y2) - Public

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Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



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Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	3 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



# Table of Contents

Table of Contents4List of Tables6List of Tables7List of Aronyms8Executive Summary101Introduction111.1Relation to other project tasks111.2Structure of the document1.3Gilossary adopted in this document1.11.32.1FISHY in events1.32.1.12.1.1FISHY dedicated events2.2Publications2.3Liaison with other project, initiatives & communities2.4FISHY Dissemination and Communication Channels/Tools2.4.3Social Networks2.4.4Newsletters2.4.5Blog2.4.7Dissemination & communication toolkit2.4.8KPIs momunication toolkit2.4.8KPIs in communication toolkit2.4.9Social Networks2.4.1Nessletters2.4.2Social Networks2.4.3Videos2.4.4Newsletters2.5292.4.7.1Infographics2.5292.4.7.2Infographics2.5710332.5.12.5.4POLITO342.5.535.5TID342.5.62.5.10CAPCEMINI ENC355.102.5103525.102.510342.5.72.51035342.5.710 <th>Document Information</th> <th>2</th>	Document Information	2
List of Tables       6         List of Figures       7         List of Acronyms       8         Executive Summary.       10         1       Introduction       11         1.1       Relation to other project tasks       11         1.2       Structure of the document       11         1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1       FISHY in events       13         2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.4       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination acommunication toolkit       28	Table of Contents	4
List of Figures       7         List of Acronyms       8         Executive Summary       10         1       Introduction       11         1.1       Relation to other project tasks       11         1.2       Structure of the document.       11         1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1.1       FISHY in events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Biog.       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure.       29         2.4.7.2       Infographics       29 <td>List of Tables</td> <td>6</td>	List of Tables	6
List of Acronyms       8         Executive Summary       10         1       Introduction       11         1.1       Relation to other project tasks       11         1.2       Structure of the document       11         1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1.1       FISHY in events       13         2.1.1       FISHY decicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics	List of Figures	7
Executive Summary	List of Acronyms	8
1       Introduction       11         1.1       Relation to other project tasks       11         1.2       Structure of the document       11         1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1       FISHY in events       13         2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog.       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.3       Videos       29         2.4.7.4       Infographics       29         2.4.7.3 <td>Executive Summary</td> <td>10</td>	Executive Summary	10
1.1       Relation to other project tasks       11         1.2       Structure of the document       11         1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1       FISHY in events       13         2.1.1       FISHY in events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       Infographics       33         2.5.5	1 Introduction	11
1.2       Structure of the document.       11         1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1       FISHY in events       13         2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY project presentation       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog.       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       ROS       33         2.5.1       ATOS       33         2.5.3       XLAB       33	1.1 Relation to other project tasks	11
1.3       Glossary adopted in this document       12         2       Dissemination & Communication       13         2.1       FISHY in events       13         2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33	1.2 Structure of the document	11
2       Dissemination & Communication       13         2.1       FISHY in events       13         2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.8       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.5	1.3 Glossary adopted in this document	12
2.1       FISHY in events       13         2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.8       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO	2 Dissemination & Communication	13
2.1.1       FISHY dedicated events       13         2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog.       27         2.4.6       Press releases       27         2.4.6       Press releases       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.8       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34	2.1 FISHY in events	13
2.1.2       Participation in Events/conferences/fairs       15         2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34	2.1.1 FISHY dedicated events	13
2.2       Publications       16         2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog.       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit.       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       <	2.1.2 Participation in Events/conferences/fairs	15
2.3       Liaison with other projects, initiatives & communities       17         2.4       FISHY Dissemination and Communication Channels/Tools       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SO	2.2 Publications	16
2.4       FISHY Dissemination and Communication Channels/Tools.       18         2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit.       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35 <td>2.3 Liaison with other projects, initiatives &amp; communities</td> <td>17</td>	2.3 Liaison with other projects, initiatives & communities	17
2.4.1       Website       19         2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4 FISHY Dissemination and Communication Channels/Tools	18
2.4.2       Social Networks       22         2.4.3       FISHY project presentation       26         2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.1 Website	19
2.4.3       FISHY project presentation.       26         2.4.4       Newsletters       26         2.4.5       Blog.       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit.       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.2 Social Networks	22
2.4.4       Newsletters       26         2.4.5       Blog       27         2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7       Brochure       29         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.3 FISHY project presentation	26
2.4.5       Blog	2.4.4 Newsletters	26
2.4.6       Press releases       28         2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPIs in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.5 Blog	27
2.4.7       Dissemination & communication toolkit       28         2.4.7.1       Brochure       29         2.4.7.2       Infographics       29         2.4.7.3       Videos       29         2.4.7.4       KPls in communication and dissemination       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.6 Press releases	28
2.4.7.1       Brochure.       29         2.4.7.2       Infographics.       29         2.4.7.3       Videos.       29         2.4.7.3       Videos.       29         2.4.7.4       KPIs in communication and dissemination.       30         2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO.       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.7 Dissemination & communication toolkit	28
2.4.7.2       Infographics	2.4.7.1 Brochure	29
2.4.7.3       Videos	2.4.7.2 Infographics	29
2.4.8       KPIs in communication and dissemination	2.4.7.3 Videos	29
2.5       Dissemination and communication plan for Y3       33         2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.4.8 KPIs in communication and dissemination	30
2.5.1       ATOS       33         2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.5 Dissemination and communication plan for Y3	33
2.5.2       SYN       33         2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.5.1 ATOS	33
2.5.3       XLAB       33         2.5.4       POLITO       34         2.5.5       TID       34         2.5.6       UPC       34         2.5.7       TUBS       34         2.5.8       OPT       34         2.5.9       SONAE       35         2.5.10       CAPGEMINI ENG       35	2.5.2 SYN	33
2.5.4       POLITO	2.5.3 XLAB	33
2.5.5       TID	2.5.4 POLITO	34
2.5.6       UPC	2.5.5 TID	34
2.5.7       TUBS	2.5.6 UPC	34
2.5.8       OPT	2.5.7 TUBS	34
2.5.9       SONAE	2.5.8 OPT	34
2.5.10 CAPGEMINI ENG	2.5.9 SONAE	35
	2.5.10 CAPGEMINI ENG	35
2.5.11 STS	2.5.11 STS	35

Document name:	$D7.3\ \text{Report}$ on dissemination, standards and exploitation (Y2)					Page:	4 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



	2.5.12	2 UMINHO	5
	2.5.13	3 UC3M	5
3	Stand	ardisation3	6
3	.1 (	Contributions to Standards Development Organisations (SDOs)	6
	3.1.1	IETF and IRTF	6
	3.1.2	ETSI	7
	3.1.3	3GPP	7
3	.2 (	Open-Source Strategy	7
	3.2.1	Contributing to OSM	8
	3.2.2	Contributing to OpenConfig	8
	3.2.3	FISHY Sandbox Distribution	8
4	Exploi	tation	9
4	.1 (	Overview	9
	4.1.1	Highlights	9
	4.1.2	KPIs4	0
	4.1.3	Interaction with other tasks4	1
	4.1.4	Horizon Results Booster4	2
	4.1.5	Plans for Y34	3
4	.2 I	nnovation Management4	3
	4.2.1	Individual Exploitation Update4	4
	4.2.2	Key Exploitable Results4	4
	4.2.3	IPR Analysis and Protection5	9
	4.2.4	Exposure of FISHY Results	0
	4.2.5	External Advisory Board6	2
5	Concl	usions & Future Work6	4
6	Refere	ences6	5
7	Apper	ndix6	6
7	.1 I	P background and results6	6

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	5 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



# List of Tables

Table 1. Groups of audience and tools to reach them	18
Table 2. FISHY Newsletter scheduling	27
Table 3. Blog posts planning	27
Table 4. Dissemination Activities: KPIs and Targets	30
Table 5. Dissemination proposed KPIs       3	31
Table 6. Communication proposed KPIs	31
Table 7. Updated KPIs for FISHY's exploitation activities	41
Table 8. Key Results in analysis at the HRB programme	42
Table 9. Partners' roles, interests and contributions to the FISHY Platform	48
Table 10. Partners' roles, interests and contributions to TIM	50
Table 11. Partners' roles, interests and contributions to IRO	52
Table 12. Partners' roles, interests and contributions to SACM	53
Table 13. Partners' roles, interests and contributions to SPI	55
Table 14. Partners' roles, interests and contributions to EDC	56
Table 15. Partners' roles, interests and contributions to SIA	58
Table 16. IP background and results in relation to the FISHY KERs	59
Table 17. Agenda of the 2 <sup>nd</sup> Advisory Board meeting	52
Table 18. FISHY IP background log	56
Table 19. FISHY IP results log	58
Table 20. FISHY KERs log	59
Table 21. FISHY ERs log	59

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						6 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



# List of Figures

Figure 1. SADE use case demo in 2 <sup>nd</sup> review meeting	14
Figure 2. KCYEU program	14
Figure 3. Henrique Santos participating in The Need for IoT Security Standardization &	
Certification"	15
Figure 4. Key Exploitable Results in FISHY website	20
Figure 5. FISHY website analytics, second year	20
Figure 6. FISHY website analytics, first and second year	21
Figure 7. Users by country, during Y2	21
Figure 8. Top channels for accessing during Y2 (June 28, 2022)	21
Figure 9. FISHY website visitors-Gender balance (June 28, 2022)	22
Figure 10. Most visited pages during Y2 (June 28,2022)	22
Figure 11. Twitter account (June 29, 2022)	23
Figure 12. LinkedIn account (June 29, 2022)	24
Figure 13. Most appreciated tweets during Y2 (June 29, 2022)	24
Figure 14. LinkedIn posts with more impressions	25
Figure 15. FISHY video presenting the project	26
Figure 16. Use case FISHY infographics	29
Figure 17. FISHY KERs and joint exploitation model	40
Figure 18. Restructuring KERs onto the final joint exploitation model (early version on the le	ft,
final version on the right)	45
Figure 19. Distribution of FISHY innovations across its KERs	46
Figure 20. Distribution of the IP results across the KERs	60

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						7 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



# List of Acronyms

Abbreviation / acronym	Description
AB	Advisory Board
ACME WG	Automated Certificate Management Environment Working Group
BMC	Business Model Canvas
BOE	Boletin Oficial del Estado
CNF	Cloud-native Network Function
D	Deliverable
DoA	Description of Action
EC	European Commission
EDA	Exploitation Domains of Action
EDC	Enforcement & Dynamic Configuration
EIM	Exploitation and Innovation Manager
EPO	European Patent Office
ER	Exploitable Result
EU	European Union
GA	Grant Agreement
GDPR	General Data Protection Regulation
HIDS	Host-based Intrusion Detection System
НРС	High Performance Computing
HRB	Horizon Results Booster
I2NSF WG	Interface to Network Security Functions Working Group
IDS	Intrusion Detection System
IETF	Internet Engineering Task Force
IGT	Impact Generation Team
IRO	Intent-based Resilience Orchestration
IRTF	Internet Research Task Force
ISO	International Organization for Standardization

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						8 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



Abbreviation / acronym	Description
ITRO	IT Resilience Orchestration
JSON	JavaScript Object Notation
KER	Key Exploitable Results
MTRL	Market Technology Readiness Level
NETMOD WG	Network Modeling Working Group
NFV	Network Function Virtualisation
NGFW	Next Generation firewall
NIDS	Network-based Intrusion Detection System
NMRG	Network Management Research Group
OPSAWG	Operations and Management Area Working Group
PPM WG	Privacy Preserving Measurement Working Group
RATS WG	Remote ATtestation ProcedureS Working Group
SACM	Security Assurance & Certification Manager
SDN	Software Defined Networking
SEM	Security Event Management
SFC WG	Service Function Chaining Working Group
SIA	Secure Infrastructure Abstraction
SIEM	Security Information and Event Management
SIM	Security Information Management
SNMP	Simple Network Management Protocol
SOAR	Security Orchestration, Automation, and Response
SPI	Security & Privacy Dataspace Infrastructure
SWOT	Strengths, Weaknesses, Opportunities, and Threats
тсо	Total Cost of Ownership
ТСР	Transfer Control Protocol
TIM	Trust & Incident Manager
UDP	User Datagram Protocol
UTM	Unified Threat Management
UVP	Unique Value Proposition

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						9 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



### **Executive Summary**

This document reports the WP7 activities during the second year of the FISHY project; as well as the accumulative work done along the whole project duration. Moreover, the updated plans for the last year of the project are also presented. The document is the the public version of D7.6 and is organized as follows. The first section of introduction provides context on the present document, followed by a section for each task in WP7 summarizing the work carried out on each one of them. Apart from these sections and after the conclusions and references, an appendix about the IP background and results is presented. The detailed dissemination and communication activities where the consortium participated are detailed in section 2, together with the employed communication tools and the associated impact measuring metrics, and an updated plan for the last year. The results of standardization activities are also presented, in terms of the contributions made so far, and an analysis of the most salient opportunities for further contribution. As the project has initiated the active contribution to upstream open-source projects, this initial activity is reported together with a discussion of the general open-source strategy. The analysis on the exploitation framework for the project results, performed throughout the second year of the project as part of its innovation management activity, is translated into an analysis of exploitation opportunities summarized in this public version of the deliverable, with the collaboration of the project External Advisory Board extensively described throughout section 4.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						10 of 70
Reference:	D7.3	V7.3 Dissemination: PU Version: 1.0					Final



## 1 Introduction

#### 1.1 Relation to other project tasks

The purpose of this document is to provide a detailed report of the activities related to dissemination, standardization and exploitations activities carried during the second year of the project. It is of great importance to maintain good monitoring and evaluating practices throughout the project lifetime to maximize the impact of its outputs, detailing and analyzing already performed and ongoing activities, and using them as input to establish a plan for future actions. This translates into the continuous metering of communication and dissemination impact, the identification and monitoring of standardization opportunities and contributions, and the analysis of innovation options in the framework of the potential market for project results. In addition to this, the partners provide updates on their individual and coordinated plans to maximize project impact, with the aim of ensuring the adaptability and flexibility that can help introduce added value to the produced outcomes.

Regarding the recommendation from the 1<sup>st</sup> review meeting about the measure of additional qualitative and impact-oriented indicators. These recommendations were already presented in our 2<sup>nd</sup> review meeting. The summary of these qualitative activities is:

- FISHY has strengthened collaborations with other European projects during Y2 of the project as a consequence EU research in the FISHY areas will reach out higher levels of quality, innovation and audience.
- The maturity of the project has fueled the seed for internal research collaborations between partners: FISHY expects highly impacting joint publication to come in the next months.
- The work done on social networks has also enlarged the communication activities towards maximizing the project visibility.
- The ongoing discussion about the model of offering of the FISHY platform, the extensibility of it towards interacting with existing cybersecurity solutions, and the plan to deliver value from each of the defined KERs, have already provided results that can be consulted in the context of exploitation in section 4.

The impact creation activities within WP7 reported here are horizontal activities within the project, and therefore directly related to all other work packages, collaborating with them in identifying the opportunities for impact creation and in translating project results into contributions in the areas of communication, standardization, and further exploitation. This deliverable constitutes the second of a series of periodic reports, each corresponding to one of the years in the project lifetime. The document is an update of the report produced in the first year, [1]. D7.3 is the summarized public version of the full document published as deliverable D7.6. D7.3 will be followed by the corresponding update reflected in the public deliverable D7.4 and in its confidential counterpart D7.7, reporting progress and plan updates for year 3, in the light of the final update of the project.

#### 1.2 Structure of the document

The document is structured according to the three classes of impact creation activities, each one reported in one of the chapters.

Chapter 2 details the communication and dissemination activities, ranging from event participation and organization to publications of different nature. The different communication channels (website,

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						11 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



social networks, newsletters, etc.) are described and their impact analysed as well. An update of the communication plan for the next project year is included.

Chapter 3 summarizes the active involvement and the contributions made to different standardization bodies and industry groups, including the discussion of ongoing activities and further contributions.

Chapter 4 reports the activities regarding further exploitation of project results, with specific focus on innovation management aspects, with the identification of the project's innovation assets and the exploitation framework for them, deriving a plan for business development with the support of the Horizon Results Booster programme and the project's External Advisory Board.

#### 1.3 Glossary adopted in this document

The most important terms used in this document and their explanation are listed below.

- **Business Model**. The rationale of a company to generate, deliver and capture value out of their commercial offering and their business relationships.
- **Domain of action.** This is the domain targeted by partners responsible for the KERs.
- **Feature comparison.** The analysis of the competitors based on the comparison with their features and the value they can generate.
- **Key Exploitable Results (KER or plural KERs).** These are the results implying business potential from the technology partners in the project.
- Legal and Regulatory Landscape. The legislation basis in relation to the scope of FISHY affecting at international, national and regional levels.
- **Market growth.** The volume and potential of a specific market in the context of the industry and audience it is addressing.
- **Market radar**. Continuous monitoring of relative positioning of the top software vendors within a specific market or niche (or domain of action).
- Market trend. The tendencies and dynamics of the market resulting into the attractiveness of the IT and what it relates to.
- **Technological imperatives.** The technologies that translate the necessities to be addressed in a specific industry.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						12 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



## 2 Dissemination & Communication

In this chapter, the specific communication and dissemination activities carried out during the second year of the project are deeply described. Also the KPIs related to communication and dissemination are updated and reviewed.

These activities include, but are not limited to, participation in events/conferences/workshops, published scientific papers, blog entries and other general publications, fostering relationships and synergies with related projects.

#### 2.1 FISHY in events

#### 2.1.1 FISHY dedicated events

During this second year of the FISHY project, we held different FISHY internal events:

1st Review meeting was held remotely on October 27, 2021. The reviewers attending were:

- Santiago Fidel, Project Officer, EU
- Pino Caballero-Gil, University of La Laguna.
- Athanasios Karantzias, University of Piraeus
- An Braeken, Vrije Universiteit Brussel
- Jorge Ferreira, Amkor, Portugal

The result of the first review was very successful and the comments and suggestions from the reviewers were very useful to face the second year of the project. One of these valuables suggestions was that the project defines, adopts, and regularly measures additional qualitative and impact-oriented indicators.

On March 1st, 2022, we participated in the **meeting/workshop** with Julià Manzanas, Areopa Group, from the **Horizon Results Booster** where the FISHY team presented FISHY's KERs. It was an iterative process with Julià, taking several meetings, starting with the overview of KERs and then drilling down into each KER, and was very positive to start setting out an exploitation strategy.

During the 4<sup>th</sup> General Assembly on March 24<sup>th</sup> 2022, the FISHY consortium had its **second online meeting with the Advisory Board**. The EAB members attending the meeting were:

- Jianping Wang, University of Hong Kong, China
- Xiangtong Qi, Hong Kong University of Science and Technology, China

The main outcomes/suggestions of this very fruitful meeting have been:

- Set a good understanding of the skillset, benefits and usability of the FISHY technology
- Define the minimum deployment needed for FISHY to operate correctly
- Explore the combination of FISHY tools with existing systems in the infrastructure owner
- Publish press releases as LinkedIn articles
- Put the focus on the benefits of FISHY rather than on technical aspects when communicating to the outside world
- Strengthen efforts in standardization

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						13 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final





Figure 1. SADE use case demo in 2<sup>nd</sup> review meeting

Finally, on May 18 2022, FISHY had its **second review meeting**; It was a very fruitful and successful remote meeting including demos of each one of the use cases.

#### 2.1.1.1 FISHY workshops

During the first year of the project FISHY already organized two of the three planned FISHY workshops; and in this second year the third workshop was also organized:

**3**<sup>rd</sup> **FISHY workshop**: On March 28,2022, FISHY organized the 1st International Workshop on Key challenges in global cybersecurity: Efforts and trends in EU (KCYEU) organized jointly with H2020 CYRENE and H2020 IoTAC, co-located with the DRCN2022 conference<sup>1</sup>.

The main focus of the workshop was to track current research in cybersecurity, especially in the fields of IoT and supplychain but also open to other cybersecurity research areas and projects.

The full program of the workshop (shown in Figure 2) included one technical session, one work-inprogress session and a keynote by Prof. Erol Gelenbe. In the technical session two papers from FISHY were presented and in the work-in-progress session another paper from FISHY was presented.

13:30-13:45 CET Welcome: Henrique Santos (University of Minho)
13:45-14:15 CET Keynote: The Dynamics of Cybersecurity Speaker: Prof Erol Gelenbe
14:15-16:15 CET Technical session: <b>Key challenges in global cybersecurity: Efforts and trends in EU</b> Chair: Prof. Maria Carla Calzarossa (University of Pavia)
The IoTAC Software Security-by-Design Platform: Concept, Challenges, and Preliminary Overview Continuous Industrial Sector Cybersecurity Assessment Paradigm
16:15-16:30 CET Coffee Break
16:30-18:00 CET <b>Work-in-progress session</b> Chair: Dora Kallipolitou (Zelus P.C.)
Multi-Criteria Information Security Metrics Taxonomy for Industrial Environments Distributed Software Bill of Materials D-SBOM an new decentralized architecture for Software Component Analytics and Software Supply Chain Lifecyle Management Software Development for Automation of Threats Analysis in Web based CMSs Front-End Access Management System

Figure 2. KCYEU program

<sup>1</sup> https://www.drcn2022.upc.edu/65183/detail/drcn-2022.html

Document name:	D7.3 Repo	$D7.3\ \text{Report}$ on dissemination, standards and exploitation (Y2)					14 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### 2.1.2 Participation in Events/conferences/fairs

Apart from the mentioned events and third workshop, FISHY partners participated in different events on behalf of FISHY during this second year of project.

- Work-in-progress presented in the EuroCybersec2021 workshop organized by the EU project IoTAC: A Machine Learning IDS for Known and Unknown Anomalies, by Francesc Aguilo from UPC.
- Clustering workshop, December 13,v2021 FUTURE PROOFING AND CERTIFYING SUPPLYCHAINS organized by the EU projects Assured<sup>2</sup> and CYRENE<sup>3</sup>.
- On Friday April 8, 2022, FISHY participated in the roundtable "The Need for IoT Security Standardization & Certification", with the participation of EU projects: CONCORDIA, IoTAC3, CYRENE2, BIECO and NGIOT. Henrique Santos from University of Minho presented "The Role of Certification to Leverage Trust level in IoT-based Supply Chains: the FISHY vision", as evident in Figure 3.



Figure 3. Henrique Santos participating in The Need for IoT Security Standardization & Certification"

- UC3M has presented a solution (L2S-M) to support virtual networking in Kubernetes clusters to the ETSI Open-Source Mano Community. This solution forms part of the SIA southbound interface. UC3M is actively working on the integration of L2S-M into the OSM codebase. In particular, UC3M has participated in the following Scientific events:
  - o OSM TECH Talks (weekly calls): 17/02/2022, 17/03/2022
  - OSM#12 Mid-term release conference: 10/03/2022
  - OSM #13 plenary conference: 01/06/2022
- SONAE presented FISHY in a webinar promoted by the National Innovation Agency of Portugal (ANI) on the 12th May 2022. The webinar was dedicated to showcasing co-funded projects in the themed area of advanced industries.
- TID takes part in the **GSMA OPG** (Operator Platform Group), where the SIA core elements have been introduced.
- Diego Lopez from TID made a keynote address at the IFIP/IEEE International Symposium on Integrated Network Management on 21 May 2021, titled "The road to aware-nets", with FISHY ACK.

<sup>&</sup>lt;sup>3</sup> https://www.cyrene.eu/

Document name:	D7.3 Repo	ort on disseminatior	Page:	15 of 70			
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>2</sup> https://www.project-assured.eu/



- CAPGEMINI has also presented the project inside the Capgemini group: Vice-President/Head of Research Capgemini Engineering and Head of Research Capgemini Engineering Spain
- CAPGEMINI also participated in the Digital Meeting Telecommunications and Services: "Challenges and objectives 2022" organized by the company's telco division.

#### 2.2 Publications

In the past deliverable [1] FISHY reported the publication of four papers in workshops and one in a conference. Now, after this second year the number of publications has shown growth and especially important is the current number of journals, six. This is the list of published scientific publication during this second year of project with ack to the FISHY project.

Journals:

- **The Green Blockchains of Circular Economy**, by George Hatzivasilis, Sotiris Ioannidis, Konstantinos Fysarakis, George Spanoudakis, Nikos Papadakis in Electronics 2021 (MPDI) 10(16), 2008, August 2021.
- A Secure Link-Layer Connectivity Platform for Multi-Site NFV Services, by Ivan Vidal, Borja Nogales, Diego Lopez and Juan Rodriguez, Francisco Valera and Arturo Azcorra in Electronics (Volume 10, Issue 15), August 2021.
- *Cybersecurity in ICT Supply Chains: Key Challenges and a Relevant Architecture*, by X.Masip, E.Marín, J.Ruiz, A.Jukan, P.Trakadas, A.Cernivec, A.Lioy, D.López, H.Santos, A.Gonos, A.Silva, J.Soriano, G.Kalogiannis, Sensors 2021, 21, 6057.
- A Combinatorial Reliability Analysis of Generic Service Function Chains in Data Center Networks, Anna Engelmann, and Admela Jukan in ACM Transactions on Modeling and Performance Evaluation of Computing Systems (Volume 6, Issue 3), September 2021.
- Scaling migrations and replications of Virtual Network Functions based on network traffic forecasting, by Francisco Carpio, Wolfgang Bziuk, Admela Jukan in Computer Networks Volume 203, 11, February 2022.
- Link Layer Connectivity as a Service for Ad-Hoc Microservice Platforms, by Luis F. Gonzalez, Ivan Vidal, Francisco Valera and Diego R. Lopez in IEEE Network (Volume: 36, Issue: 1), February 2022.

#### Conferences:

- **Engineering and Experimentally Benchmarking a Serverless Edge Computing System**, by Francisco Carpio, Marc Michalke, and Admela Jukan in Globecom 2021.
- *A Machine Learning IDS for Known and Unknown Anomalies* by F. Aguiló–Gost; E. Simó– Mezquita; E. Marín–Tordera; A. Hussain in DRCN 2022.
- Continuous Industrial Sector Cybersecurity Assessment Paradigm: Proposed Model of Cybersecurity Certification, by André da Silva Oliveira and Henrique Santos in DRCN 2022.
- Benchmarking Various ML Solutions in Complex Intent-Based Network Management Systems, by Mounir Bensalem, Jasenka Dizdarević, Admela Jukan in 2022 45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO), 2022.

Accepted for publication:

Document name:	D7.3 Repo	ort on dissemination	Page:	16 of 70			
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



 A model of capabilities of Network Security Functions, C. Basile, D. Canavese, L. Regano, I. Pedone, A. Lioy in SecSoft 2022: Proceedings of the 4th International Workshop on Cyber-Security in Software-defined and Virtualized Infrastructures, IEEE, July 1<sup>st</sup> 2022, Milan (Italy)

#### 2.3 Liaison with other projects, initiatives & communities

As it is reported in subsection 2.1.1.1, FISHY organized its third workshop in collaboration with IoTAC and CYRENE; as well as participated in three events, subsection 2.1.2, organized by different EU projects: EuroCybersec2021 workshop, Clustering workshop and the roundtable "The Need for IoT Security Standardization & Certification".

Apart from these events, in this section there are summarized other liaisons, both individually (at partner level), as well as jointly as a consortium. In that regards, different partners participate in close projects/initiatives which are mutually beneficious for both projects. Examples of these participations are:

- POLITO has collaborated with the PALANTIR H2020 project (grant agreement 883335) to support the platform integrity assessment using the Trust Monitor component and the policy refinement using our capability model.
- TID is proposing the use of the SIA core elements (L2S-M and PCIPS) in two H2020 projects: LABYRINTH and INSPIRE5Gplus.
- UC3M has collaborated with the LABYRINTH H2020 project (Grant agreement ID: 861696) to support the secure communication in the project using L2S-M.
- The FISHY Project has been used (UC3M) as an example on how to bring security to 5G communications in the "Master of lifelong learning in Network Function Virtualization (NFV) and Software Defined Networks (SDN) for 5G networks"<sup>4</sup>.
- UC3M has released, jointly with TID, an open-source project (L2S-M) to support virtual networking in Kubernetes clusters<sup>5</sup> L2S-M is used as the basis for the SIA southbound interface. The project repository includes a specific reference to the FISHY project.
- OPT is involved in IoTNGIN contributing in blockchain-relevant applications for smart agriculture.
- STS collaborated in "AI4HealthSec", A Dynamic and Self-Organized Artificial Swarm Intelligence Solution for Security and Privacy Threats in Healthcare ICT Infrastructures and "CYRENE", that enhances control and ensures accountability in Information and Communication Technology systems, components and services across a supply chain with the use of a novel, dynamic and evidence based Conformity Assessment Process for handling security threats and vulnerabilities and for evaluating the security and resilience of Supply Chain Services.
- UMinho participates in the ADMIN.IN project (National).
- SYN has presented FISHY to H2020-FASTER project building secure infrastructures for first responders in their open pilot workshop event in March 2022.

Finally, at the consortium level:

• ATOS has liaised with ECSO so that FISHY is featured in ECSO Cybersecurity Awareness Calendar, June 2022 edition as well as the collaboration with CSA Action SWForum.eu to boost the promotion of FISHY results [2, 3].

<sup>&</sup>lt;sup>5</sup> http://l2sm.io

Document name:	D7.3 Repo	ort on dissemination	Page:	17 of 70			
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>4</sup> <u>https://www.uc3m.es/master/NFV-SDN-5g-networks</u>



- UPC and ATOS are involved in a collaboration with CYRENE project, defining the lines of action. One of these lines is the creation of a common infographic, comparing both approaches to address the supply chain cybersecurity.
- With IoTAC project, FISHY has already collaborated/participated in different dissemination activities, and now both projects are discussing the participation in a common booth (with other 6 EU projects) in the IoT Solutions World Congress/Barcelona Cybersecurity Congress 2023, in January/February 2023.
- FISHY has been included in the SWForum.eu hub<sup>6</sup> in their project radar initiative; and it has been especially promoted during July 2022.

#### 2.4 FISHY Dissemination and Communication Channels/Tools

In this section, the different communication channels utilized in FISHY are described, as well as the evolution of them during this second year. Table 1 summarizes the target audience of FISHY and the tools to reach this audience.

Groups/ categories	Individual actors	Key message	How to address them	Tools	Achievement
General public (GP) and civil society organisations (CSO)	Supply chain, end users	Strong dependence of the whole society on systems built over supply chains	Very accessible language	Social media, website, workshops, fairs, brochures, leaflets, posters	<ul> <li>5048 visits to website</li> <li>178 Twitter and 85 LinkedIn followers</li> <li>3 workshops with 80 attendants, in total</li> <li>1 brochure and 4 infographics</li> <li>10 blog entries</li> </ul>
Industry (I)	Cloud/Edge providers IoT Providers Cybersecurity experts SMEs Large companies	Business benefits of the FISHY framework to address security in ICT infrastructure of large supply chains and ensure cross-resilience	Informative, technical, formal language	Social media, website, workshops, conferences, fairs, brochures, leaflets, posters, Journals/maga	<ul> <li>40% of followers in Linkedin come from Industry</li> <li>Industrial Panel in DRCN 2022 where 3rd FISHY workshop was co-located</li> </ul>

Table 1. Groups of audience and tools to reach them.

<sup>6</sup> https://swforum.eu/project-hub/coordinated-framework-cyber-resilient-supply-chain-systems-over-complex-ict-0

Document name:	D7.3 Repo	ort on disseminatior	Page:	18 of 70			
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



			-	_:		
				zines, press	•	IoT round table
				release		on April 8, 2022
Government (G)	Policy makers, decision makers, national and regional administration s, European Commission services	Large scale cyber- attacks on supply chains of complex ICT infrastructures can directly or indirectly impact various public services	Informative, non- technical, formal language	Social media, website, workshops, conferences, brochures, leaflets, posters, press release	•	3 Newsletters Published KERs
Scientific community (SC)	Artificial Intelligence, Cloud & Cybersecurity experts Standardizatio n organisations R&D teams and projects	How findings of the project can contribute on the state-of-the-art of the fields of cybersecurity, AI/ML applications, security assurance, etc.	Technical, formal language	Papers, scientific publications, webinars, conferences, workshops, website, newsletter, open access publications	•	6 journal papers of open access and 9 conference papers with more than 10 citations 3 workshop with 80 attendants 3 Newsletters 10 blog entries

#### 2.4.1 Website

One of the main ways of communication in FISHY is the website, not only because all the public content of FISHY is made available on the website, but also because other communication channels, such as blog, social networks, newsletter also use the website as a place to point out. It was designed and implemented jointly by ATOS and UPC. ATOS hosts the website and makes the structural changes and the update of news, publications, events, etc. is led by UPC as leaders of dissemination.

Document name:	D7.3 Repo	D7.3 Report on dissemination, standards and exploitation (Y2)					19 of 70
Reference:	D7.3	D7.3Dissemination:PUVersion:1.0				Status:	Final



As it is described in D7.2, the first release of the FISHY website was in December 2020, and a second version was released in March 2021, with different improvements such as the Blog and Promotional material tabs. During this second year different content was added, as well as some modification in the menus. One of the most important is the addition of the Key Exploitable Results tab in the Technology menu <u>https://fishy-project.eu/kers</u>.

	НОМЕ	TECHNOLOGY 🗸	PROJECT 🗸	NEWS & EVENTS	BLOG	CONTACT	
		Architecture					
		Use cases					
	Key Explo	Methodology					
		Key Exploitable Re	sults				26
The FISHY technology builds on seven Key Re KER1 Dashboard & Platform Dasing FISHY platform usability users according to their expect Suporting the hybrid model FISHY is envision cybersecurity that offers monitoring, and sec typically separate and vendor-specific). Benefits 1. Cybersec information readiness 2. Automation of cybersec pipelines 3. non vendor specific and able to integrate solutions	suits , making the ted profile an c needs inher ed to support urity and resil	whole system user- d thus permitted fur ent to the heteroger lince enforcement up up u	friendly and rec rectionalities.	ady to be used for or rse supply chain so chular approach to chular approach to these functionaliti setting (s) setting (s) se	different cenario al ensuring es are "I" Telefolo est & Prandi tel (DC) Est Est Est Est Est Est Est Est Est Est	SO Yun	
Use cases		Supp.	HSHY Plat	oum packnone.			

Figure 4. Key Exploitable Results in FISHY website

In Figure 5 and Figure 6 the summary of website analytics is presented, for the second year and also for the whole project respectively (until June 27, 2022). Usually the peaks in the graph regarding the number of users are related to publications on the website; for instance in Figure 5, there are peaks:

- October 27-28, 2021, 1<sup>st</sup> review meeting.
- December 22-25, 2021, XLAB blog entry.
- January 20, 2022, about new journal publication.
- March 17, 2022, POLITO blog entry.
- April 20, 2022, 3<sup>rd</sup> workshop papers publication.
- June 20, 2022, FISHY in ECSO Cybersecurity Awareness Calendar, June 2022 edition.

Users + VS Select a metric							Hourly Day Week Month
<ul> <li>Users</li> </ul>							
60							
40	mm		Wednesday, 19 January 2022 # Users: 3	M	bruh	1 MMM	mont
October 2	021 November 2021	December 2021	January 2022	February 2022	March 2022 Ap	oni 2022 May 2022	June 2022
						New Visito	r 📕 Returning Visitor
Users	New Users	Sessions	Number of Sessions per User	Page Views	Pages/Session		
2,163 	2,156	2,322 www.d.wohnworm	1.07 <u>m<sup></sup>ri<b>n</b>mini</u> ni	3,666 www.holehole.hole.hole.	1.58 William <u>Incolance des abo</u>		90.8%



Document name:	D7.3 Repo	D7.3 Report on dissemination, standards and exploitation (Y2)					20 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



Users + VS Select a metric						Hourty Day Week Month
Users						
200						
100						
h h Mhama	halman M	Manna	Mannen 1	Anna		have donted and and and
January 2021	March 2021	May 2021 Jul	ly 2021 Septemb	er 2021 November	2021 January 2022	March 2022 May 2022
lleare	New Lieare	Careinne	Number of Sections per liter	Page Viewe	Panae/Saesion	Returning Visitor
5.054	5.056	6 3 7 6	1 26	1/ 365	2 25	8.6%
5,054	5,050	0,370		14,303	2.20	
Michael and Looks and	Bulakana and Ladaard	Childrente and Junch and		a make many second second second	Lifenterfordualitet_backing hain	
Avg. Session Duration	Bounce Rate					N
00:01:37	67.44%					
American Street Like						
						90.4%

Figure 6. FISHY website analytics, first and second year

Also it is observed that FISHY accumulates 14365 pages views with an average time of session of 1 min 31 seconds. Most of the users, as shown in Figure 7, are from countries belonging to the consortium, Spain, Portugal, Greece, Italy, Slovenia and Germany. However it is remarkable in this list of the first ten countries United States, Austria, India and Hungary.

Country Users	% Users
1. 🔽 Spain 643	29.70%
2. 📑 United States 194	8.96%
3. 🔄 Greece 160	7.39%
4. 🚺 Portugal 143	6.61%
5. 🚺 Italy 128	5.91%
6. 🗰 Slovenia 107	4.94%
7. 📕 Germany 88	4.06%
8. 💶 India 57	2.63%
9. 🗖 Austria 48	2.22%
10. 🗮 Hungary 40	1.85%





Figure 8. Top channels for accessing during Y2 (June 28, 2022)

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2) Page: 21 o						21 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final







In Figure 8, the top channels for accessing the website are represented in percentage, where the direct access is the most used way of accessing the FISHY website. However, compared with the first year, the organic search has been gaining ground, from 16% in Y1 to 29% in Y2. Regarding gender balance, in Figure 9 it is shown that almost half of the visitors (45,85%) are women.

Finally, it is worth to mention the pages most visited, as shown in Figure 10, the top three are the main page, the summary of the project and the blog, followed by the news and events. The increase in visits to the blog is remarkable, being in Y1 in the 10<sup>th</sup> position and now in the third position, showing the growing interest on the blog entries published on the FISHY website.

Page		Page Views	% Page Views
1. /	(A)	693	18.82%
2. /coordinated-framework-cyber-resilient-supply-chain-systems-over-complex-ict-infrastructures	R	292	7.93%
3. /blog	P	202	5.48%
4. /news-events	R	191	5.19%
5. /farm-fork-f2f	R	181	4.91%
6. /publications	(F)	175	4.75%
7. /library/deliverables	R	147	3.99%
8. /consortium	R	104	2.82%
9. /architecture	Ð	98	2.66%
10. /use-cases	Ę	94	2.55%

Figure 10. Most visited pages during Y2 (June 28,2022)

#### 2.4.2 Social Networks

One important channel for disseminating and communicating FISHY results and news are the social media. In September 2020 a Twitter account, Figure 11, and a LinkedIn group were created. However, in March 2021 we changed the FISHY LinkedIn group to a usual LinkedIn account, Figure 12, to increase the visibility.

Although both accounts are used to publish news related to FISHY such as meetings, scientific publications, deliverables, workshops, etc, on LinkedIn the target audience is slightly different from the Twitter audience. Twitter is addressed to a more general audience, but not limited to it; and LinkedIn is focused on a more scientific and companies' audience.

FISHY also has a YouTube account where it is planned to upload videos about project and use case presentations and demos.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						22 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



The data (June 28, 2022) about these accounts are summarized as follows:

- Twitter
  - o Link: <u>https://twitter.com/H2020Fishy</u>
  - Number of tweets: 213 (+77 during Y2  $\approx$  7 per month)
  - Number of followers: 178 (+54 during Y2)
- LinkedIn
  - o Link: https://www.linkedin.com/in/fishy-project-16342920a/
  - Number of posts: 101 (+45 during Y2 $\approx$  4 per month)
  - Number of connections: 85 (+29 during Y2)
- YouTube
  - Link: https://www.youtube.com/channel/UCSDpfCPvFNjRS3RemG0iNQQ
  - Number of videos: 2
  - Visualizations: 32



Figure 11. Twitter account (June 29, 2022)

Document name:	D7.3 Repo	Page:	23 of 70				
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final





Figure 12. LinkedIn account (June 29, 2022)

		mpressions	Chargements	
PISHU	PISHY H0200 Project el-cutorhuy- Sep 10 New acopted journal in <b>61</b> /2002Fishy: *Oybersecuthy in ICT Supply Orients: Key Colleges and a Relevant Architecture In dustrial Internet of Things mdpi.com/1424-822021/1	720	25	3.6%
<b>N</b>	Transks to all the consoftum for this goal Way Texes Life HISNY 142020 Project electorizing occil The first yair of the 0142007Faily project is over and this months, since the first collocity both on the technical and the impact generation activities.	392	21	5.4%
-	pic.hvitter.com/gmddBSGeay Veer Twot atthity FISHY H2020 Project Britott/Twhy -Sep 28 New accepted paper by GNUBraunachweig: A. Engemann and A. Jukan, A. Combinatorial Reliability	372	11	3.0%
14	Analysis of Generic Service Function Charins in Data Center Networks, accepted for publication in ACM Transactions on Modeling and Performance Evaluation of Computing Systems View Texet activity FISHY H2020 Project de/0020Filey - Oct 8	198	18	9.1%
ก็ยาย	PBIYT will be in the EuroOpenets 2021 Workshop agrinedie by UB/Corpored The work-in programs. A Machine Learning (DB for Known and Urkinown Anonalie w.g.: F. Agalá, Grav, marth, tunkt, X. Massip, In-Indexen and M. Mahmoudi tion tills, UPC will be presented with will. Was Toward States			
Twee	Its Top Tweets Tweets and reciles Promoted			
		Impressions	Engagements	Engagement rate
Para	ESMY Mode Index Sectors was as a to hove a sector was also been as a sector of the sector of the sector of the protocol of the sector of the sector of the protocol of the sector of the year of the sector of the year of the sector of the year of the sector of the sect	270	Engagements 28	Engagement rate
Posta Posta	BitH H0000 Project disclosificative view dis Con Moday 28, we have the: How many the intervention of the ICVC10 operative How many the ICVC10 operative disclosed by How Many the ICVC10 oper	<u>Inpression</u> 270 242	28	Ergagement nata
	BRY H2020 Project al:0007w/s Mz 51     Cm Moday 23, we have the:     It iteramical Winkshop in Key challenges in global     Iteramical Winkshop in Key challenges in global     Winkshop in Key Challenges in Key Challenges     Winkshop in Key Challenges     Key Challenges Key	270 242 204	<u>Ergepernets</u> 28 8 8	819289019911 104% 10.4% 3.3% 5.9%
	PSHY H2020 Project set:0007ws; Mer 31     Cn Accuracy 38, we have the:	270 242 204 154	28 28 8 12 13	Experiment rate

#### Figure 13. Most appreciated tweets during Y2 (June 29, 2022)

Document name:	D7.3 Repo	Page:	24 of 70				
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



Figure 13 shows the most appreciated tweets (from September 1<sup>st</sup>, 2021 to June 29 2022), where it is observed that tweets with more impressions and /or engagement are usually related to main publications in FISHY or important events, such the 3<sup>rd</sup> FISHY workshop, Key challenges in global cybersecurity: Efforts and trends in EU (KCYEU). During this second year, the total number of Twitter impressions has been 8K impressions.



Figure 14. LinkedIn posts with more impressions

In the same sense, Figure 14, there are some of the LinkedIn post with more impressions, related especially to Blog posts on the FISHY website, as well as publications and events.

Finally, the first FISHY video addressed to a more general audience was released in April 2022 and it presents the Project<sup>7</sup> on the FISHY YouTube channel, Figure 15. In this video, project and technical coordinators describe the main insights of FISHY, as well as the exploitation leader explains the proposed exploitation strategy for FISHY. Currently, the use case partners are working for releasing three more videos describing the benefits of FISHY in each one of the pilots (planned for September 2022). One of these videos, about the F2F use is already published in the FISHY YouTube channel<sup>8</sup>. Also,

<sup>&</sup>lt;sup>8</sup> https://youtu.be/gImAd1KDLd4

Document name:	D7.3 Repo	25 of 70					
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>7</sup> https://www.youtube.com/watch?v=Us2FPgAg6kg&t=88s



the YouTube channel will be used to upload use case demo videos at the end of the project, validation phase.



Figure 15. FISHY video presenting the project

#### 2.4.3 FISHY project presentation

A first version of the FISHY presentation was prepared as Power Point file in April 2021 to be used in the different events where FISHY is presented. This presentation is available in the internal repository for being updated and personalized by the different partners, and a pdf version is published on the FISHY website<sup>9</sup>. This presentation has been updated during this second year to be used for instance in the 2<sup>nd</sup> advisory board meeting, in the Clustering workshop on December 13, 2021, or in the IoT roundtable on April 8, 2022, 2.1.2.

Apart from this general presentation, the consortium prepared different pitch and deck material, under the shape of an extra Power Point presentation, as well as a White Paper<sup>10</sup>.

#### 2.4.4 Newsletters

The main objective of the FISHY newsletter is the direct communications to the targeted stakeholders, such as, the European Commission, researchers and potential interested investors. At the beginning of the project, in the communication and dissemination plan, the consortium proposed a plan for newsletters, Table 2, that has been slightly updated according to the main events in the project. The newsletter task is led by UPC, as communication leader, but also is supervised by the project, technical and exploitation coordinators, as well as agreed with the whole consortium. During the second year of the project FISHY has released two new newsletters, second and third FISHY newsletters<sup>11</sup>; the third one gathering the information about main events such as the third FISHY workshop, the second meeting with the advisory board, as well and the second review meeting and the proposed KER for FISHY. The newsletters are usually uploaded to the FISHY website, News&Events section, but they are also sent by email to specific mailing lists.

<sup>11</sup> https://fishy-project.eu/node/142

Document name:	D7.3 Repo	26 of 70					
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>9</sup> https://fishy-project.eu/promotional-material/project-presentation

<sup>&</sup>lt;sup>10</sup> https://fishy-project.eu/promotional-material/white-paper



#### Table 2. FISHY Newsletter scheduling

#	Main Objective	Date	Date
π		planned	released
1	To inform about the Project objectives. To involve stakeholders in	M6	M6
	the project activities and workshops.		
2	To report results of the FISHY architecture and achievements in Y1.	M12	M13
2	To involve stakeholders in FISHY project activities and workshops.	M18	M22
5	Describing the results of the 2 <sup>nd</sup> review meeting and the KER.	IVIIO	10122
л	To inform about the achievements in the implementation of the	M24	Ν/Δ
-	use cases	1012-7	N/A
5	To provide details about the technical components of the FISHY	M30	NI/A
5	framework	10150	N/A
6	To inform about project outcomes and sustainability of these	M36	Ν/Δ
	achievements.	14130	11/7

#### 2.4.5 Blog

In our dissemination and communication plan described in D7.1 [3], the FISHY consortium agreed on publishing periodical blog entries with the next main ideas and policy: "The idea of publishing a blog is to spread FISHY to a more general audience and will be shared through a menu option in the Home page of the project website. FISHY blogs will have and extension of one page and the text should be supported by different graphical material, such as pictures, graphs, infographics, etc. Blog posts in FISHY will be published on a bi-monthly basis and will be produced by all partners with the view to communicate project findings as well as ignite interesting conversations. These blogs will be available from the project website. Blogs will be also promoted in the social networks, LinkedIn and Twitter."

During the first year of the project FISHY published four blog entries which cover a variety of topics including project results and also open to any research topics related to FISHY; during this second year FISHY has already published five more entries. FISHY blog posts have great popularity in terms of dissemination impact, as it can be observed in Figure 13 and Figure 14, especially in LinkedIn.

Partner	Date	Titles
ATOS	February 28, 2021	FISHY: Trustful and smart cybersecurity for supply chains
UPC	May 14, 2021	Securing IoT nodes in supply of chains
SYN	June 30, 2021,	Vulnerability Assessment
SONAE	August 31, 2021	The importance of security in the Industry 4.0 paradigm
CAPGEMINI	October 27, 2021	FISHY, IoT Security for the automotive Supply Chain

#### Table 3. Blog posts planning

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						27 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



XLAB	December 21. 2021	The importance of early detection of vulnerabilities and
	,	attacks for a healthy supply chain
POLITO	March 7, 2022	Easing the burden of network configuration: a capability- driven approach
TID	May 7, 2022	A reference framework for FISHY
TUBS	June 30, 2022	Intent-based Resilience Orchestration in Supply Chains
OPTIMUM	August 31, 2022	Experiences from validation of FISHY in the Farm to Fork use case
STS	October 31, 2022	[to be announced]
UMINHO	December 21, 2022	[to be announced]
SYN	February 28, 2023	[to be announced]
SONAE	April 30, 2023	[to be announced]
CAPGEMINI	June 30, 2023	[to be announced]
ATOS/UPC	August 31, 2023	[to be announced]

#### 2.4.6 Press releases

In D7.1, [3], the consortium agreed that the press releases are the means used to inform about how FISHY can produce benefits to the stakeholders' groups, such as: General public and civil society organisations, Industry, Government and Scientific community. Also it was planned to produce two press releases during the whole duration of the project.

The first one was published on the FISHY website <sup>12</sup>, in March 2021, also was made available in the repository because partners can update and use it on their internal websites or to be communicated to their own stakeholders or clients. This press release has been also published on LinkedIn as an article. The second press release is planned to be produce at the end of the project, gathering all the results of the project in terms of benefits to the use case provider.

#### 2.4.7 Dissemination & communication toolkit

The following section describes the printed/published online dissemination material already prepared in order to spread the message of FISHY. The initial idea was to print part of this material, such as brochure, posters and infographics to be used in face-to-face meetings, however due to the pandemic situation the consortium decided in the first and second year to have only online versions of this material, in the repository and on the website, to be freely used by the partners. However, for the third year of the project the consortium expects to attend different face to face events, where all this material will be used.

<sup>&</sup>lt;sup>12</sup> https://fishy-project.eu/sites/fishy-project.eu/files/public/content-files/2021/FISHY\_Press\_release\_V2\_1.pdf

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						28 of 70
Reference:	D7.3	Dissemination: PU Version: 1.0				Status:	Final



#### 2.4.7.1 Brochure

There is no update in the brochure already reported in D7.2 [1] and uploaded on the website<sup>13</sup> and unfortunately it could not be used yet in any physical event due to the pandemic situation during these two years of project. At the end of the project the consortium plans to produce a final brochure with the main achievements of FISHY in each use case and the final architecture.

#### 2.4.7.2 Infographics

During this second year three new infographics have been produced and uploaded on the FISHY website; one for each use case, where the main ideas about the benefits of FISHY in each one of the use cases have been highlighted. Also, the infographics have been disseminated in the social networks.



Figure 16. Use case FISHY infographics

#### 2.4.7.3 Videos

In section 2.4.2 the FISHY YouTube channel is reported, as well as the video of presentation of the project. Currently, the consortium is preparing three short videos, one per use case, describing the impact of FISHY in the pilots. One of these videos, about the F2F use case is already published on Youtube. These videos will be used next year in some of the planned events, such as the booth in the Cybersecurity Congress 2023 in Barcelona, planned to be attended jointly with several EU projects.

Furthermore, it is planned that some of the blog entries bi-monthly produced maybe be under the shape of video-blog; and also, a video describing the FISHY architecture mixing animation and real video at the end of the project.

<sup>&</sup>lt;sup>13</sup> https://fishy-project.eu/sites/fishy/files/public/content-files/2021/fishy-flyer.pdf

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						29 of 70
Reference:	D7.3	D7.3 Dissemination: PU Version: 1.0					Final



#### 2.4.8 KPIs in communication and dissemination

In the grant agreement, the consortium established several performance indicators about communication and dissemination which are directly extracted from the grant agreement to Table 4, for the whole duration of the project.

KPI description	KPI Target
Scientific publication to conferences and journals supporting FISHY approach	At least 9 indexed journals and 20 conference papers
Impact factor of journals considered for FISHY publications	Greater than 2,5 (within JCR Q1 or Q2)
Number of workshops attended/organized	At least 6/3
Percentage of ISI indexed journal	90% (room for open source journals)
Ranking of conferences	75% must belong to tier1 or tier 2 conferences

#### Table 4. Dissemination Activities: KPIs and Targets

Regarding these KPIs in Table 4, the number of current published journals with ACK to the project is 6; and the impact factor of these journals is:

- Computer Networks (JCR 4.474 Q1)
- Electronics MDPI (JCR 2.397 Q3)
- Sensors MDPI (JCR 3.576 Q2)
- ACM Transactions on Modeling and Performance Evaluation of Computing Systems (JCR 0.41 Q3)
- IEEE Network (JCR 2.86 Q1)

During the last year of the project the consortium plans to publish in 3 or more journals due to the maturity of the research developed in the project, fulfilling this KPI.

Regarding the papers in conferences or workshops the number of published papers is 8, being some of them of ranks, in HPSR (rank C), ARES (rank B), DRCN (rank B) and Globecom (rank A), and then belonging to the ranking of conferences proposed by the KPI.

Finally, in terms of organized and attended workshop the consortium has already accomplished the proposed KPI with already 3 organized workshops, and more than 6 events attended.

Although these are well defined, in D7.1 there were proposed other more detailed indicators to assess the fulfilment of the project each year. These new KPIs are shown in Table 5 and Table 6, and in parenthesis there are detailed the KPIs achieved during this first and second years. As it can be observed FISHY is in good numbers in these tracking KPIs; even the number of scientific publications has increased from 1 to 6 journal publication. Regarding the number of articles in media, in the sequel we only include the number of proceedings papers in workshops/conferences; at the end of the project it is planned to completely fulfil this KPI. The other weak parameters in these tables are the followers on LinkedIn and number of video-blogs, but during the third year of the project the consortium expects to achieve these KPIs.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						30 of 70
Reference:	D7.3	7.3 Dissemination: PU Version: 1.0				Status:	Final



	Targets <sup>14</sup>	gets <sup>14</sup> Expected Impact		Europeted Immed			
KPI	Y1	Y2	Y3	Expected Impact			
Number of project- dedicated workshops	1 (2)	2(3)	3	Increased collaboration with other initiatives/projects/programmes for joint			
Number of attendees to the FISHY workshops	50 (40)	100 (80)	150	research, information exchange and dissemination.			
Number of FISHY events (Summer Camp/ Demo Day)	0	0	2	Increased awareness. Contact to external stakeholders to promote FISHY solutions.			
Number of attended events (including 4 exhibitions and industrial events)	10 (5)	20(7)	30	Ideas' gathering and knowledge exchang with relevant communities, projects an initiatives; Information about latest ICT news Liaisons; Increased awareness.			
Number of scientific publications (90% ISI indexed journals)	1 (1)	5(6)	9	Validation of the preiotic company findings			
Number of articles in general media (at least 20 publications to international conferences and workshops related to cyber resilience)	2 (1)	10(9)	20	and advantages; Promotion of results to scientific communities; Ideas' gathering and knowledge exchange with relevant communities and initiatives.			
Liaisons and joint activities with other projects, communities, initiatives.	5(4)	7(7)	10	Communication of project news, events & results; Validation of project's concept, findings and progress; Ideas' gathering and knowledge exchange; Increased awareness.			
Contributions to standardizations	0(15)	2(22)	5	Submission of at least 4 contributions in relevant industrial bodies and communities			

#### Table 5. Dissemination proposed KPIs

#### Table 6. Communication proposed KPIs

	Targets			<b>F</b>			
крі	Y1	1 Y2 Y3		Expected Impact			
Number of unique website visitors	1,500 (2519)	2,500 (5048)	3,500	Main online information channel;			
Average duration of website visits	2 min (2 min 10 s)	2,5 min (1 min 37 s)	3 min	Communication of project news, event & results; Liaisons with other initiative projects, working groups; Increase			

 $^{\mbox{\tiny 14}}$  The number in brackets is the already achieved results.

Document name:	D7.3 Repo	ort on disseminatior	Page:	31 of 70			
Reference:	D7.3	D7.3 Dissemination: PU Version: 1.0					Final



Number of website page views	3,000 (9188)	5,000 (14317)	8,000	awareness. Drive engagement with the project.
Number of references to the project website on search engine (Link Building)	10 (14)	15 (25)	20	Liaisons with other initiatives, projects through links; Increased awareness
Number of accumulative followers in Twitter	100 (124)	200 (178)	250	Increased visibility to stakeholders active
Number of tweets	100 (139)	200 (213)	300	in social media; Attainment of interest of stakeholders; Direct communication with
Number of LinkedIn members	100 (56)	200 (85)	250	followers. Sharing knowledge with other projects and initiatives. Drive
Number of posts, news/ events on the website	15 (>15 )	30 (>30)	45	engagement with the project
Number of brochures	1 (1)	1(1)	1	Increased awareness. Drive engagement with the project
Number of infographics	3 (2)	3(4)	3	Increased awareness on project use cases.
Number of posters	1 (0)	1(0)	1	Communication of main project's concepts and advances in a catchy and easily understandable manner. Drive engagement with the project
Number of blog posts	4 (4)	10 (10)	16	Communication of main project's concepts and advances in a catchy and easily understandable manner. Drive engagement with the project
Number of project videos	1 (0)	1 (2)	2	Increase awareness. Reinforcement of the exploitation strategy.
Number of blog videos	2 (0)	4 (0)	6	Communication of main project's concepts and advances in a catchy and easily understandable manner. Drive engagement with the project
Number of press releases	1 (1)	1(1)	2	Communication of project news, events & results; Increased awareness. Unique branding and visual identity of the project; Improves communication of results and information provision during events.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						32 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### 2.5 Dissemination and communication plan for Y3

The main dissemination and communication plans, at consortium level, for the third and last of the project includes, but is also open to other initiatives:

- Organization of a Demo day
- Organization of a Summer Camp
- Attendance of an Exhibition Event → Currently the consortium is discussing the attendance to a shared booth in the Barcelona Cybersecurity Congress 2023 (organized by IoTAC)
- Invitation to SWForum.eu featured Project Spotlight, supporting in leaving a mark in Open Source Software
- Publication of at least 3 journals and 12 conferences.
- Production of a white paper with CYRENE project.
- Production of 4 more videos
- Production of at least a video-blog.
- Production of 2 Newsletters and 1 press release.
- Production of a final brochure and poster.

Apart from these planned activities, FISHY will be continuously updating the website as well as posting on LinkedIn and Twitter. The individual plans for dissemination and communication of the different partners are detailed in the next subsections.

#### 2.5.1 ATOS

The main ATOS dissemination/communication plans for Y3 are:

- New insights about FISHY on our project website
- Another blog entry
- Writing a joint paper with the Consortium about FISHY
- Media presence, mainly Twitter and LinkedIn
- Internal promotion of FISHY results
- Attendance to a physical (if possible) / online relevant event to showcase the project, teaming up with the Consortium.
- Looking for new alliances with synergic projects

#### 2.5.2 SYN

Apart of the usual participation in FISHY workshops, demo day and summer camp, SYN is planning the preparation of a paper on the Farm to Fork use case on the final pilot results.

#### 2.5.3 XLAB

The main XLAB dissemination/communication plans for Y3 are:

- Preparation of training material for TIM component.
- Possible conference/journal paper
- Participation in blog and social media

Document name:	D7.3 Repo	ort on disseminatio	Page:	33 of 70			
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



- Participation in workshops and events organised by the project
- Co-creation of pitch materials
- Pitch activities

#### 2.5.4 POLITO

POLITO will continue to disseminate the results of the FISHY project in different ways. POLITO is planning to publish new journal and conference papers with an acknowledgment to the FISHY project. In addition, POLITO is also actively collaborating with the PALANTIR H2020 project and we will actively disseminate our results and activities with this project's partners. In this regard, it is expected that some joint scientific publication will be also produced.

#### 2.5.5 TID

TID plans to continue the dissemination activities of FISHY results, especially focused on the SIA core elements (L2S-M and PCIPS), and aimed in three main directions:

- Publications of results. A publication for the IEEE Access Journal is currently under preparation, in collaboration with UC3M.
- The dissemination of results in industrial events and forums such as GSMA, the OSM community and the recent TFS open-source initiative
- Building internal awareness within the Telefonica group, through specific and general corporate events.

#### 2.5.6 UPC

UPC as the task leader of dissemination and communication, will continue coordinating the overall set of activities and actions related to communication and dissemination. In this leadership role, UPC will gather all the information about dissemination actions from all partners, such as scientific publications, blog entries, attendance of events and others. Fruit of this activity, UPC will continue updating news and events on FISHY website, as well as posting on LinkedIn and Twitter. UPC is also in charge of the production of the last two Newsletters of the project as well as the final press release. Apart from this, UPC will collaborate in the production of new videos about the project.

From the research point of view, UPC plans to write 2 papers in journals and 3 more submitted to conferences.

#### 2.5.7 TUBS

Planning to publish a new conference paper with an acknowledgment to the FISHY project.

#### 2.5.8 OPT

Preparation of a paper on the Farm to Fork use case on the final pilot results in collaboration with SYN.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						34 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### 2.5.9 SONAE

The dissemination and communication plans for Y3 of SONAE are:

- SONAE ARAUCO's channels such as corporate website and social media channels
- SONAE's social media channels
- Industry events
- A new blog entry on the FISHY website
- A use case video of FISHY

#### 2.5.10 CAPGEMINI ENG

- CAPGEMINI is reviewing with their Communications Department events schedule to identify in which one makes sense to use dissemination material.
- CAPGEMINI will be publishing an entry on internal blog in the company regarding updates on our collaboration in FISHY and the use stories to be validated in second iteration.
- Also planning to publish an article on public website of the company.
- Actively sharing posts from the project on social networks as LinkedIn.
- It is expected to collaborate generating some joint scientific publications with different FISHY partners.

#### 2.5.11 STS

STS has submitted the paper 'Incident Handling for Healthcare Organizations and Supply-Chains') for ICTS4eHealth 2022<sup>15</sup>.

#### 2.5.12 UMINHO

UMinho will continue to look for opportunities to disseminate the FISHY project, mainly through the contacts with local industries, and as soon as we have some kind of demonstration tool.

We expect to contribute more effectively to the project dissemination through the social networks.

Concerning the scientific results, we expect to publish two papers in journals, with research results and two papers in conferences.

We also expect to launch the project of a standard, based on the FISHY results, aiming to address metrics and security objectives issues.

#### 2.5.13 UC3M

UC3M will continue to expand the dissemination of the FISHY project in the upcoming months. Particularly, it is expected that more scientific publications under the ACK of FISHY will be published. A publication for the IEEE Access Journal is currently under preparation.

UC3M will also continue to disseminate the work performed in FISHY by attending future meetings of ETSI's OSM, showcasing the evolution of some of the components of the FISHY Project.

UC3M plans to expand its dissemination activities through collaborations with different FISHY partners. In this regard, it is expected that some joint scientific publication will be generated.

<sup>&</sup>lt;sup>15</sup> https://www.icts4ehealth.icar.cnr.it/

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						35 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



### 3 Standardisation

#### 3.1 Contributions to Standards Development Organisations (SDOs)

During this year, FISHY partners have focused their contributions to SDOs on those aspects better aligned to project goals and where impact could become higher. Special emphasis has been made on the adoption of project concepts for different work-items and activities, seeking for a long-term impact, even beyond the project lifetime.

#### 3.1.1 IETF and IRTF

Within the IETF (Internet Engineering Task Force), and its research branch IRTF (Internet Research Task Force), FISHY has contributed on the following Working Groups (WG) and Research Groups (RG):

- ACME WG (on certificate management), achieving the publication of the profile for delegation for short-lived certificates (STAR)<sup>16</sup>.
- **I2NSF WG** (on security function management), with the discussion of a recharting proposal to extend the activity of the group<sup>17</sup>.
- **NETMOD WG** (on network modelling), with a document on modelling extended access control lists<sup>18</sup>.
- **NMRG** (on network management), with a document on the characterization and classification of network intents<sup>19</sup>, currently under evaluation for publication.
- **OPSAWG** (on network operational aspects), with several documents on data modelling and intent-based operations<sup>20,21,22</sup>.
- **PPM WG** (on privacy preservation in network measurements), supporting the charter of the new group<sup>23</sup>.
- **RATS WG** (on remote attestation mechanisms), extending the charter of the group and its activity<sup>24</sup>.
- **SFC WG** (on service function chaining), participating in the discussions on group extension, that was finally not accepted.

Finally, the project has been instrumental in the proposal of a new WG within the Security Area. This WG, named **SCITT** (Supply Chain Integrity, Transparency, and Trust)<sup>25</sup> is totally aligned with the main goals of the project, and we are working in maximising the future of project results in supply chain security standards withing the IETF. The group is expected to be approved in the next IETF meeting (end of July 2022, in Philadelphia, USA), and some project results (particularly the SIA approach) have been listed as one of the relevant implementations for the SCITT proposal.

<sup>&</sup>lt;sup>25</sup> https://www.ietf.org/mailman/listinfo/scitt

Document name:	$D7.3\ \text{Report}$ on dissemination, standards and exploitation (Y2)						36 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>16</sup> https://www.ietf.org/rfc/rfc9115.pdf

<sup>&</sup>lt;sup>17</sup> https://mailarchive.ietf.org/arch/browse/i2nsf/

<sup>&</sup>lt;sup>18</sup> https://datatracker.ietf.org/doc/html/draft-dbb-netmod-acl/

<sup>&</sup>lt;sup>19</sup> https://datatracker.ietf.org/doc/draft-irtf-nmrg-ibn-intent-classification/

<sup>&</sup>lt;sup>20</sup> https://datatracker.ietf.org/doc/draft-claise-opsawg-collected-data-manifest/

<sup>&</sup>lt;sup>21</sup> https://datatracker.ietf.org/doc/draft-palmero-opsawg-dmlmo/

<sup>&</sup>lt;sup>22</sup> https://datatracker.ietf.org/doc/draft-ietf-opsawg-service-assurance-architecture/

<sup>&</sup>lt;sup>23</sup> https://datatracker.ietf.org/wg/ppm/about/

<sup>&</sup>lt;sup>24</sup> https://datatracker.ietf.org/doc/charter-ietf-rats/01-00/



#### 3.1.2 ETSI

The project activity in ETSI has been focused on the following groups:

- **ISG NFV** (on network function virtualisation), acting as editors of the group Research Agenda<sup>26</sup>, and defining and supporting new work-items on the management of data analytics<sup>27</sup> and on virtualized function OAM (operations and management)<sup>28,29</sup>.
- **ISG SAI** (on secure AI applications), supporting the definition and approval of a new work-item on privacy aspects of AI/ML systems<sup>30</sup>.
- **ISG PDL** (on distributed ledger technologies), chairing the group and facilitating the definition and approval of work items on services for trust and identity management<sup>31</sup>, and on reputation management<sup>32</sup>.
- **ISG ZSM** (on zero-touch network and service management), chairing the group and collaborating in the definition of a new work-item on network digital twins<sup>33</sup>.

As a result of this activities, we were invited to participate in a joint event, organized by ETSI and CEN-CENELEC, titled "Standards in support of the industrial data value chain". This was an excellent opportunity to establish initial contacts and to position the project proposals as reference for further industrial standards.

#### 3.1.3 3GPP

The project has contributed as well to Service Activity 3 (SA3) of 3GPP, focused on security aspects. We have collaborated in the definition and approval of two new proposals on privacy-related issues, one on the improvement of the privacy support for SUPIs (subscribers' permanent identifiers), and another one on studying the privacy of identifiers over radio access<sup>34</sup>.

#### 3.2 Open-Source Strategy

The FISHY scope and architecture make it an *integration project*, seeking for the combination of existing tools to achieve a series of goals beyond the ones of the individual tools being integrated, and providing novel mechanisms to achieve such integration. As a research project in current IT, these tools are essentially open-source tools. Paraphrasing Sir Isaac Newton, FISHY is built "on the shoulders of open-source giants".

The FISHY team has identified such a set of tools, commonly known in open-source community as *upstream projects* and, following the common practice in these communities, it is committed to contribute back any update or enhancement provided during project lifetime to these upstream projects.

<sup>&</sup>lt;sup>34</sup> https://portal.3gpp.org/desktopmodules/WorkItem/WorkItemDetails.aspx?workitemId=940016

Document name:	$D7.3\ \text{Report}$ on dissemination, standards and exploitation (Y2)						37 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>26</sup> https://docbox.etsi.org/ISG/NFV/Open/Other/NFV\_Research\_Agenda-202104.pdf

<sup>&</sup>lt;sup>27</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=63972

<sup>&</sup>lt;sup>28</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=64336

<sup>&</sup>lt;sup>29</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=66222

<sup>&</sup>lt;sup>30</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=63499

<sup>&</sup>lt;sup>31</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=66207

<sup>&</sup>lt;sup>32</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=66206

<sup>&</sup>lt;sup>33</sup> https://portal.etsi.org/webapp/WorkProgram/Report\_WorkItem.asp?WKI\_ID=64372



This collaboration focused on upstream contributions has been initiated within the base modules of the SIA, providing enhancements developed by the project to the two main foundation upstream projects, Open-Source MANO (OSM) and OpenConfig. Other potential targets for upstream contribution are envisaged, as the integration towards Iteration 2 progresses.

Furthermore, the team is facilitating the access and evaluation of the FISHY Platform with the public access to an open version of the Sandbox environment described in D5.1.

#### 3.2.1 Contributing to OSM

Open-Source MANO (OSM) is an ETSI-hosted project to develop an Open Source NFV Management and Orchestration (MANO) software stack aligned with ETSI NFV. OSM has become a reference project for research and innovation in network transformation and softwarization, next-generation networking and advanced network management, sustained by a thriving ecosystem<sup>35</sup>.

The FISHY team has worked on contributions related to the multi-domain connectivity support provided by the L2S module developed for SIA, as an essential enabler for supporting the orchestration and management of cloud-native network functions.

A Proof-of-Concept for multidomain connectivity management, leveraging results of previous work currently incorporated in L2S, titled "Integration of 5G Experimentation Infrastructures into a Multi-Site NFV Ecosystem using OSM" has been executed and reported to the OSM community<sup>36</sup>.

A proposal for extension of OSM based on L2S was presented to the OSM Technical Steering Committee<sup>37</sup>, and approved as the feature titled "Connectivity among CNFs using SDN<sup>38</sup>.

#### 3.2.2 Contributing to OpenConfig

OpenConfig is a working group of network operators sharing the goal of building more dynamic, programmable network infrastructures by adopting software-defined networking principles such as declarative configuration and model-driven management and operations. The focus in OpenConfig is on compiling a consistent set of vendor-neutral data models and on the application of streaming telemetry as a new paradigm for network monitoring.

The FISHY team has made contribution regarding security data models (for keychain management<sup>39</sup>) and streaming telemetry based on the NetFlow protocol<sup>40</sup>.

#### 3.2.3 FISHY Sandbox Distribution

Finally, the nature of the FISHY software platform as integration of different (enhanced) open-source elements makes possible the distribution of this platform as an open virtual execution environment. This has already been achieved for Iteration 1 of the FRF (FISHY Reference Platform), making a sandbox environment for evaluating and experimenting with the FRF available at GitHub<sup>41</sup>.

<sup>40</sup> https://github.com/openconfig/gnpsi

<sup>&</sup>lt;sup>41</sup> https://github.com/Networks-it-uc3m/FISHY-Sandbox-development

Document name:	$D7.3\ \text{Report}$ on dissemination, standards and exploitation (Y2)						38 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>35</sup> https://osm.etsi.org/wikipub/index.php/OSM\_Ecosystem

<sup>&</sup>lt;sup>36</sup>https://osm.etsi.org/wikipub/index.php/OSM\_PoC\_13\_Integration\_of\_5G\_Experimentation\_Infrastructures\_into\_a\_Multi -Site\_NFV\_Ecosystem\_using\_OSM#Demos

 <sup>&</sup>lt;sup>37</sup> https://docbox.etsi.org/OSG/OSM/05-CONTRIBUTIONS/2022/OSM(22)000007\_L2S-M\_presentation\_\_10\_Feb\_2022\_.pdf
 <sup>38</sup> https://osm.etsi.org/gitlab/osm/features/-/issues/10921

<sup>&</sup>lt;sup>39</sup> https://github.com/openconfig/public/commit/c28f23731fe0d7b5816746bccef1efa25075b36a



### 4 Exploitation

The following section reports on the activities of Task 7.3 that focus on the exploitation of the project, during the Y2 reporting period of M13-M24. This builds on the first report published within the deliverable D7.2 and includes the IPR management, the business and product development, and the innovation tracking, leveraging other tasks of the project (e.g., the FISHY radar in Task 2.1).

In this section, we discuss the activities towards the maximization of the industrial impact over targeted verticals and elaborate on the achieved value proposition business models for the stakeholders. Moreover, we describe the exploration of the market positioning building on the FISHY Radar achievements in WP2, as published in the deliverables D2.3 and D2.6.

We also update on the individual and joint exploitation plans by the consortium partners towards the sustainability of the project and summarize the second interaction with the FISHY Advisory Board.

#### 4.1 Overview

The following section presents an overall overview of the main achievements and measured progress of Task 7.3 to the reader, that will later along the succeeding subsections be able to obtain details of that progress and achievements. In that, we start with the highlights obtained from M13 to M24 building on what was published in the preceding impact generation report in the deliverable D7.2. Then we follow with the analysis of the specifically drawn KPIs for this task, and the description of the lively interactions with other tasks across the project's work programme. We then discuss the experience in the first iteration with the Horizon Results Booster in the Q1 of 2022, that will be followed in the Q4 of 2022 with the forthcoming *Business Plan Development* coaching programme. Finally, we unveil the activities planned for the Year 3 of the lifetime of the project.

#### 4.1.1 Highlights

In this second reporting period, we have focused on elaborating on the Key Exploitable Results (KERs) of the project in parallel to the collaboration with the Horizon Results Booster (HRB) on the problems that those KERs are trying to solve, how is the proposed technology addressing those problems, and what is the unique value proposition (UVP) that will determine the differentiator of the solution that will derive from them (see Figure 17). These KERs are built from the earlier defined Exploitable Results (ERs) representing the innovation assets, offered by the FISHY project to the open source and the scientific communities, and through their exploitation, to the European business ecosystem. Their exploration roadmap was prepared in the context of the HRB European Commission (EC) initiative (further described in Section 4.1.4) and the results of that data collection and analysis are available to the consortium through a live and actionable document in the project's repository that can serve as guidance for the further technical work. It is a parallel effort to the FISHY Radar developed in the context of Task 2.1, aiming to keep the project in sync with the market and scientific landscapes. We will be engaged in two other coaching programmes from this initiative, one on business model planning in Q4 of 2022 focusing the FISHY platform (KER 1) and another on innovation management towards a go-to-market strategy focusing TIM (KER 2) in Q1 of 2023. This initiative is complementary to the Innovation Radar where the organisation already selected the FISHY Platform (KER 1) and SIA (KER 7) as the most innovative assets. This will then be scaled to the sustainability analysis, that is being

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						39 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



investigated in the context of the joint exploitation potential of the FISHY Reference Framework, and the achievements and the opportunities deriving from the use cases and the individual exploitation of project partner.



Figure 17. FISHY KERs and joint exploitation model

The KERs are exposed at the Horizon Results Platform and at the Cyberwatching.eu marketplace<sup>42</sup> to contribute to the clear communication of the benefits of the FISHY technology (this is further discussed in Section 4.2.4). Moreover, we are exploring the Cyberwatching.eu project radar<sup>43</sup> particularly regarding the MTRL comparison. The interactions with the innovation radar<sup>44</sup> have been done on a yearly basis, providing the answers to the Innovation Radar Questionnaire. We proceeded to exploring innovation radar having profiled XLAB as leader of exploitation<sup>45</sup>. In what regards to the ECSO SME Hub initiative<sup>46</sup>, FISHY was exposed in a thematic week, and we've been investigating on the *Cybersecurity Made in Europe* label<sup>47</sup>, usually paid and directed to companies not projects.

#### 4.1.2 KPIs

The updated progress of exploitation activities of FISHY is shown in the KPIs of Table 7 below for the T7.3 achievements. These exploitation specific KPIs improve the planning published in D7.1, based on expected outcomes as agreed within the consortium. While IPR management and product articulation have made significant progress (mostly due to the nature of the exploitation tasks in this first year), business development is showing some initial advances (mostly around joint exploitation) and go-to-market had some initial actions building on the communications activities and preliminary understanding of the FISHY business opportunities. These updates (and corrections) of the exploitation KPIs were published in Table 10 of deliverable D7.1.

<sup>&</sup>lt;sup>47</sup> https://www.cybersecurity-label.eu/how-to-get-the-label/

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						40 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final

<sup>&</sup>lt;sup>42</sup> https://www.cyberwatching.eu/projects/3097/fishy

<sup>&</sup>lt;sup>43</sup> https://radar.cyberwatching.eu/radar

<sup>44</sup> https://www.innoradar.eu/

<sup>&</sup>lt;sup>45</sup> https://www.innoradar.eu/resultbykeyword/xlab

<sup>&</sup>lt;sup>46</sup> https://ecs-org.eu/initiatives/ecso-sme-hub



As noticed in Table 7 below, we have already achieved some of the proposed targets for M36 in M24. Note that the figures for IPR management refer to the expected IP outcomes, while the figures for product articulation refer to the analysis of the project results that need to be configured along the way to the solutions. They show the IP results and exploitable results analysed, which is an initial work that can be refined during the lifetime of the project. We also expect these numbers to increase over the lifetime of the project including new trends and relevant competitors.

To better track the progress of the exploitation effort in the lifetime of the project, we have readjusted the KPI names and descriptions from those published in D7.2.

КРІ	Description	Metrics	Target (M36)	Threshold	Status (M24)
IPR Management	Identification, analysis and protection of IP results	# of IP instances logged and analysed	20	15	18
Innovation Management	nalysis of the FISHY novations with market otential # of exploitable results analysed		15	10	17
Product Development	Analysis of solutions from FISHY KERs	# of solutions prepared	10	5	8
Business Development	Focused business models based on joint exploitation	# of business tools prepared	5	3	6
Go-to-market	Coordinated communication of the FISHY Key Exploitable Results (KERs)	# of actions	5	1	3

#### Table 7. Updated KPIs for FISHY's exploitation activities

The progress on the IPR Management is described in the section 4.2.3 complemented by the appendix detailing the 18 IP results logged and analysed. The 17 exploitable results analysed within the progress of Innovation Management, published in the preceding deliverable D7.2, were refined and feed the Product Development progress on the 7 KERs and full-stack described in section 4.2.2. The business tools prepared to guide the Business Development of FISHY were started in D7.3, through the BMC, SWOT and PESTEL analysis defined with contribution from the competitors analysis in D2.1. Finally, in what regards the Go-to-market effort, we have exposed the KERs in a specific page on our website and across our marketing materials, through the Horizon Results Platform (as a first iteration to be updated in Y3) and through the Cyberwatching.eu Marketplace (see section 4.2.4).

#### 4.1.3 Interaction with other tasks

The transversal activities of the exploitation task in this second reporting period continue to leverage the results of most R&D tasks, distinguishing the innovation assets essential to product development. On the other hand, also the technical development is using the defined unique value proposition of

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						41 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



the established KERs, in sync with the communication perspectives that approximate the objectives of the exploitation of FISHY. This interaction with task T7.1 is active throughout the lifetime of the project, generating exploitation-focused content to agreed target audiences in effective ways. Moreover, the benefits of this interaction can be seen through the profiling in EC initiatives as, e.g., the Horizon Results Booster and Cyberwatching.eu (see Section4.2.4) but also in the context of liaisons like, e.g., the exploitation-focused communication collaboration with the CYRENE project.

The further developments of WP2 on the FISHY Radar were guided by the KERs established within the exploitation activities, and fed the latter with an updated market assessment and competitor analysis considering the overall functionality of FISHY across its KERs. This new phase of exploitation activities building on the new developments of the FISHY Radar, particularly in the context of the Technological Imperatives, brought more proximity to the use case implementation in WP6. We have explored the usefulness and limitations of each of the KERs (published in the deliverable D2.3). This will be followed in the 3<sup>rd</sup> reporting period by the business cases extracted from the exploitation of FISHY in the context of its use cases. This already generated infographics and blogposts and will also generate the three videos of the use cases in Q3 of 2022.

#### 4.1.4 Horizon Results Booster

During Q1 of 2022 the FISHY consortium was awarded with a coaching programme by the European initiative *Horizon Results Booster* (HRB) named Exploitation Strategy Seminar (ESS). This programme had the objective to guide brainstorming sessions on the use of the project's results through:

- 1) the identification/grouping of key exploitable results;
- 2) the first definition of the related use mode;
- 3) the identification and mapping of risks related to the exploitation.

It helped the team to characterise a selection of these results, identify the risks and potential obstacles for their exploitation, and analyse how to better address them in the context of their nature and of the nature of the key beneficiaries holding their IP ownership.

A first introductory meeting was held on 1.12.2021 with the leader of the exploitation task Joao Costa (XLAB) and the project coordinator Jose Francisco Ruiz (ATOS). A follow-up meeting with the FISHY consortium was held on 1.2.2022, after an exchange and analysis of respective documents, dedicated to the introduction to the participants and content of the programme, and to the essential knowledge to better perform *Communication, Dissemination and Exploitation.* It was followed by several interactions with the HRB mentor Julià Manzanas, and culminated in a hands-on workshop held on the 14.2.2022, 15.2.2022 and 17.2.2022 addressing KER 1, KER 3 and KER 2, respectively, where the three selected key results (listed in Table 8) were described and discussed. These discussions and further remote interactions originated a final report [4].

KER	Full name	TRL	Lead Partner	Acronym
1	FISHY Platform Backbone & Dashboard	5	UPC	N/A
2	Trust & Incident Manager	5	XLAB	TIM
3	Intent-based Resilience Orchestration	5	TUBS	IRO

#### Table 8. Key Results in analysis at the HRB programme

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						42 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



Having in mind that the time dedicated to the ESS seminar allows only for a few results to be discussed, we took the lessons learned and provided the base for further developing of this exploitation analysis for all the other KERs (as presented in the section 4.2).

Moreover, during April 2022 the consortium was awarded with a following coaching programme dedicated to the Business Plan Development planned to Q4 of 2022 and focusing the KER 1, i.e., the FISHY Platform Backbone and dashboard. This KER was identified as the one in the ESS analysis with more need of further exploitation work and can be extended to the business model of the full-stack FISHY solution that we are addressing in the last year of the project.

Furthermore, we were recently awarded with a final coaching programme on the go-to-market section focusing on KER 2 (TIM) that is the result including the biggest amount of innovation assets, from all KERs in analysis, and the one that is more market-ready. We will then use the gained knowledge to enrich the business opportunities across the other KERs in the project.

#### 4.1.5 Plans for Y3

In this second reporting period of the project we led the systematic work done to create a stable base through the appropriate IPR management, including the log of IP background and IP exploitable results synchronised with the defined KERs and the different levels of ownership they carry. We have also proceeded with the study of exploitation pathways for the identified innovation assets considered as key results in the context of these KERs established, in the context of the Horizon Results Booster coaching service. These were the base activities to build realistic business models and strategies in line with the achievements reached (as initiated in the deliverable D7.3). We will continue with these activities in relation to the technical work done in WP2 supporting it through the FISHY Radar, keeping the project in sync with the scientific, technological and market landscape. We will also intensify the exploration of exploitation potential, following the work of WP6 for the validation of the FISHY technology through its early technology adopters, the use cases.

Moreover, we will be intensifying the collaboration with the communication activities at T7.1 towards the communication of the unique value proposition and benefits of the innovation offered by FISHY through their innovations. Furthermore, we will be classifying these into IP-focused categories to better establish their differentiators, and update the exposure profiles accordingly, in the Horizon Results Platform, the Cyberwatching.eu Marketplace and other EC initiatives.

With the available prototypes of components of the FISHY solution available in M24, we will intensify the go-to-market activities in collaboration with the communication task T7.1, leveraging the R&D achievements. This also includes the successful implementation of the further releases of the FISHY platform in the use cases and the use cases validation and assessment where we can explore the FISHY potential in the three considered scenarios.

#### 4.2 Innovation Management

In the following, we will describe the progress of the innovation management activities of FISHY throughout this second reporting period. We will continue the discussion of the KERs started in the deliverable D2.3, describing its restructuring to a final stage, the relation with innovations (labelled earlier as ERs) and the defined domains of action.

Document name:	$D7.3\ \text{Report}$ on dissemination, standards and exploitation (Y2)						43 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### 4.2.1 Individual Exploitation Update

With the participation of a new partner U3CM as a third party in the project, with a particularly important role in the R&D of SIA, we have updated the KER-focused information made available in the next subsection 4.2.2, assigned an exploitation appointed person to take part of the WP7 meetings and decisions (Ivan Vidal), and present below their individual exploitation plan for the sake of completion.

#### U3CM

As an academic institution UC3M does not have capabilities to exploit potential commercial results directly, but it is interested in the academic exploitation of the results of the project that will have a notorious impact in different aspects.

From the academic perspective the outputs of the project will be used to improve UC3M training of under and postgraduate students (the Masters and PhD programs on Telematics Engineering and the Master program in NFV and SDN for 5G Networks will directly incorporate the results of the project as part of the scientific contents of some courses), as well as to attract post-doctorates and Ph.D. students to the UC3M Ph.D. program (the research that will be done in this project will be continued in future degree or master thesis as well as PhD thesis).

From a research perspective, UC3M will consolidate its expertise in the area of networking research, more specifically in the field of management and orchestration of vertical services, strengthening its position as one of the major research centres in Spain and Southern Europe. It will increase its visibility internationally by publishing papers at top conferences and giving seminars on the resulting work. The SIA components, developed as a result of the project execution, will potentially extend the 5TONIC testbed and will be used to support UC3M research and experimentation activities in national and international follow-up research projects within the scope of 5G/6G. UC3M will explore the possibility of publishing software, and facilitating technology transfer in the context of contracts with institutions and companies. Finally, UC3M will contribute to the development of open-source initiatives, in particular to Open Source MANO (OSM).

#### 4.2.2 Key Exploitable Results

The FISHY KERs were defined in an early stage of technological development and published in the previous impact generation report in deliverable D7.2, to be slightly modified in its final version presented in the deliverable D2.3 and further discussed in this section. To better align with the FISHY workflow and architecture, we have merged the *Security Metrics Assurance* and the *Evidence Certification Manager*, and reordered the KERs (see Figure 18) so that the *FISHY Platform Backbone* is exposed as the main KER, and can represent the full-stack solution. It will be the target for the *Business Plan Development* coaching programme of the HRB in the Q4 of 2022.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	44 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final





Figure 18. Restructuring KERs onto the final joint exploitation model (early version on the left, final version on the right)

To better understand the relation between the innovations distributed across the FISHY domains of action, and the corresponding KERs that they help to build (as represented in Figure 19 through colour correspondence), we analyse the work planned in the Description of Action (DoA) of the project and the IP ownership supporting the innovation assets identified (see Section 4.2.3). Recall that, as mentioned in the Section 2 of the deliverable D2.3, the IRO is now also part of the domains of action due to its importance in the KER structure of FISHY. The correspondence reflects the different levels of collaboration and expertise across KERs, all of which imply the collaboration of at least three consortium partners. This distribution will also guide the IP ownership analysis, and the joint exploitation in the context of the sustainability analysis performed in the forthcoming 3<sup>rd</sup> reporting period of the project.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	45 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final





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The following KER analysis was done in the context of the HRB work programme for the first three KERs, followed by the analysis of the other four KERs based on the gained know-how from the HRB coaching programme.

#### **KER 1 - FISHY Backbone**

Horizon Results Platform ID 42289 Cyberwatching.eu Marketplace ID 3097

#### Problem

The problem we are addressing with this KER is that of guaranteeing data security in a manufacturing context, ensuring data sharing with external entities and cybersecurity of IoT devices, as well as edge and cloud infrastructures. There is no end-to-end solution appropriately addressing the cybersecurity of supply chains. Moreover, the FISHY Platform should centralize the management of users, including different user profiles, and support system's administrators in their responsibility of monitoring the security of the IoT devices and systems they operate.

#### Solution

Our solution is a security platform that combines data sharing security mechanisms with technologies to reinforce IoT and edge/cloud security, fit for the manufacturing industry. It is focused on supporting IoT and other devices authentication and identification; supporting data integration and sharing along the value-chain.

It is a modular platform that can offer monitoring, and security and resilience enforcement all-in-one tool (these functionalities are typically separate and vendor-specific). Moreover, it is not vendor-specific; instead it adopts a modular approach to ensure cybersecurity and resilience (i.e., offering multiple modules/services).

#### Benefits

From the analysed aims and problems solved, we identify the following benefits:

- Cybersec information readiness
- Automation of cybersec pipelines
- Non vendor specific and able to integrate with existing solutions

#### UVP

FISHY is a platform that is not vendor-specific, with a modular approach for ensuring cybersecurity that offers monitoring, and security and resilience enforcement all-in-one tool (these functionalities are typically separate and vendor-specific). Moreover, it can automate cybersec pipelines, and is non vendor specific as well as able to integrate with existing solutions.

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Table 9. Partners' roles, interests and contributions to the FISHY Platform					
Role	Contribution	Interest			

Partner	Role	Contribution	Interest
ATOS	IP owner, contributing to the joint exploitation	Further developing XL- SIEM and RAE (risk assessment engine)	Exposing exploitable results, and successful project coordination
SYN	F2F use case owner validating exploitation and IP owner of TIM's smart contract component	Validation in the F2F use case	Appropriate satisfaction of F2F use case needs Smart contract component exploitation
XLAB	Exploitation task leader and IP owner	Expand on the capabilities, usability and exposure of Wazuh & VAT (vulnerability assessment tools) extensions, detection and protection components, and further development of the XOpera cloud orchestrator	Exposure of exploitable results and TIM (KER2)
POLITO	IP owner, academic partner	Development of the Integrity Assessment Toolkit (Trust monitor extension)	Exposure of exploitable results and IRO (KER3)
TID	IP owner and task leader of contribution to standards	Development of the Standardised API for network infrastructure abstraction and the Ordered Proof of Transit (OpoT)	Exposure of exploitable results and SIA (KER7)
UPC	Leader of the KER, project technical coordination, IP owner, academic partner, reuse of content to dissemination	KER leader and development of the Trustworthy identification and authentication of edge systems and the Advanced Mitigation strategy (PMEM)	Exposure of exploitable results and coordination of this KER (platform and dashboard)
TUBS	IP owner, academic partner	Development of the Intent- based resilience orchestrator (IRO)	Exposure of exploitable results and IRO (KER3)

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	48 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



ОРТ	IP owner of ILT-part of TIM's SC component supporting F2F use case	Supporting the F2F case and developing the ILT- based warehouse management system	Exposure of exploitable results and appropriate attendance of F2F use case needs
SONAE	Smart manufacturing	Validation in Smart Manufacturing use case	Appropriate attendance of Smart Manufacturing use case needs
ALTRAN/ CAPGEM INI	IoT Automotive early adopter	Validation in Vehicle ioT use case	Appropriate attendance of Vehicle IoT use case needs
STS	IP owner	Development of the Security Assurance & Certification Management Platform	Exposure of exploitable results and SACM (KER4)
UMinho	IP owner supporting smart manufacturing use case	Developing the Framework for InfSec evaluation within IoT	Exposure of exploitable results and SPI (KER5)
UC3M	IP owner	Supporting TID in the development of SIA	Exposure of exploitable results in SIA (KER7)

#### KER 2 - TIM

Horizon Results Platform ID 42318 Cyberwatching.eu Marketplace ID 3097

#### Problem

The continuous detection of vulnerabilities in production infrastructures and during software development phases, appearing in the infrastructure when new services or features are added, or simply when new vulnerabilities are discovered in existing (outdated) services. It is also challenging to track ongoing attacks and cyber risk exposure, particularly in real time and not after the attack succeeded, and having enough accuracy to improve the efficiency of attack detection and prevention.

#### Solution

The Trust & Incident Manager (TIM) is a FISHY component that performs the analysis of metrics collected by the monitoring components of the FISHY platform. TIM is responsible for determining the vulnerabilities, detecting attacks and/or incidents and generating mitigating actions for the purpose of hardening the cybersecurity level of a monitored infrastructure. FISHY makes available SIEM technology (wazuh, XL SIEM) for ongoing attack detection, in pair with a Risk Assessment Engine that provides a cyber risk report based on user online surveys, and continuously updating the risk value based on a combination of real time metrics. The risk report and ongoing attack activities are used by

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)				Page:	49 of 70	
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



the mitigation component (PMEM) to generate actions (e.g., IP block or port closure) that can stop attacks and improve the preventative measures (e.g., adding a firewall rule).

#### UVP

The vulnerability assessment in TIM enables users to set up custom scans based on any user-provided script or by using the integrated vulnerability scanners to run the scanning tasks on-demand immediately or set up automatic repeated schedules, being alerted to new vulnerabilities discovered. The SIEM component uses multiple technologies for real time anomaly detection, and can be customized based on the intents provided by users. Mitigation can assist both with stopping real time attacks and improving the security and prevention measures of the monitored infrastructure. The vulnerability detection, SIEM, mitigation engine technologies are well integrated, smoothly running together and collaborating, and this does not need much configuration eased by the intent-based model of the platform.

Partner	Role	Contribution	Interest
ATOS	IP contributors and project coordinator	Develop extended capabilities for XL-SIEM and RAE (risk assessment engine)	Positioning of own exploitable results within this KER
SYN	F2F use case owner validating exploitation IP owner	Validation in F2F UC Development of smart contact component	Validation in F2F UC Smart contract exploitation
XLAB	Leader of the KER, exploitation leader, IP owner	Expand on the capabilities, usability and exposure of Wazuh and VAT	Coordination of the KER and exposure of own results
POLITO	IP owner, academic partner	Developing the Integrity Assessment Toolkit (Trust monitor extension)	Positioning of own exploitable results within this KER
TID	Reuse of content to contribution to standards	Feedback from standards contributions	Contributions to standardisation and liaisons generated by TIM
UPC	Project technical coordination, IP owner, academic partner, reuse of content to dissemination	Further develop the PMEM (AI-based vulnerability detection and mitigation)	Positioning of own exploitable results within this KER, communication and dissemination of results from TIM
TUBS	No role	Not contributing to TIM	Not contributing to TIM
ΟΡΤ	IP owner supporting F2F early adopter	Adapting TIM to their warehouse management system	Validation in F2F UC exploitable results within this KER
SONAE	Smart manufacturing early adopter	Validation in Smart Manufacturing UC	Validation in Smart Manufacturing UC
ALTRAN	IoT Automotive early adopter	Validation in Vehicle IoT UC	Validation in Vehicle IoT UC

#### Table 10. Partners' roles, interests and contributions to TIM

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	50 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



STS	No role	Not contributing to TIM	Not contributing to TIM
UMinho	Supporting use cases	Developing the SPI with which TIM will integrate with	Interacting for the development for appropriate integration
UC3M	No role	Not contributing to TIM	Not contributing to TIM

#### KER 3 - IRO

Horizon Results Platform ID 42320 Cyberwatching.eu Marketplace ID 3097

#### Problem

The advances in network infrastructures have driven the development of new network applications that expect specific capabilities from the network. Capabilities may include constraints on traditional network metrics such as delay, minimum bandwidth, jitter, high-level requirements in terms of availability and service downtimes, as well as specialized requirements such as encryption of data along the service path. To achieve a specific objective, the network operator must make sure that related operations are executed, which can become a cumbersome and error-prone manual process. The use cases identify the following related problems:

- Autonomous driving: The use of this component will be indirect and will allow the generation of
  policy definitions to be applied by the EDC. The intents will be generated by other components
  based on the analysis and processing of the data obtained from the infrastructure of the SADE
  use case by these other components.
- Farm-to-fork: The IRO is required to offer to the administrators of the F2F IT solutions: a) the capability to register their system and define the rules to be monitored; and b) to receive notifications, alerts and suggestions for actions and security audits of their systems.
- Smart manufacturing: This component will allow for the registration of systems and devices to FISHY, to be communicated to the EDC and SPI components respectively. It will also, together with the dashboard, send notifications, alerts and suggestions for actions and security audits to users according to their profile.

#### Solution

Intent-based interfaces have emerged as the preferred north-bound interfaces in programmable network management concepts which can provide applications with a syntax to define what is desired from the network which can be agnostic of the underlying technology or the specific mechanism / algorithm to fulfill a request. With the use of intents, the applications can treat the underlying network technology as a black-box.

#### UVP

The utilization of high level language to apply policies and communicate with the network will save operation expenses for the network administrator. Using other modules of FISHY to monitor the IT

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	51 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



infrastructure, IRO shows notifications and alerts about the network condition, recommends actions, and reacts depending on the situation.

Partner	Role	Contribution	Interest
ATOS	Project coordination and technical support	Support with the general dashboard integration.	Successful implementation of the project
SYN	F2F use case owner validating exploitation,	Validation in F2F UC	Early adoption to the F2F UC
XLAB	No role	Not directly but TIM will get compiled intents from the IRO and will consider ongoing integration activities	Interacting with development for appropriate integration and supporting exploitation
POLITO	No role	Not contributing in IRO	Not contributing to IRO
TID	Reuse of content to contribution to standards	Feedback from standards contributions	Contributions to standardisation and liaisons generated by IRO
UPC	Project technical coordination, reuse content for dissemination, academic partner	Project technical coordination, reuse content for Dashboard integration. dissemination, academic partner	
TUBS	LEADER of the KER, IP owner, academic partner	Coordination and main contribution to the KER development	Coordination of the KER
OPT	IP owner supporting F2F use case	Validation in F2F UC	Validation in F2F UC
SONAE	Smartmanufacturingusecaseownervalidating exploitation	Validation in Smart Manufacturing UC	Validation in Smart Manufacturing UC
ALTRAN	IoT Automotive use case owner validating exploitation	Validation in Vehicle IoT UC	Validation in Vehicle IoT UC
STS	F2F use case owner validating exploitation	Not contributing in IRO	Positioning of own exploitable results within this KER
UMinho	No role	Not contributing in IRO	Not contributing to IRO
UC3M	No role	Not contributing in IRO	Not contributing to IRO

#### Table 11. Partners' roles, interests and contributions to IRO

Document name:	D7.3 Repo	07.3 Report on dissemination, standards and exploitation (Y2)					52 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### KER 4 - SACM

Horizon Results Platform ID 42333 Cyberwatching.eu Marketplace ID 3097

#### Problem

The SACM is trying to address the real-time monitoring (in terms of violation or satisfaction) problem of custom-based rules regarding security aspects (including the Confidentiality, Integrity, Availability triangle). Furthermore, it addresses the lack of evidence-based, certifiable view of the security posture of complex ICT systems.

#### Solution

Collecting certifiable evidence from the pilots' infrastructure, and auditing/reasoning security metrics tailored to the pilots infrastructure. SACM has 4 main components: the Security Metrics, the auditing component, the evidence-collection engine and the certification component.

#### UVP

Component architecture tailored to supply chains needs focussing especially to regulatory obligations (e.g., GDPR) and violations/compliance of service level agreements. Easy management of evidence produced by monitoring and assistance with compliance to certification standards, and ensure the truthfulness of the collected data.

Partner	Role	Contribution	Interest
ATOS	Project coordinator	Not contributing in SACM	Not contributing to SACM
SYN	F2F use case owner	Validation in F2F UC	Early adoption to the F2F UC
XLAB	Integration and data modelling for central repository	Not direct IP contribution in SACM but satisfying data storage requirements	Not contributing directly to SACM
POLITO	WP4 coordinator	Not contributing in SACM	Not contributing in SACM
TID	No role	Not contributing in SACM	Not contributing to SACM
UPC	No role	Not contributing in SACM	Not contributing to SACM
TUBS	IRO implementation	SACM communicates with the Knowledge base	Not contributing directly to SACM
OPT	No role	Not contributing in SACM	Not contributing to SACM

#### Table 12. Partners' roles, interests and contributions to SACM

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	53 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



SONAE	Smart manufacturing use case owner validating exploitation	Validation in Smart Manufacturing UC	Early adoption to the Smart Manufacturing UC
ALTRAN	IoT Automotive use case owner validating exploitation	Validation in Vehicle IoT UC	Early adoption to the Vehicle IoT UC
STS	IP Owner and KER leader	Developing the Security Assurance & Certification Management Platform	Exposure of own results
UMinho	No role	Not contributing in SACM	Not contributing to SACM
UC3M	No role	Not contributing in SACM	Not contributing to SACM

#### KER 5 - SPI

Horizon Results Platform ID 42335 Cyberwatching.eu Marketplace ID 3097

#### Problem

Current information systems development frameworks promote highly distributed components that better fit the virtualization-based infrastructure and the IoT paradigm. Security and privacy should be taken seriously in this environment, impacting the architectural design and the initial non-functional requirements. Interconnected components and modules will expose entry points and data (at local or global levels), enlarging the potential surface attack. To address those issues, designers should apply standards and regulations (like GDPR) to this type of project. Missing that goal exposes the system to a high risk of being untrustable and rejected by final users, besides incurring severe penalties. FISHY isn't different, and this module will address the required security and privacy technologies and policies.

#### Solution

Technology able to organize data related to infrastructure events and enforce privacy and Access Control rules, including Identity Management. The proposed solution includes Keycloak for Access Control and Identity Management (based on OAuth2 and IdConnect) and XACML for policy management. Measurements can be captured by any performance or security monitoring system and made available to high-level decision modules using proper metrics derived from security objectives; metrics/measurements classification is fundamental for efficient use. The taxonomy under development addresses that issue. Along with data organization, a data handler like RabbitMQ will explore the semantic dimension of events.

#### UVP

An enhanced framework for system events' management, including metrics/measurements from different sources and promoting co-relation with added semantics. Secure data transfer between

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	54 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



monitored infrastructure and FISHY platform, with data anonymization according to previously defined privacy policies.

Partner	Role	Contribution	Interest
ATOS	Project coordinator	Not contributing in SPI	Mainly related to project coordination
SYN	F2F use case owner	Developing the evidence- based data monitoring platform and validating the technology	Early technology adoption
XLAB	No role other than integration	Integrating AC techniques and validating technology	Mainly related to TIM integration
POLITO	No role	Not contributing in SPI	Not contributing to SPI
TID	IP owner	Extending the Ordered Proof of Transit (OPoT) enforcing IdM functions	Exposing own results
UPC	Project technical coordination and IP ownership	Developing identification and authentication in the FISHY dashboard.	Exposing own results
TUBS	No role	Not contributing in SPI	Not contributing to SPI
OPT	IP owner	Developing the ILT-part of the smart contract component	Exposing own results
SONAE	Smart manufacturing use case owner validating exploitation	Validation of AC techniques in Smart Manufacturing UC	Early adoption to the Smart Manufacturing UC
ALTRAN	IoT Automotive use case owner validating exploitation	Validation in Vehicle IoT UC, enforcing IdM and AC functions	Early adoption to the Vehicle IoT UC
STS	No role	Not contributing in SPI	Not contributing to SPI
UMinho	IP owner and KER leader	Developing the Framework for AC and Privacy enforcement, and InfSec evaluation within IoT	Exposing own results
UC3M	No role	Not contributing in SPI	Not contributing to SPI

#### Table 13. Partners' roles, interests and contributions to SPI

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	55 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### KER 6 - EDC

Horizon Results Platform ID 42337 Cyberwatching.eu Marketplace ID 3097

#### Problem

Correctly configuring network devices (particularly security controls) is a critical and, unfortunately, error-prone task, especially regarding the modern SDN-based infrastructures. An administrator must be aware of the entire network topology and the device configuration rules to avoid catastrophic mistakes. As the network size and heterogeneity keep growing, this job quickly becomes unfeasible for a human being.

#### Solution

The EDC will allow an administrator to effortlessly configure various security controls (e.g., a firewall or a VPN terminator) through high- level declarative policies that are automatically translated into a series of optimal low-level configurations. Its innovative refinement process will consider the current network landscape topology and its configurations to avoid inconsistencies and issues in the deployed rules.

#### UVP

Translation of high-level policies into low-level configurations for a variety of NSFs (security controls), within a framework leveraging a capability model instead of the traditional refinement techniques based on logic rules, where adding a new NSF type requires only describing its capabilities using a very simple model.

Partner	Role	Contribution	Interest
ATOS	Project coordinator and IP owner	Infrastructure and repository	Exposing own results
SYN	F2F use case owner	Validation in F2F UC	Early adoption to the F2F UC
XLAB	No role	Repository extended from WP3	Integration with WP3 effort
POLITO	KER leader and IP owner	Design and implementation	Research publications and potential spin-offs
TID	IP owner	Developing the interface to SIA	EDC interface to SIA
UPC	Project technical coordination and IP owner	Security control support, remediation	Integrating knowledge with the policy refinement

#### Table 14. Partners' roles, interests and contributions to EDC

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	56 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



TUBS	IP owner	Contributing to HSPL	Developing the IRO workflow
ОРТ	IP owner	Developing the ILT-based warehouse management system	Exposing own results
SONAE	Smart manufacturing use case owner validating exploitation	Validation in Smart Manufacturing UC	Early adoption to the Smart Manufacturing UC
ALTRAN	IoT Automotive use case owner validating exploitation	Validation in Vehicle IoT UC	Early adoption to the Vehicle IoT UC
STS	No role	Not contributing in EDC	Not contributing to EDC
UMinho	No role	Not contributing in EDC	Not contributing to EDC
UC3M	IP owner	Developing the interface to SIA	EDC interface to SIA

#### KER 7 - SIA

Horizon Results Platform ID 42339 Cyberwatching.eu Marketplace ID 3097

#### Problem

Supply chain security in modern cloud-native infrastructures requires mechanisms for the dynamic and elastic use of functionalities focused on monitoring and mitigation actions, supporting on-demand deployments of the required network functions and a powerful network abstraction to simplify connectivity management and facilitate the enforcement of applicable policies as significant events take place.

#### Solution

Provide a common interface for the orchestration of the network-based functions used by FISHY, in all its phases: monitoring data collection, threat detection, policy translation and enforcement. This orchestration includes the deployment and management of functions using standard cloud-native interfaces, and multi-domain connectivity management. SIA is the base for the FISHY Reference Framework (FRF) and sandbox environment.

#### UVP

Abstract interface allowing the orchestration and connectivity of virtualized functions for monitoring and mitigation actions on different types of underlying infrastructure (IoT, IaaS, baremetal, etc).

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	57 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### Table 15. Partners' roles, interests and contributions to SIA

Partner	Role	Contribution	Interest
ATOS	Project coordinator	Not contributing in SIA	Not contributing in SIA
SYN	F2F use case owner	Validation in the F2F UC	Early adoption to the F2F UC
XLAB	Task participant, not contributing as IP owner in SIA	Investigating connectivity capabilities of SIA for appliance data collection agents	From the perspective of using the capabilities of SIA
POLITO	IP owner	Developing the IoT Gateway	Integration with EDC
TID	IP owner and KER leader	Standardised API for network infrastructure abstraction	Exposure of own results, in collaboration with UC3M
UPC	Project technical coordination	Developing trustworthy identification and authentication of edge systems	Interface with WP3 tools and development of SEN (Secure Edge Node)
TUBS	No role	Not contributing in SIA	Not contributing in SIA
OPT	No role	Not contributing in SIA	Not contributing in SIA
SONAE	Smart manufacturing use case owner validating exploitation	Validation in Smart Manufacturing UC	Early adoption to the Smart Manufacturing UC
ALTRAN	IoT Automotive use case owner validating exploitation	Validation in Vehicle IoT UC	Early adoption to the Vehicle IoT UC
STS	No role	Not contributing in SIA	Not contributing in SIA
UMinho	No role	Not contributing in SIA	Not contributing in SIA
UC3M	IP owner	Standardized API for network infrastructure abstraction. Connectivity control for cloud-native environments	Exposure of own results, in collaboration with TID

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	58 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### 4.2.3 IPR Analysis and Protection

In this second reporting period we have led a systematic IPR analysis, extracting from the work plan in the DoA the expected IP results, and mapping those both to the established KERs and to the IP Background where the project builds on. We have logged 34 IP background items (as described in the confidential impact generation plan in deliverable D7.2), most of them based on open-source technology, and most relating directly to this KER as the FISHY platform backbone. On the other hand, we estimate 17 IP results covering the main ongoing developments in the platform, last reviewed on 31-8-2021. The IP Results are being logged and mapped onto the Exploitable Results and FISHY components. Changes were made to earlier to the published IP Results log in deliverable D7.2 [5]. Particularly the Data Management and Privacy Enforcement (IPR34) is broken down into three IPR items: *IoT architectures and protocols* (IPR41), *Monitoring systems* (IPR42) and *Security evaluation and metrics* (IPR43). Consult the appendix for further detail, and see Table 16 for the mapping between KERs, ERs, IP Background and IP Results.

KER	ERs	IP Background	IP Results
1	17	ALL	ALL
2	1,2,6,7,8,12,14	1,2,4,5,7,17	1,2,3,4,8,13,15
3	13	18	14
4	4,5,10	16,28	7,12
5	11	8,9,10,11,33,41,42,43	6,16
6	3	3,19	10,11
7	9,15,16	8,9,10,11	5

#### Table 16. IP background and results in relation to the FISHY KERs

The distribution of IP results across KERs is represented in Figure 20 where we can observe that the bigger part of IP results is generated in TIM (KER 2), representing also the bigger collaboration between consortium partners. The KER 1 is not represented in the chart as it should include all the IP results generated, being the full-stack solution. According to our IPR analysis, the results are well distributed

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	59 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



across the consortium partners and the tasks planned in the DoA, with about 63% being open source with Apache 2.0 and GPL licenses, and the remaining 37% being commercial protected by copyright.



Figure 20. Distribution of the IP results across the KERs

If any KER will be jointly exploited by two or more partners, joint owners of KERs have to agree amongst themselves as soon as possible upon the detailed terms of exercising ownership and protection of such results in accordance and in proportion with the agreed intellectual contribution to its development. If relevant, bilateral/multilateral Memorandum of Understanding agreements should be signed among relevant partners. A template for the MoU is provided enclosed to the HRB report and will be addressed in Y3.

#### 4.2.4 Exposure of FISHY Results

With the good progress on the definition of its KERs, the FISHY consortium has been preparing the appropriate profiling of the main results of the project based. We have prepared a new pitch deck, a new white paper and a new KER subpage all of these aligned in the same branding baseline, reflected in the global profiles of the Horizon Results Platform and the Cyberwatching.eu Marketplace, to expose the value message of the FISHY technology in a homogenic and clear fashion.

The first point of exposure is the new KER page on the FISHY website (https://fishy-project.eu/kers) where each of the 7 KERs has a structured description starting with the slogan and the schematic image highlighting its positioning. It is followed by the top 3 benefits and the specific usage by the project's use cases used as references to the usefulness of the developed technology. Having in mind the joint exploitation nature of these results, the contact points for each of them are the coordinator of the project and the innovation manager.

With the recent availability of the Cyberwatching.eu marketplace we have promoted the exposure of the innovation of the project through the KERs, highlighting:

- the unique value proposition used as a slogan
- the benefits based on usability
- the usefulness of results from the experience of use cases
- the description of the technology
- the white paper (including all the KERs).

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	60 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



These KERs have each its own page under the FISHY project page assigned with the ID 3097, where the visitor can also see the details on the project and the project's video. These are the direct links:

- KER 1: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-cyber-resilient-supply-chain-system
- KER 2: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-trust-incidentmanager
- KER 3: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-intent-based-resilience-orchestration
- KER 4: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-security-assurance-certification-manager
- KER 5: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-security-privacydataspace-infrastructure
- KER 6: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-enforcementdynamic-configuration
- KER 7: https://www.cyberwatching.eu/projects/3097/fishy/products/fishy-secure-infrastructure-abstraction

where we provide the insight on the benefits and functionality of the technology provided by the project across the KERs. Moreover, we have also proceeded with the initial submission of the KERs to the Horizon Results Platform, where we detail complementary information as, e.g., the current status of the technology, the intentions and needs, or the business documents and tools available:

- KER 1: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/**42289**;resultId=42289;keyword=fishy
- KER 2: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/**42318**;resultId=42318;keyword=fishy
- KER 3: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/**42320**;resultId=42320;keyword=fishy
- KER 4: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/**42333**;resultId=42333;keyword=fishy
- KER 5: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/42335;resultId=42335;keyword=fishy
- KER 6: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/42337;resultId=42337;keyword=fishy
- KER 7: https://ec.europa.eu/info/fundingtenders/opportunities/portal/screen/opportunities/horizon-resultsplatform/**42339**;keyword=fishy

Each of the KERs has an ID (as highlighted above) and serve as the main exposure of the outcomes of the project acknowledging its funding by the EC. In M34 we will be updating this information according to the final state of the technological development and the final decisions on the exploitation strategy and sustainability of FISHY's results beyond the lifetime of the project.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	61 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### 4.2.5 External Advisory Board

In March 2022 we met with 2 out of 6 EAB members, to expose the first project results and discuss on the modularity of the system, the examples of success stories, and the obstacles to potential business opportunities. The participation of EAB members included:

Jianping Wang - University of Hong Kong, China

Xiangtong Qi - Hong Kong University of Science and Technology, China

while other EAB members were not able to attend due to different circumstances related to professional compromises, etc. The main meeting objectives were:

- Update the experts of the FISHY Advisory Board about the status of the project with focus on the most relevant topics at this stage of the project
- Collect insightful feedback from the Advisory Board members to transform it into beneficial actions for the project
- Strengthen the links between the FISHY Consortium and the Advisory Board members

The agenda held included the overview of the project, from the administrative and technical perspectives, and highlighted the progress on use cases and KER definition, as follows:

Time	Duration (in minutes)	Agenda Item No.	Description	Presenter
09.00	5′	1	Welcome and agenda presentation	ATOS
09.05	10'	2	High level perspective of project status (Addressing recommendations from previous meeting)	ATOS
09.15	20'	3	FISHY progress and results halfway the project timeline	UPC
09.35	10'	4	Wood-Based Panel Trusted Value-Chain pilot	SONAE
09.45	20'	5	Securing Autonomous Driving Function at the Edge pilot (Including practical demo)	CAPGEMINI
10.05	20'	6	Farm-to-Fork pilot (Including practical demo)	SYNELIXIS
10.25	25'	7	FISHY adoption: Pitch presentation of key exploitation results and road ahead	XLAB
10.50	10'	8	Cross-topic discussion	ATOS
11:00	End of mee	eting		

#### Table 17. Agenda of the 2<sup>nd</sup> Advisory Board meeting

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	62 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



The main recommendations of the Advisory Board focused on the overall usability and knowledge sharing, and were the following:

- domain-specific attacks
- scope of supply chain monitoring
- open data shared to research

Prof Jianping Wang congratulated the FISHY team for the good work and was interested on what kind of intents are used in the system. We are now working on the functionalities and then we will identify what kind of intents should be defined. Prof. Wang was also interested on how we are planning to address domain-specific attacks or keep with the general attacks. The first attack presented at the EAB meeting is general but the second is domain-specific and specific to the usage of blockchain. In the first iteration these general attacks are to test functionalities, but in the second iteration should be more specific and will be identified. Moreover, resilience in supply chain is broken from IT infrastructure and from legal agreements. The platform needs flexibility, real-time meeting objectives, optimality of supply chain.

Xiangtong Qi was interested in the scope of supply chain monitoring. In that, SONAE is considering one part of the production process also considering the maintenance of the equipment (with predictive maintenance). This project generates much data and Qi was also interested in how the project will share this as open data to research. This depends on each of the use cases, due to confidentiality in this data, but also depends on the sensitivity and some data can be shared. Moreover, we are discussing in the next months to collect anonymized info in specific components, providing this anonymized data for training the models.

In what specifically regards the activities of WP7, the importance of standardization was mentioned in relation to exposure, particularly in identifying an alliance on IoT security to expose our results (which is well undergoing as described in Section 3).

With regards to dissemination, the elaborated research questions as published in the deliverable D2.3 should provide a bigger reach to the technology. On the other hand, the second video on use cases is separated in 3 videos, one per each use case, highlighting the usefulness of the technology.

Finally, in regard to exploitation we discussed on how we are intensifying the pursue for opportunities with innovation radar (ongoing), MTRL (done), Marketplace of cyberwatching.eu, and ECSO SME Hub Cybersecurity Marketplace (not yet available, coming in autumn 2022<sup>48</sup>).

<sup>48</sup> https://ecs-org.eu/initiatives/ecso-sme-hub

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	63 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



### 5 Conclusions & Future Work

In this deliverable D7.3 the FISHY consortium has presented all activities related to dissemination and communication, standardisation, and exploitation for the second year of FISHY, as well as the accumulative work done along the whole project duration. The plans for the next and last year of the project are also presented and discussed, having in mind that in this period FISHY must maximize the impact and achieve all the KPIs related to dissemination, communication, standardisation, and exploitation.

During this second year, and fuelled by the valuable suggestions made in the two meetings with the EAB and the two reviews meetings, the promotion of the FISHY main concepts to different relevant audiences has had a considerable boost. In this regard, FISHY has stretched the collaboration with other EU projects, as an example of these kind of collaboration the 3<sup>rd</sup> FISHY workshop has been organized jointly with IoTAC and CYRENE. Also with regard to scientific production, the project has experienced a significant leap both quantitatively and qualitatively. Generally speaking, the project is in a very good track and the KPIs about communication and dissemination will be achieved during the last year of the project; especially promoted by on one hand the maturity of the project, as well as the increasing collaboration between partners, and also with other EU projects.

Considerable progress has been made in terms of standardisation and open-source contributions, effectively leveraging the influential position of project partners in terms of leadership of target activities. In particular, two opportunities in each field are expected to increase project impact before its end: the creation of a WG focused on supply chain security in the IETF, and the contributions on cloud-native security connectivity to the OSM community.

The activities related to exploitation have followed a well-structured path, supported by the market analysis within the progress of the FISHY radar as reported in D2.3, and the analysis of innovation assets supported by the Horizon Results Booster. Especially important is the definition and publication of the 7 KERs, exposing the main contribution of FISHY to the European innovation leadership and excellence. Business opportunities are being established and analysed with the collaboration of the External Advisory Board, and will continue being refined as the project evolves and direct experience with the different use case implementations become available.

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	64 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



### 6 References

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Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	65 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



# 7 Appendix

#### 7.1 IP background and results

For the sake of completeness, we present in this section the registry log of the KERs, ERs, IP results and IP background corresponding to the research and development in FISHY, including the IDs used across this deliverable.

ID	Name	Owner(s)	License
IPB-1	Extended Continuous Risk Assessment Engine	ATOS	Copyright
IPB-2	XL-SIEM	ATOS	Copyright
IPB-3	SynField devices and platform	SYN	Copyright
IPB-4	Wazuh	XLAB	GPL v2, partial copyright, OpenSSL license
IPB-5	Vulnerability Assessment Tool (VAT)	XLAB	Copyright
IPB-6	xOpera	XLAB	Apache 2.0
IPB-7	Integrity assessment toolkit	POLITO	APL 2.0
IPB-8	OSM Network Orchestration	TID	Apache 2.0
IPB-9	Netphony routning control Framework	TID	Apache 2.0
IPB-10	MAMI ACME-STAR	TID	Apache 2.0
IPB-11	TID virtualized implementation for synthetic traffic generation	TID	FRAND
IPB-12	TID monitoring platform	TID	FRAND
IPB-13	TID OPoT implementation	TID	FRAND
IPB-14	TIB Blockchain-based network assurance tool	TID	FRAND
IPB-15	TID mcTLS-based security services	TID	FRAND
IPB-16	Secure Edge Node (SEN)	UPC	Apache 2.0
IPB-17	Predictive Maintenance Tool (PMEM)	UPC	Apache 2.0

#### Table 18. FISHY IP background log

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	66 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



IPB-18	Intent-based resilience orchestrator (IRO)	TUBS	Apache 2.0
IPB-19	Aberon Warehouse Management System	ОРТ	Copyright
IPB-20	Know-how, experience and data owned by SONAE on smart industry	SONAE	Copyright
IPB-21	ENSCONCE components	ALTRAN	Copyright
IPB-22	EDGE components	ALTRAN	Copyright
IPB-23	REMOTIS car components	ALTRAN	Copyright
IPB-24	REMOTIS SW components	ALTRAN	Copyright
IPB-25	Recognition and GDPR SW	ALTRAN	Copyright
IPB-26	Semantic Data Collector (SDA)	TID	Apache 2.0
IPB-27	CCIPS TID	TID	Apache 2.0
IPB-28	Continuous assessment of security and privacy	STS	Copyright
IPB-29	Attack Remediation Engine (ARE)	POLITO	APL 2.0
IPB-30	vNSF in the SIA block	POLITO	APL 2.0
IPB-31	Model-driven customisations to Keycloak enabling the realisation of different security standards and risk management requirements	UMinho	APL 2.0
IPB-33	Know-how, experience and data owned by SYN on F2F	SYN	Copyright
IPB-34	Know-how, experience and data owned by ALTRAN on autonomous driving funtion at the edge	ALTRAN	Copyright
IPB-35	Prototype developed by the company in previous projects , including the SPAP platform (GUI), auditing mechanism and evidence collection engine with several metrics	STS	Copyright
IPB-36	Know-how, related to best-practices and performance comparison among technologies used in IoT architectures	UMinho	Copyright
IPB-37	Monitoring systems	UMinho	Copyright

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	67 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



IPB-38	Security evaluation and metrics	UMinho	GPL v2, partial copyright, OpenSSL license

#### Table 19. FISHY IP results log

IP Result	Name	Owner(s)	License
IPR-1	Wazuh extensions	XLAB	GPL v.2
IPR-2	VAT extensions	XLAB	copyright
IPR-3	Enhanced capabilities for ATOS XL-SIEM	ATOS	copyright
IPR-4	Extended Continuous Risk Assessment Engine	ATOS	copyright
IPR-5	Standardised API for network infrastructure abstraction	TID	Apache 2.0
IPR-6	Ordered Proof of Transit (OPoT)	TID	Apache 2.0
IPR-7	Security Assurance & Certification Management Platform	STS	copyright
IPR-8	Detection and protection components	XLAB	GPLv2
IPR-9	Extensions to xOpera	XLAB	Apache 2.0
IPR-10	ILT-based warehouse management system	ОРТ	copyright
IPR-11	Evidence-based data monitoring platform	SYN	copyright
IPR-12	Trustworthy identification and authentication of edge systems	UPC	Apache 2.0
IPR-13	Advanced Mitigation strategy - PMEM	UPC	Apache 2.0
IPR-14	Intent-based resilience orchestrator (IRO)	TUBS	Apache 2.0
IPR-15	Integrity Assessment Toolkit (Trust monitor extension)	POLITO	Apache 2.0
IPR-16	Framework for InfSec evaluation within IoT	UMinho	GPL v.2

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	68 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



#### Table 20. FISHY KERs log

ID	Name	Acronym	Lead
KER-1	Dashboard & Platform	FISHY Platform	UPC
KER-2	Vulnerability Forecast & Risk Estimation	TIM	XLAB
KER-3	Intent-based Resilience Orchestration	IRO	TUBS
KER-4	Security Assurance and Certification Manager	SACM	STS
KER-5	Security & Privacy Dataspace Infrastructure	SPI	UMinho
KER-6	Enforcement & Dynamic Configuration	EDC	POLITO
KER-7	Secure Infrastructure Abstraction	SIA	TID

#### Table 21. FISHY ERs log

ID	Name	Lead	Task
ER-1	Enhanced capabilities for ATOS XL-SIEM	ATOS	3.2
ER-2	Extended Continuous Risk Assessment Engine	ATOS	3.2
ER-3	Standardised API for network infrastructure abstraction	TID	5.2
ER-4	Ordered Proof of Transit (OPoT)	TID	5.2
ER-5	Security Assurance & Certification Management Platform	STS	4.2
ER-6	Detection and protection components	XLAB	3.2
ER-7	Vulnerability Assessment	XLAB	3.2
ER-8	Extensions to xOpera	XLAB	4.1
ER-9	ILT-part of smart contract components	OPT	3.3
ER-10	Smart contract components (blockchain functionality of FISHY platform)	SYN	3.3
ER-11	Trustworthy identification and authentication of edge systems	UPC	3.3
ER-12	Advanced Mitigation strategy - PMEM	UPC	3.2

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)						69 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final



ER-13	Intent-based resilience orchestrator (IRO)	TUBS	5.1
ER-14	Integrity Assessment Toolkit (Trust Monitor)	POLITO	3.2
ER-15	Framework for InfSec evaluation within IoT	UMinho	5.2
ER-16	Connected & Autonomous Car Use Case	Altran	6.2
ER-17	Prototype of FISHY platform ready for validation in a real context	UPC	6.2

Document name:	D7.3 Report on dissemination, standards and exploitation (Y2)					Page:	70 of 70
Reference:	D7.3	Dissemination:	PU	Version:	1.0	Status:	Final