Team name:	ENSTA B	BRETAGNE					_==
Referee I (Sea):	VLAD1	Referee	II (Sea):	ANDREA			
Referee I (Air):	STJEPAN	, Refere	e II (Air):	MARGAR	RIDA		
Date (DD/MM/YYY	(Y): <u>21/</u> 6	09/2017	, Time (2	4:00):1	3:00		
Duration: 4	5 min (M	ax. 45 min) 🗖 Tim	neout				
					×		
Achievemer	ıts						
Set A1: Outdoo	ors						
An aerial robot read	ches the waypoints (V	WPs) within a radius	of 5 m in	A1.1	A1.	2	A1.3
autonomous navigation. Waypoints can be reached in no specific order			WP1 A	WP2	A '	WP3 A	
and the team can suggest additional waypoints to their flight plan				⊠.	×		
	f start of the run, a ro	=	ect location (wi	thin radius 5 i	m)		A1.4
of the missing works	er outside the building	g.					
An aerial robot dep	loys the first-aid kit ((within radius 2 m) f	rom the worker	outside the b	ouilding		A1.5
			4	Pipe damage	s on lar	nd	
The aerial robot(s) re	eports the damages or	n the land nines	D1 🗆	D2 🗆	Ť	D3 🗆	1
, ,	only be scored once).	• •	A1.6	A1.7		A1.8	
The aerial robot det	tects the leak marker	on the pipe,				1	A1.9 🗖
The aerial robot rep	ports the pipe that is l	eaking on land.					A1.10
The aerial robot bu	ilds an outdoor map o	of the land pipes are	a with OPIs (No	orth-West sid	e).		A1.11
			· · · · · · · · · · · · · · · · · · ·		<u> </u>		
The aerial robot bu	ilds an outdoor map o	of the land pipes are	a with OPIs (N	orth-East side	:). ,,		A1.12
The aerial robot bu	ilds an outdoor map o	of the land pipes are	a with OPIs (So	outh-West sid	e).		A1.13

The aerial robot builds an outdoor map of the land	nino		ith ODI	la (Couth Ea	et side)		_	A1.14	
The aerial robot builds an outdoor map of the fand	pipes	s area w	illi OP	is (Souill-Ea	st side).			A1.14	
							_		
9		Maps (by area)							
The aerial robot builds the maps on board during	ring North-We			est North-East South-West			Soi	South-East	
the flight. The maps must be shown to the referees just after the flight finishes.	٠ ١		0	3 A1.16	□ A1.1			A1.18	
Set A2: Underwater	<u>. </u>	Ti de la companya de		Type	Firegra			,	
				Type o	f images				
The underwater robot provides images of the gate.		Acous	stic buo	y-1 ⊠ A2.1	Optica	al buo	y-1	□ A2.3	
		Acous	stic buo	y-2 🗷 A2.2	Optica	al buo	y-2	□ A2.4	
The underwater robot passes through the gate without touching it.							A2.5 ⊠		
The underwater robot passes through the gate with	in th	e first 3	0 minu	tes from the	start of tl	ne run		A2.6 □	
			Buoys	3					
The underwater robot detects the plume buoys in ro	eal ti	ime.	B1□	B2□	В3 🗆	B4□]	B5□	
Images are needed.			A2.7	A2.8	A2.9	A2.1	0	A2.11	
			Buoys	numbers					
The underwater robot recognises the number on the	e plu	ıme	B1□	B2□	B3□	B4□]	B5□	
buoys		Į.	A2.12	A2.13	A2.14	A2.1	5	A2.16	
The underwater robot produces a geometric map of the plume (Area: B1+B2).						T			
The underwater robot produces a geometric map o	1 1110	prume	(Area:	B1+B2).			1	A2.17 □	
The underwater robot produces a geometric map o The underwater robot produces a geometric map o				·).		╁	A2.17	
· · · · · · · · · · · · · · · · · · ·	f the	plume	(Area:	B3+B4+B5)).		1		
The underwater robot produces a geometric map o	f the	plume	(Area:	B3+B4+B5)			1	A2.18 🗆	
The underwater robot produces a geometric map of the underwater robot detects the leak marker on the underwater robot recognises and provides image.	f the	pe in re	(Area:	B3+B4+B5)	ed on the	tion.	1	A2.18 □ A2.19 □	

				A2.23 □		
Following the leaking pipe up to the assembly structure, the underwater robot provides an						
image mosaic of the second half of the leaking pipe.						
				ļ		
95						
		Pipe structu	ıre sides	3		
The underwater robot provides images of the structure sides.	North□	South□	East□	l West□		
	A2.24	A2.25	A2.26	A2.27		
		Stru	ucture S	ide		
The underwater robot provides a 3D reconstruction of the struc	ture.	Front	Rea	ear 🗆		
	A2.28 A			.2.29		
		b)				
The underwater robot provides a 2D acoustic or optical map of the debris. Area 1						
A2.30						
The underwater robot localises the missing worker underwater within a radius of 5 meters.						
The underwater robot gives the dimensions and geometrical sha	ape of the cl	osest object to	the			
worker.				A2.33 □		
The underwater robot provides 3D reconstruction of the worker	### = = = = = = = = = = = = = = = = = =			40245		
-				A2.34 □		
The underwater robot surfaces within a radius of 2 meters from the worker position.						
*			1			
Set A3: Cooperation						
The underwater robot communicates directly OR through a sur-	face robot to	the aerial rol	bot			
the position (within a radius of 5 meters) of the worker underwate				A3.1		
C C . C						

The underwater robot communicates directly OR through a surface robot to the aerial robot	
the position (within a radius of 5 meters) of the worker underwater.	A3.1
Specify if directly/through surface robot:	
The aerial robot receives and decodes the message with the position of the worker sent by the	
	A3.2
underwater/surface robot.	
The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the	
authorised aerial volume) of the harbour area showing either the underwater robot or the surface	A3.3
robot on the position that marks where the worker is. (The image includes location).	
The underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	A3.5
the underwater or through the surface robot.	A3.5

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 □
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7 □

The underwater robot surfaces in a controlled way once all the tasks have been done.	A4.1
The aerial robots return to the landing area once all the tasks have been done,	A4.2
	X
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
The marine robot(s) transmits live position and images/video to the control station during the run	A 1 1
or the manipulation task.	A4.4

The robot needs manual interven	ntion during a run (e.g. the robot is stuck):
Marine robot	No permitted
Aerial robot	PB1 □ (max. 1)

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB1
A robot does not conform to safety requirements for the competition.	DB2
The aerial robot leaves the flight volumes defined by the organisation.	DB3
The aerial robot impacts the building.	DB4
The aerial robot enters the building.	DB5
A marine robot is tele-operated (except for safety reasons agreed by the	
Technical Committee and the manipulation task).	DB6
Comment: WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).	is
Benchmarking data delivered appropriately: □ yes / □ no	
(Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	
Referee signature:	

Tooms married	ENICTA TEAM	,				
	ENSTA TEAM		(Coo)-	ANDOFA		
	VLAD!					
	STJEPAN					
Date (DD/MM/YYYY	Y): 21/09/20	17	, Time (2	24:00): 15	5,00	
Duration:9	5 min (Max. 45	min) 🗖 Time	eout			
Achievemen	ts					
Set A1: Outdoor	rs			æ		
An aerial robot reach	nes the waypoints (WPs) v	vithin a radius	of 5 m in	A1.1	A1.2	2 A1.3
autonomous navigation. Waypoints can be reached in no specific order			WP1 A	WP2	A WP3 A	
and the team can suggest additional waypoints to their flight plan						
Within 30 minutes of	start of the run, a robot re	ports the correc	et location (wi	thin radius 5 r	m)	
of the missing worker		ports the correc	i location (wi	uiiii iaqius 3 i	11)	A1.4
An aerial robot deplo	bys the first-aid kit (within	n radius 2 m) fr	om the worker	r outside the b	uilding	
				Pipe damages	s on lan	ıd
The aerial robot(s) rep	ports the damages on the l	and pipes.	D1 🗖	D2 🗆		D3 🗆
(Each damage can o	nly be scored once).		A1.6	A1.7		A1.8
The aerial robot dete	ects the leak marker on the	e pipe.				A1.9 □
The aerial robot repo	orts the pipe that is leaking	g on land.				A1.10
The aerial robot buil-	ds an outdoor map of the	land pipes area	with OPIs (N	orth-West side	e).	A1.11
The aerial robot buil	ds an outdoor map of the	land pipes area	with OPIs (N	orth-East side).	A1.12
The aerial robot buil	ds an outdoor map of the	land pipes area	with OPIs (So	outh-West side	e).	A1.13

The aerial robot builds an outdoor map of the land	nina	o area with	ODIc	(South Ea	ct cida)		Ι Λ	1.14
The aerial robot builds an outdoor map of the fand	prpe	s area with	OFIS	(South-La	si side).			
							*	
У.		Maps (by area)						
The aerial robot builds the maps on board during	No	orth-West	No	rth-East	South-W	est :	South-	-East
the flight. The maps must be shown to the referees		A1.15		A1.16	□ A1.1′	7 1	⊐ A1.	.18
just after the flight finishes.					ŧ			
							_	
Cot A2. Undamyatan								
Set A2: Underwater								
				Type o	f images			
The underwater robot provides images of the gate.		Acoustic	buoy-	1 □ A2.1	Optic	al buoy	′-1 🔲	A2.3
and anger water read of provided images or the gard					1	·		
		Acoustic	buoy-	2 □ A2.2	Optica	al buoy	<i>7</i> -2 ⊔	A2.4
The underwater robot passes through the gate without touching it.					A2	2.5 🗆		
The underwater robot passes through the gate within the first 30 minutes from the start of the run.					-			
The under water robot passes through the gate with	1111 (1)	ic mst 50 n	minute.	s from the	Start Or ti	ic ruii.	A2	2.6 □
		В	uoys					
The underwater robot detects the plume buoys in re	eal t	ime. B	1 🗆	B2□	В3□	B4□	В	5 🗆
Images are needed.	our c	i i	2.7	A2.8	A2.9	A2.1		2.11
					A2.9	A2.1	U A	.2.11
				umbers		40		
The underwater robot recognises the number on th	e plı	ıme B	1 🗆	B2□	В3□	B4□	В	35□
buoys		A	2.12	A2.13	A2.14	A2.1	5 A	2.16
The underwater robot produces a geometric map o	f the	plume (A	rea: B	(+B2).			A2.	17 🗆
The underwater robot produces a geometric map o	of the	e plume (A	rea: B3	3+B4+B5`).			
The same of the sa		, F			,		A2.	18 🗆
The underwater robot detects the leak marker on the	he pi	pe in real t	ime.				A2.	19 🗆
The uniteraction as between each annuite income		aftha blac	1, ,,,,,,,	hau ataman	ad an tha			
The underwater robot recognises and provides imaleaking pipe.	iges	of the black	k num	ber stamp	ed on the		A2.	20 🗆
Towning professional and the second s								
The underwater robot reports which is the number	of tl	he leaking	pipe b	y its geom	etric posi	tion.	A2.	21 🗆
Estimate the lastice wire up to the coccurbly street		the condess		wahat mua	videe on			22 🗆
Following the leaking pipe up to the assembly struct image mosaic of the <u>first half</u> of the leaking pipe.	iure,	uie unaer	water	ronor bro	viues an		A2.	44 4
The state of the state of the search priper								

Following the leaking pipe up to the assembly structure, the under	erwater rob	ot provides an	1	A2.23 🗆		
image mosaic of the second half of the leaking pipe.						
*						
		Pipe structu	ire side	es		
The underwater robot provides images of the structure sides.	North□	South□	East	□ West□		
	A2.24	6 A2.27				
		Stru	ıcture	Side		
The underwater robot provides a 3D reconstruction of the struct	ure.	Front	Ro	Rear 🗆		
A2.28 A						
The underwater robot provides a 2D acoustic or optical map of the debris. Area 1						
A2.30						
The underwater robot localises the missing worker underwater v	within a rad	ius of 5 meters) <u>.</u>	A2.32 🗖		
The underwater robot gives the dimensions and geometrical sha	pe of the cle	osest object to	the			
worker.				A2.33 □		
The underwater robot provides 3D reconstruction of the worker				A 2 24 🗖		
				A2.34 □		
The underwater robot surfaces within a radius of 2 meters from the worker position.						
Set A3: Cooperation						
The seal of the se	1	41	-4			
The underwater robot communicates directly OR through a surf		tne aeriai roi	100	A3.1		
the position (within a radius of 5 meters) of the worker underwater.						

The underwater robot communicates directly OR through a surface robot to the aerial robot	,
the position (within a radius of 5 meters) of the worker underwater.	A3.1
Specify if directly/through surface robot:	
The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot.	A3.2
The aerial robot , upon receiving the position of the underwater worker, takes a picture (from the	
authorised aerial volume) of the harbour area showing either the underwater robot or the surface	A3.3
robot on the position that marks where the worker is. (The image includes location).	
The underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	A3.5
the underwater or through the surface robot.	A3.3

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 □
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7

The underwater robot surfaces in a controlled way once all the tasks have been done.	A4.1
The aerial robots return to the landing area once all the tasks have been done.	A4.2
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
The marine robot(s) transmits live position and images/video to the control station during the run	A4.4
or the manipulation task.	A4.4
(g)	

The robot needs manual intervention during a run (e.g. the robot is stuck):				
Marine robot	No permitted			
Aerial robot	PB1 X (max. 1)			

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB1 I
A robot does not conform to safety requirements for the competition.	DB2 l
The aerial robot leaves the flight volumes defined by the organisation.	DB3 I
The aerial robot impacts the building.	DB4 I
The aerial robot enters the building.	DB5 l
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB6 l
WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).	is
Benchmarking data delivered appropriately: □ yes / □ no	
(Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	
Referee signature:	

Team name:	U. GIRONA	/ ISEP INSICT	EC .
Referee I (Sea):	VLADI	, Referee II (Sea):	ANDREA
Referee I (Air):	STJEPAN	, Referee II (Air):	MARGARIDA
Date (DD/MM/Y	YYY): 21/09	7/2017 , Time	(24:00): 10:00
Duration:	45 min (Ma	x. 45 min)	

Achievements

Set A1: Outdoors

An aerial robot reaches the waypoints (WPs) within a radius of 5 m in autonomous navigation. Waypoints can be reached in no specific order and the team can suggest additional waypoints to their flight plan	WP1 A	WP2 A	WP3 A	
Within 30 minutes of start of the run, a robot reports the correct location (within radius 5 m) of the missing worker outside the building.				
An aerial robot deploys the first-aid kit (within radius 2 m) from the worker outside the building.				

	Pipe damages on land			
The aerial robot(s) reports the damages on the land pipes.	D1 🗷	D2 🛮	D3 🖾	
(Each damage can only be scored once).	A1.6	A1.7	A1.8	

The aerial robot detects the leak marker on the pipe.	A1.9 🗷
The aerial robot reports the pipe that is leaking on land.	A1.10
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-West side).	A1.11
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-East side).	A1.12
The aerial robot builds an outdoor map of the land pipes area with OPIs (South-West side).	A1.13

The aerial robot builds an outdoor map of the land	pipes area	with O	PIs (South-Ea	st side).			A1.14
7	Maps (by area)							
The could use at builds the mans on board during	North-W	last	Nlow	th-East	South-W	Voot	Court	h-East
The aerial robot builds the maps on board during the flight. The maps must be shown to the referees	~	- 1		Ï		- 1		
just after the flight finishes.	⊠ A1,1:			A1.16	🏻 A1.1′	7	M A	.1.18
620								
		-						
Set A2: Underwater								
				Type o	f images			
The underwater robot provides images of the gate,	Aco	ustic bu	ıoy-1	I ⊠ A2.1	Optica	al buo	y-1 C	A2.3
	Aco	ustic bu	10y-2	2 🗷 A2.2	Optica	al buo	y-2 C	J A2.4
The underwater robot passes through the gate	without to	ouching	g it.				F	A2.5 ⊠
The underwater robot passes through the gate with	in the first	30 min	nutes	from the	start of th	ne run.	I	A2.6 🗷
		Buo	ys					
The underwater robot detects the plume buoys in re	eal time.	B1□]	В2□	В3□	В4□		B5□
Images are needed.		A2.7	7	A2.8	A2.9	A2.1	0	A2.11
		Buo	ys ni	umbers				
The underwater robot recognises the number on the	e plume	B1C		B2□	В3□	B4□		B5□
buoys		A2.1	12	A2.13	A2.14	A2.1	5	A2.16
	C 410 1	- (A	. D1	+D2)				
The underwater robot produces a geometric map of the plume (Area: B1+B2).					A2	2.17		
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).					A	2.18 🗷		
The underwater robot detects the leak marker on the pipe in real time.					A.	2.19 🗆		
The underwater robot recognises and provides image	ges of the	black n	umb	er stampe	ed on the			
leaking pipe.					A:	2.20 🗆		
The underwater robot reports which is the number of the leaking pipe by its geometric position.					A.	2.21 🗆		
Following the leaking pipe up to the assembly structure, the underwater robot provides an						A.	2.22 🔲	
image mosaic of the <u>first half</u> of the leaking pipe.								

Following the leaking pipe up to the assembly structure, the underwater robot provides an A2.23						
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the second half of the leaking pipe.						
image mosaic of the second hair of the leaking pipe.						
V.						
		Pipe structu	ıre sides			
The underwater robot provides images of the structure sides.	North 🔀	South	East□	West□		
The underwater robot provides images of the structure sides.		A2.25				
	A2.24	A2.25	A2.26	A2.27		
		C+w-	ıcture Si	do		
The underwater robot provides a 3D reconstruction of the struct	ure.	Front 🛮	Rea	r 🗆		
		A2.28	A2.	29		
The underwater robot provides a 2D acoustic or optical map of the debris. Area 1						
A2.30						
The underwater robot localises the missing worker underwater within a radius of 5 meters.						
The underwater robot gives the dimensions and geometrical shape of the closest object to the						
worker.				A2.33 🗆		
The underwater robot provides 3D reconstruction of the worker,						
The underwater robot surfaces within a radius of 2 meters from the worker position.						
Set A3: Cooperation						
The underwater robot communicates directly OR through a surf	ace robot to	the aerial rol	oot			
the position (within a radius of 5 meters) of the worker underwater.				A3.1		

The underwater robot communicates directly OR through a surface robot to the aerial robot the position (within a radius of 5 meters) of the worker underwater. Specify if directly/through surface robot:	A3.1
The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot.	A3.2
The aerial robot , upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location).	A3.3
The underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A3,5

í.

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 ⊠
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7

The underwater robot surfaces in a controlled way once all the tasks have been done.	A4.1
	X
The aerial robots return to the landing area once all the tasks have been done.	A4.2
	×
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
	×
The marine robot(s) transmits live position and images/video to the control station during the run	A 1 1
or the manipulation task.	A4.4
9	

The robot needs manual intervention during a run (e.g. the robot is stuck):					
Marine robot	No permitted				
Aerial robot	PB1 □ (max. 1)				

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB1 E
A robot does not conform to safety requirements for the competition.	DB2
The aerial robot leaves the flight volumes defined by the organisation.	DB3 E
The aerial robot impacts the building.	DB4 E
The aerial robot enters the building.	DB5 E
A marine robot is tele-operated (except for safety reasons agreed by the	
Technical Committee and the manipulation task).	DB6 C
Comment: WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it really necessary (e.g. cheating).	t is
Benchmarking data delivered appropriately: □ yes / □ no	
(Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	
. •	

Team name:	OUBOT /	RAPTORS	×
Referee I (Sea):	RAY	, Referee II (Sea):	GINNY
Referee I (Air):	STJEPAN	, Referee II (Air):	MARGARIDA
Date (DD/MM/Y	YYYY): 21/09/	201 7 , Time	(24:00): 14:00
Duration:	45 min (Max. 4	5 min) 🗖 Timeout	

Achievements

Set A1: Outdoors

An aerial robot reaches the waypoints (WPs) within a radius of 5 m in autonomous navigation. Waypoints can be reached in no specific order and the team can suggest additional waypoints to their flight plan	MP1 A	WP2 A	A1.3 WP3 A
Within 30 minutes of start of the run, a robot reports the correct location (with of the missing worker outside the building.	hin radius 5 ı	n)	A1.4
An aerial robot deploys the first-aid kit (within radius 2 m) from the worker outside the building.			

	Pipe damages on land			
The aerial robot(s) reports the damages on the land pipes.	D1 ☑	D2 🗵	D3 🗷	
(Each damage can only be scored once).	A1.6	A1.7	A1.8	

The aerial robot detects the leak marker on the pipe.	A1.9 🗷
The aerial robot reports the pipe that is leaking on land.	A1.10
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-West side).	A1.11
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-East side).	A1.12
The aerial robot builds an outdoor map of the land pipes area with OPIs (South-West side).	A1.13

The aerial robot builds an outdoor map of the land p		area with							
± 2	ſ		Maps (by area)						
The aerial robot builds the maps on board during	Nor	rth-West	No	rth-East	South-V	Vest	Soi	uth-Eas	
the flight. The maps must be shown to the referees just after the flight finishes.		A1.15	□ A1.16 □		□ A1.1	□ A1.17		□ A1.18	
Set A2: Underwater			-1						
				Туре	of images				
The underwater robot provides images of the gate.		Acoustic	buoy-	1 □ A2.1	Optic	al buc	y-1	□ A2	
		Acoustic	buoy-	2 □ A2.2	Optic	al buc	y-2 □ <mark>A2</mark> .4		
The underwater robot passes through the gate	withc	out touch	ing it				_		
								Δ25	
The underwater robot passes through the gate with					start of the	he run	ì.		
The underwater robot passes through the gate with					start of the	he run	1.		
The underwater robot passes through the gate with		e first 30 n			start of the	he run	1.	A2.5	
The underwater robot detects the plume buoys in re	in the	e first 30 m	ninute		start of the	he run			
	in the	Birne. B	ninute	s from the				A2.6	
The underwater robot detects the plume buoys in re	in the	Bit Bit A	uoys 1 2.7	s from the	B3□	B4E		A2.6	
The underwater robot detects the plume buoys in real Images are needed. The underwater robot recognises the number on the	in the	Browne. B	uoys 1 2.7	B2 A2.8	B3□	B4E	10	A2.6 B5E A2.	
The underwater robot detects the plume buoys in relating are needed.	in the	Browne. B A Browne B	uoys 1 2.7 uoys n	B2 A2.8	B3□ A2.9	B4C A2.	10	B5E A2.	
The underwater robot detects the plume buoys in real Images are needed. The underwater robot recognises the number on the	in the	Bi Bi Bi Me Bi A	uoys 1 2.7 uoys n 1 2.12	B2 A2.8 A2.13	B3□ A2.9	B4C A2.	110	B5E A2.	
The underwater robot detects the plume buoys in real Images are needed. The underwater robot recognises the number on the buoys	eal tin	Bi B	uoys 1	B2 A2.8 B2 A2.8 B2 A2.13	B3□ A2.9 B3□ A2.14	B4C A2.	10	B5E A2.	
The underwater robot detects the plume buoys in real Images are needed. The underwater robot recognises the number on the buoys The underwater robot produces a geometric map of	eal tin	Bine. Bine Bine Bine Bine Arplume (Arplume (Arpl	uoys 1	B2 A2.8 B2 A2.8 B2 A2.13	B3□ A2.9 B3□ A2.14	B4C A2.	110	A2.6	
The underwater robot detects the plume buoys in real Images are needed. The underwater robot recognises the number on the buoys The underwater robot produces a geometric map of the u	e plument of the plum	Bine. Bine Bine Bine Bine Bine Bine Arplume (Arplume (Arplume (Arplume in real times))	uoys 1	B2	B3	B4C A2.	110	B5E A2.1 B5E A2.17 A2.17	
The underwater robot detects the plume buoys in real Images are needed. The underwater robot recognises the number on the buoys The underwater robot produces a geometric map of the underwater robot produces a geometric map of the underwater robot detects the leak marker on the Underwater robot recognises and provides images.	e plumer of the property of th	Bit	uoys 1	B2 A2.8 numbers B2 A2.13 A2.13 B+B4+B5	B3	B4C A2.	110	B5C A2.1 A2.17 A2.18 A2.19	

Following the leaking pipe up to the assembly structure, the underwater robot provides an						
image mosaic of the second half of the leaking pipe.						
T						
2		Pipe structu	ıre sides			
The underwater robot provides images of the structure sides.	North□	South□	East□	West□		
The dide! water robbt provides images of the structure sides.		6				
	A2.24	A2.25	A2.26	A2.27		
		Strı	icture Si	de		
The underwater robot provides a 3D reconstruction of the struct	ure.	Front	Rea	r 🗆		
		A2.28	A2.	29		
The underwater robot provides a 2D acoustic or optical map of t	he debris.	Area 1	I Aı	ea 2□		
		A2.30	A:	2.31		
4						
The underwater robot localises the missing worker underwater v	vithin a rad	ius of 5 meters	j.	A2.32 🗆		
The underwater robot gives the dimensions and geometrical sha	pe of the cl	osest object to	the			
worker.				A2.33 □		
The underwater rehat provides 3D reconstruction of the worker						
The underwater robot provides 3D reconstruction of the worker.						
The underwater robot surfaces within a radius of 2 meters from the worker position.						
Set A3: Cooperation						
The underwater robot communicates directly OR through a surfa		the aerial rol	ot			
the position (within a radius of 5 meters) of the worker underwate	r.			A3.1		

The underwater robot communicates directly OR through a surface robot to the aerial robot the position (within a radius of 5 meters) of the worker underwater. Specify if directly/through surface robot: The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot. The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.		
Specify if directly/through surface robot: The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot. The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	ne underwater robot communicates directly OR through a surface robot to the aerial robot	
The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot. The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	e position (within a radius of 5 meters) of the worker underwater.	A3.1
Underwater/surface robot. The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	pecify if directly/through surface robot:	
The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	ne aerial robot receives and decodes the message with the position of the worker sent by the	A3.2
authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	iderwater/surface robot.	A3.2
robot on the position that marks where the worker is. (The image includes location). The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	ne aerial robot, upon receiving the position of the underwater worker, takes a picture (from the	
The underwater robot communicates the correct underwater leaking pipe to the aerial robot. The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	thorised aerial volume) of the harbour area showing either the underwater robot or the surface	A3.3
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	bot on the position that marks where the worker is. (The image includes location).	
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	ne underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
the underwater or through the surface robot.	ne aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	A3.5
	e underwater or through the surface robot.	
S		

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 □
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7 □

The underwater robot surfaces in a controlled way once all the tasks have been done,	A4.1
The aerial robots return to the landing area once all the tasks have been done.	A4.2
	Z
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
The marine robot(s) transmits live position and images/video to the control station during the run	A4.4
or the manipulation task.	A4.4
(9)	

The robot needs manual interven	ntion during a run (e.g. the robot is stuck):
Marine robot	No permitted
Aerial robot	PB1 □ (max. 1)

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB11
A robot does not conform to safety requirements for the competition.	DB2
The aerial robot leaves the flight volumes defined by the organisation.	DB3 l
The aerial robot impacts the building.	DB4 l
The aerial robot enters the building.	DB5 I
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB6 l
Comment: WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).	is
Benchmarking data delivered appropriately: □ yes / □ no	
(Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	
Referee signature:	

Team name:	ROBDOS / J	IJ PIOMBINO		
Referee I (Sea):	HITESH	, Referee II (Sea):	KELLY	
Referee I (Air):	STJEPAN	, Referee II (Air):	MARGARIDA	
Date (DD/MM/YY	YY): 21/09/	2 <i>0</i> 1 <i>7</i> , Time	e (24:00):	
Duration:	45 min (Max	. 45 min) 🗖 Timeout		

Achievements

Set A1: Outdoors

An aerial robot reaches the waypoints (WPs) within a radius of 5 m in autonomous navigation. Waypoints can be reached in no specific order and the team can suggest additional waypoints to their flight plan	A1.I WP1 A	A1.2 WP2 A	A1.3 WP3 A	
Within 30 minutes of start of the run, a robot reports the correct location (within radius 5 m) of the missing worker outside the building.				
An aerial robot deploys the first-aid kit (within radius 2 m) from the worker outside the building.				

	Pipe damages on land			
The aerial robot(s) reports the damages on the land pipes.	D1 ⊠	D2 🗷	D3 🗷	
(Each damage can only be scored once).	A1.6	A1.7	A1.8	

The aerial robot detects the leak marker on the pipe.	A1.9 🗷
The aerial robot reports the pipe that is leaking on land.	A1.10
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-West side).	A1.11
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-East side).	A1.12
The aerial robot builds an outdoor map of the land pipes area with OPIs (South-West side).	A1.13

The second of the last of the							A 1 1 /	
						A1.14 □		
v		Maps (by area)						
The aerial robot builds the maps on board during	North-West North-East South-West			Soi	uth-East			
the flight. The maps must be shown to the referees	□ A	1.15		A 1.16	□ A1.1′	7		A1.18
just after the flight finishes.			ļ		4			
	2							
Set A2: Underwater								
Set A2. Chief water								
				Type o	f images			
The underwater robot provides images of the gate.	A	Acoustic b	uoy-	1 □ A2.1	Optica	al buo	y-1	□ A2.3
2		Acoustic b	uov '	2 🗖 🔥 2 2	Ontice	al buo	w-2	□ A2.4
*	^	Acoustic o	uoy	Z L AZ.Z	Ориса	ai ouo	-y-2	L A2.4
		-4 41. *	. 14				- 1	
The underwater robot passes through the gate	withou	ut touchin	ig it.					A2.5 □
The underwater robot passes through the gate with	in the f	first 30 mi	nutes	from the	start of th	ne run		10.55
1 5 5					¥ >			A2.6 🗆
		Buc	oys					
The underwater robot detects the plume buoys in re	eal time	e. B1		B2□	В3□	B4 	1	B5□
Images are needed.		A2.	.7	A2.8	A2.9		_	
								A2.11
The underwater robot recognises the number on the	Buoys numbers							A2.11
The underwater robot recognises the number on the plume			<u> </u>			A2.1	10	
buoys	e plume	e B1I		В2□	B3□	B4□	10	B5□
	e plume					<u> </u>	10	
buoys		e B1I	.12	B2□ A2.13	B3□	B4□	15	B5□ A2.16
		e B1I	.12	B2□ A2.13	B3□	B4□	15	B5□
buoys	f the pl	e B1I A2.	.12 a: B1	B2□ A2.13 +B2).	B3□ A2.14	B4□	15	B5□ A2.16
The underwater robot produces a geometric map of the underwater robot produces and the underwater robot produces a geometric map of the underwater robot produces and the underwater rob	f the pl	e B1I A2. Iume (Are.	a: B1	B2□ A2.13 +B2).	B3□ A2.14	B4□	15	B5
The underwater robot produces a geometric map of	f the pl	e B1I A2. Iume (Are.	a: B1	B2□ A2.13 +B2).	B3□ A2.14	B4□	115	B5□ A2.16
The underwater robot produces a geometric map of the underwater robot produces and the underwater robot produces a geometric map of the underwater robot produces and the underwater rob	f the pl	lume (Area in real tin	a: B1 a: B3	B2□ A2.13 +B2). B+B4+B5)	B3□ A2.14	B4□	115	B5
The underwater robot produces a geometric map of the underwater robot produces a geometric map of the underwater robot detects the leak marker on the	f the pl	lume (Area in real tin	a: B1 a: B3	B2□ A2.13 +B2). B+B4+B5)	B3□ A2.14	B4□	115	B5
The underwater robot produces a geometric map of the underwater robot produces a geometric map of the underwater robot detects the leak marker on the underwater robot recognises and provides image leaking pipe.	f the pl f the pl e pipe ges of t	lume (Area in real tin	a: B1	B2	B3 A2.14	B4C A2.1	115	A2.17
The underwater robot produces a geometric map of the underwater robot produces a geometric map of the underwater robot detects the leak marker on the Underwater robot recognises and provides image.	f the pl f the pl e pipe ges of t	lume (Area in real tin	a: B1	B2	B3 A2.14	B4C A2.1	115	B5
The underwater robot produces a geometric map of the underwater robot produces a geometric map of the underwater robot detects the leak marker on the underwater robot recognises and provides image leaking pipe.	f the pl f the pl e pipe ges of t	lume (Area in real time) the black is	a: B1 a: B3 numb	B2 \(\text{A2.13} \) +B2). B+B4+B5) Deer stamped (its geom.)	B3 A2.14	B4C A2.1	115	A2.17

				A2.23 □		
Following the leaking pipe up to the assembly structure, the underwater robot provides an						
image mosaic of the second half of the leaking pipe.						
U2						
	Pipe structure sides					
The underwater robot provides images of the structure sides.	North□	South□	East□	West□		
	A2.24	A2.25	A2.26	A2.27		
		Strı	ucture Si	de		
The underwater robot provides a 3D reconstruction of the struct	ure.	Front	Rea	r 🗆		
		A2.28	A2.	29		
The underwater robot provides a 2D acoustic or optical map of	the debris.	Area 1□] Aı	rea 2□		
		A2.30	A.	2.31		
The underwater robot localises the missing worker underwater v	vithin a rad	ius of 5 meters	·.	A2.32 🗖		
The underwater robot gives the dimensions and geometrical sha	pe of the cl	osest object to	the			
worker.				A2.33 🗖		
The underwater robot provides 3D reconstruction of the worker,	6:			10215		
•				A2.34 □		
The underwater robot surfaces within a radius of 2 meters from the worker position.						
Set A3: Cooperation						
The underwater robot communicates directly OR through a surf		the aerial rol	oot	A3.1		
the position (within a radius of 5 meters) of the worker underwater.						

The underwater robot communicates directly OR through a surface robot to the aerial robot	
the position (within a radius of 5 meters) of the worker underwater.	A3.1
Specify if directly/through surface robot:	
The aerial robot receives and decodes the message with the position of the worker sent by the	
underwater/surface robot.	A3.2
The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the	
authorised aerial volume) of the harbour area showing either the underwater robot or the surface	A3.3
robot on the position that marks where the worker is. (The image includes location).	
The underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	A3.5
the underwater or through the surface robot.	A3.5

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 □
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7 □

The underwater robot surfaces in a controlled way once all the tasks have been done.	A4.1
The aerial robots return to the landing area once all the tasks have been done.	A4.2
	Ø
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
	×
The marine robot(s) transmits live position and images/video to the control station during the run	A4.4
or the manipulation task.	
(9	

The robot needs manual interve	ntion during a run (e.g. the robot is stuck):
Marine robot	No permitted
Aerial robot	PB1 □ (max. 1)

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB1 E
A robot does not conform to safety requirements for the competition.	DB2 [
The aerial robot leaves the flight volumes defined by the organisation.	DB3 E
The aerial robot impacts the building.	DB4 [
The aerial robot enters the building.	DB5
A marine robot is tele-operated (except for safety reasons agreed by the Technical Committee and the manipulation task).	DB6 [
WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it really necessary (e.g. cheating). Benchmarking data delivered appropriately: yes / no	is
(Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	_
Referee signature:	

У.				
Team name: TOMKYLE / HSR				
Referee I (Sea): YVAN , Referee II	(Sea):	KELLY		=3
Referee I (Air):, Referee	II (Air):	LARGAR	DA	
Date (DD/MM/YYYY): 21/09/2017	, Time (24:0	00):1	6:00	
Duration: (Max. 45 min) ☐ Time	out			
Achievements				
Set A1: Outdoors				
Ŋ.º	b			
An aerial robot reaches the waypoints (WPs) within a radius of		A1.1	A1.2	A1.3
autonomous navigation. Waypoints can be reached in no spec and the team can suggest additional waypoints to their flight p		WP1 A	WP2 A	WP3 A
		2	ZI ————————————————————————————————————	⊠
Within 30 minutes of start of the run, a robot reports the correct	t location (within	n radius 5 n	1)	A1.4
of the missing worker outside the building.				×
An aerial robot deploys the first-aid kit (within radius 2 m) fro	om the worker ou	itside the b	uilding.	A1.5
	Pip	e damages	on land	
The aerial robot(s) reports the damages on the land pipes.	D1 🗆	D2 🗆	D3	
(Each damage can only be scored once).	A1.6	A1.7	A1.	8
The aerial robot detects the leak marker on the pipe.				A1.9 🗆
The aerial robot reports the pipe that is leaking on land.				A1.10
The aerial robot builds an outdoor map of the land pipes area	with OPIs (North	n-West side	e).	A1.11
The aerial robot builds an outdoor map of the land pipes area	with OPIs (North	n-East side)).	A1.12
The aerial robot builds an outdoor map of the land pipes area	with ODIa (Saut)	West old		□ Δ1.13
The aeriai robot bunds an outdoor map of the land pipes area	willi Oris (South	i- w est side	·)·	A1.13

		1.1) DI	/C .1 E	. !! \			
The aerial robot builds an outdoor map of the land	ipes area with OPIs (South-East side).					A1.14		
<u> </u>								
	Maps (by area)							
The aerial robot builds the maps on board during	North-	North-West North-East South-			South-V	Vest	Sou	th-East
the flight. The maps must be shown to the referees just after the flight finishes.	□ A1.	l A1.15		A 1.16	□ A1.17			A 1.18
				6				
x			1.					
Set A2: Underwater								
			÷	Type o	of images			
The underwater robot provides images of the gate.	Ac	oustic b	uoy-	1 🛛 A2.1	Optic	al buo	y-1	□ A2.3
	Ac	oustic b	ouoy-	2 🗷 A2.2	Optic	al buo	y-2	□ A2.4
	-							
The underwater robot passes through the gate	without	touchir	ng it.	ĸ				A2.5 🗵
The underwater robot passes through the gate with	in the fir	st 30 mi	inutes	s from the	start of t	he run.		A2.6 🗵
		Bue	oys					
The underwater robot detects the plume buoys in ro	The underwater robot detects the plume buoys in real time. B1 B2 B3 B4						B5□	
Images are needed.		A2	.7	A2.8	A2.9	A2.1	0	A2.11
,		Buc	oys n	umbers	-			
The underwater robot recognises the number on the	e plume	B11		В2□	В3□	В4□		В5□
buoys		A2	.12	A2.13	A2.14	A2.1	5	A2.16
The series of th	C 41 1	- (A	D.1	LD2\				
The underwater robot produces a geometric map of the plume (Area: B1+B2).					Α	2.17 🛚		
				The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).				
The underwater robot produces a geometric map of	f the plu	ne (Are	a: B3	+B4+B5)).	-	Α	2.18 🗷
The underwater robot produces a geometric map of the underwater robot detects the leak marker on the				+B4+B5)) .	-		2.18 🗷
The underwater robot detects the leak marker on the Underwater robot recognises and provides image.	e pipe ir	real tin	ne.			-	Α	2.19
The underwater robot detects the leak marker on the	e pipe ir	real tin	ne.				Α	
The underwater robot detects the leak marker on the Underwater robot recognises and provides image.	e pipe ir	real tin	ne. numl	oer stampe	ed on the		A	2.19 🗆
The underwater robot detects the leak marker on the Underwater robot recognises and provides image leaking pipe.	e pipe inges of the	real tine black	ne. numl	per stampo	ed on the		A	2.19 🗆

Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the second half of the leaking pipe.				A2.23 □	
mage mosaic of the second han of the leaking pipe.					
ZI IZ		Pipe structi	ure side	es	
The underwater robot provides images of the structure sides.	North 🔼	South	South East		
(Acoustic)	A2.24	A2.2,5	A2.20	6 A2.27	
		Stri	ucture	Side	
The sales of the s		Front \square			
The underwater robot provides a 3D reconstruction of the struct	ure.		Rear 🗆		
A2.28 A				2.29	
The underwater robot provides a 2D acoustic or optical map of t	the debris.	Area 1	ן פ	Area 2□	
A2.30				A2.31	
		1			
The underwater robot localises the missing worker underwater v	vithin a rad	ius of 5 meters	S.	A2.32 🗷	
The underwater robot gives the dimensions and geometrical sha	pe of the cl	osest object to	the		
worker.				A2.33 🗆	
The underwater robot provides 3D reconstruction of the worker.					
The underwater robot surfaces within a radius of 2 meters from the worker position.				A2.35 □	
Set A3: Cooperation					

The underwater robot communicates directly OR through a surface robot to the aerial robot	
the position (within a radius of 5 meters) of the worker underwater.	A3.1
Specify if directly/through surface robot:	
The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot.	A3.2
The aerial robot, upon receiving the position of the underwater worker, takes a picture (from the	
authorised aerial volume) of the harbour area showing either the underwater robot or the surface	A3.3
robot on the position that marks where the worker is. (The image includes location).	
The underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by	A3.5
the underwater or through the surface robot.	l _

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 □
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7

The underwater robot surfaces in a controlled way once all the tasks have been done.	A4.1
	₩ No
The aerial robots return to the landing area once all the tasks have been done.	A4.2
	×
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
The marine robot(s) transmits live position and images/video to the control station during the run	A4.4
or the manipulation task.	A4.4
Q .	

The robot needs manual intervention during a run (e.g. the robot is stuck):			
Marine robot	No permitted		
Aerial robot	PB1 ☑ (max. 1)		

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB1 C
A robot does not conform to safety requirements for the competition.	DB2 E
The aerial robot leaves the flight volumes defined by the organisation.	DB3 E
The aerial robot impacts the building.	DB4 E
The aerial robot enters the building.	DB5 E
A marine robot is tele-operated (except for safety reasons agreed by the	
Technical Committee and the manipulation task).	DB6 □
Comment:	is
Benchmarking data delivered appropriately: ☐ yes / ☐ no (Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	1
Referee signature:	

Team name: TUSCANY				
Referee I (Sea): YVAN, Referee II	(Sea): K	ELLY		
Referee I (Air): STTEPAN , Referee	II (Air):	ARGARIS	14	
Date (DD/MM/YYYY): 21/09/2017	, Time (24:0	0):	2:00	
Duration: 45 min ☐ Time	out			
Achievements				
Set A1: Outdoors				
An aerial robot reaches the waypoints (WPs) within a radius of	of 5 m in	A1.1	A1.2	A1.3
autonomous navigation. Waypoints can be reached in no spec	cific order	WP1 A	WP2 A	WP3 A
and the team can suggest additional waypoints to their flight p	lan	区	Z	Ø
NVIII 20 1 1 C 1 C 1		11 5		
Within 30 minutes of start of the run, a robot reports the correct of the missing worker outside the building.	t location (within	i radius 5 m	1)	A1.4
An aerial robot deploys the first-aid kit (within radius 2 m) from	om the worker ou	tside the bu	iilding.	A1.5
	Pin	e damages	on land	
The aerial robot(s) reports the damages on the land pipes.	D1 🗵	D2 🗵		3 🗷

	Pipe damages on land		
The aerial robot(s) reports the damages on the land pipes.	D1 🗵	D2 🗵	D3 🗷
(Each damage can only be scored once).	A1.6	A1.7	A1.8

The aerial robot detects the leak marker on the pipe.	A1.9 🖬
The aerial robot reports the pipe that is leaking on land.	A1.10
	(X
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-West side).	A1.11
The aerial robot builds an outdoor map of the land pipes area with OPIs (North-East side).	A1.12
The aerial robot builds an outdoor map of the land pipes area with OPIs (South-West side).	A1.13

The conict wall of havilds are suited as were after land			ام الماء	DI- /	Cauth Ea	-4 -: 4 - \		_	A 1 1 4
The aerial robot builds an outdoor map of the land pipes area with OPIs (South-East side).							A1.14		
								_	
7	Г				Maps (b	y area)			
The aerial robot builds the maps on board during	North-We		est	Nor	th-East	South-V	Vest	Soi	uth-East
the flight. The maps must be shown to the referees just after the flight finishes.		A1.15			A1.16	□ A1.1	7		A1.18
Set A2: Underwater					-				
					Type o	f images			
The underwater robot provides images of the gate.		Acous	stic bu	ioy-	1 🗷 A2.1	Optic	al buo	y-1	□ A2.3
		Acous	stic bu	10y-2	2 🗷 A2.2	Optica	al buo	y-2	□ A2.4
The underwater robot passes through the gate	uzitl	aout tor	chin	a it				Т	
The underwater robot passes through the gate	VV 1 C1	iout tot	ıcımı	g n.					A2.5
The underwater robot passes through the gate within the first 30 minutes from the start of the run.					A2.6				
			Buo						
The underwater robot detects the plume buoys in real time.		B1C	ם כ	B2□	В3□	B4□)	B5□	
Images are needed.			A2.7	7	A2.8	A2.9	A2.1	0	A2.11
			Buo	ys n	umbers		•		
The underwater robot recognises the number on the	e pli	ume	B1C]	В2□	В3□	B4□]	B5□
buoys			A2.1	12	A2.13	A2.14	A2.1	5	A2.16
The underwater robot produces a geometric map o	f the	plume	(Area	: B1	+B2).				A2.17 ☑
The underwater robot produces a geometric map of the plume (Area: B3+B4+B5).					A	A2.18 □			
The underwater robot detects the leak marker on the pipe in real time.				A	A2.19 □				
The underwater robot recognises and provides images of the black number stamped on the leaking pipe.				A	A 2.20 □				
The underwater robot reports which is the number of the leaking pipe by its geometric position.				A	A2.21 □				
Following the leaking pipe up to the assembly structure, the underwater robot provides an image mosaic of the <u>first half</u> of the leaking pipe.				A	A2.22 🗆				

				A2.23 🗖	
Following the leaking pipe up to the assembly structure, the underwater robot provides an					
image mosaic of the second half of the leaking pipe.			- 1		
2					
ig A		Pipe structu	ro sidos		
The underwater robot provides images of the structure sides.	North□	South□	East□	□ West□	
	A2.24	A2.25	A2.26	A2.27	
		L			
	_	Stru	icture Si	de	
The second secon					
The underwater robot provides a 3D reconstruction of the struct	ure.	Front	Rea	r 🗆	
		A2.28	A2.2	29	
The underwater robot provides a 2D acoustic or optical map of	the debris.	Area 1	l Ar	ea 2□	
A2.30			A ₂	2.31	
The underwater report legalises the missing worker underwater a	vithin a radi	us of 5 motors			
The underwater robot localises the missing worker underwater within a radius of 5 meters.				A2.32 🗖	
The underwater robot gives the dimensions and geometrical sha	ne of the clo	sest object to	the		
worker.	pe or the en	osesi object to		A2.33 🗖	
The underwater robot provides 3D reconstruction of the worker.				A 2 24 🗖	
· ·				A2.34 □	
The underwater robot surfaces within a radius of 2 meters from the worker position.				A2.35 🗆	
11 E				712.55	
Set A3: Cooperation					
The underwater robot communicates directly OR through a surf	ace robot to	the aerial rob	oot	421	

The underwater robot communicates directly OR through a surface robot to the aerial robot	
the position (within a radius of 5 meters) of the worker underwater.	A3.1
Specify if directly/through surface robot:	
The aerial robot receives and decodes the message with the position of the worker sent by the underwater/surface robot.	A3.2
The aerial robot , upon receiving the position of the underwater worker, takes a picture (from the authorised aerial volume) of the harbour area showing either the underwater robot or the surface robot on the position that marks where the worker is. (The image includes location).	A3.3
The underwater robot communicates the correct underwater leaking pipe to the aerial robot.	A3.4
The aerial robot receives and decodes the message with the correct leaking pipe sent by directly by the underwater or through the surface robot.	A3.5 □

The aerial robot communicates the correct land leaking pipe to the underwater robot (directly or through the surface robot).	A3.6 □
The underwater robot receives and decodes the message with the correct land leaking pipe sent by the aerial robot or the surface robot.	A3.7

The underwater robot surfaces in a controlled way once all the tasks have been done.	A4.1
	Ø
The aerial robots return to the landing area once all the tasks have been done.	A4.2
The aerial robot(s) transmits live position and images/video to the control station during the run.	A4.3
	×
The marine robot(s) transmits live position and images/video to the control station during the run	A4.4
or the manipulation task.	Α4.4
2	

The robot needs manual intervention during a run (e.g. the robot is stuck):			
Marine robot	No permitted		
Aerial robot	PB1 □ (max. 1)		

The underwater robot changes batteries.	PB2□ (max. 1)
The underwater robot surfaces at any point (GPS fix can be obtained) and re-submerges. (The surface for preparation of the manipulation task is not penalised)	PB3 □ □ (max. 2)
The aerial robot does not keep the safety distance of 5 m with the building wall.	PB4 □ □ (max. 2)

A robot damages competition arena (including the obstacles).	DB11
A robot does not conform to safety requirements for the competition.	DB2 l
The aerial robot leaves the flight volumes defined by the organisation.	DB3 l
The aerial robot impacts the building.	DB4
The aerial robot enters the building.	DB5 I
A marine robot is tele-operated (except for safety reasons agreed by the	
Technical Committee and the manipulation task).	DB6 l
Comment: WARNING: A disqualifying behaviour discards all other achievements in the current task. Use it only when it is really necessary (e.g. cheating).	is
Benchmarking data delivered appropriately: □ yes / □ no	
(Time is 60 min after the end of the team's time-slot, formats as described in the TBM-3)	
Team leader signature:	
Referee signature:	