EUROPEAN COMMISSION
Research Executive Agency

Fostering Novel ideas, FET-Open

ANNEX 1 (part A)

Research and Innovation action

NUMBER — 829157 — TopSpec

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1.1. The project summary

Project Number [1]	829157	Project Acronym [2]	TopSpec

One form per project

General information

Project title [3]	Next generation precision antibody profiling - from science fiction to reality
Starting date [4]	01/01/2019
Duration in months [5]	36
Call (part) identifier [6]	H2020-FETOPEN-2018-2019-2020-01
Topic	FETOPEN-01-2018-2019-2020 FET-Open Challenging Current Thinking
Fixed EC Keywords	Spectroscopic and spectrometric techniques, Proteomics, Molecular biology and interactions, Proteomics in biochemistry, Mass Spectrometry, Instrumentation and Instrumental techniques
Free keywords	Antibody profiling, immunotherapeutics, Mass spectrometry, Tandem mass spectrometry

Abstract [7]

One of the major challenges of modern medicine is to understand how the human organism defends itself against invasions and diseases. The biggest mystery is the human immune system, and understanding this ultimately requires knowledge of the sequence repertoire of human antibodies and their respective antigens. The purpose of the TopSpec project is to be the first in the world to solve this challenge, opening up opportunities in medical research and drug development that are today only dreamt about. We will create a breakthrough technology that will revolutionize academic, clinical and industrial proteomics and dramatically advance the development of new generation antibody- and protein-based therapeutics. Antibodies represent the most sophisticated line of natural defense against disease. Knowing exactly which antibodies are produced in response to a particular disease enables us not only to better understand the cause of the disease but also to provide new-generation cures in the form of personalized therapeutic antibodies. The limiting factor for this to truly be achieved is to find a way to analyze and sequence large molecules in the gas phase, and this represents a formidable challenge. The TopSpec project will develop ground-breaking TOP-down tandem mass SPECtrometry (MS/MS) approaches based on novel radical gas-phase ion-electron and ion-atom reactions, and implement them on a unique, hyphenated, ultrahigh-resolution MS platform. Another “killer innovation” is the ability to greatly simplify MS/MS spectra of large molecules by adding another dimension of separation – collisional cross-sections of fragment ions using two parallel approaches. TopSpec will be the first project to implement de-convolution of massively overlapping isotopic clusters, solving one of the greatest challenges in top-down MS of large molecules.

1.2. List of Beneficiaries

Project Number [1]	829157	Project Acronym [2]	TopSpec

List of Beneficiaries

No	Name	Short name	Country	Project entry month[8]	Project exit month
1	KAROLINSKA INSTITUTET	KI	Sweden	1	36
2	FASMATECH EPISTIMONIKI KAI TECHNOLOGIKI ANONYMI ETAIREIA	FASMATECH SA	Greece	1	36
3	THERMO FISHER SCIENTIFIC (BREMEN) GMBH	THERMO FISHER	Germany	1	36
4	SPECTROSWISS SARL	SPECTROSWISS	Switzerland	1	36
5	BIOMOTIF AB	Biomotif AB	Sweden	1	36
6	THE NOTTINGHAM TRENT UNIVERSITY	TNTU	United Kingdom	1	36
7	INSTITUT PASTEUR	IP	France	1	36
8	SPECTROMETRY VISION BV	MS VISION	Netherlands	1	36

1.3. Workplan Tables - Detailed implementation

1.3.1. WT1 List of work packages

WP Number[9]	WP Title	Lead beneficiary[10]	Person-months[11]	Start month[12]	End month[13]
WP1	Omnitrap development and testing	2 - FASMATECH SA	42.00	1	36
WP2	Implementation of CAD, ECD, HECD, UV, IR PD, and EID MS/MS techniques in Omnitrap	1 - KI	42.00	1	24
WP3	Development and application of H-atom bombardment (HAB) MS/MS techniques	2 - FASMATECH SA	85.00	1	24
WP4	Development and application of Coulomb explosion MS/MS technique	1 - KI	49.00	18	33
WP5	Development of pI-Trap-ESI combination	5 - Biomotif AB	42.00	15	36
WP6	Modification of the Orbitrap mass spectrometer	3 - THERMO FISHER	38.00	2	36
WP7	Signal detection and data processing	4 - SPECTROSWISS	108.00	1	34
WP8	Dissemination, Communication & Exploitation	8 - MS VISION	71.00	3	36
WP9	Project Management and Administration	1 - KI	72.00	1	36
		Total	549.00		

1.3.2. WT2 list of deliverables

Deliverable Number[14]	Deliverable Title	WP number[9]	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D1.1	Two fully equipped Omnitraps & one IMS installed	WP1	2 - FASMATECH SA	Other	Public	18
D1.2	Modified Omnitraps with updated software	WP1	1 - KI	Other	Public	33
D1.3	Fully serviced, functioning Omnitraps & IMS	WP1	2 - FASMATECH SA	Other	Public	36
D2.1	in situ testing of the optimized CAD MS/ MS protocol	WP2	1 - KI	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	18
D2.2	Protocol of in situ testing of the optimized CAD	WP2	1 - KI	Report	Confidential, only for members of the consortium (including the Commission Services)	20
D2.3	in situ testing optimized ECD, HECD and EID MS/MS	WP2	1 - KI	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	24
D3.1	Prototype of the HAB gun installed and tested protocol	WP3	2 - FASMATECH SA	Other	Confidential, only for members of the consortium (including the Commission Services)	15
D3.2	Optimized HAB guns installed and tested - protocols	WP3	2 - FASMATECH SA	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D4.1	Protocol- CED gun prototype installed and tested	WP4	1 - KI	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D4.2	Protocols: CED guns installed and tested	WP4	1 - KI	Other	Confidential, only for members of the consortium	33

Deliverable Number[14]	Deliverable Title	WP number[9]	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
					(including the Commission Services)	
D5.1	Prototype pI-Trap-ESI installed and tested– protocol	WP5	5 - Biomotif AB	Other	Public	20
D5.2	Two tested, optimized pI-Trap-ESI installed and tested	WP5	5 - Biomotif AB	Other	Public	36
D6.1	Installation of Q Exactive instrument for Omnitrap development	WP6	3 - THERMO FISHER	Other	Confidential, only for members of the consortium (including the Commission Services)	12
D6.2	Modified Orbitrap Q Exactive HF X installed	WP6	3 - THERMO FISHER	Other	Public	36
D7.1	Two Prototype FTMS Booster installed and tested-protocol	WP7	4 - SPECTROSWISS	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D7.2	Top-down analysis software	WP7	4 - SPECTROSWISS	Other	Confidential, only for members of the consortium (including the Commission Services)	29
D7.3	Optimized FTMS Boosters test protocols	WP7	4 - SPECTROSWISS	Other	Confidential, only for members of the consortium (including the Commission Services)	34
D8.1	IP protection strategy finalized	WP8	8 - MS VISION	Other	Public	3
D8.2	Draft Exploitation plan and Business strategy document	WP8	8 - MS VISION	Report	Public	12
D8.3	Young scientist TopSpec technology workshop	WP8	8 - MS VISION	Other	Public	33
D8.4	Public demonstrations of TopSpec technology	WP8	8 - MS VISION	Report	Public	33
D8.5	Scientific reports and publications	WP8	8 - MS VISION	Report	Public	36

Deliverable Number[14]	Deliverable Title	WP number[9]	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D8.6	Exploitation plan and Business strategy document	WP8	8 - MS VISION	Report	Confidential, only for members of the consortium (including the Commission Services)	36
D9.1	Logo and Website launch and public accessibility	WP9	1 - KI	Other	Public	2
D9.2	Data management plan	WP9	1 - KI	ORDP: Open Research Data Pilot	Public	6
D9.3	Technical/scientific review meeting documents	WP9	1 - KI	Report	Confidential, only for members of the consortium (including the Commission Services)	13
D9.4	Review meetings	WP9	1 - KI	Report	Confidential, only for members of the consortium (including the Commission Services)	36

1.3.3. WT3 Work package descriptions

Work package number [9]	WP1	Lead beneficiary [10]	2 - FASMATECH SA
Work package title	Omnitrap development and testing		
Start month	1	End month	36

Objectives

To develop an Omnitrap with advanced ion transfer and manipulation capabilities.

Description of work and role of partners

WP1 - Omnitrap development and testing [Months: 1-36]
FASMATECH SA, THERMO FISHER
Task 1.1 Mechanical design & testing (FASM, M1-M4): A novel design will be produced with reduced capacitive coupling, eliminated resistor over-heating in vacuum, precision machining and new pulsed beam source. The reduced capacitive coupling will be achieved by new hyperbolic electrode structures and will ensure that higher order-field components and associated non-linear resonances will not be present and affect performance. These studies will be performed using ion optical simulation tools. Overheating in vacuum will be accomplished by a introducing a multi-pin spring- contact feedthrough distributing RF and DC signals on a two-level in-vacuum pcb for driving the omnitrap. The new pulsed electron beam source will utilize a new set of high voltage electron optics to counterbalance the string effects of space charge and also a high voltage pulser unit synchronized with the main RF drive and controlled through the FPGA unit to create pulses of desired length.
Task 1.2 Ion optical simulations (FASM, M1-M5): Effects of waveform non-idealities on ion isolation will be investigated, as well as ion isolation using resolving DC and variations of the RF duty cycle as an alternative. These studies will rely on precise measurements of ion stability conditions using RF-DC scanning methods to identify sharp boundaries which can be utilized for ejecting lower or higher m/z values relative to the window of interest. A calibration table will be generated to automate the process of m/z selection and also allow the user to define the width of the window.
Task 1.3 Electronics design & testing (FASM, M1-M7): An improved rectangular RF drive generator with voltage pulse stability of < 3% and minimized jitter will be developed. The target value is 250V0p at 2MHz, but efforts to push electronics beyond this threshold will be made to enhance isolation, trapping efficiency and increase the number of ions that can be stored in the trap by reducing the undesired effects of space charge. Optimization of sweep algorithms will be performed to allow for multi-notch isolation experiments. Finally, a new FPGA platform will be implemented that will allow precise control of trigger signals which are essential for synchronizing all the complex functionality available in the omnitrap.
Task 1.4 Mechanical & vacuum assembly (FASM, M7-M18): Assembly of two Omnitraps and one IMS to meet tolerance specifications together with vacuum testing and related gas load during operation of the pulse valve systems will be carried out. Inspection tests of tolerances achieved will be performed and a residual gas analyzer will also be employed to monitor the quality of the gas. Modifications to the original omnitrap design will be considered to facilitate easy removal and cleaning of the electron optics assembly.
Task 1.5 Design control software (FASM, M6-18): Production of instruction sequence lists for basic experiments, bundle modes development and implementation of new automatic modes of operation to control vacuum state. Each bundle will also be accessible to the user to perform in-depth optimization of the extended functionality of the trap. Automated m/z isolation procedures will be achieved by precise tuning of RF amplitude, frequency and duty cycle of the waveforms. A series of dipolar excitation experiments will also allow for precise measurements of ion secular frequency. All this functionality will be available through the sequence list of the omnitrap software.
Task 1.6 Electronics testing & synchronization (FASM, M10-M18): Communication board and software design to synchronize ion transfer from and to the C-trap of the Orbitrap. These experiments involve optimization of cooling pressures and ion axial energy, together with gas pulsing performed in the omnitrap to receive and thermalize high mass protein ions. The experiments will also involve frequency and RF amplitude optimization in additional to the axial DC profile and related DC switching of electrodes used to gate pulses of ions.
Task 1.7 Installation & instructions in situ (FASM, M14,23,28): The Omnitrap + IMS will be installed in Stockholm at KI and the standalone Omnitrap in Paris at IP. Training of local research personnel and students will be executed. A detailed manual of operation will also be provided. Training in Athens before instrument shipping is also an option and will be discussed between partners.

Task 1.8 Modifications and optimization in situ (FASM, TF, M18-19, 26,30,33): Necessary modifications will be performed as per request of the researchers at KI and IP to improve and optimize Omnitrap performance. These optimizations will be related to the operation of the hyperthermal H gun and the bright electron source for improving sequence information.
Task 1.9 Maintenance and servicing in situ (FASM, TF, M18,21,25,29,33): will be performed in both locations to ensure fault-free performance. Clean-up, consumable replacement, other preventive maintenance during the course of this project.

Participation per Partner

Partner number and short name	WP1 effort
2 - FASMATECH SA	39.00
3 - THERMO FISHER	3.00
Total	42.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D1.1	Two fully equipped Omnitraps & one IMS installed	2 - FASMATECH SA	Other	Public	18
D1.2	Modified Omnitraps with updated software	1 - KI	Other	Public	33
D1.3	Fully serviced, functioning Omnitraps & IMS	2 - FASMATECH SA	Other	Public	36

Description of deliverables

D1.1. Two Omnitraps + one IMS fully equipped with driving electronics, gas lines and pulse valves and control software designed, constructed and installed
D1.2. Modified and optimized Omnitraps with updated software
D1.3. Fully serviced, functioning Omnitraps

D1.1 : Two fully equipped Omnitraps & one IMS installed [18]

Two Omnitraps + one IMS fully equipped with driving electronics, gas lines and pulse

D1.2 : Modified Omnitraps with updated software [33]

Modified and optimized Omnitraps with updated software (month 33).

D1.3 : Fully serviced, functioning Omnitraps & IMS [36]

Fully serviced, functioning Omnitraps.

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS2	Omnitraps & IMS Electronics design	2 - FASMATECH SA	12	Omnitraps & IMS Electronics design finalized
MS4	Omnitraps & IMS P.O.s sent to suppliers	2 - FASMATECH SA	12	Omnitraps & IMS P.O.s sent to suppliers
MS5	Omnitraps & IMS Mechanical design	2 - FASMATECH SA	12	Omnitraps & IMS Mechanical design finalised
MS9	Interfacing pI-Trap-Orbitrap OMNI-ORBI combination	2 - FASMATECH SA	26	Capacity to sequence intact proteins

Work package number [9]	WP2	Lead beneficiary [10]	1 - KI
Work package title	Implementation of CAD, ECD, HECD, UV, IR PD, and EID MS/MS techniques in Omnitrap		
Start month	1	End month	24

Objectives

To implement and test in Omnitrap ion isolation and collision-based fragmentation techniques (CAD) and electron-based fragmentation techniques ECD, HECD and EID, as well as IR and UV photo-dissociation.

Description of work and role of partners

WP2 - Implementation of CAD, ECD, HECD, UV, IR PD, and EID MS/MS techniques in Omnitrap [Months: 1-24]
KI, FASMATECH SA, THERMO FISHER , TNTU, IP
Task 2.1 Testing in situ ion isolation techniques (KI, FASM, IP, NTU, M15-17). Ensure single- and multi-notch isolation of precursor ions with high efficiency. Determine the width of the m/z window at <50% ion loss.
Task 2.2 Testing in situ collision-activated UV and IR dissociation reactions (KI, FASM, IP, NTU, M16-18)
Test CAD MS/MS; determine maximum efficiency as a ratio of the total fragment charge over precursor charge.
Task 2.3 Testing in situ ECD, HAB and CED MS/MS techniques (KI, FASM, IP, NTU, M15-19): Testing & optimization of electron-based MS/MS techniques; determine minimum time needed to perform.
Task 2.4 Application of ECD, HAB and CED MS/MS techniques to analysis of proteins (KI, TF, M16-23)

Participation per Partner

Partner number and short name	WP2 effort
1 - KI	19.00
2 - FASMATECH SA	4.00
3 - THERMO FISHER	3.00
6 - TNTU	8.00
7 - IP	8.00
Total	42.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D2.1	in situ testing of the optimized CAD MS/MS protocol	1 - KI	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	18
D2.2	Protocol of in situ testing of the optimized CAD	1 - KI	Report	Confidential, only for members of the consortium (including the Commission Services)	20

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D2.3	in situ testing optimized ECD, HECD and EID MS/MS	1 - KI	Demonstrator	Confidential, only for members of the consortium (including the Commission Services)	24

Description of deliverables

D2.1: Protocol of in situ testing of the optimized ion isolation technique
D2.2: Protocol of in situ testing of the optimized CAD MS/MS
D2.3: Protocol of in situ testing of the optimized ECD, HECD and EID MS/MS

D2.1 : in situ testing of the optimized CAD MS/MS protocol [18]

Protocol of in situ testing of the optimized ion isolation technique

D2.2 : Protocol of in situ testing of the optimized CAD [20]

Protocol of in situ testing of the optimized CAD MS/MS

D2.3 : in situ testing optimized ECD, HECD and EID MS/MS [24]

Protocol of in situ testing of the optimized ECD, HECD and EID MS/MS

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification

Work package number [9]	WP3	Lead beneficiary [10]	2 - FASMATECH SA
Work package title	Development and application of H-atom bombardment (HAB) MS/MS techniques		
Start month	1	End month	24

Objectives

Development and application of a novel hydrogen atom source with hyper-thermal energies.

Description of work and role of partners

WP3 - Development and application of H-atom bombardment (HAB) MS/MS techniques [Months: 1-24]
FASMATECH SA, KI, THERMO FISHER , TNTU, IP
Task 3.1 Designing the hyper-thermal H-atom gun (FASM, KI, IP, NTU, TF, M1- M7). The design will be based on a pulse plasma source utilizing DC potentials and fast pulse valves for raising pressure above the breakdown limit. Ion pulse transients of the order of a few tens of ms will be generated which will contain atomic ions of hydrogen. These ions will be thermalized via interactions with highly polished surfaces positioned coaxially with the expansion axis of the pulsed plasma beams.
Task 3.2 Building the hyper-thermal H-atom gun (FASM, KI, NTU, IP, TF, M6- M11)
The hyperthermal plasma gun will be developed and tested on a separate vacuum chamber for iterating the design and optimizing conditions of H atom production. Measurements will be performed with a residual gas analyzer to monitor reaction products in the plasma jet. Stopping curve experiments will also be performed for measuring the kinetic energy spread of the pulsed ion and neutral beams ejected from the plasma source. Critical parameters such as maintaining high vacuum conditions outside the source will also be evaluated carefully so as to not affect the ultra-high vacuum conditions for the orbitrap mass analyzer to operate smoothly.
Task 3.3 Interfacing the H-atom gun system with Omnitrap (FASM, KI, NTU, IP, TF, M11- 12)
Critical parameters such as maintaining high vacuum conditions outside the source will also be evaluated carefully so as to not affect the ultra-high vacuum conditions for the orbitrap mass analyzer to operate smoothly. Mechanical design considerations will also be critical for fitting the gun due to restrictions in the QE instrument design. Additional pumping capabilities will be employed if necessary.
Task 3.4 Develop of software for HAB MS/MS-Omnitrap combination (FASM, KI, NTU, IP, TF, M8-13)
The software will include additional instructions available in the instruction list of the omnitrap software to allow the user to define parameters such as the number of gas pulses applied sequentially, the amount of gas released in the system, the energy of the beam and other conditions that will permit optimization of protein ion fragmentation reactions. These will be part of a bundle instruction that can be introduced in the sequence list of any experiment performed in the omnitrap.
Task 3.5 Testing the HAB MS/MS- Omnitrap combination (FASM, KI, NTU, IP, TF, M11- 13)
After the successful completion of the hyperthermal H atom gun on the stand-alone vacuum chamber, tests will include ESI of proteins using the QE platform and testing H attachment and fragmentation reactions using standard protein ions. Optimization tests will be performed and energy-resolved experiments will be carried out to investigate the associated gas phase reaction effects.
Task 3.6 Optimizing the software and hardware for HAB MS/MS. (FASM, KI, TF M18- M22)
Feedback from the users in KI and IP will be essential for improvng the technology. This feedback will be provided after exhasutive experiments on the two prototype units for a given set of proteins and understanding of the gas phase mechanism responisble for fragmentation.
Task 3.7 HAB MS/MS analysis of mAbs. (FASM, KI, M18- M24)
The reactions of H atom produced from plasma jets will be tested on mAbs and the effects will be investigated using advanced sequence algorithms for deciphering fragmentation patterns and measuring sequence coverage. H attachment reactions will also be evaluated and used for deciphering between even and odd electron species. The complementarity of this technique to ECD, CID or other standard fragmentation techniques will be evaluated.

Participation per Partner

Partner number and short name	WP3 effort
1 - KI	37.00

Partner number and short name	WP3 effort
2 - FASMATECH SA	33.00
3 - THERMO FISHER	1.00
6 - TNTU	7.00
7 - IP	7.00
Total	85.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D3.1	Prototype of the HAB gun installed and tested protocol	2 - FASMATECH SA	Other	Confidential, only for members of the consortium (including the Commission Services)	15
D3.2	Optimized HAB guns installed and tested - protocols	2 - FASMATECH SA	Other	Confidential, only for members of the consortium (including the Commission Services)	24

Description of deliverables

D3.1. One prototype of the HAB gun installed and tested at KI – protocol of test
D3.2. Two tested, optimized HAB guns installed and tested at KI, IP– protocols of tests

D3.1 : Prototype of the HAB gun installed and tested protocol [15]

One prototype of the HAB gun installed and tested at KI – protocol of test

D3.2 : Optimized HAB guns installed and tested - protocols [24]

Two tested, optimized HAB guns installed and tested at KI, IP– protocols of tests

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS7	Suffic HAB MS/MS demonstrated	2 - FASMATECH SA	23	HAB MS/MS spectra of proteins demonstrated

Work package number [9]	WP4	Lead beneficiary [10]	1 - KI
Work package title	Development and application of Coulomb explosion MS/MS technique		
Start month	18	End month	33

Objectives

To develop the novel techniques utilizing 100-1000 eV electrons to achieve Coulomb explosion.

Description of work and role of partners

WP4 - Development and application of Coulomb explosion MS/MS technique [Months: 18-33]
KI, FASMATECH SA, Biomotif AB, TNTU, IP
Task 4.1 Designing the 100-1000 eV pulsed electron source (FASM, KI, NTU, IP, BM; M18 – M20)
Task 4.2 Building the 100-1000 eV pulsed electron source. (FASM, KI, NTU, IP, BM; M20 – M22)
Task 4.3 Interfacing the 100-1000 eV pulsed electron source with Orbitrap MS (FASM, KI, NTU, IP, BM; M22 -23)
Task 4.4 Testing the Coulomb explosion MS/MS. (Lead: KI, Part: FASM, NTU, BM, IP; M23 – M24)
Task 4.5 Optimizing the hardware and software for Coulomb explosion MS/MS. (FASM, KI, NTU, IP; M23-25)
Task 4.6 Application of Coulomb explosion dissociation (CED) MS/MS to mAbs. (KI, FASM, NTU, IP; M23-28)

Participation per Partner

Partner number and short name	WP4 effort
1 - KI	26.00
2 - FASMATECH SA	13.00
5 - Biomotif AB	2.00
6 - TNTU	4.00
7 - IP	4.00
Total	49.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D4.1	Protocol- CED gun prototype installed and tested	1 - KI	Other	Confidential, only for members of the consortium (including the Commission Services)	24
D4.2	Protocols: CED guns installed and tested	1 - KI	Other	Confidential, only for members of the consortium (including the Commission Services)	33

Description of deliverables

D4.1. One prototype of the CED gun installed and tested at KI – protocol of test
D4.2. Two tested, optimized CED guns installed and tested at KI and IP – protocols of tests

D4.1 : Protocol- CED gun prototype installed and tested [24]

One prototype of the CED gun installed and tested at KI – protocol of test.

D4.2 : Protocols: CED guns installed and tested [33]

Two tested, optimized CED guns installed and tested at KI and IP – protocols of tests

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS12	Development of CED MS/MS	1 - KI	36	CEB MS/MS spectra of proteins

Work package number [9]	WP5	Lead beneficiary [10]	5 - Biomotif AB
Work package title	Development of pI-Trap-ESI combination		
Start month	15	End month	36

Objectives

Modify the pI-Trap and build an ESI interface for effective clean-up, fractionation, and ionization of Abs.

Description of work and role of partners

WP5 - Development of pI-Trap-ESI combination [Months: 15-36]
Biomotif AB, KI, THERMO FISHER , TNTU, IP, MS VISION
Task 5.1 Designing and testing the pI-cell optimized for large proteins. (BM, KI, MS, TF; M15- M18)
The peek capillary tubing and the tubular nafion membranes must be optimized in terms of length and diameter for the best performance analyzing large proteins. We will also work with different ampholytes for getting optimum performance for protein analysis. Advice and expertise will be collected from partners KI, MS and TF.
Task 5.2 Design and testing buffer exchanger ESI interface for pI-Trap. (BM, MS, TF; M16- M18)
The micro dialysis membrane and the inner of outer tubing must be optimized for best performance when analyzing large proteins. The best volume needed will also be investigated as well as optimum time interval for the buffer exchange process. Work will be done with valuable input from MS and TF.
Task 5.3 Design controlling software for pI-Trap-Orbitrap combination (BM, TF, MS, NTU; M18- 20)
This will be done in close collaboration with TF, MS and NTU. We will also need support and input from Spark Holland and DataApex for best adaptation with the software controlling autosampler and fraction collector.
Task 5.4 Testing the pI-Trap-Orbitrap combination for proteins (BM, KI, TF, IP; M20- 24)
This task is best done in conjunction with partners KI, IP and TF. The testing will take place at the Karolinska Institutet on samples from IP and KI.

Participation per Partner

Partner number and short name	WP5 effort
1 - KI	15.00
3 - THERMO FISHER	3.00
5 - Biomotif AB	17.00
6 - TNTU	2.00
7 - IP	2.00
8 - MS VISION	3.00
Total	42.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D5.1	Prototype pI-Trap-ESI installed and tested– protocol	5 - Biomotif AB	Other	Public	20

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D5.2	Two tested, optimized pI-Trap-ESI installed and tested	5 - Biomotif AB	Other	Public	36

Description of deliverables

D5.1. One prototype of the pI-Trap-ESI installed and tested at KI – protocol of test
D5.2. Two tested, optimized pI-Trap-ESI installed / tested at KI and IP – protocols of tests

D5.1 : Prototype pI-Trap-ESI installed and tested– protocol [20]

One prototype of the pI-Trap-ESI installed and tested at KI – protocol of test

D5.2 : Two tested, optimized pI-Trap-ESI installed and tested [36]

Two tested, optimized CED guns installed and tested at KI and IP – protocols of tests

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS8	Interfacing pI-Trap-Orbitrap	5 - Biomotif AB	26	Excellent fractionation of mAb isoforms and ionization
MS13	All technologies interfaced	5 - Biomotif AB	36	Sequencing mAb

Work package number [9]	WP6	Lead beneficiary [10]	3 - THERMO FISHER
Work package title	Modification of the Orbitrap mass spectrometer		
Start month	2	End month	36

Objectives

To improve the performance of the Orbitrap Q Exactive HF X mass spectrometer for top-down MS/MS of Abs.

Description of work and role of partners

WP6 - Modification of the Orbitrap mass spectrometer [Months: 2-36]
THERMO FISHER , KI
Task 6.1. Installation of a loaned Q Exactive instrument to Fasmatech to support Omnitrap development
A Q Exactive HF instrument will be configured to be interfaced to Omnitrap by removing the charge detector on the back of the HCD cell and adding functionality of ion transfer to and from the Omnitrap. Once the instrument is shipped and installed at Fasmatech, dedicated trigger signals will be provided to initiate the operational sequence of the Omnitrap and software training and support provided to Fasmatecch and Spectroswiss in order to fulfil corresponding tasks of the project. This instrument will be focused on optimizing Omnitrap functionalities.

Task 6.2. Modified Orbitrap Q Exactive HF X delivered and installed at KI - protocol
In parallel to Task 6.1, a standard Orbitrap Q Exactive HF-X (or a similar high-end instrument) will be modified to improve its performance for desolvation and transmission of intact antibodies. Based on research using Q Exactive UHMR and standard HF-X instruments, there is clearly a reserve for optimizing the desolvation region of the atmosphere-to-vacuum interface that deserves a more detailed exploration.
In parallel to this, a joint work with Spectroswiss and Fasmatech will be started on integration of instrument control software using application programming interface (API) to be provided by TF. This work includes also development of tuning and calibration procedures specific for antibody analysis in order to ensure best top-down performance, integration of data for all fragmentation methods and cross-section measurements.
After testing of all functional units, the resulting will be delivered and installed at KI and performance protocol will be completed for a test set of compounds.

Participation per Partner

Partner number and short name	WP6 effort
1 - KI	10.00
3 - THERMO FISHER	28.00
Total	38.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D6.1	Installation of Q Exactive instrument for Omnitrap development	3 - THERMO FISHER	Other	Confidential, only for members of the consortium (including the Commission Services)	12
D6.2	Modified Orbitrap Q Exactive HF X installed	3 - THERMO FISHER	Other	Public	36

Description of deliverables

Deliverables:
D6.1. Installation of a loaned Q Exactive instrument to Fasmatech to support Omnitrap development
D6.2. Modified Orbitrap Q Exactive HF X delivered and installed at KI - protocol

D6.1 : Installation of Q Exactive instrument for Omnitrap development [12]

Installation of a loaned Q Exactive instrument to Fasmatech to support Omnitrap development

D6.2 : Modified Orbitrap Q Exactive HF X installed [36]

Modified Orbitrap Q Exactive HF X delivered and installed at KI - protocol

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS3	Installation of Q Exactive instrument for Omnitrap development	3 - THERMO FISHER	12	Installation of a loaned Q Exactive instrument to Fasmatech to support Omnitrap development
MS9	Interfacing pI-Trap-Orbitrap OMNI-ORBI combination	2 - FASMATECH SA	26	Capacity to sequence intact proteins

Work package number [9]	WP7	Lead beneficiary [10]	4 - SPECTROSWISS
Work package title	Signal detection and data processing		
Start month	1	End month	34

Objectives

To design, develop, test and optimize FTMS Booster for top-down analysis of large proteins.
To develop and implement algorithms for data processing and analysis for top-down of large proteins.

Description of work and role of partners

WP7 - Signal detection and data processing [Months: 1-34]
SPECTROSWISS, KI, FASMATECH SA, TNTU, IP
Task 7.1 Develop data acquisition system (FTMS Booster) for protein top-down analysis (SPS: the lead, performs the task using SPS infrastructure and personnel, M1-M14)
Task 7.2 Develop a transient-based decay constant deconvolution approach (SPS: the lead, supervision and main development, TNTU: support for related data analysis software development, KI: support for fundamentals and vision of the approach development and applications, M4-M12)
Task 7.3 Develop data processing software for protein top-down analysis (SPS: the lead, development and implementation of time-domain data (transients) processing aiming for protein analysis; TNTU: support for related data analysis software development, KI and IP: software specifications formulation, software evaluation, M1-M18)
Task 7.4 Evaluating the FTMS Boosters in protein top-down analysis in a laboratory environment. (SPS: the lead, supervision and support of the evaluation procedure, optimization and facilitation of FTMS Booster connectivity to the Orbitrap platforms on-site at KI and IP, troubleshooting; KI and IP: perform experimental evaluation of the FTMS Boosters in their laboratories, M19-M34)
Task 7.5 Development of the top-down data analysis software optimized for Abs (TNTU: the lead, SPS: support for related data analysis software development, interfacing data processing and data analysis software architectures and tools, FASM, KI and IP: software specifications formulation, and software evaluation, M1-M29)

Participation per Partner

Partner number and short name	WP7 effort
1 - KI	35.00
2 - FASMATECH SA	1.00
4 - SPECTROSWISS	44.00
6 - TNTU	21.00
7 - IP	7.00
Total	108.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D7.1	Two Prototype FTMS Booster installed and tested-protocol	4 - SPECTROSWISS	Other	Confidential, only for members of the consortium (including the Commission Services)	24

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D7.2	Top-down analysis software	4 - SPECTROSWISS	Other	Confidential, only for members of the consortium (including the Commission Services)	29
D7.3	Optimized FTMS Boosters test protocols	4 - SPECTROSWISS	Other	Confidential, only for members of the consortium (including the Commission Services)	34

Description of deliverables

D7.1. Protocol of installation and testing a prototype FTMS Booster at KI
D7.2. Protocols of installation and testing of two optimized FTMS Boosters at KI and IP
D.7.3. Top-down data processing and analysis software

D7.1 : Two Prototype FTMS Booster installed and tested-protocol [24]

Protocol of installation and testing a prototype FTMS Booster at KI

D7.2 : Top-down analysis software [29]

Top-down data processing and analysis software distributed to participants. Includes implementation of an approach to mass spectra deconvolution via transient decay rates.

D7.3 : Optimized FTMS Boosters test protocols [34]

Protocols of installation and testing of two optimized FTMS Boosters at KI and IP

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS1	Demonstrated effectiveness of product ion isotopic distribution deconvolution	4 - SPECTROSWISS	12	Demonstrated effectiveness of product ion isotopic distribution deconvolution in simulated and reference experimental top-down mass spectra via time-domain data (transient) damping approach.
MS6	Data processing algorithms and software for simulated and experimental top-down mass spectra and time-domain data transients	4 - SPECTROSWISS	18	Data processing algorithms and software are produced and tested on simulated and experimental top-down mass spectra and time-domain data (transients) for top-down data analysis, including approaches for big data analysis of full profile mass spectra for maximizing sensitivity and dynamic range

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS10	Data analysis algorithms and software for simulated and experimental top-down data analysis	6 - TNTU	29	Data analysis algorithms and software are produced and tested on simulated and experimental top-down mass spectra for top-down data analysis, including approaches to product ion assignment with and without mass spectra
MS11	Two FTMS Booster prototypes are designed, implemented, and evaluated	4 - SPECTROSWISS	34	Two FTMS Booster prototypes are designed, implemented, and evaluated at Spectroswiss for enabling in-line digital signal processing capable of on-the-fly delivering mass spectra

Work package number [9]	WP8	Lead beneficiary [10]	8 - MS VISION
Work package title	Dissemination, Communication & Exploitation		
Start month	3	End month	36

Objectives

To develop an exploitation and communication plan to ensure successful uptake for the TopSpec technologies. To integrate all technologies developed in work packages 1-7 into a TopSpec platform.
To apply the integrated TopSpec platform to model and real-life applications for Abs analysis.

Description of work and role of partners

WP8 - Dissemination, Communication & Exploitation [Months: 3-36]
MS VISION, KI, FASMATECH SA, THERMO FISHER , SPECTROSWISS, Biomotif AB, TNTU, IP
Task 8.1 Management of patent strategy and freedom to operate (FTO): An IP protection strategy will be developed at the start of the project (M3). New IP will fall under the Consortium Agreement (MS, All; M 1-36).
Task 8.2 Public engagement: articles with easy public access through project website (Task 10.1), general science magazines, to news reporters (newspapers, TV, radio etc.) (KI; All M1-36)
Task 8.3 Develop and implement a common business strategy for market introduction. (All M12-36).
Task 8.4 Communication to scientific community via publications and relevant scientific meetings.
Task 8.5 Young scientists 8.5.1 A summer school on Top-down analysis of proteins will be organized, as part of the annual MSBM (MS in biotechnology and medicine) summer school in Dubrovnik, Croatia. (Lead KI; Part: All; Month 12-36).
8.6 A hands-on course will be arranged at KI, and will be open to European students (KI; All; Month 30-33).
Task 8.7 Communication to commercial research organizations. We anticipate significant interest in TopSpec from the pharma industry, will act through technical media channels, B2B, fairs and conferences (All; M12- 36).

Participation per Partner

Partner number and short name	WP8 effort
1 - KI	19.00
2 - FASMATECH SA	3.00
3 - THERMO FISHER	5.00
4 - SPECTROSWISS	11.00
5 - Biomotif AB	5.00
6 - TNTU	9.00
7 - IP	9.00
8 - MS VISION	10.00
Total	71.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D8.1	IP protection strategy finalized	8 - MS VISION	Other	Public	3

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D8.2	Draft Exploitation plan and Business strategy document	8 - MS VISION	Report	Public	12
D8.3	Young scientist TopSpec technology workshop	8 - MS VISION	Other	Public	33
D8.4	Public demonstrations of TopSpec technology	8 - MS VISION	Report	Public	33
D8.5	Scientific reports and publications	8 - MS VISION	Report	Public	36
D8.6	Exploitation plan and Business strategy document	8 - MS VISION	Report	Confidential, only for members of the consortium (including the Commission Services)	36

Description of deliverables

D8.1 IP protection strategy finalized
D8,2 Draft of Exploitation Plan and Buisiness strategy document delivered
D8.3 Completion of Young scientist TopSpec technology workshop
D8.4 Public demonstrations of TopSpec technology
D8.5 Scientific reports and publications
D8.6 Exploitation plan and Business strategy document published

D8.1 : IP protection strategy finalized [3]

IP protection strategy finalized

D8.2 : Draft Exploitation plan and Business strategy document [12]

Draft plan of Exploitation plan and Business strategy document delivered

D8.3 : Young scientist TopSpec technology workshop [33]

Completion of Young scientist TopSpec technology workshop

D8.4 : Public demonstrations of TopSpec technology [33]

Public demonstrations of TopSpec technology

D8.5 : Scientific reports and publications [36]

Scientific reports and publications delivered

D8.6 : Exploitation plan and Business strategy document [36]

Exploitation plan and Business strategy document published

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification

Work package number [9]	WP9	Lead beneficiary [10]	1 - KI
Work package title	Project Management and Administration		
Start month	1	End month	36

Objectives

To manage the project, partners, project tasks and activities through effective organization and administration.

Description of work and role of partners

WP9 - Project Management and Administration [Months: 1-36]
KI, FASMATECH SA, THERMO FISHER , SPECTROSWISS, Biomotif AB, TNTU, IP, MS VISION
Task 9.1 Design and publish the TopSpec project website. (KI, All: M1-3).
Task 9.2 Preparation and delivery of a data management plan. (KI; All: M4-6)
Task 9.3 Project management and administration (KI: M1-36). The KI administration will ensure all legal agreements are in place before start. Organize and document consortium and steering group meetings (every 6 months at partner sites).
Task 9.4 Financial Control and management (KI: M1-36). A financial manager at the KI will be hired.

Participation per Partner

Partner number and short name	WP9 effort
1 - KI	30.00
2 - FASMATECH SA	6.00
3 - THERMO FISHER	6.00
4 - SPECTROSWISS	6.00
5 - Biomotif AB	6.00
6 - TNTU	6.00
7 - IP	6.00
8 - MS VISION	6.00
Total	72.00

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D9.1	Logo and Website launch and public accessibility	1 - KI	Other	Public	2
D9.2	Data management plan	1 - KI	ORDP: Open Research Data Pilot	Public	6
D9.3	Technical/scientific review meeting documents	1 - KI	Report	Confidential, only for members of the consortium (including the Commission Services)	13

List of deliverables

Deliverable Number[14]	Deliverable Title	Lead beneficiary	Type[15]	Dissemination level[16]	Due Date (in months)[17]
D9.4	Review meetings	1 - KI	Report	Confidential, only for members of the consortium (including the Commission Services)	36

Description of deliverables

D9.1 Project logo and website launch and public accessibility Site will be constantly maintained and updated.
D9.2 Data management plan
D9.3 Financial and technical reports to ECAS according to requirements
D9.4 Final review meetings of the project

D9.1 : Logo and Website launch and public accessibility [2]

Project logo and website launch and public accessibility. Site will be constantly maintained and updated.

D9.2 : Data management plan [6]

Data management plan

D9.3 : Technical/scientific review meeting documents [13]

Delivered draft agenda and presentations during review meeting following RP1.

D9.4 : Review meetings [36]

Review / evaluation meetings of the project.

Schedule of relevant Milestones

Milestone number[18]	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification

1.3.4. WT4 List of milestones

Milestone number[18]	Milestone title	WP number[9]	Lead beneficiary	Due Date (in months)[17]	Means of verification
MS1	Demonstrated effectiveness of product ion isotopic distribution deconvolution	WP7	4 - SPECTROSWISS	12	Demonstrated effectiveness of product ion isotopic distribution deconvolution in simulated and reference experimental top-down mass spectra via time-domain data (transient) damping approach.
MS2	Omnitraps & IMS Electronics design	WP1	2 - FASMATECH SA	12	Omnitraps & IMS Electronics design finalized
MS3	Installation of Q Exactive instrument for Omnitrap development	WP6	3 - THERMO FISHER	12	Installation of a loaned Q Exactive instrument to Fasmatech to support Omnitrap development
MS4	Omnitraps & IMS P.O.s sent to suppliers	WP1	2 - FASMATECH SA	12	Omnitraps & IMS P.O.s sent to suppliers
MS5	Omnitraps & IMS Mechanical design	WP1	2 - FASMATECH SA	12	Omnitraps & IMS Mechanical design finalised
MS6	Data processing algorithms and software for simulated and experimental top-down mass spectra and time-domain data transients	WP7	4 - SPECTROSWISS	18	Data processing algorithms and software are produced and tested on simulated and experimental top-down mass spectra and time-domain data (transients) for top-down data analysis, including approaches for big data analysis of full profile mass spectra for maximizing sensitivity and dynamic range
MS7	Suffic HAB MS/MS demonstrated	WP3	2 - FASMATECH SA	23	HAB MS/MS spectra of proteins demonstrated
MS8	Interfacing pI-Trap-Orbitrap	WP5	5 - Biomotif AB	26	Excellent fractionation of mAb isoforms and ionization
MS9	Interfacing pI-Trap-Orbitrap OMNI-ORBI combination	WP1, WP6	2 - FASMATECH SA	26	Capacity to sequence intact proteins
MS10	Data analysis algorithms and software for simulated and experimental top-down data analysis	WP7	6 - TNTU	29	Data analysis algorithms and software are produced and tested on simulated and experimental top-down mass spectra for top-down data analysis, including approaches to product ion assignment with and without mass spectra
MS11	Two FTMS Booster prototypes are	WP7	4 - SPECTROSWISS	34	Two FTMS Booster prototypes are designed, implemented, and evaluated

Milestone number[18]	Milestone title	WP number[9]	Lead beneficiary	Due Date (in months)[17]	Means of verification
	designed, implemented, and evaluated				at Spectroswiss for enabling in-line digital signal processing capable of on-the-fly delivering mass spectra
MS12	Development of CED MS/MS	WP4	1 - KI	36	CEB MS/MS spectra of proteins
MS13	All technologies interfaced	WP5	5 - Biomotif AB	36	Sequencing mAb

1.3.5. WT5 Critical Implementation risks and mitigation actions

Risk number	Description of risk	WP Number	Proposed risk-mitigation measures
1	Low efficiency of HAB MS/MS (high)	WP3	Redesign the HAB gun, increase the H-atom flux and their energy
2	Low efficiency of CEB MS/MS (high)	WP4	Redesign the 100-1000 eV electron gun and/or optics
3	Delay in software design (medium)	WP7	Additionally, employ professional programmers
4	Despite MS/MS efforts, full sequence coverage of mAb is not obtained (high)	WP3, WP4, WP7	Increase charge state of precursor ions by super-charging via buffer exchange. Use multiple fill technique. Add IR and/or UV laser.

1.3.6. WT6 Summary of project effort in person-months

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total Person/Months per Participant
1 - KI	0	19	37	26	15	10	35	19	30	191
2 - FASMATECH SA	39	4	33	13	0	0	1	3	6	99
3 - THERMO FISHER	3	3	1	0	3	28	0	5	6	49
4 - SPECTROSWISS	0	0	0	0	0	0	44	11	6	61
5 - Biomotif AB	0	0	0	2	17	0	0	5	6	30
6 - TNTU	0	8	7	4	2	0	21	9	6	57
7 - IP	0	8	7	4	2	0	7	9	6	43
8 - MS VISION	0	0	0	0	3	0	0	10	6	19
Total Person/Months	42	42	85	49	42	38	108	71	72	549

1.3.7. WT7 Tentative schedule of project reviews

Review number [19]	Tentative timing	Planned venue of review	Comments, if any
RV1	14	Brussels	If necessary the location might be different
RV2	37	Brussels	If necessary the location might be different

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It can generally not be changed. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry into force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a written justification.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Abstract

8. Project Entry Month

The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

9. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

10. Lead beneficiary

This must be one of the beneficiaries in the grant (not a third party) - Number of the beneficiary leading the work in this work package

11. Person-months per work package

The total number of person-months allocated to each work package.

12. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

13. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

14. Deliverable number

Deliverable numbers: D1 - Dn

15. Type

Please indicate the type of the deliverable using one of the following codes:

R	Document, report
DEM	Demonstrator, pilot, prototype
DEC	Websites, patent fillings, videos, etc.
OTHER	
ETHICS	Ethics requirement
ORDP	Open Research Data Pilot

16. Dissemination level

Please indicate the dissemination level using one of the following codes:

PU	Public
CO	Confidential, only for members of the consortium (including the Commission Services)
EU-RES	Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
EU-CON	Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
EU-SEC	Classified Information: SECRET UE (Commission Decision 2005/444/EC)

17. Delivery date for Deliverable

Month in which the deliverables will be available, month 1 marking the start date of the project, and all delivery dates being relative to this start date.

18. Milestone number

Milestone number:MS1, MS2, ..., MSn

19. Review number

Review number: RV1, RV2, ..., RVn

20. Installation Number

Number progressively the installations of a same infrastructure. An installation is a part of an infrastructure that could be used independently from the rest.

21. Installation country

Code of the country where the installation is located or IO if the access provider (the beneficiary or linked third party) is an international organization, an ERIC or a similar legal entity.

22. Type of access

VA	if virtual access,
TA-uc	if trans-national access with access costs declared on the basis of unit cost,
TA-ac	if trans-national access with access costs declared as actual costs, and
TA-cb	if trans-national access with access costs declared as a combination of actual costs and costs on the basis of unit cost.

23. Access costs

Cost of the access provided under the project. For virtual access fill only the second column. For trans-national access fill one of the two columns or both according to the way access costs are declared. Trans-national access costs on the basis of unit cost will result from the unit cost by the quantity of access to be provided.