

TOP

SPEC



Horizon 2020

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# TopSpec

## Project Deliverable Report

### D8.2 Draft Exploitation and Dissemination Plan

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<b>Author:</b>	Remco Swart (MS)
<b>Contributors:</b>	Susanna Lundström (KI), Jan Commandeur (MS)
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## VERSION AND CONTROLS



Version	Date	Reason	Editor/ Author/ Reviewer
1.0	12 Dec 2019	First release	Remco Swart
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# EXECUTIVE SUMMARY



This document provides an overview of the completed and planned dissemination and exploitation activities for the TopSpec project, funded by the European Commission under Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020), Grant Agreement number: 829157

TopSpec is a three-year project that started in January 2019. It aims to develop a ground-breaking TOPdown tandem mass SPECTrometry (MS/MS) platform to solve the challenge of unravelling the sequence repertoire of human antibodies and their respective antigens.

The TopSpec consortium comprises 8 participants from 7 countries who bring together a mix of stakeholder organisations and corresponding expertise. The participants include instrument manufacturers, technology SME's, universities and research institutes.

In this document, which is a Deliverable in WP8 titled 'Dissemination, Communication & Exploitation', the dissemination and exploitation activities are described.

This report contains Annexes that are indicative of how the dissemination and exploitation are kept track of by the project consortium. Annexes 1 and 3 will be treated as 'live' document throughout the duration of the project to reflect the most up to date information and will be accessible from the TopSpec website for all project collaborators.

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## 1 Project background

TopSpec is a three-year project that started in January 2019. A major and growing challenge in the EU health system is the cost of drugs and targeted therapies. Reducing time taken to develop novel therapies will reduce costs to the health system. To address this grand challenge, it is imperative to better understand how the human organism defends itself against 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 aiming 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.

This complex and ambitious project brings together 8 participants from 7 countries and funded by the European Commission under Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020), Grant Agreement number: 829157.

## 2 Introduction

The Exploitation and Dissemination Plan describes activities that are aimed to i) ensure successful uptake for the TopSpec technologies, ii) integrate all technologies developed in work packages 1-7 into a TopSpec platform and iii) apply the integrated TopSpec platform for Abs analysis.

This draft document describes dissemination and exploitation activities that have been completed or planned for project TopSpec. In the early phase of the project the emphasis is on the dissemination of the project and its results. For the following project duration the value of the obtained knowledge and technology will be exploited. The following type of dissemination activities are taken into consideration:

- TopSpec website and social media
- Scientific presentations
- Scientific publications
- Conferences
- Tradeshows
- Patent applications
- Collaborations

The communication and dissemination of results can be categorized according to the target audience group. In the table below the targeted audience groups are listed and the planned communication/dissemination actions:

Target groups	Communication/Dissemination action
Website	Publicly accessible website with a closed partner access section.
Proteomics research community	Collaborations, scientific reports. Open access publication in relevant journals: Analytical Chemistry, J American Society for Mass spectrometry, JACS, Molecular & Cellular Proteomics, J of Proteomics, Nature Meth and Nature Biotechnology
Young scientists	Young scientists will be encouraged and promoted. Exchange of young researchers will be organised. Summer schools and workshops.
Healthcare providers	Focused meetings to bring technology developers and end users together. Video demonstrations accessible through YouTube and through partner websites
Diagnostics and pharma industry	Ongoing collaboration with Amgen, Astra-Zeneca, Bayer, Sanofi, other EU pharma companies. International conferences: Bio, EuPA and HUPO meetings, IMS and ASMS conferences, BIT congresses, PittCon, Analytica. National meetings, CASSS-meetings.
General public and broader audience	Information through website, social platforms (Linkedin, Twitter) mass media (newspapers, TV, radio) popular science journals, press releases. Open exhibitions.

## 3 Dissemination of results

This section describes the activities and tools to communicate and disseminate foreground results of project TopSpec. During the course of the project the available foreground knowledge will increase and thereby also the communication and dissemination activities.



### 3.1 TopSpec public website and social media

Under WP8, a project webpage (<https://topspec.ki.se/>) has been designed and launched. The TopSpec website contains current information related to the project, news, obtained results and organized/attended events and will be updated on a regular base. Further is contains the following information:

- Description of project
- Individual work-packages
- Public documents
- Objectives and milestones
- Profile of researchers and project partners
- Events related to the project implementation

The project webpage contains the following clause: “This project is funded by the European Horizon 2020 research and innovation program under grant agreement no 829157.” The website is actively maintained and updated using materials from events organized by the collaboration partners, delivered lectures, workshops. All reports that have the “PUBLIC” status can also be found on the webpage.

To make the project more visible a logo of the project has been designed and uploaded to the project webpage. This logo will be used in all public communication activities (tradeshows, presentations).

The TopSpec webpage is regularly updated and up to now 8 news items have been published. Up to this date the project webpage has been visited by more than a thousand visitors.

The screenshot shows the TopSpec website homepage. The header includes the TopSpec logo and a navigation menu with links for BACKGROUND, PROJECT, PARTNERS, NEWS & EVENTS, PROGRESS, PUBLICATIONS, DOCUMENTS, and SOFTWARE. A search icon is also present. On the right side of the header, there is a funding notice: "This project is funded by the European Horizon 2020 research and innovation program under grant agreement no 829157". The main content area is divided into three columns. The left column features a large image of an antibody structure. The middle column is titled "Background" and contains a quote: "Next generation precision antibody profiling - from science fiction to reality". Below the quote is a smaller version of the TopSpec logo and a paragraph of text: "A major and growing challenge in the EU health system is the cost of drugs and targeted therapies. Reducing time taken to develop novel therapies will reduce costs to the health system. To address this grand challenge, it is imperative to better understand how the human organism defends itself against 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 aiming 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 are the most sophisticated line of natural defence against disease. Knowing which antibodies are produced in response to a given disease enables us not only to better understand the disease cause but also to provide next-generation cures in form of personalized therapeutic antibodies. The limiting factor for this to truly be achieved is to find a way to sequence large molecules in the gas phase, and this represents a formidable challenge." The right column is titled "Latest news & events" and lists several recent activities: "IITB Proteomics Bootcamp", "SMAP - 2019", "AutoVectis workshop at the Ardour Symposium", "TopSpec meeting - Bremen", and "Former Prime Minister of Greece - Alexis Tsipras - visits Omnitrap lab in Athens".



Besides the website, a Twitter and a LinkedIn project account have been created with the following links:

<https://topspec.ki.se/>

<https://twitter.com/TopSpecMS2>

<https://www.linkedin.com/company/topspecms/>

### 3.2 Scientific presentations

The following scientific presentations have been delivered by the TopSpec collaboration partners

- MS analysis of polyclonal antibodies - the ultimate challenge and reward, Susanna Lundström, Ardgour Symposium, Peak District, UK
- AutoVectis development progress for top-down and antibody analysis
  - Presenter – David Kilgour, Nottingham Trent University
  - Presented at – Ardgour Symposium 2019

### 3.3 Scientific publications

Result obtained in the TopSpec project will be published in scientific journals in the field of analytical chemistry. In case technology requires patent protection the publication cycle may be delayed. The articles will be published in open access publication in relevant journals:

- Analytical Chemistry,
- J American Society for Mass spectrometry,
- JACS
- Molecular & Cellular Proteomics
- J of Proteomics,
- Nature Meth
- Nature Biotechnology

Publications will consist of the clause in the acknowledgements section:

“This project is funded by the European Horizon 2020 research and innovation program under grant agreement no 829157.”

#### Publications

Improved assignment algorithms for antibody spectra that will be used for TopSpec:

C. Gstöttner, D. Reusch, M. Habegger, I. Dragan, P. van Veelen, D.P.A. Kilgour, Y.O. Tsybin, Y.E.M. van der Burgt, M. Wuhler & S. Nicolardi (2019): Monitoring glycation levels of a bispecific monoclonal antibody at subunit level by ultrahigh resolution MALDI FT-ICR mass spectrometry

Publications will also be listed on the TopSpec homepage.



### 3.4 Conferences

The results and data from project TopSpec will be presented at industrial and academic conferences, user meetings, immunology, proteomics and MS conferences. This section describes some of the recent conferences that have been visited by TopSpec project partners.

#### *SMAP 2019*

“De Spectrométrie de Masse et Analyse Protéomique” (SMAP) is the annual French mass spectrometry society meeting with up to 350 participants from academia and industry. The meeting is a great opportunity for interdisciplinary networking across different fields with mass spectrometry as the common denominator. Mathieu Dupre (IP) peaked interest in TopSpec following his presentation. See Mathieu Dupre below.



#### *2019 EMSG Ardgour Symposium*

David Kilgour (TNTU), presented the latest features and upgrades of AutoVectis v9 (part of WP7), at the 2019 EMSG Ardgour Symposium, in the beautiful Peak district, UK. The Ardgour Symposium is an interdisciplinary scientific meeting centered around the users and developers of scientific instrumentation. The Symposium structure has been refined over the years to provide an environment that is designed to foster the development of new productive networks. The meeting was attended by 20 scientists from across Europe (countries and nationalities represented: Italy, Netherlands, France, Germany, Romania, Hungary, Sweden and the UK) and the wider world (USA and India) and had a mixture of scientific sessions, group networking sessions, workshops and free discussion time. In addition to David, Susanna Lundström (KI) attended the meeting and gave a presentation with the title “MS analysis of polyclonal antibodies – the ultimate challenge and reward”. Both David and Susanna acknowledged TopSpec and the European Horizon 2020 research and innovation program under grant agreement no 829157. The TopSpec project was discussed and the webpage was also advertised during the meeting. See David Kilgour below.



### *IITB Proteomics Bootcamp*

David Kilgour (TNTU) travelled to the Indian Institute of Technology Bombay, Mumbai, India, to teach as part of the international faculty at the IITB Proteomics Bootcamp: “Basic and Advanced Proteomics Techniques – Omics Technologies for Life Sciences”. This two week long course focused on:

- Proteomics: basic and advanced technologies,
- Other ‘omics technologies – genomics, metabolomics etc
- Big data analysis and bioinformatics
- and, included a mixture of lectures, hands-on workshops and tutorials.

It was aimed at life science and medical researchers. Overall, there were more than 50 attendees, who came from across India. The faculty included lecturers from the UK, India and the US.

Dr Kilgour gave lectures on electrospray ionisation, basic Fourier transform mass spectrometry concepts, and an introduction to absorption mode FTMS data processing. The TopSpec project was discussed specifically as an example of the future direction and cutting edge of protein analysis in biomedical research.

The following international conferences will be visited to present results from the TopSpec project:

- Bio
- EuPA
- HUPO meetings
- IMSC
- ASMS
- BIT
- National mass spectrometry and biopharma meetings
- CASS-meetings

### 3.5 Tradeshows

Dissemination of foreground results at fairs and international tradeshows such as Analytica and Pittcon is planned. In order to promote the TopSpec project among the scientific community at conferences and meetings we have created a banner, see annex 2.

### 3.6 Patent applications

In the course of the project it is expected that foreground knowledge will be generated. The project consortium will strive to obtain patent protection of inventions/solutions which may result in business opportunities taken up by one or more collaboration partners. The IP strategy as well as the dissemination of foreground knowledge has been described detail in in deliverable D8.1 TopSpec Intellectual Property Protection Strategy.

Similar to other results of the TopSpec project, patent applications should consist of the following clause in the acknowledgements section: “This project is funded by the European Horizon 2020 research and innovation program under grant agreement no 829157.”

### 3.7 Collaborations

It is expected that the resulting technology will be of the utmost importance to researchers that are tasked to identify protein structures and interactions. In order to access the potential of the technology we will organize a demonstration workshop. Stakeholders will be invited to analyze project results in order to evaluate the scientific relevance, performance and transferability of the technology. Existing research partners in industry and academia will be invited to this workshop:

<b>Investigator</b>	<b>Institution</b>	<b>Country</b>
Dr. Sophia Hober	Swedish National Centre for Biological Mass Spectrometry (Bio-MS)	Sweden
Prof. Michael Nielsen	Proteomics centre of the Copenhagen University	Denmark
Prof. Frank Kjeldsen	Proteomics centre, University of Southern Denmark, Odense	Denmark
Dr. Kim Haselmann	Protein analysis laboratory of Novo Nordisk AS, Copenhagen	Denmark
Dr. Pavel Bondarenko	Protein analysis laboratory of Amgen	USA
Dr. Bogdan Budnik	FAS Division of Science Core Facility Proteomics laboratory of Harvard University	USA
Dr. Chris Adams	Proteomics laboratory of Stanford University	USA
Dr. Kathrin Breuker	Top-down protein analysis laboratory of Innsbruck University	Austria
Prof. Dr. Catherine Costello	NIH-supported glycoproteomics laboratory at Boston University	USA
Dr. Logan C. Mackay	Scottish Instrumentation and Resource Centre for Advanced Mass Spectrometry University of Edinburgh	UK
Prof. dr. Manfred Wuhrer	Leiden University Medical Center	Netherlands

## 4 Exploitation of results

The objective of the TopSpec project is to develop a ground-breaking top-down tandem mass spectrometry platform to solve the challenge of unravelling the sequence repertoire of human antibodies and their respective antigens. Thus, the activities within the project will require tools to be developed by the participants and/or third parties and then integrated into a comprehensive and customised platform. If successful, TopSpec will greatly expand our knowledge of the human immune system, which may have a dramatic impact on the field of personalized, precision medicine. TopSpec may facilitate the development of new diagnostics and treatments for infectious diseases including global diseases and the problem of treatment resistance, ageing related diseases (e.g., AD) and other big killer diseases. Another significant impact will be in the field of MS instrument design. Specific impacts:

- Increase in the speed of diagnosis and in the speed of drug development
- Increase knowledge on an individual's antibody response to disease
- Contribute to the growth and expansion of 4 European SMEs
- Expand scientific research around proteomics
- Create new business opportunities within and outside the project

Expected results from the TopSpec project are summarized in the table below:

Expected Result	Target Industry	Use within the project	Use outside the project
Novel MS/MS platform	MS instrumentation	Adopted by TF	Adopted by other MS manufacturers
Top-down Ab sequencing assay	Biotechnology, Clinical diagnostics	Proof of principle, biomarkers of AD and bacterial infection	Quality control in mAb production, biosimilars and biobetters, clinical diagnostics
Library of Ab repertoire as immune system response to challenge	Immunology, Bioinformatics	Proof of principle	Large EU projects to collect Ab sequence libraries for specific diseases
Top-down data analysis software	Analytical, biotechnology, pharmaceutical	Proof of principle	Open source and commercial versions for industrial and academic analytical scientists
Novel data acquisition and realtime data processing system	MS instrumentation	Adopted by Spectroswiss	Adopted by other MS manufacturers, including TF

The project partners are keen to bring the technology to the market. This can be as a complete LC-MS platform for antibody sequencing including hardware, software and consumables. Also the possibility to commercialize parts of the developed technology will be explored. The strategy to commercialize products and services will be discussed in a dedicated workshop with TopSpec project partners.

Based on the market potential of the foreground technology and its application a detailed business strategy document will be prepared and published (CONFIDENTIAL) for the consortium partners, detailing the market size and potential. See for more details task 8.7 in annex 3.

## 5 Concluding remarks

This deliverable provides a draft plan for communication, dissemination and exploitation of the foreground results. During the course of the project and the maturation of technology the dissemination and exploitation plan will be updated. The leader of WP 8 has the responsibility to manage WP8 and the planned deliverables.

This report contains Annexes (1+3) that will be treated as 'live' documents throughout the duration of the project to reflect the most up-to-date information.

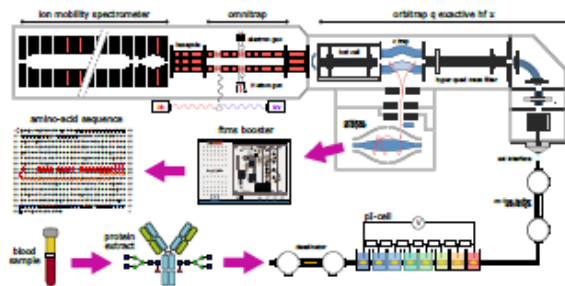
## Annex 1

### TopSpec Consortium exploitation and dissemination activity tracker (to be kept updated)

Person	Institution	Activity	Type of activity	Status	Result	Date of completion	Comments	Link (DOI)
David Kilgour	Nottingham Trent University, UK	Dissemination	Promotional collateral	In-progress				
Susanna Lundström	Karolinska Institutet, Stockholm, Sweden	Dissemination	Website contribution	In-progress				
Susanna Lundström	Karolinska Institutet, Stockholm, Sweden	Dissemination	Twitter post	In-progress				
Susanna Lundström	Karolinska Institutet, Stockholm, Sweden	Dissemination	LinkedIn post	In-progress				
Susanna Lundström	Karolinska Institutet, Stockholm, Sweden	Dissemination	Presentation at scientific conference	Completed				
David Kilgour	Nottingham Trent University, UK	Dissemination	Promotional collateral	Completed		3-12-2019	Created promotional banner for TopSpec	
David Kilgour	Nottingham Trent University, UK	Dissemination	Peer-reviewed publication	Completed	Published	21-10-2019		<a href="https://doi.org/10.1080/19420862.2019.1682403">https://doi.org/10.1080/19420862.2019.1682403</a>
David Kilgour	Nottingham Trent University, UK	Dissemination	Workshop	Completed	Published	28-9-2019	Taught at MS Proteomics Bootcamp Workshop at IITB in Mumbai. Discussed TopSpec Project with attendees.	<a href="https://topspec.ki.se/new-events/">https://topspec.ki.se/new-events/</a>
David Kilgour	Nottingham Trent University, UK	Dissemination	Workshop	Completed	Published	20-9-2019	Presented aspects of top-dopwon sequencing software development at Ardgour Symposium	<a href="https://topspec.ki.se/new-events/">https://topspec.ki.se/new-events/</a>
Dimitris Papanastasiou	Fasmatech, Athens, Greece	Dissemination	Presentation at scientific conference	In-progress		jun-20	Multiple-stage Top-Down MSn analysis of antibodies in the Omnitrap Platform	
Dimitris Papanastasiou	Fasmatech, Athens, Greece	Exploitation		In-progress		Running	Demo lab established in Athens for top-down analysis of proteins	
Dimitris Papanastasiou	Fasmatech, Athens, Greece	Dissemination	Peer-reviewed publication	Completed	Published		JACS paper in Thermal H gun published in 2018 together with R Zubarev - Karolinska	
Dimitris Papanastasiou	Fasmatech, Athens, Greece	Dissemination	Peer-reviewed publication	In-progress			Main article introducing the omnitrap platform (Karolinska-Thermo)	

## Annex 2

### TopSpec Consortium banner for display at conferences



“Next generation precision antibody profiling – from science fiction to reality”

Members of the TopSpec research project consortium:



This research project has received funding from the European Horizon 2020 research and innovation program under grant agreement No 829157

## Annex 3

### Overview of WP 8 – Dissemination, communication and exploitation of results

<b>Task</b>	<b>Activity</b>	<b>Period</b>
<b>8.1</b>	<b>Dissemination activities</b> <ul style="list-style-type: none"> <li>• Creating and publishing the public dissemination material (Website, posters, brochures, videos),</li> <li>• Adapting the dissemination support to the target,</li> <li>• keeping track of publications and public disclosures by creating a database.</li> </ul>	M1-36
<b>8.2</b>	<b>Knowledge Management and IPR</b> <ul style="list-style-type: none"> <li>• Management of the pre-existing knowledge needed to achieve the work (background), the knowledge created during the project (foreground), and the knowledge created in parallel to the project (side-ground) by either partners or other parties that might impact the project.</li> </ul>	M1-36
<b>8.3</b>	<b>Exploitation strategy of the results</b> <ul style="list-style-type: none"> <li>• Identification of the internal and external stockholders.</li> <li>• Determining the synergies between them to integrate the results, identify the weak points, assess the usability of the results.</li> <li>• Identify the competing technical approaches</li> <li>• Analyze the evolving socio-economic context including user needs, overall market trends.</li> </ul>	M1-36
<b>8.4</b>	<b>Demonstration workshop</b> <ul style="list-style-type: none"> <li>• The stakeholders identified and presented in 8.3 will be invited to analyze project results in order to evaluate the scientific relevance, performance and transferability of the technology.</li> </ul>	M22
<b>8.5</b>	<b>Management of patent strategy and freedom to operate (FTO)</b> <ul style="list-style-type: none"> <li>• Develop an IP protection strategy at the start of the project (M3).</li> <li>• Monitor that the newly created IP falls under the Consortium Agreement.</li> </ul>	M1-36
<b>8.6</b>	<b>Public engagement</b> <ul style="list-style-type: none"> <li>• Create articles with easy public access through project website</li> <li>• Publish popular articles in general science magazines</li> <li>• Giving interviews to news reporters (newspapers, TV, radio etc.)</li> </ul>	M1-36
<b>8.7</b>	<b>Develop and implement a common business strategy for market introduction</b> <ul style="list-style-type: none"> <li>• Develop a common business strategy for market introduction through consultations within Consortium.</li> <li>• Implement the developed business strategy for market introduction.</li> </ul>	M12-36
<b>8.9</b>	<b>Organizing relevant conferences</b> <ul style="list-style-type: none"> <li>• Organizing a conference of the UppCon series (Uppsala conference on Electron Capture Dissociation and related phenomena, run since 2003).</li> <li>• Organizing a conference on Top-down analysis of proteins;</li> <li>• Organizing a summer school on Electron Capture Dissociation and related phenomena Top-down analysis of proteins, as part of the annual MSBM (MS in biotechnology and medicine) summer school in Dubrovnik, Croatia.</li> <li>• Organizing hands-on course will be arranged at KI, and will be open to European students.</li> </ul>	M6-36
<b>8.10</b>	<b>Communication to commercial research organizations</b> <ul style="list-style-type: none"> <li>• As we anticipate significant interest in TopSpec from the Pharma industry, we will act through technical media channels, B2B, fairs and conferences.</li> </ul>	M12-36