

*Horizon 2020 Work programme*

Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy

*Call*

H2020-FNR-2020: Food and Natural Resources

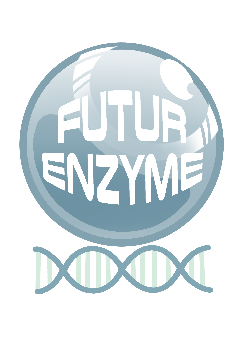
*Topic name*

FNR-16-2020: ENZYMES FOR MORE ENVIRONMENT-FRIENDLY CONSUMER PRODUCTS

*FuturEnzyme:*

Technologies of the Future for Low-Cost Enzymes for Environment-Friendly Products

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PATRICIA MOLINA

CSIC

Calle Marie Curie 2, 28049, Cantoblanco, Madrid, Spain

FE\_Minutes 24M General Assembly meeting\_FINAL

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**Document information sheet**

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| **Contact details:** | Manuel Ferrer (mferrer@icp.csic.es); Patricia Molina (patricia.molina@icp.csic.es) |
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# 1. Introduction

According to the Consortium Agreement section 6.2.2, the General Assembly (composed of at least one representative of each partner) celebrated its annual meeting the days 6th and 7th of July 2023, corresponding to the 26th month of the Horizon 2020 FuturEnzyme project (equivalent to the 24-month meeting, annual General Assembly). This document represents the minutes of this meeting (Consortium Agreement, section 6.2.5), prepared by the Coordinator (CSIC), reviewed and approved by all the members of the General Assembly.

In this context, the annual meetings of the Exploitation and Innovation Task Force and the Gender, Rights and Ethical Task Force were also conducted.

In this occasion, at least one person per partner assisted in person to the meeting, although it was also transmitted in streaming by Zoom for those who couldn’t travel. We also counted with the presence of 3 members of the Advisory Board: Luisa Crisigiovanni (Altroconsumo), Ksenia Niesel (Bayer AG) and Jog Raj (Patent Co). It took place in the Institute of Plant Science and Microbiology (IPM) from the University of Hamburg, Germany, hosted by Prof. Wolfgang Streit (Partner UHAM in the GA).

It was scheduled for 2 days, right after the [5th ESSIB](http://www.essib.eu/) that took place at the same location, as stated in the GA (event 4). The first one included a welcome, resume of the project (mostly directed to the Advisory Board so they could have a better knowledge of the project), general comments by Manuel Ferrer (FuturEnzyme Project Coordinator), and the statement of WP1, 2, 3, 4, 5, and 6. The second day consisted in the statement of WP7 and 8, the Exploitation and Innovation Task Force meeting, the Gender, Rights and Ethical Task Force meeting, final conclusions and remarks. The total number of participants (in person and on line) was 41, with representation of all the partners of the project, plus 3 members of the Advisory Board (in person). Unfortunately, FuturEnzyme’s Project Officer, Colombe Warin, was not able to attend.

In this document, relevant issues and discussions are detailed. For further information on the ongoing of the project and the exposition of the WPs, see the presentation slides available in the intranet of the project’s website, shared material section.

# 2. Participants

## Project partners

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Partner number** | **WP lead** | **Affiliation** | **Name** | **Attendance** | **e-mail** |
| 1 | 1, 9 | CSIC | Manuel Ferrer1 | In person | [mferrer@icp.csic.es](mailto:mferrer@icp.csic.es) |
| 1 | 1, 9 | CSIC | Patricia Molina | In person | [patricia.molina@icp.csic.es](mailto:patricia.molina@icp.csic.es) |
| 1 | 1, 9 | CSIC | Cristina Coscolín | In person | [cristina.coscolin@csic.es](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\cristina.coscolin@csic.es) |
| 1 | 1, 9 | CSIC | Laura Fernández | In person | [l.fernandez.lopez@csic.es](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\l.fernandez.lopez@csic.es) |
| 1 | 1, 9 | CSIC | Paula Vidal | In person | [p.vidal.ramon@csic.es](file:///D:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\p.vidal.ramon@csic.es) |
| 2 | 2 | BSC | Víctor Guallar | In person | [victor.guallar@bsc.es](mailto:victor.guallar@bsc.es) |
| 2 | 2 | BSC | Ana Robles1 | In person | [arobles@bsc.es](file:///D:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\arobles@bsc.es) |
| 2 | 2 | BSC | Rubén Muñoz1 | In person | [ruben.munoz@bsc.es](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\ruben.munoz@bsc.es) |
| 3 | 3 | Bangor University | Olga Golyshina | In person | [o.golyshina@bangor.ac.uk](mailto:o.golyshina@bangor.ac.uk) |
| 3 | 3 | Bangor University | Peter Golyshin1 | In person | [p.golyshin@bangor.ac.uk](mailto:p.golyshin@bangor.ac.uk) |
| 3 | 3 | Bangor University | Alexander Yakunin | On line | [a.iakounine@bangor.ac.uk](mailto:a.iakounine@bangor.ac.uk) |
| 3 | 3 | Bangor University | Anna Khusnutdinova | On line | [a.khusnutdinova@bangor.ac.uk](mailto:a.khusnutdinova@bangor.ac.uk) |
| 4 | 4 | UHAM | Wolfgang Streit | In person | w[olfgang.streit@uni-hamburg.de](mailto:olfgang.streit@uni-hamburg.de) |
| 4 | 4 | UHAM | Pablo Pérez1 | In person | [pablo.perez.garcia@uni-hamburg.de](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\pablo.perez.garcia@uni-hamburg.de) |
| 4 | 4 | UHAM | Lena Preuss | In person | [lena.preusz@web.de](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\lena.preusz@web.de) |
| 4 | 4 | UHAM | Marno Gurschke | In person | [marno.gurschke@uni-hamburg.de](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\marno.gurschke@uni-hamburg.de) |
| 5 | - | UDUS | Karl E Jaeger | In person | [karl-erich.jaeger@fz-juelich.de](mailto:karl-erich.jaeger@fz-juelich.de) |
| 5 | - | UDUS | Stephan Thies1 | In person | [s.thies@fz-juelich.de](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\s.thies@fz-juelich.de) |
| 5 | - | UDUS | Tobias Horbach | In person | [t.horbach@fz-juelich.de](mailto:t.horbach@fz-juelich.de) |
| 6 | - | IST-ID | Carla de Carvalho1 | In person | [ccarvalho@tecnico.ulisboa.pt](file:///D:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\24M%20General%20Assembly%20meeting\ccarvalho@tecnico.ulisboa.pt) |
| 6 | - | IST-ID | Ricardo Pereira | In person | [ricardofspereira@tecnico.ulisboa.pt](mailto:patricia.molina@icp.csic.es) |
| 7 | - | CNR | Michail Yakimov | On line | [mikhail.iakimov@cnr.it](mailto:mikhail.iakimov@cnr.it) |
| 7 | - | CNR | Laura Mortuano | In person | [laura.marturano@isp.cnr.it](mailto:laura.marturano@isp.cnr.it) |
| 8 | 8 | ITB | Ilaria Re1 | In person | [Ilaria.re@italbiotec.it](mailto:Ilaria.re@italbiotec.it) |
| 8 | 8 | ITB | Sara Daniotti | In person2 | [sara.daniotti@italbiotec.it](mailto:sara.daniotti@italbiotec.it) |
| 9 | 5 | FHNW | Patrick Shahgaldian1 | In person | [patrick.shahgaldian@fhnw.ch](mailto:patrick.shahgaldian@fhnw.ch) |
| 9 | 5 | FHNW | Guillaume Magnin1 | In person | [guillaume.magnin@fhnw.ch](mailto:guillaume.magnin@fhnw.ch) |
| 10 | 7 | CLIB | Markus Müller1 | In person | [mueller@clib-cluster.de](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\mueller@clib-cluster.de) |
| 10 | 7 | CLIB | Tobias Klement | On line | [klement@clib-cluster.de](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\klement@clib-cluster.de) |
| 11 | - | Inofea | Emilio Cutrona | In person | [Emilio.cutrona@inofea.com](mailto:Emilio.cutrona@inofea.com.) |
| 11 | - | Inofea | Carolina Giunta1 | In person | [Carolina.giunta@inofea.com](mailto:Carolina.giunta@inofea.com) |
| 11 | - | Inofea | Rita Correro | On line | [rita.correro@inofea.com](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\rita.correro@inofea.com) |
| 12 | - | BioC-CheM | Fabrizio Beltrametti | In person | [fbeltrametti@bioc-chemsolutions.com](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\fbeltrametti@bioc-chemsolutions.com) |
| 12 | - | BioC-CheM | Luca Mellere | In person | [lmellere@bioc-chemsolutions.com](mailto:lmellere@bioc-chemsolutions.com) |
| 13 | - | Henkel | Christian Degering | In person2 | [christian.degering@henkel.com](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\christian.degering@henkel.com) |
| 14 | - | Schoeller | Nazanin Ansari | In person | [nazanin\_ansari@schoeller-textiles.com](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\nazanin_ansari@schoeller-textiles.com) |
| 14 | - | Schoeller | Roland Lottenbach | In person | [roland\_lottenbach@schoeller-textiles.com](mailto:roland_lottenbach@schoeller-textiles.com) |
| 15 | - | Evonik | Moniec van Logchem | On line | [moniec.van-logchem@evonik.com](file:///E:\Patri-Systems%20Biotech\PROYECTOS\FuturEnzyme\Meetings\12M%20General%20Assembly%20meeting\Agenda\moniec.van-logchem@evonik.com) |
| 15 | - | Evonik | Xin Lu | In person2 | [xin.lu@evonik.com](mailto:xin.lu@evonik.com) |
| 16 | 6 | Eucodis | Marc Berlinger | In person | [berlinger@eucodis.com](mailto:berlinger@eucodis.com) |
| 16 | 6 | Eucodis | Jan Modregger1 | In person | [modregger@eucodis.com](mailto:modregger@eucodis.com) |

1Speakers of each entity

2Attendance on line instead of in person for last-minute personal reasons arising just before the trip.

## Advisory Board

|  |  |  |
| --- | --- | --- |
| **Affiliation** | **Name** | **Attendance** |
| Bayer AG | Ksenia Niesel | In person |
| PatentCo | Jog Raj | In person |
| Altroconsumo | Luisa Crisigiovanni | In person |

# 3. The meeting

## Day 1

The meeting began at due time, 13:30h CEST, with 32 participants present (all listed in **section 2**) and 7 on line (two more not identified).

### Welcome, WP1\_Management and Coordination, resume of the project, and general remarks (CSIC)

Manuel Ferrer, FuturEnzyme’s Coordinator (CSIC), welcomed all attendants, both in person and online. Then he summarised the project, and advances and work done up to the first reporting period of the FuturEnzyme project. He remarked the meeting in Brussel in which the progress made during the first reporting period (from month 1, June 2021, to month 18, November 2022) was presented, and its technical and financial approval; the payment stage is almost finished, only pending that each partner receives their corresponding share (CSIC already received the money from the EU and set all the paperwork for the financial distribution).

Then, he continued with the description and update of WP1\_Management and Coordination (in this occasion, WP9\_Ethics requirements, had no dedicated time, since no news or changes have been made in this regard) and summarised the deliverables and milestones achieved within these 24 months of project. He stressed out the importance of Nagoya protocol and ABS regulation, and reminds, that CSIC is in charge of filling the due diligence declaration for the whole consortium. He also remarked the comment made by the Project Officer regarding the effort that should be done in increasing the Cluster Newsletter’s (The Active Site) reach. Finally, he mentioned other issues highlighted by the Project Officer and the external evaluator in the first reporting period, and that the outcome was very positive.

Luisa Crisigiovanni (Advisory Board member from Altroconsumo) suggested to make use of the mentioned connections and collaborations with other projects, because they can be of interest for instance regarding exploitation matters. At this, Ferrer agreed, and said that the connections with other projects are running and that other future actions are already in mind; for instance, for exploiting experimental synergies in which, one enzyme that is not of direct interest for FuturEnzyme can be for any other of the three sister projects in the Cluster Enzymes for Greener Products (FNR-16-2020). Or we can also use the Newsletter to define such relations. Ferrer explained that from the beginning the idea was to establish real experimental synergies, but in practise, fix the conditions has been a handicap. It was also mentioned that we are keeping track of all the events we participate on in terms of number of assistants/reach, gender, type of public, etc.

### WP2\_Machine learning enzyme bio-prospecting integrated into an industrial context (BSC)

Ana Robles (BSC) led the exposition of WP2\_Machine learning enzyme bio-prospecting integrated into an industrial context. Manuel Ferrer, Cristina Coscolín (CSIC), Pablo Pérez (UHAM), Peter Golyshin (Bangor), and Rubén Muñoz (BSC) exposed their tasks.

In BSC exposition about the Expression Metapredictor they are developing, it was agreed that we are going to compile all the information already gathered in the project and from new experiments to create a table with expression meta-data that serves to feed their algorithm. Someone in the consortium (to be decided who) should curate this information (starting from table D4.6) that should include at least the nucleotide sequence (better than aminoacidic), expression level (in 3 levels), and taxonomic information.

Ferrer highlighted that it is appropriated to use met-data regarding activity/performance and stability, under different conditions and substrates generates in other WPs to feed and refine BSC algorithms. He also remarked that we have to decide who reviews, curates, verifies and homogenizes the information for the mentioned table for BSC. He also suggested that the industrial partners can inform the academic partners if there are other enzymatic parameters that are of interest for their processes, so we can include them to feed metapredictors. He remarked the importance of providing information to feed BSC algorithms because they cannot set up the tool without data. Patricia Molina (CSIC) suggested to use the OneDrive folder set up by Markus Müller (only consortium members can access to) to locate the table (e.g. in excel format) in such a way that anyone from the project with can access to it and add new information. Ferrer and Müller agreed.

At this stage, the agenda was slightly modified, so a short break was introduced in this moment.

### WP3\_ Activity-based bioprospecting for enzymes (Bangor)

Peter Golyshin (Bangor) started and led the exposition of the work corresponding to WP3.

It was clarified that some strains from *Halopseudomonas* were sent by UDUS to IST-ID for identifying suitable growth conditions to meet industry needs.

Ferrer continued explaining CSIC’s part. Michail Yakimov intervened to clarify CNR’s work.

At the end of this WP presentation, Ferrer took the word. In the case of textile and detergent the test application is one-step: the enzyme is applied to the product/process. But in the case of the cosmetic, it is two-steps: the hyaluronidases convert the hyaluronic acid (HA) into the desired HA molecule size, which is transferred to Evonik to be included into the cosmetic. He pointed the need to move fast in this point. There are already some hyaluronidases disclosed, genomes sequenced and trials are being done, but we need to begin the native host production for enzyme supernatants to be transferred to the partners and Evonik to start the trials. This part of the project needs to be sped up by IST-ID, BioC\_CheM and CNR. Carla de Carvalho (IST-ID) mentioned that they are trying to improve the fermentation of the enzymes working with no expensive culture media. Ferrer said that right now it is more important to perform the fermentations with the conditions we know will work, test the enzyme activity, and later optimize the media. Ksenia Niesel (Advisory Board member from Bayer AG) suggested to use the cell-free system for this that UHAM has developed, depending on the amount of enzyme we need. Wolfgang Streit (UHAM) said that continuous cycles can be carried out, obtaining 10-50 µg, which might be a lot of effort to get to the amounts of enzyme needed for this step. He added that Lena Preuβ has experience in enzymatic production using *Vibrio* strains and is developing genetic tools, which might be also of help. Ferrer suggested that CSIC and UHAM can establish a collaboration in this regard, so the knowledge is transferred from UHAM to CSIC to perform the fermentations.

Ferrer asked IST-ID if they do lipase re-screenings (after the screening with typical lipase substrates) with the real substrates for the applications: this has to be clarified for the next report. He remarks the importance of all the partners having candidates to be expressed in large in WP6, so all are represented in the outcomes of the project.

Jog Raj (Advisory Board member from PatentCo) wanted to know if any of the enzymes the project is going to produce could be used for animal feed. Manuel answered that this will be discussed more in detail in the Exploitation Workshop, and that in the Preliminary Exploitation Plan we detailed routes in this direction (D8.6). Ferrer commented that to produce enzymes out of the partners’ interest, Eucodis is the part in charge, and that they can produce up to 2000L scale, which is the middle step for large fermentation between lab scale fermentation and industrial application. Niesel offered Bayer’s capacities to help in these matters if needed. She also commented that establishing a communication together with other projects for instance in the Cluster to inform of what we do, and what we can offer would be really helpful and interesting.

Niesel wanted to know if the information we gather from the samplings contains also the metagenomic information, or only the sequences of microbial isolates. Golyshin said that depending, in some cases yes, but it is more usual just to have the sequences. Ferrer informed that we have a table detailing the information of the environmental samples we have since the beginning of the project. We also add the location of the new samplings done to a map, and the taxonomic information when available.

### WP4\_Small-scale enzyme production and characterisation (UHAM)

Pablo Pérez (UHAM) led the exposition of WP4. Pérez indicated that they have several PETases that have been produced at once, using the same conditions, whose information can be transferred to BSC for their Expression Metapredictor.

Golyshin continued to explain their part in WP4. Ferrer asked if they are using the real substrates provided by Schoeller to test the PETases (not only with the commercial PET), at which Pérez answered that now that all the enzymes are produced, they will start the test with the real textiles.

Stephan Thies (UDUS) presented their new results for WP4. Ferrer pointed out how interesting is that some lipases can be used for both textiles and detergents. Ferrer also wondered which buffer is required for textile application, at which Nazanin Ansari (Schoeller) answered that water. So, Ferrer recommended that in the tests we can assay the enzymes with water instead of buffer. De Carvalho said that Lip9 for instance does not work in water. Ansari and Roland Lottenbach (Schoeller) said that, regardless of water use, pH has to be controlled, usually is alkaline, and that they also control the temperature and the time.

Then, Guillaume Magnin (FHNW) explained the work done by FHNW. Ferrer suggested to test the final enzyme-inhibitor system with the real substrates for Henkel application, at which Magnin agreed. It would also be interesting to test the stability in the washing liquor of the enzyme once the chemical is added.

Also Yakimov mentioned CNR, BioC\_CheM and CSIC advances in WP4.

At this point, a short break was agreed.

The meeting continued with de Carvalho explanation of WP4 achievements. She informed that she will send supernantants of interest to CSIC so they can test the range of HA they produce. They have around 3 candidates for sequencing.

Then it was time for CSIC presentation of their results, carried out by Ferrer. Pérez asked the ratio of each enzyme in the multi-enzyme blends prepared. Paula Vidal (CSIC) answered that it is 1:1. HPLC analysis will be performed to analyse this better. de Carvalho said that when up-scaling, which makes the assay more similar to a real washing machine, there is a big difference in the amount of released fatty acids. Vidal pointed out that the swatch stained with pigment with oil that was selected for the mixed-enzyme blends was selected since it was the one that in general showed a lower release of fatty acids, so the improvements due to the mix would be better identified.

### WP5\_ Enhancing enzymes through innovative engineering (FHNW)

Patrick Shahgaldian (FHNW) led WP5 presentation, that was started by Rubén Muñoz (BSC), with Cristina Coscolín (CSIC), and Ferrer contribution.

Luisa Crisigiovanni (Advisory Board member from Altroconsumo) asked if PluriZymes are an example of what we mention as “disruptive”. Ferrer said that yes: sometimes we don’t know if the methods already existing are those that will provide the best option for the new enzymes, so it is necessary to keep developing innovative solution and options to broaden our possibilities of success when new enzymes need to be engineered.

Golyshin, Pérez, and Thies continued WP5 advances.

Ferrer commented that immobilized cyclodextrins-modified lipases (FHNW) can work for cleaning Schoeller’s textiles (for detergents cannot be used since cannot be included in the final product).

Carolina Giunta explained Inofea’s part. Ferrer asked if the successful immobilization used with the presented laccase could work with another laccase. Giunta answered that the pH might vary, so it should be taken into account. Shahgaldian added that when a redox mediator is added its oxidation also varies, so its recycling also matters. Fabrizio Beltrametti (BioC\_CheM) asked the precise objective that Schoeller have regarding the dye. Ansari answered that the full removal of the dye so the water can be reused.

Ferrer had some comments. It would be appropriated to decide which of the new mutants should be sent to Eucodis, or keep improving. The enzymes provided by Eucodis also need to be rechecked and we should decide if their performance is already adequate for the application, so they will be sent to the industrial partners, or if there is the need for further improvement.

### WP6\_ Development and supply of best enzyme prototypes (Eucodis)

The activities of this WP are detailed by Jan Modregger (Eucodis). He remarks that they are part of Biosynth now.

de Carvalho completed IST-ID implication in WP6 activities in this period.

Next, Beltrametti provided details about BioC\_CheM advances in WP6.

Crisigiovanni stressed out the importance of keeping people informed of the process when they access the final product, so greenwashing is clearly avoided. Ferrer answered that from the beginning of the project we have implemented a QR code system linked to the information of each enzyme produced so traceability can be followed at any stage and even more for the enzymes that reach the market.

And with this, the meeting was dismissed for the day.

## Day 2

The meeting began with a slight delay (9:10h CEST), with 28 participants present and 8 on line.

### WP7\_ Formulation and manufacturing of consumer products: sustainability and environmental assessments (CLIB)

Markus Müller (CLIB) led the WP7 summary. Ferrer commented that we have to set up a file in which the activities (for example, specific activities) of the enzymes transferred to Eucodis and from them back to the partners are compiled, so that we can check whether the values are equal, similar or different. Crisigiovanni asked what the Nagoya Protocol is, which was explained by Müller.

Christian Degering (Henkel) confirmed they received all the samples and are starting the washing testings. de Carvalho completed IST-ID contribution. Ferrer said that we should at this point check the real (or as similar as possible) conditions that Henkel foresees the detergent will be used so the experiments are fully optimised.

Ferrer commented that the conditions of the 2 candidate hyaluronidases for production for Evonik are going to be optimised soon, and not yet transferred to Evonik. Xin Lu (Evonik) wanted to know if so far the tests have been carried out with pure or semipure enzymes or protein supernatants (produced after microbial cultivation) since if not pure, there can be other factors affecting the performance on the HA. Ferrer answered that since the expression of hyaluronidases is complicated, so far the supernatants are used, but are only for pre-testings until the purification can be optimised. Müller again stresses out that this point needs to be sped up so as soon as possible we can transfer to Evonik the material so they begin their trials. Lu also wanted to know if the enzyme is going to be concentrated or immobilized, at which Müller said that Inofea will be in charge of it. Rita Correro (Inofea) mentioned that they have already received the 3 lipases but still not any hyaluronidases, at which Modregger said that they are finalising the preparations to send them this material. Beltrametti said that 1.5L cultures by BioC\_CheM are being prepared. The amount to be sent is not yet known.

Ilaria Re (Italbiotec) explained that they need more information about the industry process involving textile, and cosmetics since the market has changed in the last months. With it, they will keep updating the life cycle assessment (LCA) so the benchmark materials can be properly produced and the inventory can be more adequately set up. Lu said that they could not really start the comparison, as the final assessment will have to wait until the evaluation of the final enzymatic process. Sara Daniotti (ITB) added that they would also need, if possible, information about the environmental impact of producing enzymes for the LCA. Eucodis offered to provide this information. She also wondered when will the first application tests be finalised, since it is crucial for the LCA. Müller answered that maybe at the end of the project. Daniotti said that they can provide a list of the precise information they would need, and that in case these tests can be finalised sooner, they can also speed up the preparation of the inventory and LCA.

Crisigiovanni asked when tests of the real products are going to be performed by real consumers. For instance, for facial cream, they plan to run internal tests to measure the properties. To produce the final cream that would be released to the market and tested by real consumers, they need further tests, for instance, for toxicity until they are allowed to use it, so she is not sure that this step can be included in this project. Crisigiovanni asked if it would be useful to have a consultation to consumers about, for instance, the properties they value in the product, to have an idea if they will be contempt and willing to buy it when it is finally available (e.g. Is it soft? Smells ok?). Lu said that such type of surveys give very general information.

Schoeller mentioned that will need to slightly postpone the achievement of Milestone 23 (due for this month 26, July 2023). Ferrer commented that initial tests are being performed with the lipase material produced and transferred by Eucodis to CSIC, and that the results can be integrated into this milestone and sent to Schoeller for real pre-industrial tests.

Then Müller launched a Slido poll to know whether consortium members could access to the OneDrive shared folder. Most answered that they didn’t find problems. He reminded to keep the tables updated.

### WP8\_Communication, Dissemination and Exploitation (ITB)

Ilaria Re exposed all the activities and achievements of WP8. She remarked that since the project’s newsletter is not gaining reach, they have thought in a change of strategy: instead of the newsletter, LinkedIn editorials will be produced (one per month/month and a half). So far 3 are prepared, but we need volunteers to prepare future ones and provide topics. This can be added to the update of D8.3\_Plan for using, communication and disseminating project information and knowledge.

Ferrer commented that regarding the Exploitation issues, we will discuss it in the Workshop right after the meeting (see below), and that DMP, Exploitation plan, website, etc. will be further and continuously when needed updated.

Crisigiovanni wanted to comment three points. 1) “Let’s talk” webinar in YouTube monthly by Euroconsumers. Maybe FuturEnzyme can participate or prepare one. This can be added to the update of D8.3\_Plan for using, communication and disseminating project information and knowledge. 2) To help the testing of consumer choices, they have consultants and studies. 3) They have a new project meant to create a database of information of products that consumers can consult and have information they require in terms of composition. Re comments that they have two main objectives in this regard: to gain an idea on the best consumer expectations and to predict possible trends in consumers and open new perspectives of investments, so the higher amount of information, the better. Crisigiovanni offered also a meeting with one of their experts. Ferrer remarked the fact that we will develop improvement for products already existing in the market, that to the best of our knowledge, have a good acceptance in consumers.

Then, the video for the project was displayed to receive feedback from the attendants (it had already been circulated). They commented that the text should be better adjusted to the images, and the sentences shorter. Also, voice should be included as support for the image and text (this freelancer seeker was suggested later by email by Shahgaldian: <https://www.fiverr.com/>). Maybe we can add some results or figures about what we want to achieve.

### Conclusions and future meetings and events

We concluded that, so far, the work advances in line with what was expected.

The Executive Committee will be held in month 30 (November 2023) online (date to be decided).

The next annual meeting (36-month) will take place approximately in May, and it was agreed to be prepared by Yakimov in Italy. The date and place will be decided by the majority using for instance a doodle survey. We need to be aware that the second reporting period will take place around this date, so the dates should be fixed appropriately to avoid work overload and overlapping.

The 48-month meeting is planned to be prepared together with a policy event including also the other Cluster Enzymes for Greener Products projects, place and date to be decided (maybe in Madrid).

This concludes the 24-month General Assembly meeting, which is followed by the Exploitation and Innovation Task Force workshop.

### Exploitation and Innovation Task Force workshop

The annual meeting for the Exploitation and Innovation Task Force workshop took place, conducted by CLIB, right after the 24-month General Assembly meeting. Müller encouraged all attendants to actively participate on the workshop, also by using the Slido polls they prepared (results in **Annex I**).

Ferrer and Guallar commented on which bioinformatic tools will be freely available or under licence, as Ksenia Niesel (Bayer AG) had some concerns about the possibility that such tools become public for academia but not for industry.

It was also discussed the better way to offer our KERs when available to stakeholders, and how to manage IP issues.

Another issue to have in mind and to take decisions about is what we will do, what results we will not want to protect by IP, so they will not just lay unused.

Müller proposed to start filling a Declaration of Results (DoR) within the consortium so what is going to be exploited (or intended to) is clearer. Ferrer agreed, and pointed out that we can begin with those enzymes already in pre-validation step. Müller offers to prepare the draft for the DoR form.

It is remarked the convenience of having a “List of innovations” that the project has to offer so it can be showed at the stakeholder event (Event 8 in GA) we will hold at the end of this year.

### Gender, Rights and Ethical Task Force

The annual meeting of Gender, Rights and Ethical Task Force was conducted by Ilaria Re (ITB). There are no specific updates related to last meeting, and there are no specific questions about it.

### Final remarks

Some reminders were highlighted:

- All partners should interact more with the social media accounts of the project.

- Zenodo is an Open Science useful tool, all the partners can feed our community with their material.

- Provide feedback in the documents circulated to gain a better and wider vision and outcomes.

- Participate in projects’ events and on their dissemination and publishing.

Müller remarked that CLIB has their web and newsletter in case we want to use them to disseminate our events.

It was highlighted and thanked the nice organization of the meeting, the presence of the consortium members in person and online, and the implication of the Advisory Board members (some further comments by their side were sent after the meeting, see **Annex II**).

With this, the meeting was dismissed.

# 4. Meeting recordings and presentations

The files for the 2 days recordings and the presentation are located in the section *Shared material* of the [FuturEnzyme](http://www.futurenzyme.eu)’s intranet.

# 5. Agenda

**24-month GENERAL ASSEMBLY meeting**

**6-7 July 2022**

**Technologies of the Future for Low-Cost Enzymes for Environment-Friendly Products**

**Venue:** Institute of Plant Science and Microbiology (IPM)

<https://www.biologie.uni-hamburg.de/en/einrichtungen/ipm/kontakt.html>

Ohnhorststraße 18

22609 Hamburg, Germany

**On-line link:** https://uni-hamburg.zoom.us/j/62953520901?pwd=K25FcjhXd0tTQ1ZkZktXVGRXZXFLUT09

**Agenda**

**Thursday, 6 July**

13:30-13:40 Welcome to the 24-month General Assembly meeting

Manuel Ferrer (CSIC): Project Coordinator

Patricia Molina (CSIC): Project Manager

13:40-14:00 FuturEnzyme: general resume on the activities up to the 24th month

Manuel Ferrer (CSIC): FuturEnzyme Project Coordinator

14:00-14:20 WP1 and WP9 – progress and actions (leader, CSIC)

Manuel Ferrer

14:20-15:001 WP2 - progress and actions (leader, BSC)

Víctor Guallar

15:00-15:401 WP3 – progress and actions (leader, Bangor)

Peter Golyshin

15:40-16:10 Coffee break

16:10-16:501 WP4 – progress and actions (leader, UHAM)

Wolfgang Streit/Pablo Pérez

16:50-17:301 WP5 – progress and actions (leader, FHNW)

Patrick Shahgaldian

17:30-18:101 WP6 – progress and actions (leader, Eucodis)

Jan Modregger

18:30 -------> Project dinner at the KNIPS restaurant

**Friday, 7 July**

09:00-09:401 WP7 – progress and actions (leader, CLIB)

Markus Müller

09:40-10:201 WP8 – progress and actions (leader, ITB)

Ilaria Re, Sara Daniotti

10:20-11:002 Conclusions, remarks, and future meetings and events

All, Manuel Ferrer, Patricia Molina

Remarks, comments (on the presented results and the first reporting period), suggestions by AB members

11:00-11:30 Coffee break

11:30-12:253 Exploitation and Innovation Task Force annual meeting

Markus Müller and Manuel Ferrer

12:25-13:204 Gender, Rights and Ethical Task Force annual meeting

Ilaria Re and Manuel Ferrer

13:20-13:304 Farewell

Manuel Ferrer, all

1The idea is that each of the WP leaders make a presentation (no more than 40 min), to briefly summarize the work done by the partners involved in their WP and the following steps and actions.

2WPs, deliverables and milestones will be discussed as a whole, and then a focus on next 6-months actions will be done, so that project activities are well planned.

3The idea is to briefly discuss several aspects: how exploitable results will be monitored; if the preliminary exploitation plan due to month 12 (May 2022) needs to be updated; the 2 questionnaires to be produced (one intra-consortium, and one public for consumers; questions and the distribution/advertising of the public one).

4The idea is to briefly give an overview on how the gender, rights and ethical issues are managed, and how collection of statistics, etc., are considered.

# 6. Photos











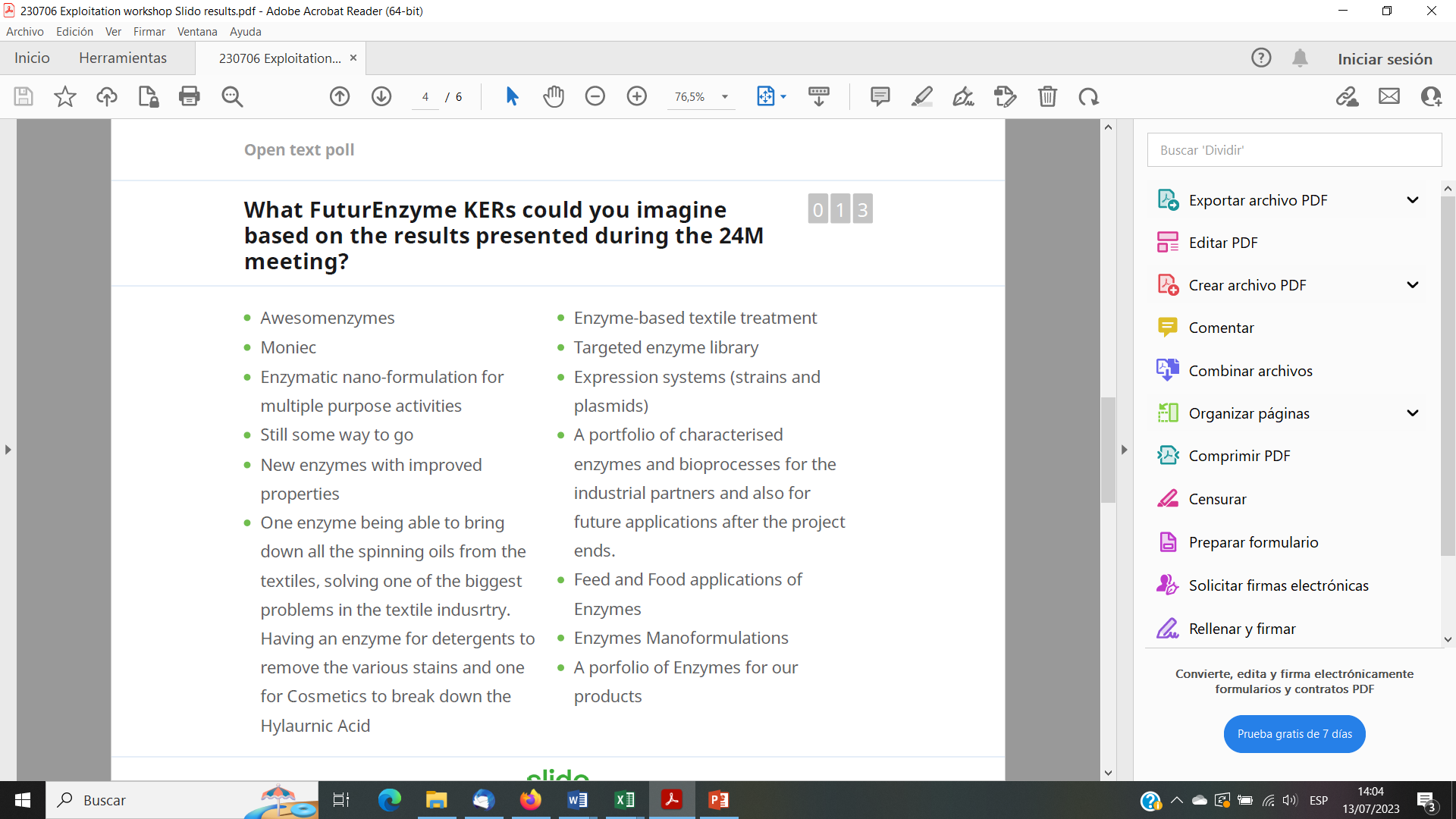


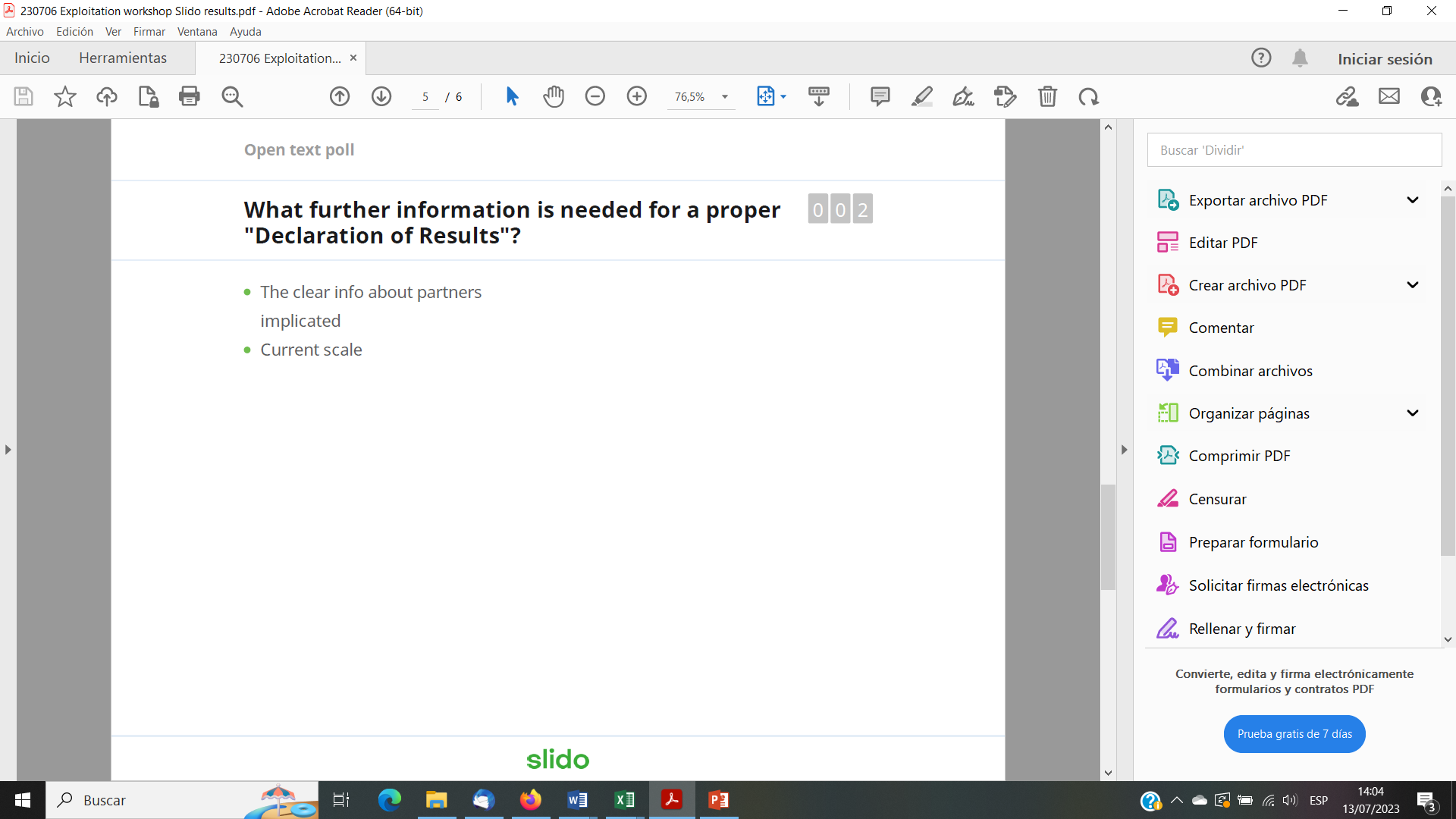


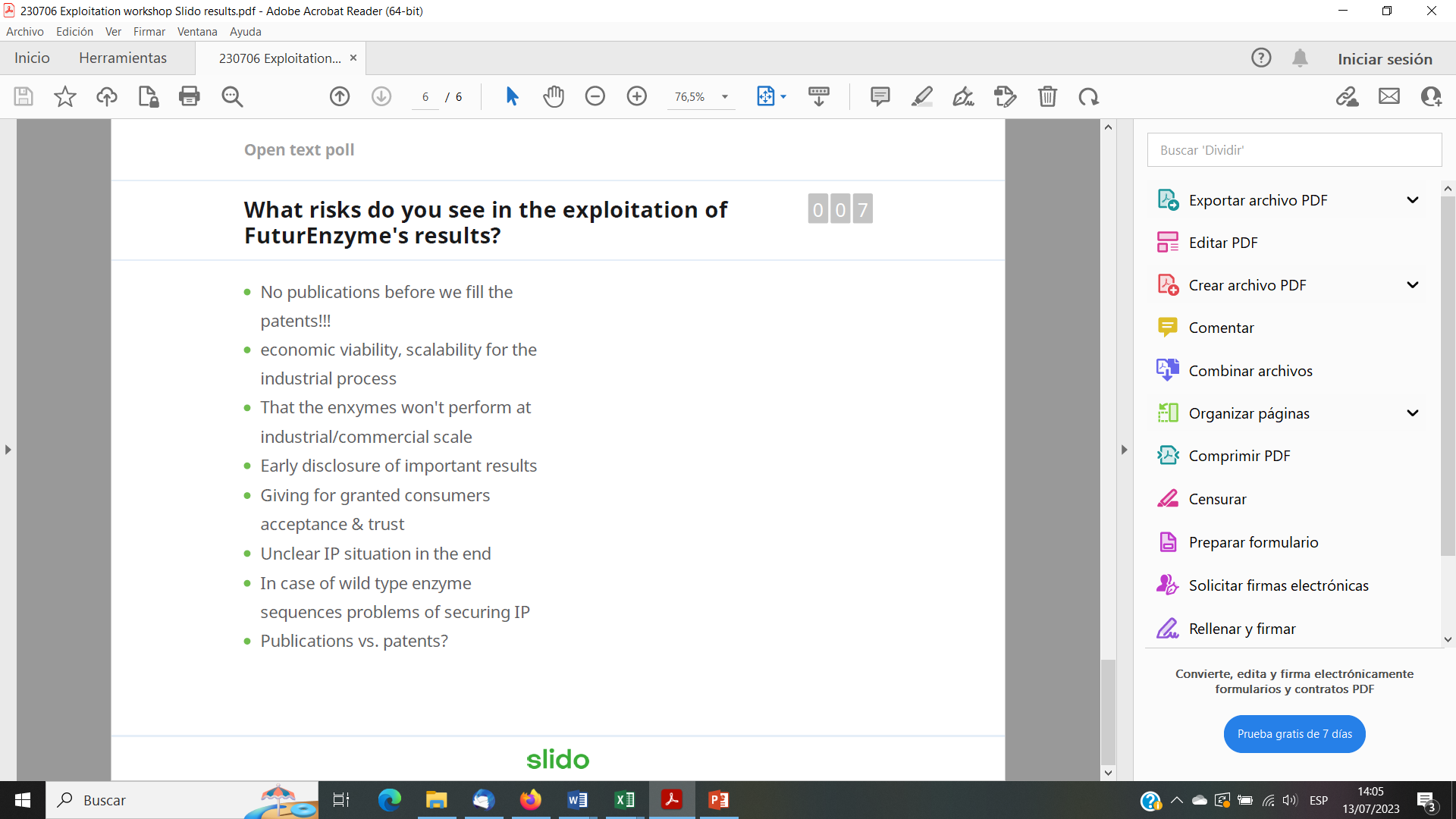


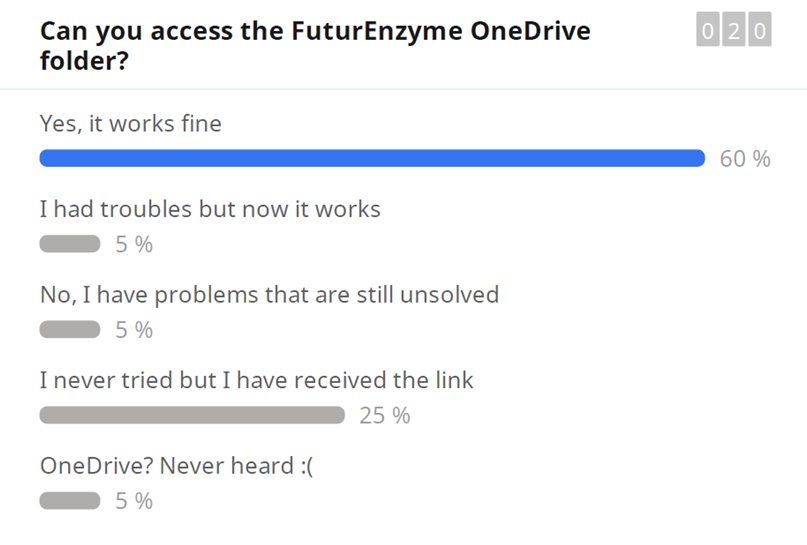


# Annex I - Exploitation and Innovation Task Force workshop: Slido polls









# Annex II – Comments and Evaluation by Advisory Board

Although the comments and suggestions of the Advisory Board experts have been included, where necessary, in the minutes detailed above, the following report was additionally provided after the meeting:

## Report: Dr. Jog Raj.

The Future enzyme project is organised very well by Prof. Manuel Ferrer as coordinator and Patricia Molina as project manager. I noticed a great teamwork, positive environment, and a staring willingness to deliver in enzymes in detergent, cosmetics, and textiles industry. On July 06 and 07, all WP 1-8 were presented and discussed. I just have a few comments:

1. Future Enzyme project team is a great group of people. May be in future alongside the project review meeting some team building exercises could also be conducted. This is just a comment. Team is already very well connected but these activities connect people further.
2. **Need for fermentation capabilities:** We are developing enzymes in this project. But there is a need for fermentation capability in Europe related to pilot scale or process optimization. There is need for the industry. Information should be on capacitor or similar website. <https://capacitor.bio/database/map>
3. **Online predictive tools**: Future enzyme suggested that there will be online predictive tool for design of enzyme. Can it be free for industry? The need for enzyme can vary from industry to industry, e.g. detergent, textiles and cosmetics have different requirements. I can comment on need for animal feed markets:

* Enzyme needs to thermostable (90-120 °C for 2 mins)
* Enzyme should be stable or tolerant at pH 3.0 and functional at neutral pH.
* Enzyme production and use should be as cheap as possible.

1. Are **enzymes available for screening in animal feed applications**?

Yes, to be determined with Ferrer. May be Patent Co. can screen enzyme applications in animal feed, e.g., lipases, proteases.

1. As project has completed 24 months and now there should be regular in person annual meetings to bring the maximum output from the project with board members invited.