

FuturEnzyme

WP6 – Development and supply of best enzyme prototypes

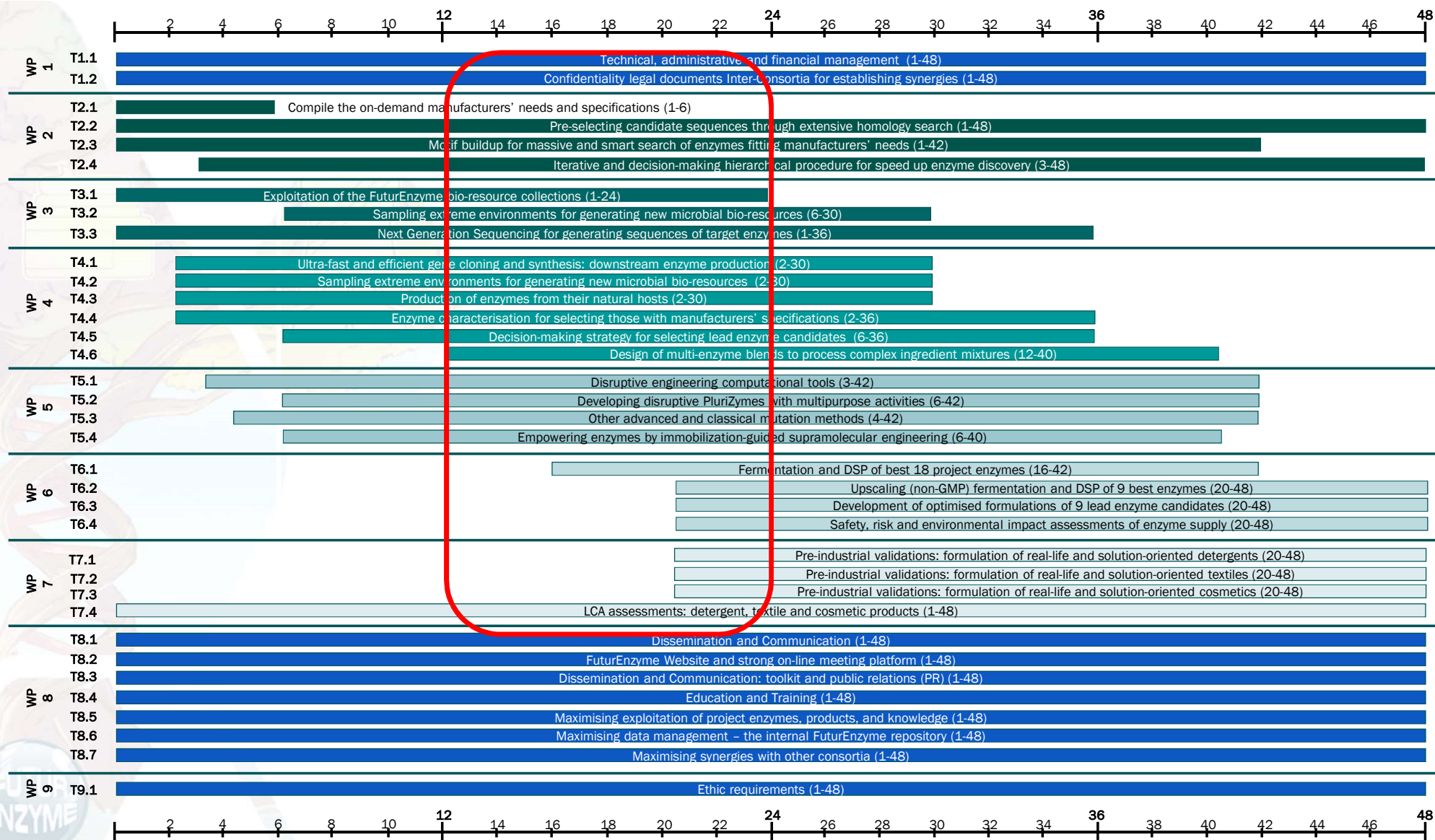
FuturEnzyme WP6: Overview

Start date: September 1st, 2022 (M16) - End date: May 31st, 2025 (M48)



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Research and Innovation Programme under grant agreement No [101000327]
Call: H2020-FNR-2020 submitted for H2020-FNR-2020-2 (08 Sep 2020)
Topic: FNR-16-2020 - Enzymes for more environment-friendly consumer products





Work package number ⁹	WP6	Lead beneficiary ¹⁰	16 - EUCODIS
Work package title	Development and supply of best enzyme prototypes		
Start month	16	End month	48

Objectives

As different downstream users will require different enzyme functions, WP6 aims with high priority to develop and scale up fermentation and DSP methods, formulation and quality assessments, of the WP5-best 18 engineered enzymes (2 x 9 enzyme classes; including artificial biomimetic proteases). After confirming their performance, they will be supplied to downstream application tests in WP7, which focuses on the implementation of real-life products integrating these enzymes or products derived from them. The amount of the enzymes to be generated, and thus the fermentation scale, will be fixed depending on the amount needed for the real-life tests needed in WP7. Although WP6 and WP7 will run independent from each other, feedback-loops will be established.

- In the first loop the application test partners will give feedback about the performance of all 18 pre-selected enzymes obtained at small/medium scale on the basis of which the 9 best enzymes (1 x 9 classes) will be up-scaled (≥ 200 L), and formulated so that they can be manufactured as verified enzymes, taking care of the formulation development (stability, liquid, dried, preparation of multi-enzyme blends, immobilization based on silica - an abundant and safe natural resource, etc.) and safety and risk assessments; and
- In the second, the application test partners will give feedback about the performance of 9 lead enzyme formulations, and WP6 partners will then supply improved formulations to be again transferred to WP7.

Finally, based on enzyme supply costs of best formulations to be integrated in best real-life products to be produced in WP7, the economic feasibility/sustainability of the enzyme supply process will be evaluated in the context of a circular economy.

Description of work and role of partners

WP6 - Development and supply of best enzyme prototypes [Months: 16-48]
EUCODIS, CSIC, IST ID, ITB, CLIB, INOFEA AG, Bio_Ch

Task 6.1 Fermentation and DSP of best 18 project enzymes M16-M42
Lead partner – BIO_CH
Participants: CSIC, IST-ID, EUC, INOFEA

Task 6.2 Upscaling (non-GMP) fermentation and DSP of 9 best enzymes M20-M48
Lead partner – EUC
Participants: CSIC, BIO_CH, INOFEA

Task 6.3 Development of optimised formulations of 9 lead enzyme candidates M20-M48
Lead partner – EUC
Participants: CSIC, INOFEA

Task 6.4 Safety, risk and environmental impact assessments of enzyme supply M20-M48
Lead partner – EUC
Participants: CSIC, CLIB, INOFEA, ITB

Participation per Partner

Partner number and short name	WP6 effort
1 - CSIC	6.00
6 - IST ID	23.00
8 - ITB	3.00
10 - CLIB	3.00
11 - INOFEA AG	20.00
12 - Bio_Ch	15.90
16 - EUCODIS	27.00
Total	97.90

List of deliverables

Deliverable Number ¹⁴	Deliverable Title	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D6.1	Best 18 Pre-Lead Enzyme Materials obtained at gram scale for real-life tests	12 - Bio_Ch	Other	Confidential, only for members of the consortium (including the Commission Services)	32
D6.2	Report on fermentation, DSP and activity verification for 18 Pre-Lead enzymes	6 - IST ID	Report	Confidential, only for members of the consortium (including the Commission Services)	32
D6.3	Best 9 Lead Enzyme Materials obtained at multi-gram/kg scale for real-life tests	16 - EUCODIS	Other	Confidential, only for members of the consortium (including the Commission Services)	36
D6.4	Report on fermentation, optimization and verification for 9 Lead Enzyme Materials	16 - EUCODIS	Report	Confidential, only for members of the consortium (including the Commission Services)	46
D6.5	Safety, risk, and environmental evaluation sheet for 9 enzymes with pre-market value, available	16 - EUCODIS	Report	Confidential, only for members of the consortium (including the Commission Services)	48

Schedule of relevant Milestones

Milestone number ¹⁸	Milestone title	Lead beneficiary	Due Date (in months)	Means of verification
MS19	First set of best enzymes at gram scale	12 - Bio_Ch	20	Report available – this milestone will attest the realisation of the first production batches at gram scale for best enzymes to be used for tests prior to pre-industrial validations.
MS20	First set of lead enzymes at multi-gram scale	16 - EUCODIS	22	Report available – this milestone will attest the realisation of the production batches at gram scale for lead enzymes to be used for pre-industrial validations.
MS21	LCA report for supplying the first set of enzymes	16 - EUCODIS	32	Report available - this milestone will attest the completion of the LCA for the production of first set of enzymes produced at large.

WP6: Development and supply of best enzyme prototypes

We need to define:

- How do we receive lead candidates from WP4 and WP5 partners?
 - Examples:
 - Sequence information
 - Origin information
 - Starting fermentation conditions
 - Available activity tests (for QC)
- What are the targets for each candidate handed over for strain and process development?
 - Examples:
 - Yield (e.g. amount, activity required for commercial viability)
 - Preferred expression system (bacterial, yeast, fungal, GRAS status etc.)
 - Quality parameters (e.g. purity, activity, stability, food-grade, endotoxins, heavy metals, microbiology, TAMC, TYMC, GMO-free/DNA-free, etc.)
 - Preferred formulation (liquid, freeze-dried, spray-dried, immobilized (and if so: requirements for particles?))
- Idea: Implementation of a „Lead Candidate Process“ (possibly online?)



WP6: Development and supply of best enzyme prototypes

Idea: Implementation of „Lead Candidate Process“ (possibly online?)

For example:

1. Step: WP4/WP5 partners enter information about candidate online
2. Step: A notification is generated to WP7 industrial partners to select candidate, add e.g. amount, quality etc. required for further application tests
3. Step: A notification is generated for WP6 partners
4. Step: WP6 partners decide after discussion, who will produce the enzyme
5. Step: Production
6. Step: Delivery note of the lead candidate sample to the WP7 partner

Benefits: no questions „what do I have to do now...?“, whole process is well-documented, important information collected in database for later (not only buried in long reports or spread by mouth...)

FuturEnzyme



FuturEnzyme Technologies of the FUTURE for low-cost ENZYMES for environment-friendly products

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