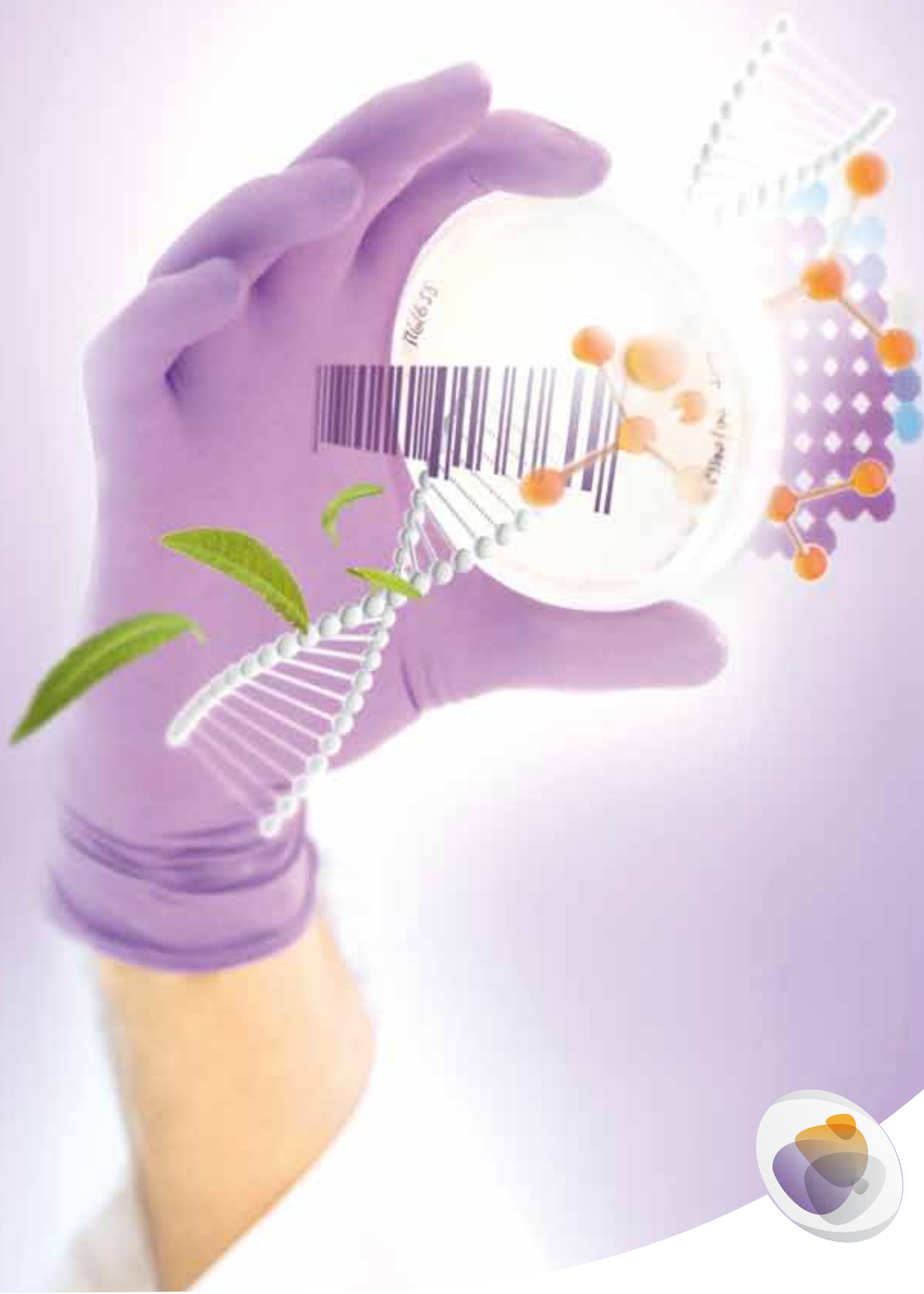


TOULOUSE WHITE BIOTECHNOLOGY

# ACCELERATE DEVELOPMENTS IN INDUSTRIAL BIOTECHNOLOGY



**twb**  
White Biotechnology  
center of excellence



# AN INNOVATIVE STRUCTURE

TWB IN FIGURES 2012-2013

€20 M

subsidy for 10 years

€2.8 M

in pre-competitive research projects

€12 M

in industrial contracts

4 patents

7 technical support platforms

over 50 collaborators

**Toulouse White Biotechnology (TWB)** is a **pre-industrial demonstrator** in the field of industrial biotechnology, also known as white biotechnology. TWB's objective is to help develop a **bioeconomy** based on the use of **renewable carbon** as a raw material for the tomorrow's industries, avoiding competition with the food use.

## OBJECTIVES



**Facilitate the public research / industry interface** in the field of white biotechnology.



**Improve the development of new methods of sustainable production** through the use of innovative biological tools (enzymes, microorganisms) and competitive processes.

## AN ORIGINAL PRIVATE/PUBLIC CONSORTIUM

It guarantees management of TWB: about thirty private and public partners sharing socio-economic objectives and working together to steer and accelerate TWB projects.



## TESTIMONIES FROM COMPANIES MEMBERS OF THE CONSORTIUM

**Luc AGUILAR**

International Director

Advanced Biotechnology Research

« Being a member of the TWB consortium means having access to innovative technologies and approaches whose industrial applications, I hope, will lead to breakthroughs in our field. Moreover, TWB's ethical and responsible approach is in line with our group's strategy in terms of sustainable development. »

**L'ORÉAL**  
Recherche & Innovation

**Jean-François ROUS**

Innovation Director

« Being at the heart of a top-notch scientific environment in the area of white biotechnology is of major importance to SOFIPROTEOL. As part of the TWB consortium, we benefit from access to a large network of private and public players in the field, favorable to developing synergies. »



**Sofiprotéol,**  
l'engagement durable

# A RECOGNIZED EXPERTISE

TWB covers a wide range of industrial research and development activities, **from biological engineering (enzyme and metabolic engineering, synthetic biology) to process development on a pre-industrial pilot scale.**

To carry out its projects, TWB combines a creative method with an **ethical and sustainable development approach.**

## VARIOUS APPLICATIONS

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▶ CHEMICALS

▶ BIOMATERIALS

▶ BIOPOLYMERS

▶ BIOFUELS

## EXCELLENCE IN RESEARCH

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TWB is based on a synergistic collaboration with the Biological Systems and Chemical Engineering Laboratory (LISBP) at the National Institute of Applied Sciences (INSA) of the University of Toulouse. This laboratory, under the triple administrative stewardship of INSA/INRA/CNRS, benefits from over 40 years' experience and it is internationally renowned for its level of expertise in the fields of **biocatalysis, metabolic engineering, microbiological engineering and environmental processes.**



Collaborations with other leading-edge public laboratories are also developed in a complementary manner.



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TWB guarantees a continuum of expertise from laboratory level to pre-industrial pilot level, all on one site. This integrated device helps accelerate development and validation of bioprocesses while reducing the risks linked to changing scale.

# CUSTOMIZED SOLUTIONS FOR COMPANIES

**Different types of collaborative research and development projects** are proposed, in connection with researchers from the top public laboratories. In order to facilitate the collaboration between private and public players, simple intellectual property rules have been pre-defined.

- **Pre-competitive research projects**, supported by the TWB consortium, to generate innovative results and fundamental discoveries that can be used by partners.
- **Competitive industrial projects**, established between a company and TWB, in complete confidentiality, to meet a precise goal.
- **Intermediate projects**, co-financed by companies and public funds, in response to national or European calls for tenders.

## LEADING EDGE TECHNICAL SUPPORT PLATFORMS

These support platforms are equipped with the latest equipment and made available to researchers and technicians for their research projects. Services are also offered on these platforms.

**7 integrated support platforms, offering innovative high-performance technical solutions with industrial development perspectives, are created:**

- **Cutting edge microbial strain engineering:** automated molecular biology station, colony picker, automated mini-biofermenters.
- **Analytical :** chemical analyses (gas, liquid and size-exclusion chromatography, mass spectrometry, flow cytometry, NMR) and physical analyses (rheometry, spectral and optic techniques).
- **Biotransformation and culture process:** bioreactors from 500 ml to 300 l, enzyme reactors, online analyses.
- **DSP/USP operations:** pretreatment of raw materials, purification, separation, formulation.
- **Bioinformatics:** data collection, storage, processing and analysis, sequencing analysis.
- **Environmental evaluation:** analysis of carbon footprint, energy flows and of the lifecycle of products and processes.
- **Ethics:** project follow-up (ethical and societal analysis), in collaboration with the Higher School of Ethics and Sciences of the Catholic Institute of Toulouse.





## EXAMPLE OF PARTNER RESEARCH PROJECT: “THANAPLAST”

Develop innovative industrial processes to reuse plastic waste and to produce a new generation of biodegradable plastic with a programmed life cycle.



### CARBIOS

The green chemistry start-up has signed a partnership to the tune of 7 million euros with TWB (via INRA\*) for a strategic project called Thanaplast. The challenge is to replace conventional chemical processes by biotechnological ones, and to redesign the lifecycle of plastics.

The applications will be immediate: programming the self-destruction of single-use plastics (kitchen bags or agricultural mulch bags), unlimited recycling of plastic waste using a biological process for the recovery of plastic-based components, identical to those of oil-based products.



### Alain MARTY

Professor at INSA\*\* Toulouse and researcher at LISBP\*\*\*, TWB scientific manager for the THANAPLAST project

« This project currently mobilizes a large number of LISBP skills, particularly in the area of enzyme engineering. 14 people were hired to successfully complete this project over a five-year time.

TWB is the bridge between our public research laboratory and the CARBIOS research and development teams. Researchers no longer have to deal with research contracts and intellectual property: TWB manages all this with CARBIOS. It also makes the necessary human and technological resources available to complete the project, allowing us to focus on our core business, i.e. scientific research.»

\*INRA: National Institute for Agricultural Research / \*\*INSA: National Institute of Applied Sciences / \*\*\*LISBP: Biological Systems and Chemical Engineering Laboratory

# TWB IS YOUR CONTACT OF CHOICE

- ▶ You wish to set up a research or economic development program in the field of industrial biotechnology; you need technical assistance or require the use of leading-edge technological equipment.
- ▶ Whether you're a company, public research laboratory, or a private or public player in bioeconomy.

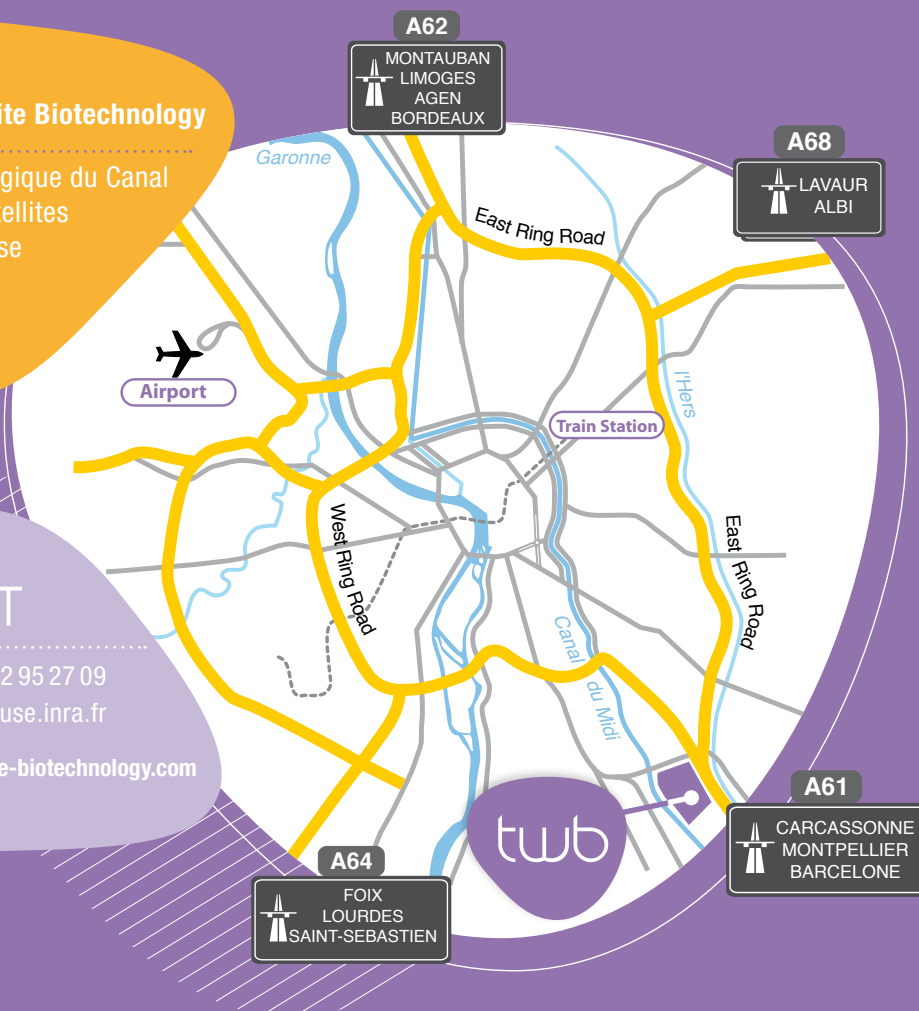
Don't hesitate to contact us.

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**Award-winner of Investments for the Future projects call** in the field of «Health and Biotechnology - Pre-industrial Demonstrators» in March 2011, the project TWB has been granted by the French National Research Agency (ANR-10-DPBS-02-01). TWB is based on a Joint Service Unit (UMS), under the triple administrative stewardship of INRA/INSA/CNRS (UMS INRA 1337 ; UMS CNRS 3582). This unit, labelled by the 3BCAR Carnot Institute, is managed by INRA.



Under the triple administrative stewardship of:



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