IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

CBS

Journée scientifique sur le thème: «Utilisation des microorganismes du sol pour accroître la productivité agricole »

How can technology transfer from Lab to Market push companies for open innovation?

Pr Souad Rouis, Entrepreneur
Center of Biotechnology of Sfax
Laboratory of Biopesticides

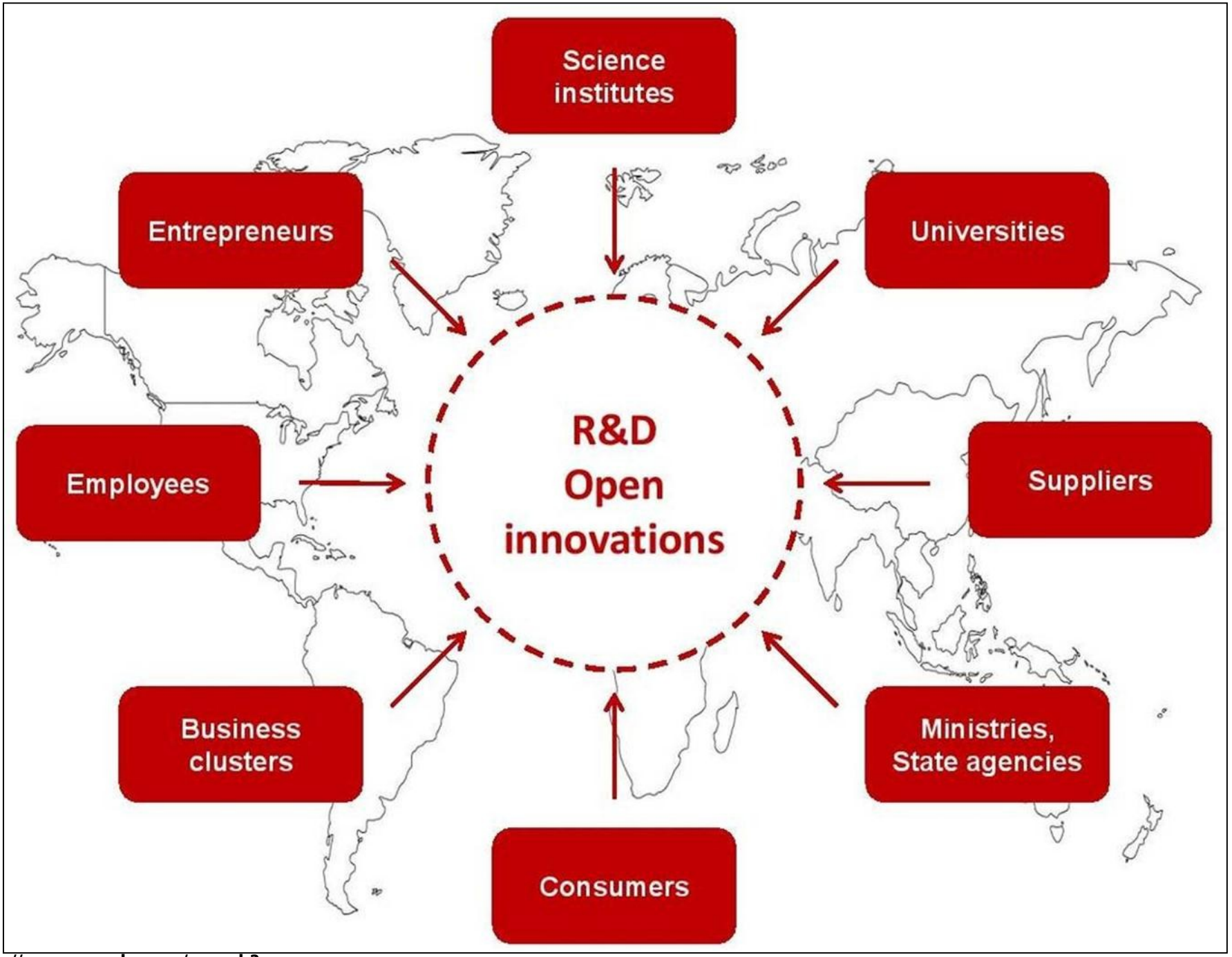
IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

OPEN INNOVATION

The concept of open innovation was developed in the early 2000s by Henry Chesbrough teacher researcher at Berkeley. The principle of open innovation refers, as its name indicates, to a process of innovation by which the COMPANY is no longer "closed" on itself within its R & D department, but opens on the contrary, on a variety of other external actors (researchers, partner companies, customers, students, etc.) or internal (non-R & D employees). The notion of open innovation also implies that the innovation process is less linear and that alternative routes (in terms of products or services) to those initially planned can be taken.



https://www.google.com/search?q=open+innovation&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj0oqjxy6nfAhVR1hoKHW61CAEQ_AUIDigB&biw=1600&bih=789#imgrc=Uo

ACADEMIC RESEARCH

EXCELLENCE
INNOVATION

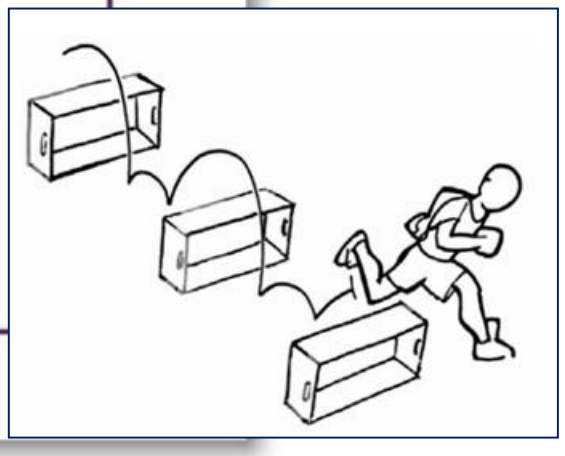
SOCIOECONOMIC IMPACT
IMPLEMENTATION
STRATEGY
COMMUNICATION

Strengths

Weaknesses

Opportunities

Threats



National & International Funding

Fetric, tempus, PASRI, H2020, ENICBCMED

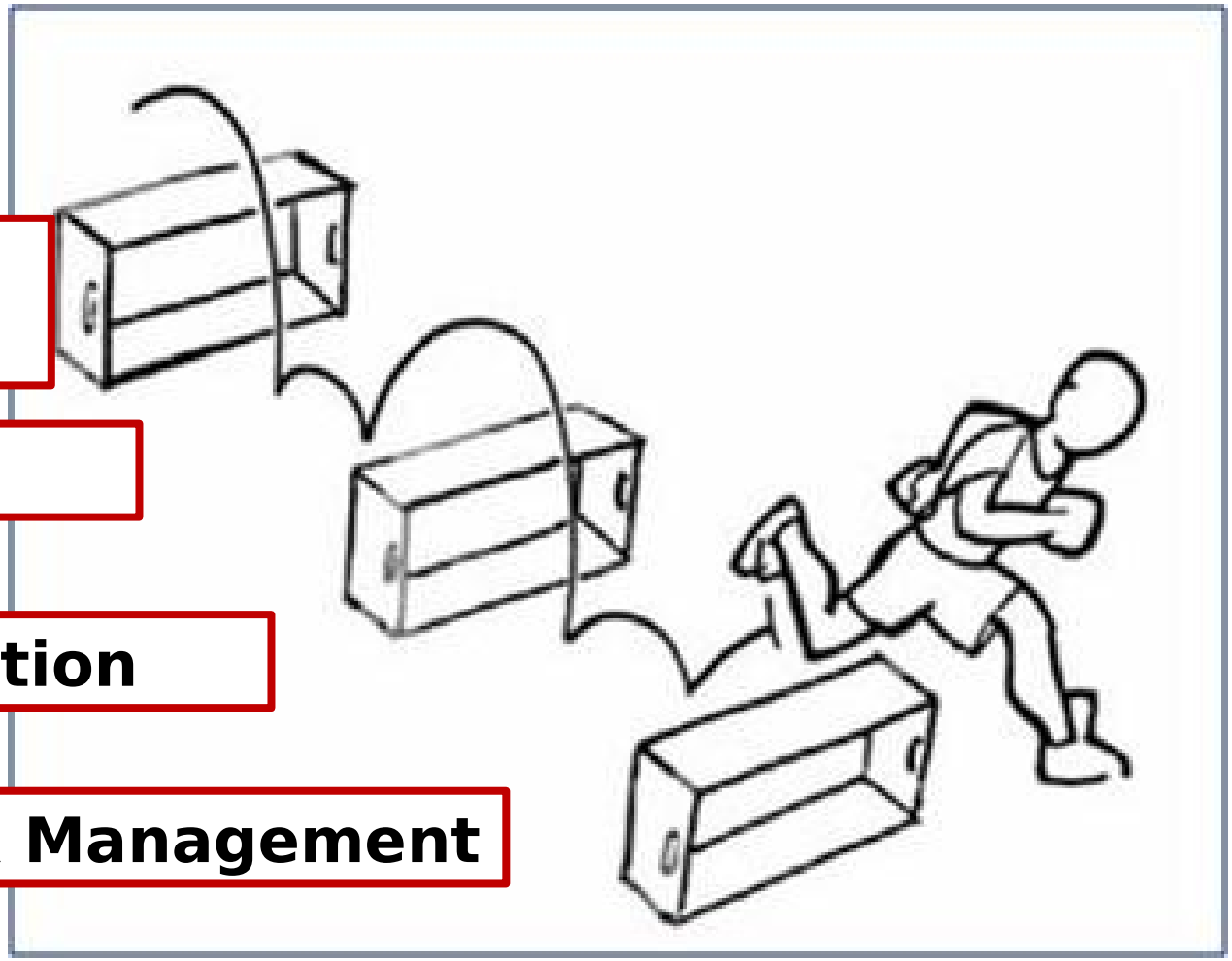
BARRIERS

Hostile Environement

Financial

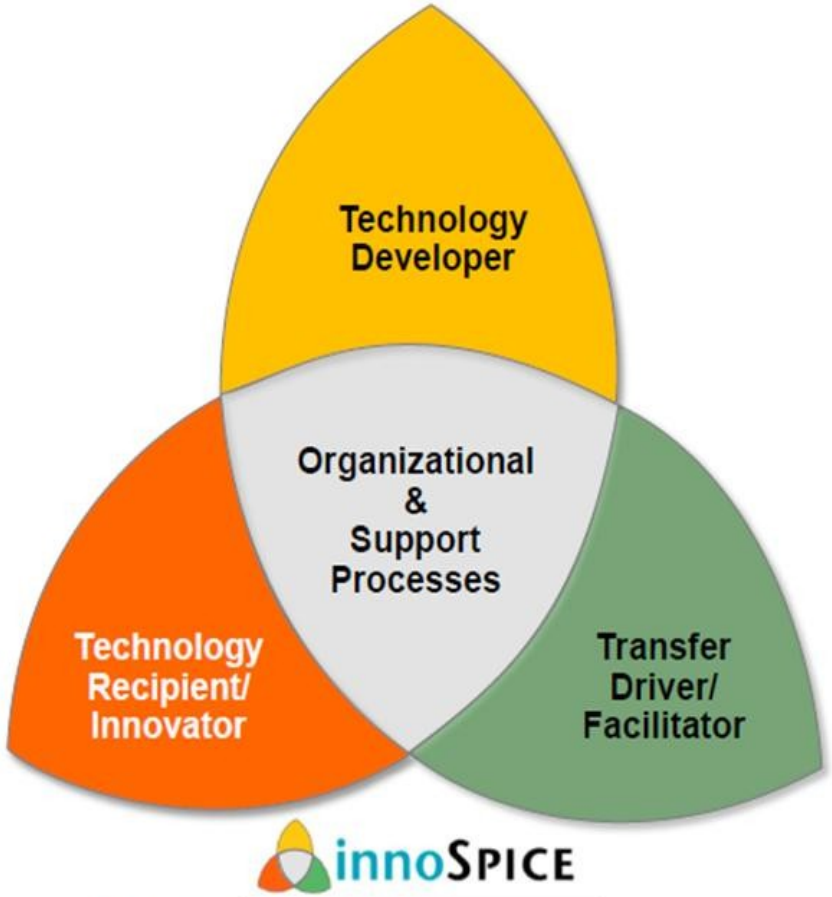
Regulation

IPR Management



innoSPICE® is an instrument to support quality management in the field of innovation, knowledge and technology transfer.

innoSPICE Model



- innoSPICE is an **ISO/IEC 15504 conformant process reference & assessment model** for knowledge- and technology transfer and innovation activities.
- The level of the transfer and innovation capability of an organization is related to
  - the fulfilment of processes (process dimension „what“?) and
  - the maturity of these processes (maturity dimension „how are they performed“?)
- innoSPICE was **evaluated within > 30 assessments** in various institutions all over Europe
- innoSPICE **Special Interest Group** (SIG) is new member of the SPICE User Group and the model is public available.

Source: innoSPICE ISO 15504

Organizational Process Category (ORG)

Tendering; Contracting; Technology Transfer Management; Relationship Management; Human Resource Management; Incentive Structure; Decision Making

Technology Developer Process Category (DEV)

Research and development project proposal preparation, Applied Science Knowledge Creation, Experimental Science Knowledge Creation, Prototype Development, Technology Development, Technology Release

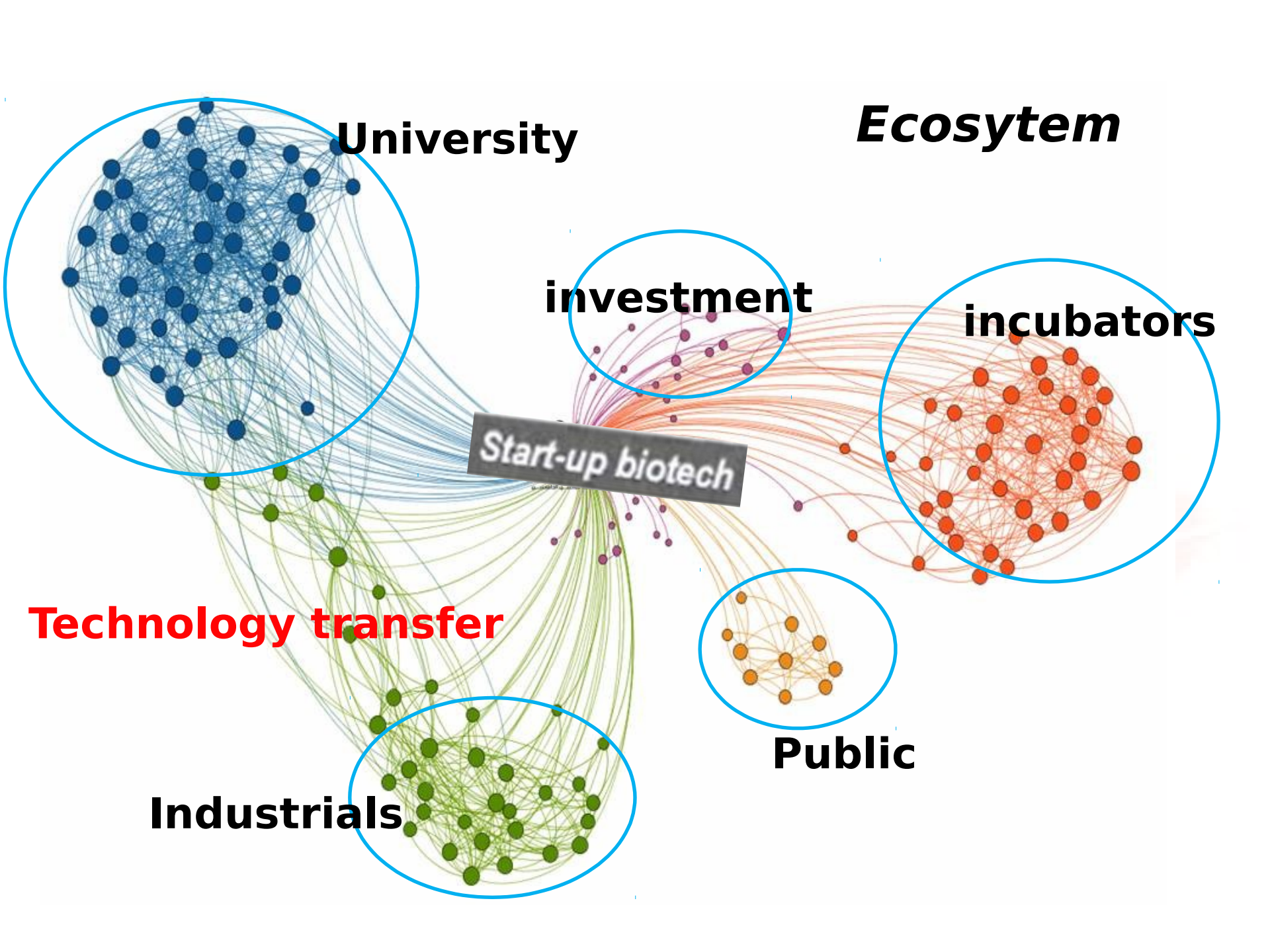
Technology Transfer Driver Process Category (TTD)

Technology Transfer Concept; Technology Evaluation; Intellectual Property Protection Determination ; Initial Market Assessment; Technical Analysis; Market and Competitive Analysis; Technology Value Evaluation; Go to Market Estimation; Commercial/Social-economic Interest Confirmation; Business Case Establishment; Financing Sources Raising

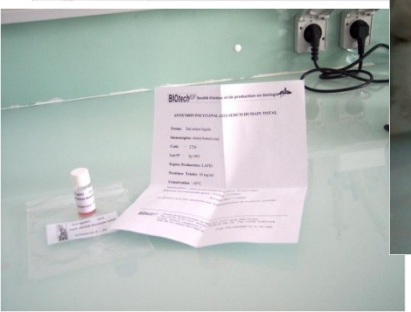
Supporting Process Category (SUP)

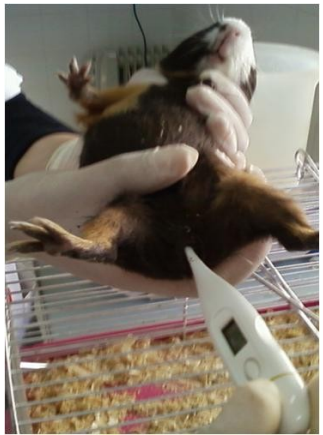
Contacts and Collaboration Development; Communication; Joint Review; Information Management; Training; Work Environment

.

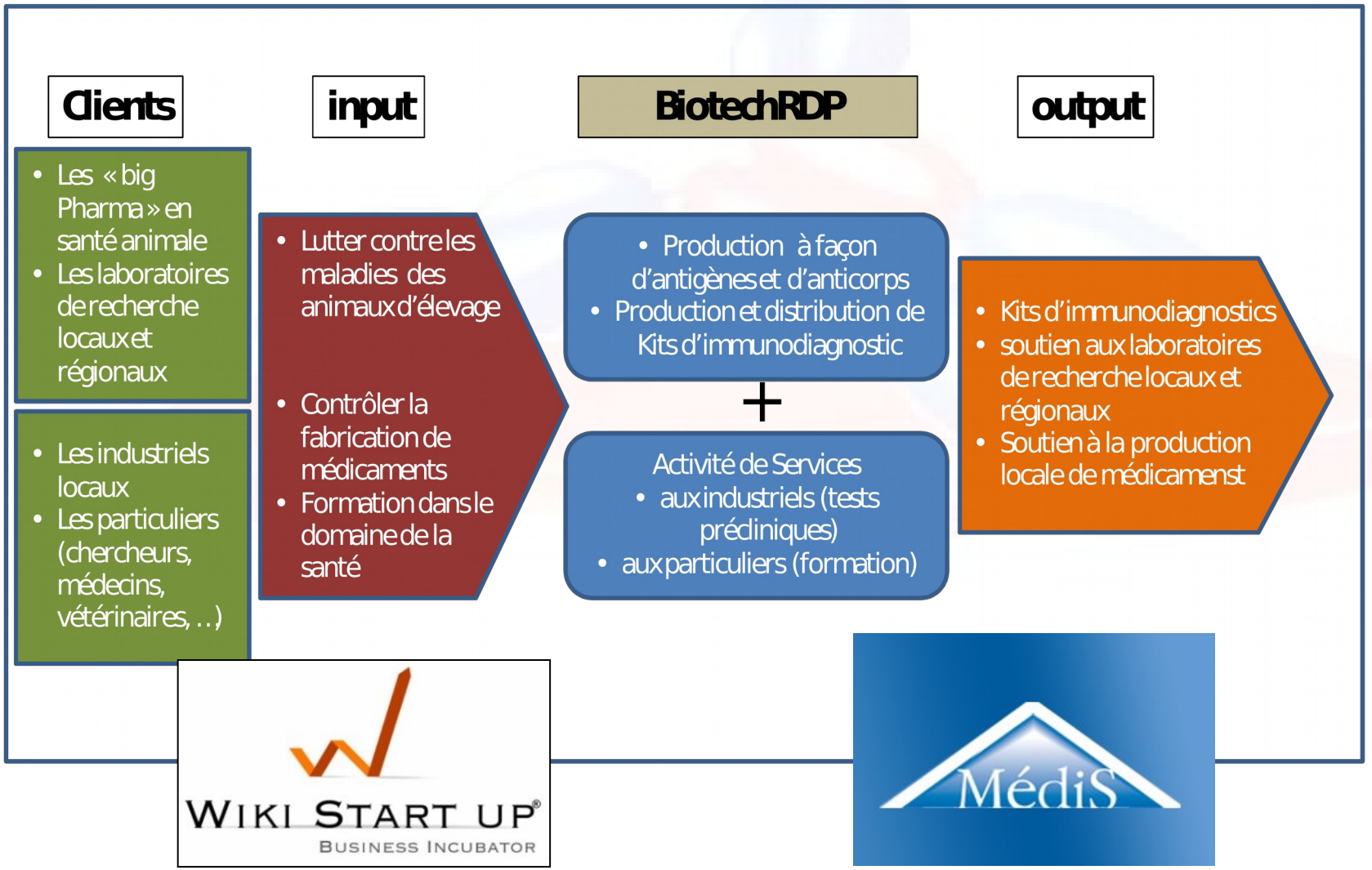

Ecosytem
University
investment
incubators
Start-up biotech
Technology transfer
Public
Industrials

BiotechR DP





Business Model



WIKI START UP®
BUSINESS INCUBATOR

MédiS

Be different
Be a transformer

VISION

Strategy/General Objectif

Establish and maintain consultation and collaboration between the different structures operating in the sphere of research, innovation and development

Create an environment encouraging to the exploitation of results by acting both on the demand and the supply of the results of research and innovations and by facilitating the Research-Development interface.

Specific Objectives

1/ Establishment of a strategic partnership with an industrialist interested in plant health for the transfer of biopesticide production technology and their commercialization

2 / Accompanying this Public-Private Partnership in the process of legal and economic maturation

3 / Realization of a proof of concept for a license and a business creation (spinoff / startup)

4 / Reinforcing the rapprochement Research-Enterprise by initiating a dialogue between all the stakeholders for the creation of a chain of plus value (cluster)

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

Laboratory of Biopesticides

BUSINESS CASE

Bt based Biopesticide Valorisation: « From Lab to Market »


Colonies isolées de B. thuringiensis
Observation microscopique des spores et des cristaux
Activité insecticide sur B. mineur
Activité fongicide sur A. niger
Culture en Erlenmeyer de B. thuringiensis
Production de Bioinsecticides en Fermenteur de 430 litres
Différents Bioinsecticides formulés prêts à l'emploi
Possibilité de traitement des forêts, arbres fruitiers, palmeraies et oliveraies
Traitement des eaux stagnantes source de germes pathogènes

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

tional Ecosystem supp

RÉPUBLIQUE TUNISIENNE
MESRS

Agence de Promotion
de l'Industrie et de l'Innovation

République Tunisienne
Ministère de l'Industrie, de l'Energie et des Mines

VRR

regional Innovatio n Award

Laboratory of Biopesticides

Spinoff

PIRD, PNRI

UNIVENTURE
SPIN-OFFS GENERATOR

WIKI START UP®
BUSINESS INCUBATOR

CTA

Centre Technique des Agrumes

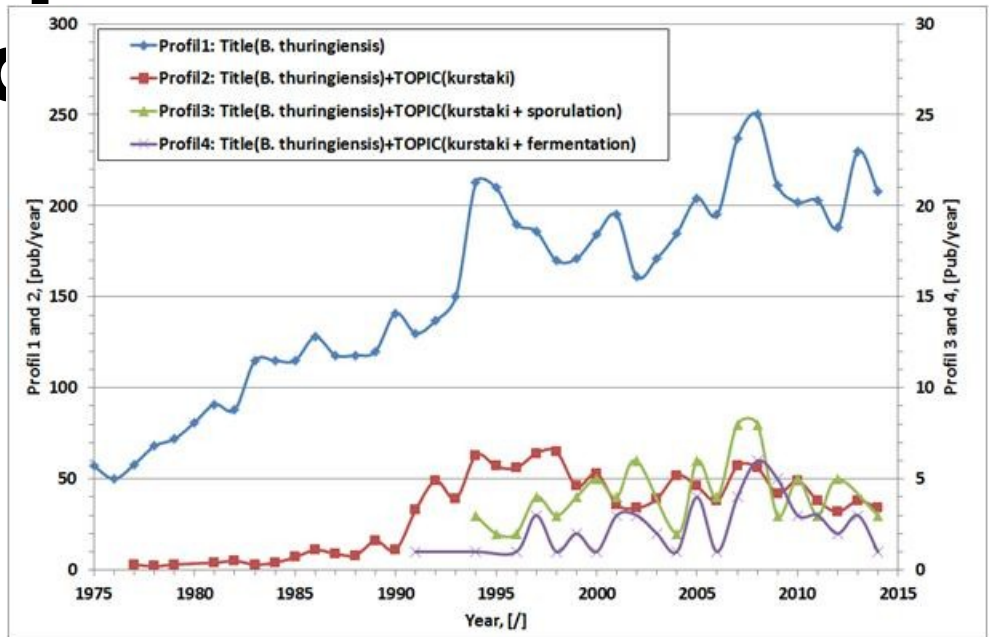
MédiS

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

Biopesticide:Scientific Exc



Profile 3			Profile 4		
Country	Paper	Rate [%]	Country	Paper	Rate [%]
USA	19	23.1	CANADA	24	46.1
CANADA	16	19.5	USA	15	28.8
MEXICO	14	17.0	TUNISIA	5	9.6
CHINA	12	14.6	BRAZIL	4	7.6
TUNISIA	9	10.9	INDIA	4	7.6
BRAZIL	8	9.7	MEXICO	3	5.7
INDIA	5	6.0	CHINA	3	5.7
ENGLAND	3	3.6	QATAR	2	3.8
FRANCE	3	3.6	TAIWAN	2	3.8
QATAR	3	3.6	ARGENTINA	1	1.9

ical origin and number of scientific papers related to profiles 3 and 4 (period : 1975 to 2015, source: WoS, Thomson

INNOVATION/ VALORISATION

cn Microbiol
OI 10.1007/s00203-009-0458-y

ORIGINAL PAPER

A new Tunisian strain of *Bacillus thuringiensis kurstaki* having high insecticidal activity and δ-endotoxin yield

Imen Saadaoui · Souad Rouis · Samir Jaoua

PATENT

Received: 13 November 2008 / Revised: 16 January 2009 / Accepted: 16 January 2009

Abstract BLB1 is a new *Bacillus thuringiensis kurstaki* strain, isolated from a Tunisian soil sample. Assay of toxicity of BLB1 crystal proteins resulted in an LC50 of 70.32 ng of toxin per mg of flour against third instar *Ephestia kuehniella* with confidence limits of (31.6–109.04 ng). This LC50 is less than that of the commercial strains HD1 used as a reference. The characterization of this strain by scanning transmission electron microscopy, analysis of its *cry* genes content by PCR-sequencing, and analysis of its δ-endotoxin patterns demonstrate that it belongs to the same subgroup than HD1, but ruled out the involvement of *cry* during sporulation (Bechtel and Bulla 1976). These proteins are specifically toxic to insect larvae and are widely used as bioinsecticides against lepidopteran, dipteran, and coleopteran pests. Crystal proteins from numerous strains have been classified according to the similarity of their amino acid sequences and their insecticidal specificity (Höfte and Whiteley 1989).

In general, most Lepidopteron-specific *B. thuringiensis* toxins are known to be synthesized as a protein crystals composed of protoxin molecules of 130–140 kDa which, upon ingestion by larvae of a susceptible species, are dis-

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

CENTRE DE BIOTECHNOLOGIE DE SFAX
LABORATOIRE DES BIOPESTICIDES

FACULTE DES SCIENCES DE SFAX
DEPARTEMENT SCIENCES DE LA VIE

République Tunisienne
Ministère de l'Enseignement Supérieur et de la Recherche Scientifique
Université de Sfax

LABORATOIRES PHARMACEUTIQUES MEDIS

THESE

En vue de l'obtention du
Doctorat en Sciences Biologiques

Présentée par

Nouha ABDELMALEK

Recherche et caractérisation de nouvelles souches de *Bacillus thuringiensis* et leur application pour la lutte biologique.

Soutenu le 19/12/ 2016 devant le jury composé de :

Mr.	Ali GARGOURI	Professeur, CBS	Président
Mme.	Alya SELLAMI-KAMOUN	Maitre de conférences, FSS	Rapporteur
Mr.	Luc FILLAUDEAU	Directeur de Recherche à l'INRA, Toulouse	Rapporteur
Mr.	Hichem CHOUAYEKH	Professeur, CBS	Examinateur
Mr.	Slim TOUNSI	Professeur, CBS	Membre Invité
Mme.	Nadia BEN SAID	Pharmacien Responsable Biotechnologies, MédiS	Membre invité
Mme.	Souad ROUIS	Maitre de conférences, CBS	Directrice de thèse

Année Universitaire : 2015-2016

Laboratory of Biopesticides

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

STRAEGIC PARTENARSHIP

CBS

CENTRE DE BIOTECHNOLOGIE DE SFAX

Support
Business dev.
Skills dev

MédiS

IPM-4-Citrus

CALL: H2020-MSCA-RISE-2016
NUMBER: 734921
DURATION: 48 MONTHS / START: 01 APR 2017
PROJECT COST: 801,000.00 €
CONTACT (PO): TIPHANIE SPANIER, REA

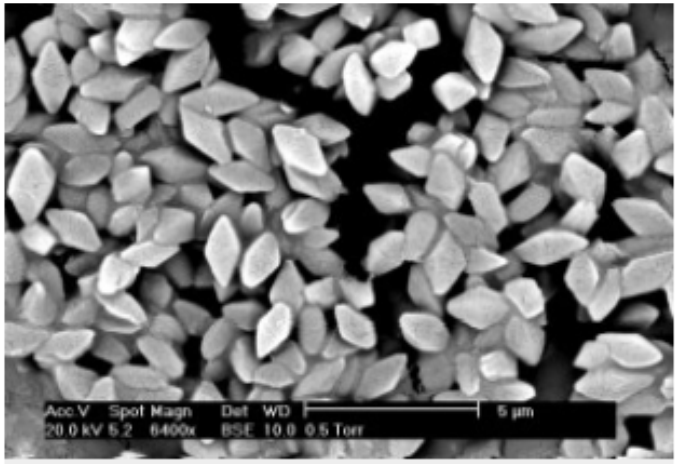
IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

IPM aims...
http://www.ipm-4-citrus.insa-toulouse.fr/

IPM-4-CITRUS aims to strengthen collaborations between academic and non-academic partners based in 3 European Member States (France, Germany and Italy), 2 Associated Countries (Turkey and Tunisia) and 1 Third Country (Lebanon), to develop two new bio-pesticides active against citrus pests and scale them up from lab to market.



Bacillus thuringiensis

The project's research and innovation activities are based on a multidisciplinary approach, which aims at understanding and sensitising stakeholders about the health risk factors related to citrus pests and developing an alternative **Integrated Pest Management (IPM)** approach based on biological control. In conjunction with validation through field tests, the project will pave the way for future commercial exploitation of these new biopesticide products by drawing up a feasibility study for future spin-off activities and/or new production lines in partner SMEs.

Staff secondments and inter-sector and international mobilities between complementary partners will represent a unique opportunity to optimise bioproduction processes and obtain high added-value bioproducts, while building up the partners' skills and reinforcing the training of early-stage researchers through knowledge sharing and networking. The project will also adopt a concrete RRI approach by favouring public engagement and informal education through the different outreach activities aimed at a variety of target groups.

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

HORIZON 2020 FUNDED

Marie Slodowska Curie Action

Research & Innovation Staff Exchange

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

TEGRATED PEST MANAGEMENT

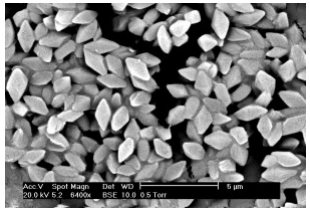
- **Understanding & sensitising stakeholders** about the health risks related to citrus pests
- **Developing an alternative IPM approach** based on biological control

11 PARTNERS

6 COUNTRIES

4 YEARS DURATION

This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement N° 734921



STRAIN USED:

Bacillus thuringiensis kurstaki BLB1 and LIP

Citrus

TARGETED PEST:

insect larvae

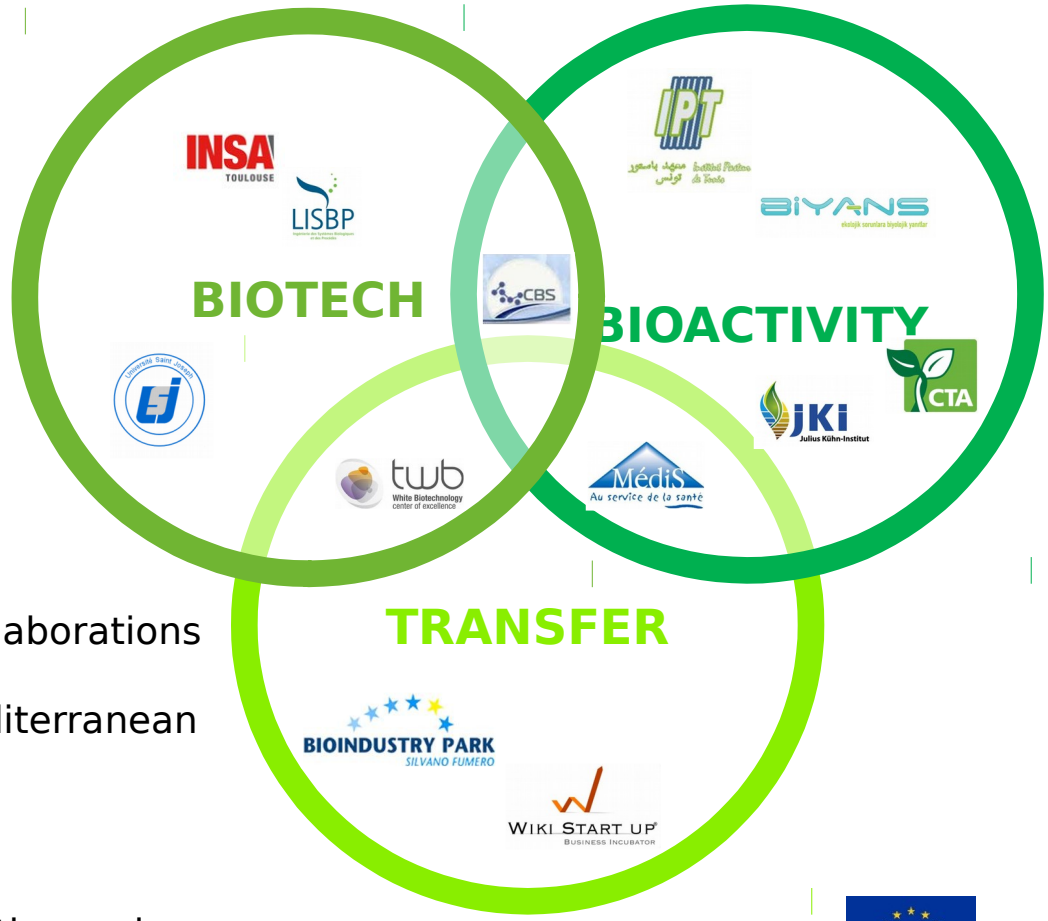
Phyllocnistis citrella & Prays citri

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

Interdisciplinary
Intersectoral
International



GOAL :

- Strengthening Academia & Industrial collaborations
- Optimising bioproduction processes
- Developing new biopesticides in the Mediterranean region

HOW :

- Feasibility study for future spin-off activities and new production lines,
- Benchmarking the opportunities & obstacles related to bringing innovative ideas to the market.

This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement N° 734921

IPM-4-CITRUS

From Research From Lab ...to Market ...to Field

A pool of competency… with human resource

	MM	Budget
Total	178	801 €
Nb participants:		36

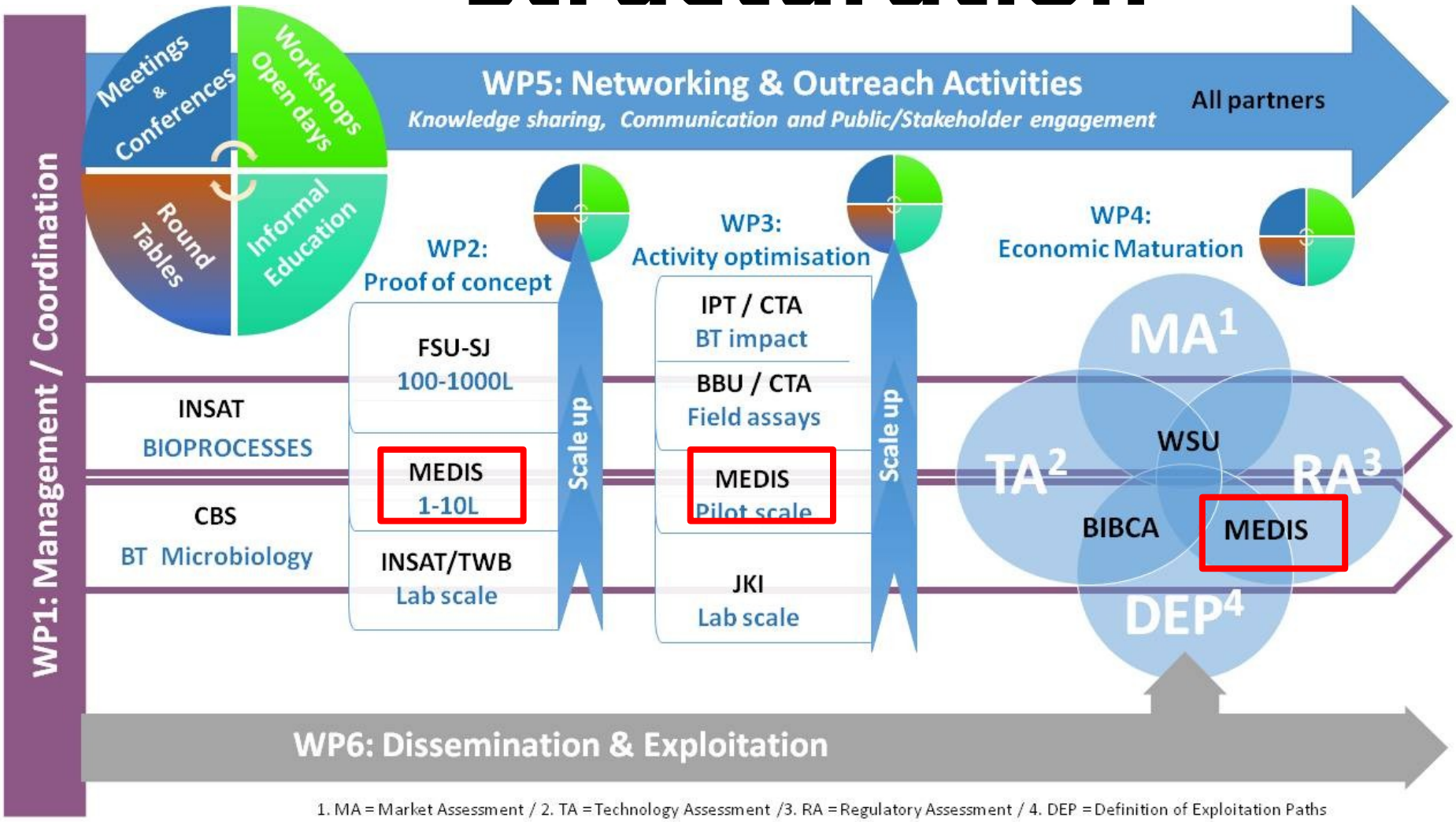
		BBU	BIPCA	CBS	CTA	FSU	INSAT	IPT	JKI	MEDIS	TWB	WSU	MM	Total k€
WP1	Secondments												0	0
	MM (No permanent)													
WP2	Secondments			17		19	31			21			88	396
	MM (No permanent)			12		16	24			12				
WP3	Secondments	9	1	6	5	11		9	16	14			71	319,5
	MM (No permanent)	9	0	0	1	10		6	2	12				
WP4	Secondments		3	1		2	2		2		1		11	49,5
	MM (No permanent)		0	0										
WP5	Secondments			3		3	1					1	8	36
	MM (No permanent)			0										
		9	4	27	5	35	34	9	18	35	1	1	178	801
	Total k€	40,5	18	122	22,5	158	153	41	81	157,5	4,5	4,5	801	
	Participants (secondement	2	2	5	2	6	6	2	3	4	1	1	34	

IPM-4-CITRUS

From Research From Lab

...to Market ...to Field

IPM-4-Citrus, WP structuration



1. MA = Market Assessment / 2. TA = Technology Assessment /3. RA = Regulatory Assessment / 4. DEP = Definition of Exploitation Paths

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

Welcome on the European scientific project website: IPM-4-Citrus

This project has received funding from the European Union's Horizon 2020 research ans innovation programme under grant agreement No 734921

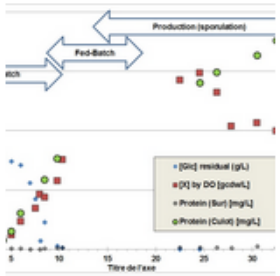
Home | Presentation | News & events | Partners | Planning | Ressources | Contact | Workspace | EC Portal

News

Tous | Citrus news | Event | Round table | Training

ESOF Toulouse, conference Session Biopesticides , July 2018

ESOF (EuroScience Open Forum), Toulouse, July 2018 Conference Open innovation for biopesticides: a new paradigm"" Place : Mercure Hotel – Conques-Cordes Although traditional innovation used to be a vertical process within companies, a new open innovation paradigm has emerged with a triple-helix model involving interactions between policy-makers, academia and



Training TP2

INDUSTRIAL MICROBIOLOGY, FERMENTATION AND SCALE-UP – CELL CULTIVATION IN BIOREACTORS (M14 AND M17) Training TP2 is dedicated to "Industrial microbiology, fermentation and scale-up" associated with a Demo Day on "Scale up (from Erlenmeyer to bioreactor) and product recovery", the consortium has acted to realised it at CBS (at valorisation unit, ...

Continue reading

Training TP1

(20th April 2018, CBS, Sfax): "Biocatalyst improvement & bioreactor cultivation: from basic concept up to intensified bioproduction" PM1 was associated with 2 satellites events (TP1 and RT1), Training TP1 is briefly described hereafter. Secondments have been planned in relation to each partner's skills and expertise and the most relevant meeting ...

Continue reading

Roundtable RT1

PM1 was associated with 2 satellites events (TP1 and RT1), Round Table RT1 is briefly described hereafter. RT1 was initially scheduled at FS-USJ in M6. Due to delay in the project, this RT was realised at CBS in association with PM1 (M12). A world café is an innovative method of ...

Continue reading

Lire plus

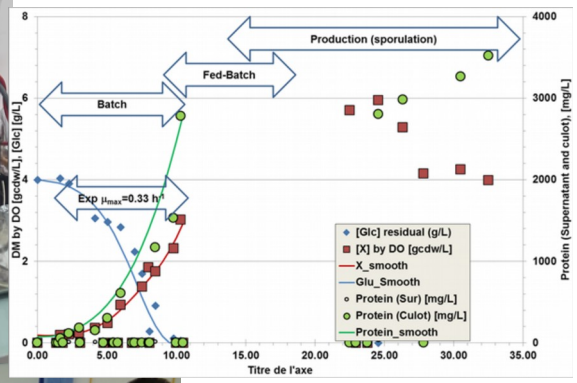
IPM-4-CITRUS

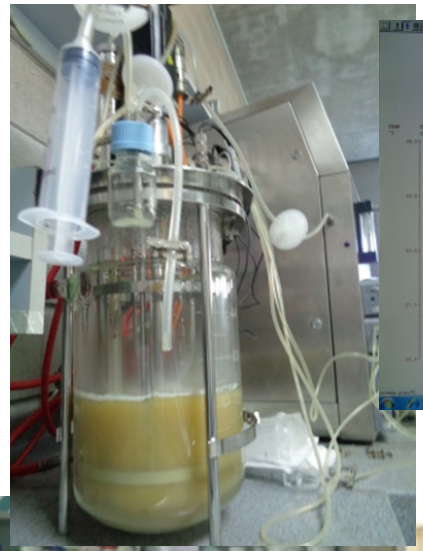
From Research
From Lab

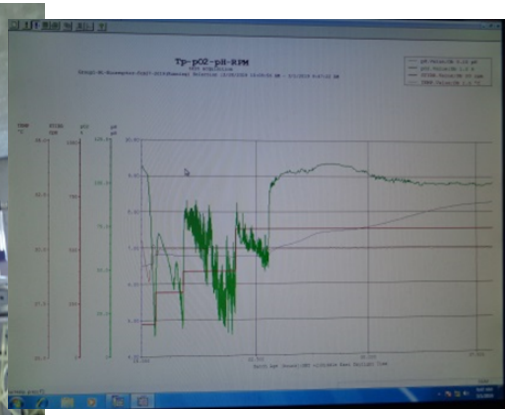
...to Market
...to Field

TRAININGS…

BEIRUT **Training TP2 training @ USJ, Industrial microbiology, fermentation and scale-up - Cell cultivation in bioreactors**





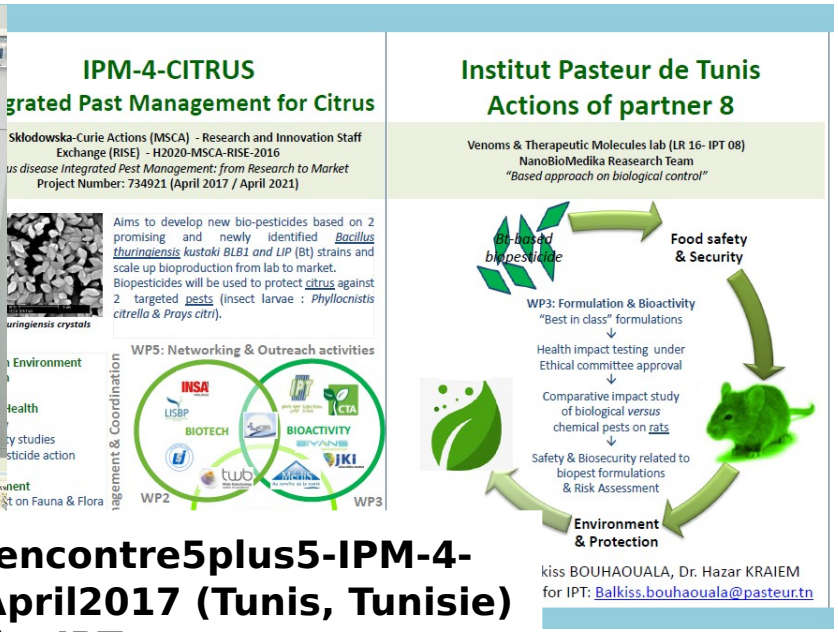


SFAX **Training TP2 training @ CBS, Industrial microbiology, fermentatio and scale-up - Cell cultivation in bioreactors**

NETWORKING ACTIVITIES…

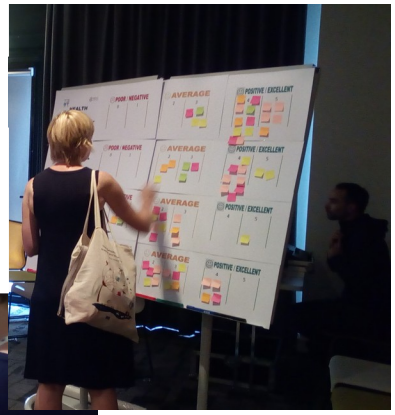
ROUND TABLES

ANKARA Biyans-seminar, April2018 (Ankara, Turkey)



TUNIS Rencontre5plus5-IPM-4-Citrus-, 7April2017 (Tunis, Tunisie) managed by IPT

TOULOUSE European Science Open Forum, July 2018.



BEIRUT Foire des sciences, Bierut-LEB, March2018 (USJ, Lebon

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

NETWORKING ACTIVITIES…
ROUND TABLES

TAANAYEL **Visit of Biopesticide Start-up (Lebanon) – April 2019**

BEIRUT **ROUND TABLE: STATE-OF-THE-ART OF BT CULTURE; COMPARING & SHARIN**

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

INNOVATION & TRANSFER

4 DIMENSIONS OF INNOVATION INTO IPM-4-CITRUS:

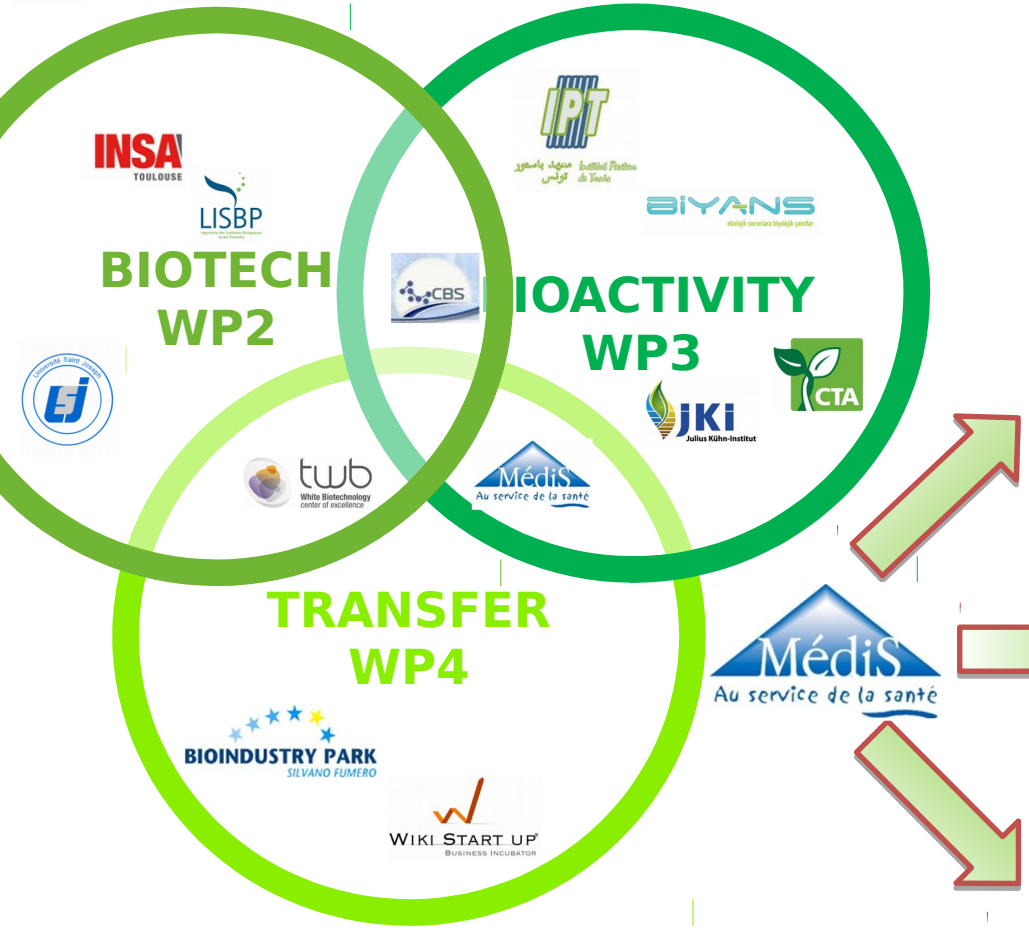
1. **Robust fermentation process** with low cost raw material + 2 endemic *Bt kurstaki* strains
2. **Alternative instrumentation** for real time process monitoring (objective : process monitoring and control)
3. **Standards & norms** for Bt production process for the MENA & Sub-Sahara African countries
4. **Innovative application strategy** for controlling leaf miner insects through epiderm (formulation)

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

FROM LAB TO MARKET…



Market	API	For	Cond	Market
Human		X	X	X
Animal		X	X	X
Plant	IPM	IPM		

MédiS
Au service de la santé

- 1 production site (Nabeul)
- Tunisian and African markets
- 1 endemic strain (Btk BLB1)

For MEDIS :
1 Manager
1 Bioprocess engineer
1 Formulation engineer

IPM-4-CITRUS

From Research
From Lab

...to Market
...to Field

Laboratory of Biopesticides

Thank you

CONTACT

Souad Rouis

24755116

souadrouis4@gmail.com

Souad.rouis@cbs.rnrt.tn