
Bio-Modeling Systems

The Mechanisms-Based Medicine Company



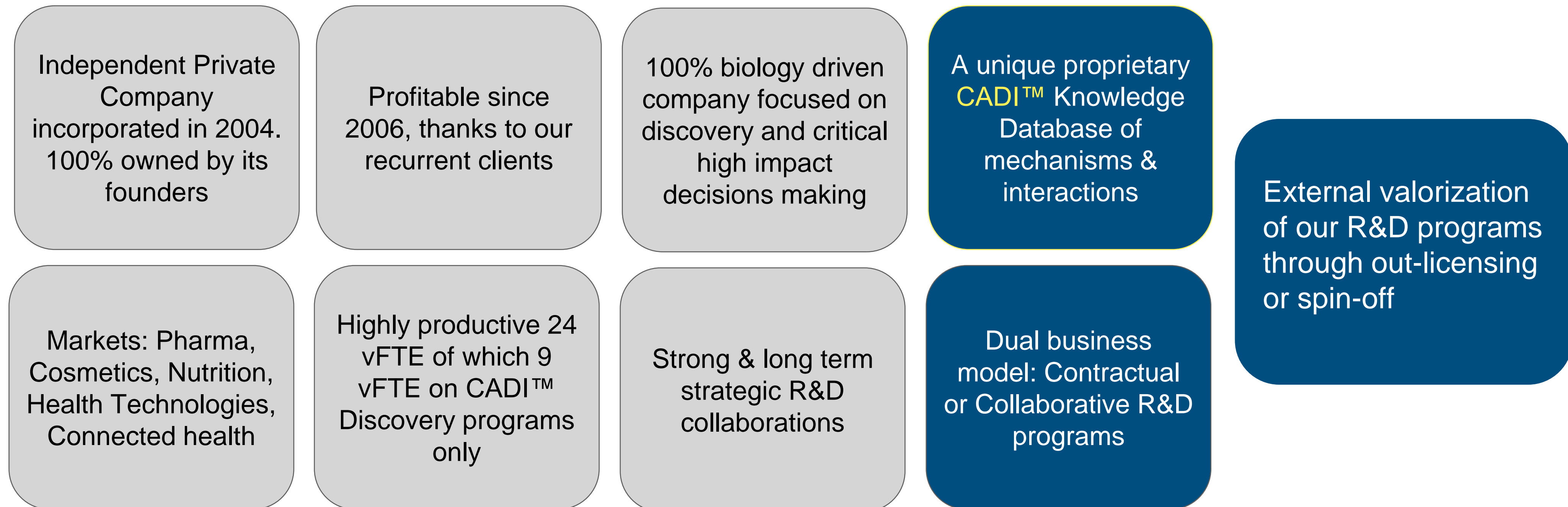
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Corporate Presentation

www.bmsystems.org

■ BMSystems at a glance



■ BMSystems' Collaborative R&D valorization strategies

World's first discovery



World's first in vivo validation of Creutzfeldt-Jakob's disease mechanisms

BMSystems/CEA collaborative research in neurodegenerative diseases was awarded for the first in vivo validation of the mechanisms of Creutzfeldt-Jakob disease pathogenesis & progression (Bio IT World Best Practice Award 2009 and European Commission 2010).

Therapeutic Spin-off



Pherecydes-Pharma, BMSystems' first therapeutic spin-off.

Novel anti-bacterial, nano-agents biotherapies technology using phages. Pherecydes Pharma develops innovative and adaptive solutions to fight multi-resistant bacterial infections. Phase 2, Compassionate, use success.

Therapeutic Spin-off



Telesphore-Pharma, BMSystems' 2nd therapeutic spin-off.

Therapeutic Solutions for Chronic Low Grade Inflammatory Disorders (CLGID). First-In-Class diagnostic & treatment for ME/CFS & Post Covid-19 CLGID Subgroups. Ready to setup

Therapeutic Out-license



CEA/BMSystems exclusive license to Theranexus, a CEA's spin-off.

Our collaborative research in psychiatric and neurological disorders, led to the co-owned worldwide patent WO20102913 exclusively licensed to Theranexus for the treatment of CNS disorders. Phase 2, listed

■ BMSystems' Dual Business Propositions

BMSystems addresses two complementary Businesses in Pharma, Biotech, Cosmetics, Nutrition, Bio-Processes and Digital-Health businesses

For R&D, Translational Medicine, & Digital Health Executives, we offer **robust alternative decision-making** to de-risk, save time and costs of R&D and Digital Health programs. *"In other words, we kill hypotheses and programs one phase before".*

For Business Developers, Patients Groups & Investors, we discover **novel low-risk, highly effective and cost-effective** diagnostic, therapy, nutrition, cosmetic, bioprocess solutions for spin-offs or out-licensing. *"In other words, we are a highly productive out-licensing and spin-off factory"*

■ BMSystems' core multidisciplinary team



François Iris
Chief Scientific Officer

Chairman, CSO & CTO of BMSystems. 40 years of experience in life sciences. Christchurch School of Medicine (NZ), **Millennium Pharmaceuticals'** (USA) collaborator of **Nobel Laureate Jean Dausset**. **Inventor of CADI™** and of new technologies in molecular biology.



Manuel Gea
Chief Executive Officer

Vice-President & CEO of BMSystems. 30 years of experience in IT and life sciences management: Colgate-Palmolive **McKinsey**, **Boehringer Ingelheim**, **HemispherX Biopharma (ME/CFS)**, **Pherecydes-Pharma** and other.



Dr. Gérard Dine
Chief Medical Officer

CMO BMSystems. 35 years of experience in clinical and medical research. Former **Head of hospital's Hematology** Dept. Former President of the **Institute for Sports Medicine**; IRMES - Institute for Research in bio Medecine and Epidemiology of Sport. **ME/CFS medical experience.**



Thanos Beopoulos
Integrative Biology director

Integrative Biology director of BMSystems. 15 years of experience in metabolic engineering at **CNRS, INRA & MIT**. Predictive biological models developer for immune, inflammatory, neurological, metabolic and cancer-related pathologies.



IPablo Santamaria,
IT & Internet Systems Director

30 years of experience in Internet technologies **and life sciences**. Scientific Engineering Degree from Ecole Centrale Paris, Founder and President of the computing firm Formitel, **Glaxo Pharma** (Evreux, France)

■ At BMSystems, we generate robust understanding of diseases

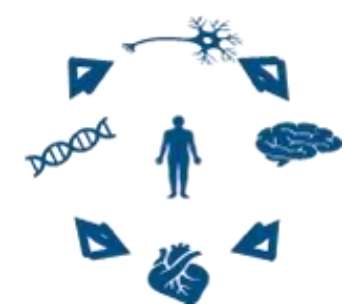
THE DEEP BMSYSTEMS' COMPETITIVE ADVANTAGE: BOTH TARGETS AND BIOMARKERS ARE THE OUTPUTS OF THE SAME CADI™ DISEASE MODEL THAT DESCRIBES THE DYNAMIC OF THE MECHANISMS OF THE DISEASE. AS A CONSEQUENCE, A POSITIVE DIAGNOSTIC TEST LEADS THE THERAPY SUCCESS.



CADI™
Discovery

1-Understand the mechanisms and the dynamic of the disease through non-mathematical heuristic modeling.

Heuristic problem solving approach **produced by Humans and Algorithms** that uses all qualitative information available (scientific literature, medical data, databases, patients, etc.). Dynamic mapping and modeling of the mechanisms contributing to disease progression through negative selection of hypotheses.



Mechanisms
Based Medicine

2-Discover the best biomarkers and targets from THE SAME CADI™ MODEL.

Identifies the diagnostic and therapeutic targets derived from the CADI mechanistic model. Proposed solutions can be novel compounds or drugs repositioning.



In vivo Biological
Validation

Generates robust models
providing novel
understanding of
mechanisms, components
and disease



Disease-Centric
Solutions
Repositioning

3-Search for most cost-effective solutions known to work in real life on the targets.

Dramatically reduces time, cost & short-term risks. We propose First in Class patentable solutions using 'real-life'-observed drug mechanisms that address the identified targets.

■ BMSystems' world collaborative network.



Our CADI™ discovery models were the laureates of two awards:

Bio IT World Best Practice Award 2009 & European Commission 2010 as “State-of-the-Art Systems Biology applications in Medicine”.



Microbiota & Autism therapeutic H2020 program started with 14 M€ funding (2019).

We built the integrated CADI Autism model. (3 publications pending)

It gathers an international consortium of scientists to study the role of the gut microbiome in the development of Autism Spectrum Disorders (ASD).



■ BMSystems' R&D programs pipeline.

External valorization of our collaborative R&D programs through out-licensing or spin-off

Program Name	CADI™ Code	Business Partners	CADI™ - v.0	Validation/ PoC	Patent/ Publication	Mid scale/ Preclinical PoC
Nano-Bioagents-Bacteriophages	CADI-R101	Pherecydes	Produced	Yes	Yes	Validated
TAPE (protein improvement)	CADI-R102	Open	Produced	Yes	Yes	Validated
Chronic Fatigue Syndrome/ ME/ Gulf War Syndrome	CADI-R103	Yes/ Open	Produced	Yes	Pending	Validated
Core symptoms of Autism mechanisms	CADI-R201	Confidential	Produced	Yes		Launched
Microbiota & Autism- GEMMA	CADI-R202	H2020	Ongoing			
Creutzfeldt-Jakob disease's mechanisms	CADI-R301	CEA	Produced	Yes	Publication	Validated
Chronic anxiety mechanisms	CADI-R302	Max Plank	Produced	Yes	Publication	
Psychiatric Disorders therapeutic strategy	CADI-R303	Confidential	Produced	Yes	Patent	Validated
Psychiatric inflammatory mechanisms	CADI-R304	Fond. Fnd	Produced			
Alzheimer's Disease Causal Mechanisms	CADI-R305	Open	Produced			
Parkinson's Disease Therapy	CADI-R306	Open	Produced			
Fibromyalgia	CADI-R307	Open	Produced			
Pain (Central/Peripheral)	CADI-R308	Open	Produced			
Malnutrition & Metabolic Disorders	CADI-R402	IISER Pune	Produced	Yes	Pending	
Hypercholestermia	CADI-R403	Open	Produced			
Metabolic Syndrome	CADI-R404	Open	Produced			

Therapeutic, Diagnostic, BioProcesses pipeline.

Program Name	Indication	Pre-clinic	Phase I	Phase 2a	Phase 2b	Comp. Use
COMBO-THERAPIES						
CADI-T1011	Multi-resistance infectious diseases					Started
CADI-T1031	CFS/ME low-grade chronic inflammation		Ready			
CADI-T1032	Gulf War Syndrome	Ready				
CADI-T2011	Attenuation of the Core Symptoms of Autism		Ready			
CADI-T3021	Parkinson's Disease		Ready			
CADI-T4021	Attenuation of Developmental Consequences of Children Malnutrition		Ready			
CADI-T4031	Metabolic Syndrome		Ready			
COMBO-DIAGNOSTICS						
CADI-D3041	Alzheimer's Disease Early Diagnostics		Ready			
CADI™-BIOPRODUCTION						
CADI-B8011	Program Synthons (16 molecules study)	ARD-IBT-L'Oréal-Arkema-Solvay				Completed
CADI-B8021	Full Human Protein Glycosylation in yeast	Open		Ready		

Internal Program Name	Indication	Pre-clinic	Clinic
COMBO-DIAGNOSTICS			
CADI-D3041	Alzheimer's Disease Early Diagnostics		Ready

Internal Program Name	Program Domains	Partners	CADI™ vers. 0	Ind. Valid.	Conf/Patent/ Pub.	First Proof of Concept (POC)
CADI™-BIOPRODUCTION						
CADI-B8011	Program Synthons (16 molecules study)	ARD-IBT-L'Oréal-Arkema-Solvay				Completed
CADI-B8021	Full Human Protein Glycosylation in yeast	Open		Ready		

■ BMSystems' CADI™ publications to date

CADI™ Models published in prestigious peer-reviewed journals: (click on the blue links to get the pdf)

- [2018: Current Opinion in Pharmacology](#): How scientific literature analysis yields innovative therapeutic hypothesis through integrative iterations. CADI Discovery addresses the complexity of life sciences mechanisms and the digital « garbage in garbage out » reality
- [2014: CNS Psychiatry publication](#): American Journal of Psychiatry and Neuroscience. Second publications with the Max Planck Institute of Psychiatry in Munich: Differential proteomics analyses reveal anxiety-associated molecular and cellular mechanisms in cingulate cortex synapses. The first output of the DECIUS CNS research program.
- [2012, CNS neurodegenerative & psychiatry](#): PharmacoPsychiatry publishes the first review describing a productive vision of Systems Medicine that will change R&D organization and interactions between clinicians & researchers & reveals how the world's first explanation of the mechanisms of the Creutzfeldt-Jakob disease led to the discovery of a truly innovative psychiatric treatment.
- [2011, CNS Psychiatry](#): Pharmaco Psychiatry publication: Proteome-Based Pathway Modelling of Psychiatric Disorders. Publication with The max Planck Institute of Psychiatry in Munich
- [2010, Infectious diseases](#): Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science :Genetically Engineered Virulent Phage Banks in the Detection and Control of Emergent Pathogenic Bacteria. Publication with Pherecydes-Pharma.
- [2009, Tissue differentiation](#): Médecine & Sciences: Müllerian duct regression explanation. Integrative systems biology & experimental Biology. Publication with CNRS experimental data.
- [2005, Cancer](#): Journal of molecular Endocrinology: Integrative analysis of gene expression patterns predicts specific modulations of defined cell functions by estrogen and Tamoxifen in MCF7 breast cancer cells. Publication in collaboration with INSERM unit 553.
- [2003, Cancer](#): Nucleic Acids Research: Integrated transcriptome analysis of the cellular mechanisms associated with H-ras-dependent malignant transformation of the human breast epithelial MCF7 cell line. Publication in collaboration with INSERM unit 553. World first. First in-silico model of a complex human disease validated in-vitro and published.

Collaboration to scientific reference books:

- [2014: Dermatology Cosmetics](#). The first reference book on “Computational Biophysics of the Skin” edited by Prof. Bernard Querleux , scientific chairperson of the International Society for Biophysics and Imaging of the Skin
- [2011: Phage Nano Technology](#) book published by Valery Petrenko. Chapter 8: Genetically Engineered Virulent Phage Banks for the Detection and Control of Bacterial Biosecurity Threats.
- [2008: CNS](#): Biomarkers for Psychiatric Disorders. (Ref. ISBN: 978-0-387-79250-7, November 2008). Dr. François Iris, is the author of the Integrative Biology chapter of the book. The editor, Prof. Christoph W. Turck, is head of the Proteomics and Biomarkers branch at the Max Planck Institute for Psychiatry

Thank You.

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