



Ιπποκράτης  
(HIPPOCRATES)

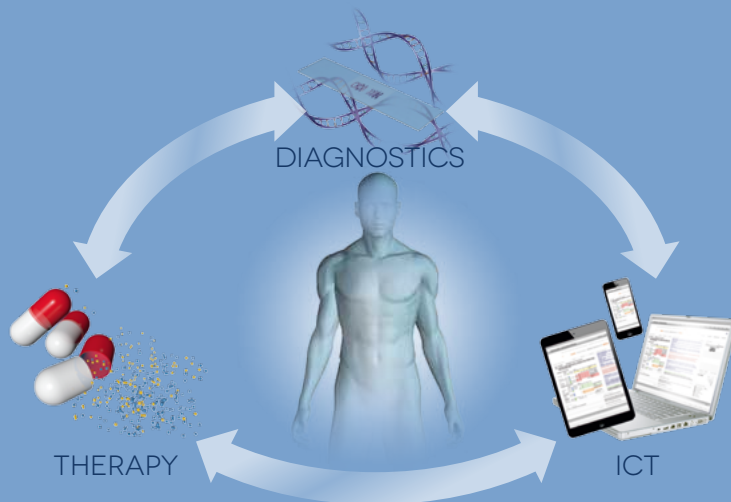
## DEVELOPMENT OF MICRO AND NANO-TECHNOLOGIES AND ADVANCED SYSTEMS TO THE MEN'S HEALTH



DISTRETTO TECNOLOGICO  
SICILIA MICRO E NANO SISTEMI  
S.C.A.R.L.

# WHAT IS THE HIPPOCRATES PROJECT?

**Hippocrates** is a project by Distretto Tecnologico Micro and Nano Sistemi Sicilia S.c.a.r.l. (Sicily Technologic District Micro and Nano systems) sponsored by MIUR (Ministero Istruzione Università e Ricerca) with PON R&C (Programma Operativo Nazionale "Ricerca e Competitività" 2007-2013) funds. It aims to develop, test and validate innovative systems based on **micro-and nano-technologies**, with the final goal of an early detection, prevention and effective treatment of diseases. Moreover, the project aims to launch the adoption of a patient-centric model through the construction of an integrated software infrastructure.

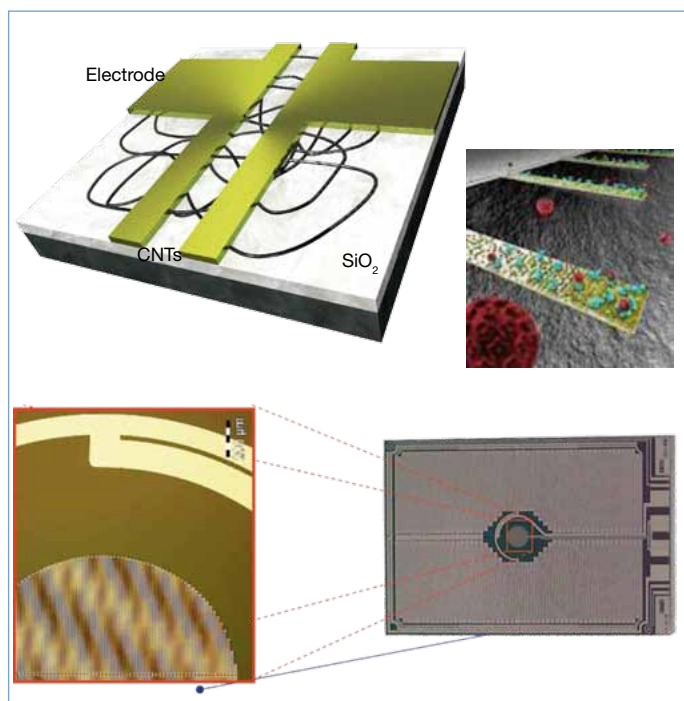


In particular, the project deals with the following research lines:

**1. Development of advanced technological solutions for *in vitro* diagnosis using miniaturized and high performance biosensors for nucleic acids and proteins that can also be used by unskilled personnel at competitive costs.**

The following classes of biosensor technologies are investigated:

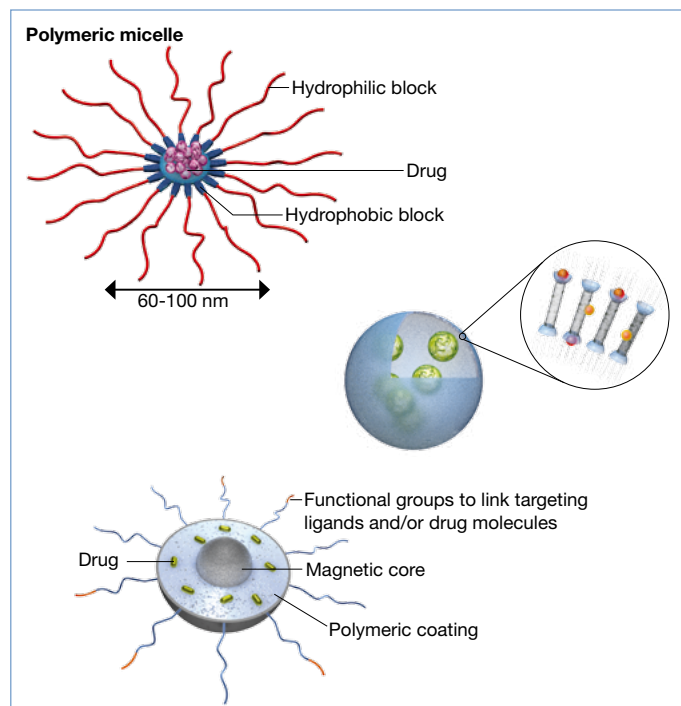
- **Optical sensors:** based on SPAD (Single Photon Avalanche Diode) detector, SPRI (Surface Plasmon Resonance Imaging) and SERS (Surface Enhanced Raman Spectroscopy) analytical methods, Real Time PCR (Polimerase Chain Reaction) and Phage Display biotechnologies;
- **Electrical sensors:** based on MOSFET (Metal Oxide Semiconductor Field Effect Transistor), FET – CNTs (Field Effect Transistor – Carbon Nanotubes), capacitive-inductive and nano-clusters technologies;
- **Electro-mechanical sensors:** based on Nanobeams and MEMS (Micro-Electro-Mechanical-System) technologies;



**2. Development of "smart" molecular systems for targeted pharmacological therapy, through drug delivery systems able to improve both bioavailability and therapeutic index of the active obtaining a controlled and targeted release.**

The following classes of molecular nano-systems technologies are investigated:

- Lipidic-micellar nanostructures;
- Polymeric nanostructures;
- Systems based on macrocycles;
- Metal nanoparticles;
- Photo-activate systems;



**3. Development of an information device for the direct transmission of clinical data of biosensors and drug delivery systems to electronic health record. This represents a high level of integration of individual patient clinical information contributing to the full adoption of a patient-centric model.**



For the proper development of these innovative technologies are identified appropriate **clinical application fields**, both in diagnosis and therapy. These define the clinical target requirements to develop the research and to validate the final results of the research.

These applications are selected based on:

- a) Clinical relevance of diagnostic/therapeutic targets (clinical utility) unmet by the current detection/drug delivery technologies available on the market (clinical gap);
- b) Sicilian region specific clinical requirements and industrial peculiarities;
- c) Relevance of reference markets.

## THE SPECIFIC SELECTED APPLICATIONS ARE:

ONCOLOGY	➔	Glioma, Breast Cancer, Myeloma, Colonrectal Cancer, Thyroid Cancer, Hepatocarcinoma
INFLAMMATORY EYE DISEASES	➔	Dry eye, Uveitis
NEURODEGENERATIVE DISEASES	➔	Parkinson, Alzheimer, AMD (Age-related Macular Degeneration), Retinopaties and Glaucoma
INFECTIOUS DISEASES	➔	HBV, Septis, Tuberculosis
ORGAN TRANSPLANT	➔	Organ Rejection

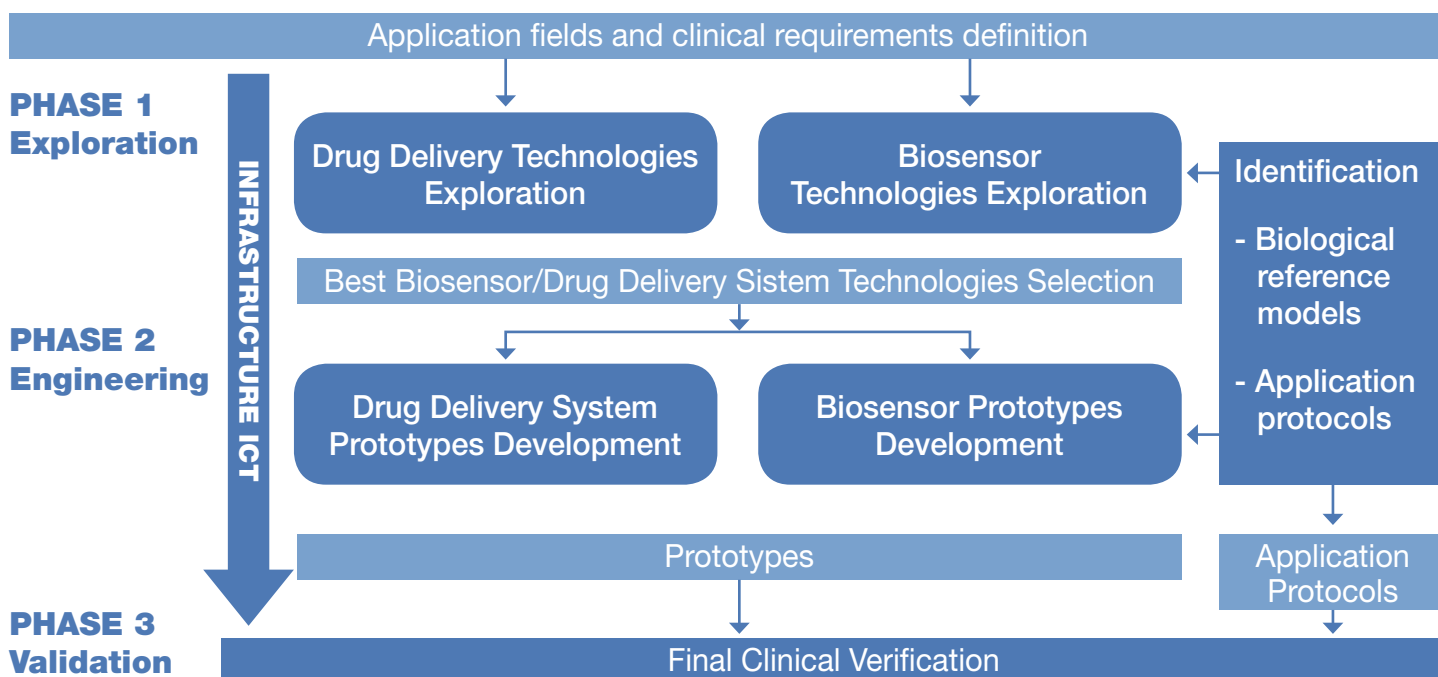
The results of this research will account for the 'feasibility study' for the subsequent development of new products in the areas of:

- a) **in vitro diagnostic devices**, which in Italy have a market worth about € 1.7 billion;
- b) **'intelligent drugs'**, with particular emphasis on the ophthalmics, which in Italy have a market worth about 366 million euro;
- c) **system integration for health** which is one of the tools that the NHS (National Health Service) plans to implement to contain health and social spending, which is expected to increase by 2020 from 13% to 21% of GDP (Gross Domestic Product).

## HIPPOCRATES: MAIN WORK PACKAGES

In order to maximize in synergic and effective way the proper contribution to research, after an initial phase of wide technology exploration (**exploration phase**), there will be a selection of methods/technologies that will show the better performances according to the criteria and

quantitative parameters established within the design specifications. These methods/technologies will go to the next phase (**engineering and testing phase**) aimed to develop the final **prototype demonstrators** that will be clinically verified in the final stage (**validation phase**).







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HIPPOCRATES:  
DISTRICT  
CONSORTIUM



## DISTRETTO TECNOLOGICO MICRO AND NANO SISTEMI SICILIA S.C.A.R.L.

The **Distretto Tecnologico Micro and Nano Sistemi Sicilia** (here below referred as “District Consortium”) is part of the 25 Districts promoted by the Italian **Ministero dell’Istruzione, dell’Università e della Ricerca** (MIUR), in cooperation with the Sicilian Regional Government, as part of the National Research Programs. The consortium is composed by 24 Members of which 11 are private companies and 13 are public institutions.

The mission of the District Consortium is to aggregate different partners, to promote the development of new infrastructures and technology platforms in the field of Micro and Nano systems, and to create new business opportunities in the Italian Region of interest.

It works as no profit organization and aims to:

- promote, present and manage research projects
- participate, in collaboration with third parties, in research and development
- achieve synergies among Universities, research centers, and the regional entrepreneurial system
- train highly qualified research staff
- act as a center for the collection and dissemination of information and technical proposals
- promote the image of the shareholders in national and international level.

### MORE INFORMATION:

More details of the project can be found at our website: <http://www.hippocrates-project.org/EN/>

### CONTACT US:

If you are interested in finding out more about the project Hippocrates, please contact us at: [info@dtsiciliamicrosistemi.it](mailto:info@dtsiciliamicrosistemi.it)