

The **NEXT HEALTH:**



**sano**

**Centre for Computational Personalised Medicine  
- International Research Foundation**

**impact**

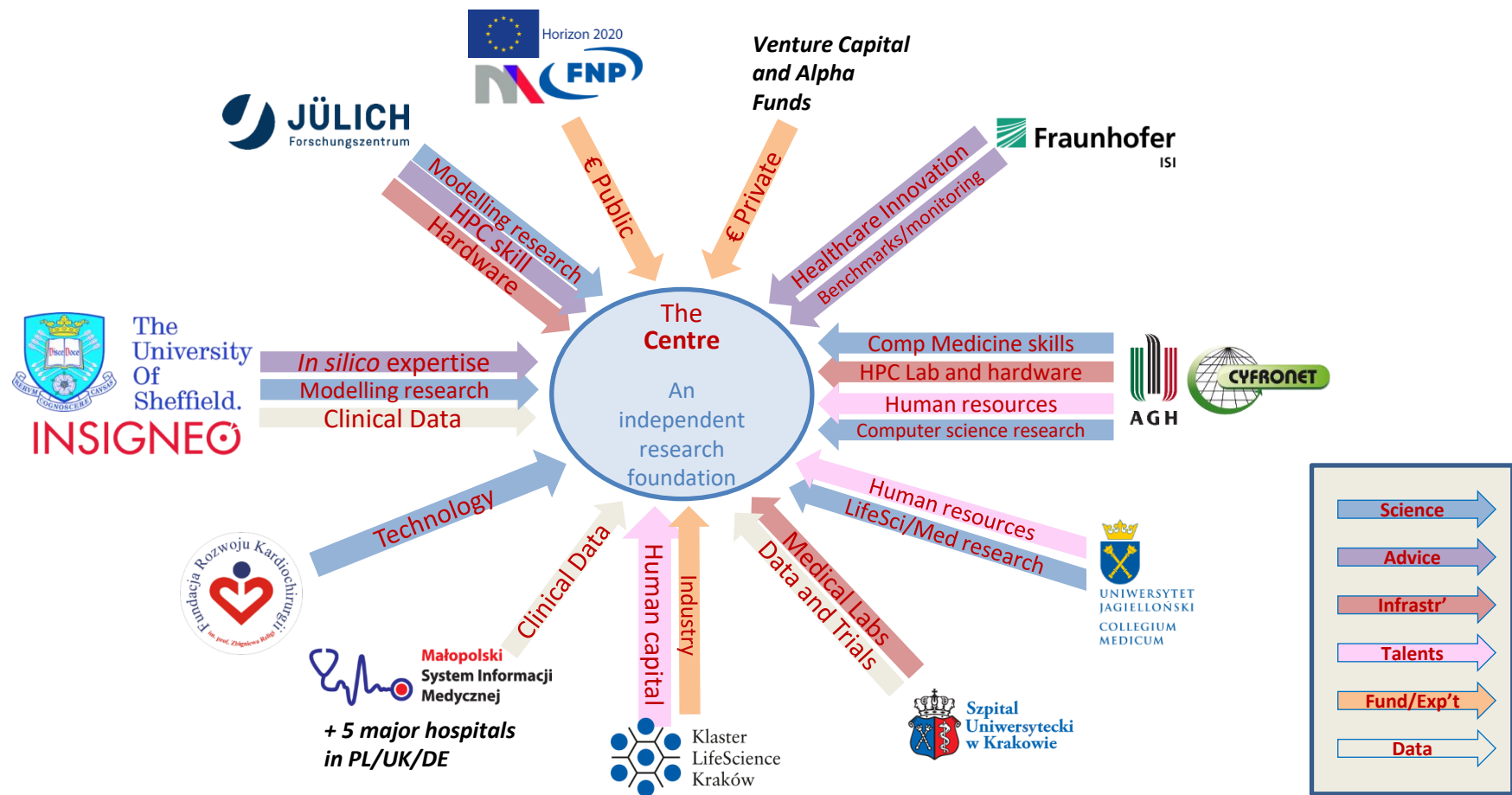
**CRACOW  
TechWeek**

**20.05 - 23.05 2019**

**Sano** is a project  
aimed at establishing, developing and sustaining in  
**Kraków** the  
**Centre for Computational Personalised Medicine**  
in the form of an  
**International Research Foundation**



# The Partnership



## ➤ Funds:

- H2020-WIDESPREAD-2016-2017 Teaming Phase 2 program (grant 857533)
- International Research Agendas program of the Foundation for Polish Science (European Regional Development Fund)
- Polish Ministry of Science and Higher Education

## ➤ Project duration: 7 years

## ➤ Start: **Aug. 1st 2019**

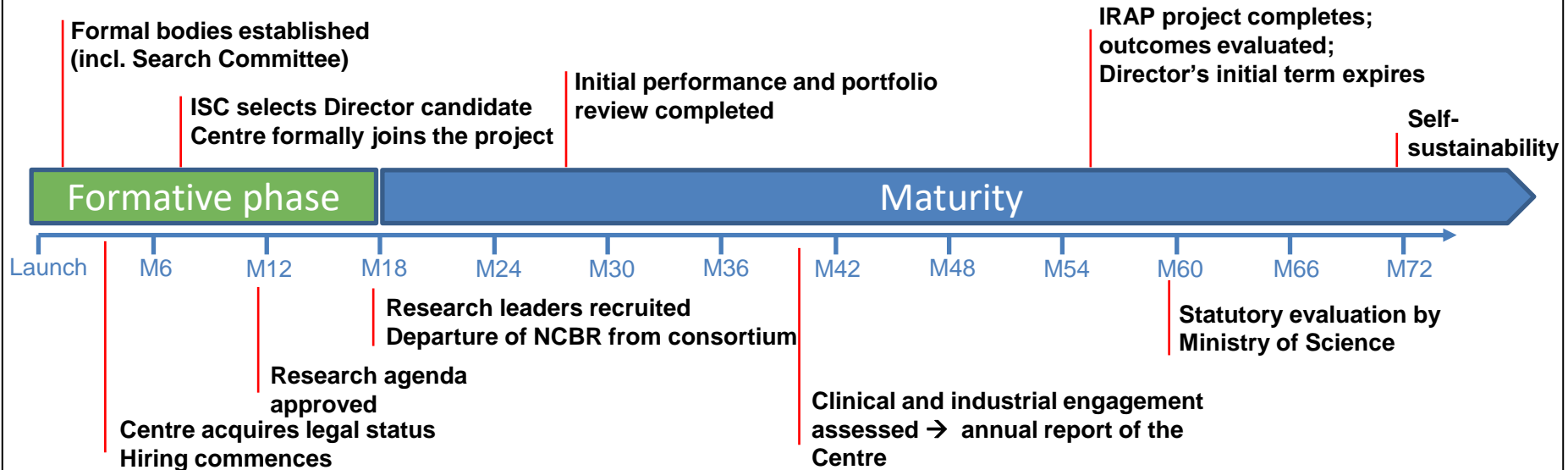
## ➤ Budget: 15M€ Teaming (CSA) + 15M€ Polish compl. funds



# The Milestones

## ➤ The **formative phase** (up to 18 months):

- Establishment of the Foundation (administration, key staff positions)
- Recruitment of the Centre's Director
- The research agenda proposed by the Director and accepted by the ISC
- Research team leaders recruited



# Why a Centre? Why Now?

## Challenges

- Ageing and co-morbidities
- Specialists' capacity
- Imprecise diagnosis
- Suboptimal treatment
- Fragmented care
- Population-specific issues

## Answers

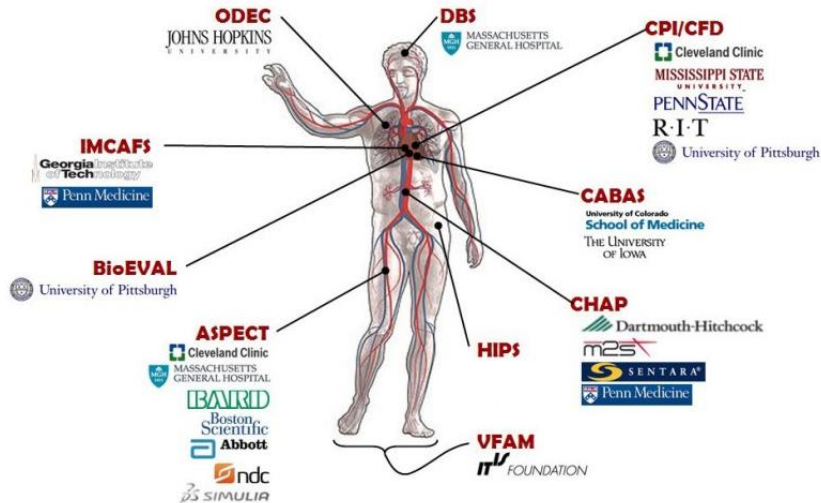
- Complexity by composition
- Unlimited capacity
- Precise diagnosis
- Ranked treatments
- Integrated care
- Subject-specific approach

# In Silico Medicine: the Concept

The direct use of computer simulation  
in the diagnosis, treatment and prevention of disease

## The Virtual Physiological Patient – The Idea

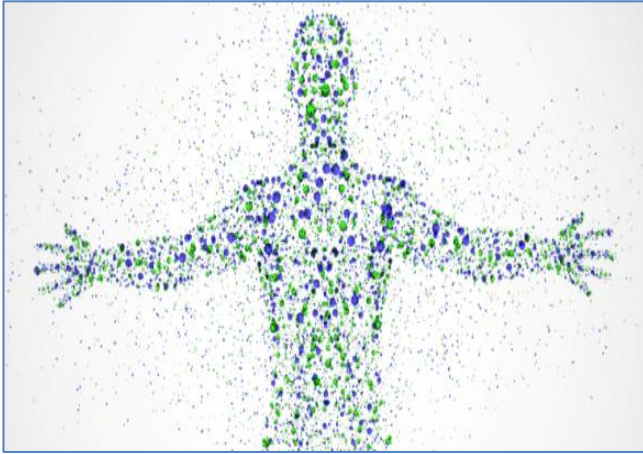
A collection of models and data for developing and evaluating medical devices (cardiovascular, orthopaedic, ...)



The framework to enable investigation of the human body as a single complex system:

- Personalised healthcare
- Preventative approach to combating disease
- Holistic *multi-morbidity* medical treatments
- Reduced need for animal experiments
- Industrial partnerships: new products & systems

# Expected Impacts - Digital Patient



Subject-specific models as decision-support systems for personalised medicine

Replace invasive diagnostics

Replace indirect prognostics

Personalise therapies

Manage multimorbidity

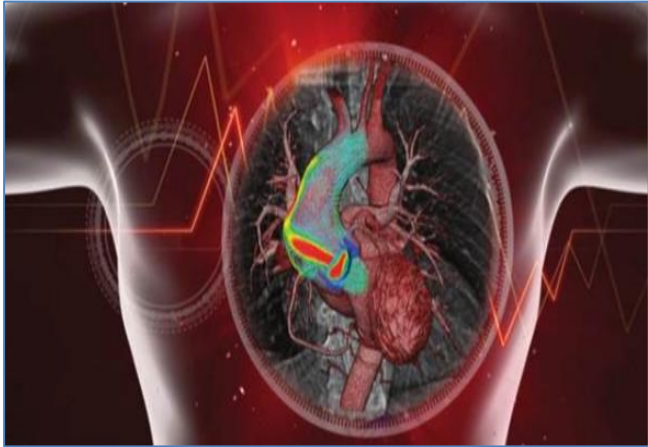
Optimise complex pathways

- Improve efficacy
- Reduce secondary care costs

- Reducing impact of ageing
- Externalise management



# Expected Impacts - In Silico Clinical Trials



Individualised computer simulation for the development or evaluation of new drugs or medical devices

Reduce innovation costs of MedTech

Reduce innovation costs of Pharma

Reduce, refine, and replace animal experimentation

- Revitalise medical industry
- Target rare/neglected disease

- More ethical research

# Expected Impacts - Personal Health Forecasting



Subject-specific models for the self-management of health

Self-manage chronicity

- Reduce primary care costs,
- Improve quality of life
- Empower participation

Refine rural telemedicine

- Improve access to care
- Low-cost MedTech industry

Personalise prevention

- Consumer ISM market

# Objectives

Development of *computational models* of human organs built in the context of organ(s) related diseases with the view to provide medical (analytical, preventive, diagnostic, and therapeutic) solutions.

Related product categories will be *tools* and *services* designed to effectively deliver, integrate and exploit this *computational models*.

The ultimate Centre product category resulting from merging previous products within integrated (disease related) solutions will be the computational *Clinical Decision Support Systems*.

- Development of new technologies for prevention, diagnosis and therapy
- Integration of existing and novel preventive, diagnostic and therapeutic solutions to increase clinical objectivity and improve outcomes
- Acceleration of regulatory and certification processes for clinical usage of computational technologies.

- Cardiovascular
- Musculoskeletal
- Orthopaedic
- Oncological
- Neurological
- Urinary

- Computational models*** of human physiology
- Conceived in response to clinical need
  - Built in the context of related diseases
  - Intended to provide medical (analytical, preventive, diagnostic, and therapeutic) solutions.

# Value Proposition

Sector	Science →		Industry →			Health care →	
Value chain	Concept & feasibility	Design & prototyping	Validation & Preclinical	Clinical testing	Market approval	Clinical exploitation	Patients
Centre competences, products and services	Modeling & simulation In Silico Techniques Algorithmic Decision Science						
	In Silico drug or medical device development		Tools for Clinical Trial Simulation (CTS)		Models for Clinical Decision Support System CDSS		
	Expertise and Tools for Automated Clinical Data Analysis						
	Data Science / Healthcare Informatics / Computer Science and High Performance Computing						
	Business Concept Development / Regulatory Approval / Market Entry						
	Professional training and consulting						

# Key Outputs

Product/service category	Output	Format	Example
Clinical Decision Support Systems	Software system	Integrated platform	EurValve DSS for aortic and mitral valve diseases
In silico tools for clinical research and practice	Software model		Blood flow simulation models, Image segmentation
Tools supporting development of computational models	Software tools	Platform, consultancy	Model Execution Environment, Atmosphere Cloud Platform
Curated data and knowledge-base	Data – sets	Platform	euHeartDB heart model database, NMS Physiome neuro-musculo-skeletal models
Automated clinical data analysis	Software model & tools	Platform, consultancy	VPH-Share Taverna workflow integration, ARQ, TrialConnect
In silico drug development			
In silico device development			
Education and professional training	Learning materials	Teaching & training	In silico Academy, Anatomy/physiology for engineers

# Main Stakeholders and Value Proposition

*Value extracted* at each step, from concept to realisation

Health science

Health industry  
SMEs and StartUps

Health industry  
medtech and pharma

Healthcare  
services

- Publically-funded projects
- Dissemination in academic contexts
- Shared links with industry partners
- Shared PhD programs

- Fast product development
- Access to curated data
- Validation and testing tools and methods
- Business up-scaling & access to markets
- Biomarker development

- Co-development of medical technologies
- Access to HPC capability and expertise
- Early access to IP
- Industrial PhD programs
- Training

- Exploitation of advanced simulation models and CDSS
- Workflow integration
- Computational optimisation
- *inSilico* clinical trials
- Education

Business  
development  
& regulatory

- Translation management
- Business incubation and acceleration
- Support in legal and regulatory issues

- IP and patents
- Individual market studies

# Expertise Throughout the Value Chain

Health science

Health industry  
SMEs and StartUps

Health industry  
medtech and pharma

Healthcare  
services

**9** Research proposals

**7** Therapeutic areas

**3** Universities

**13** SMEs: Digital Health in Poland

**6** Health clusters from the EU

**11** Industrial corporations

**1** EU-Industry Partnership EFPIA - IMI

**3** Hospitals from Poland (inc. University Hospital in Kraków)

**1** STH in UK

Business development  
& regulatory

**2** Technology Parks

**1** Venture/ Seed Capital

**1** Public body (Regional Medical Info System)

**1** Industrial Alliance (Avicenna)

# Long-time Human Talent Strategy

- **Outstanding job positions qualities:** supervision by top European scientists; high relevance of conducted research; exciting “cutting-edge” projects
- **Extensive international possibilities:** short-term visits to advanced Partners, joint PhD program for Centre scientists, collaboration in international projects
- **Career development:** postdoc positions at the advanced Partners or involvement in industry either by spin-offs or moving to industry partners
- **Skill development:** fellowship programs involving short-term researcher exchange with advanced Partners to build up expertise, learn best practices, study the local self-development culture and return home with this experience,
- **Competitive salaries:** to allow researchers to fully devote their time to the Centre activities.



# Talent Acquisition



## Recruitment of Life Science and IT research and management staff

### Foundation Council

5 reps of Teaming partners (UK, DE, PL)  
Concludes employment contracts

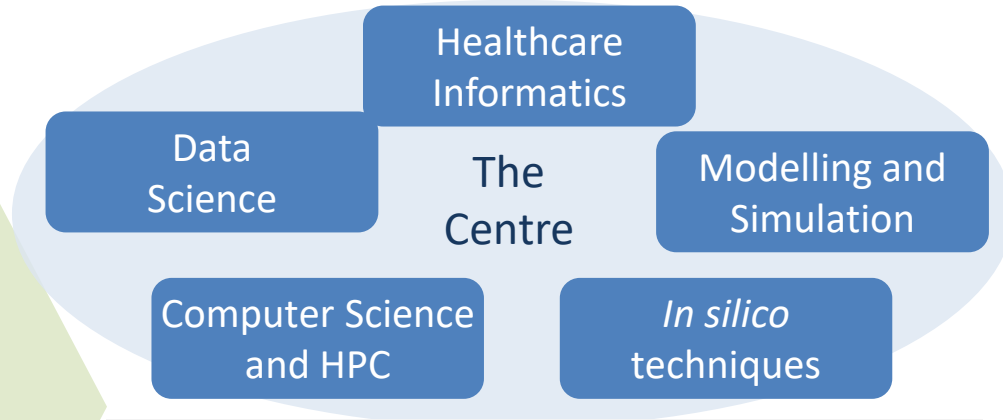
### Management Board

Led by Scientific Affairs Director  
prof. **Marian Bubak**

### International Scientific Committee

Chaired by **Marco Viceconti**  
15 members (UK, IT, DE, NL, US, PL)  
Selects top candidates

Top international candidates for the Directorship, and Laboratory Leaders



### Key personnel numbers:

- KPI-1** Research groups - 5
- KPI-4** R&D personnel - 55
- KPI-5** New scientists - 33
- KPI-6** Foreign scientists - 15

- **University of Sheffield**
  - Staff will (co-)supervise PhD students
  - Typical duration 3.5 years
  - Students will be located mostly at the Centre
  - Comprehensive training and research exchange programme
- **University of Amsterdam**
  - External PhD students at UvA
  - Computational Science
- **AGH University of Science and Tech.**
  - 4-year PhD program in Computer Science, Biomedical Engineering or Biophysics
  - Option for “industrial PhD” programme with a collaborating company
  - Option for “External” PhD degree
- **Collegium Medicum UJ**
  - Medicine and other health-related fields

## Special training and Research Exchange Programme

- At least 6 months abroad
- USFD advanced training, multi-disciplinary, computational medicine
- 2 trainings, each of at least 30 hours per student

## PhD programme in numbers

- Polish medical researchers involved in PhD co-supervision: 15 (from Clinical Advisory Committee)
- Total number of PhD students: 30 (18 on salary, 12 stipends)

# Opportunities for Clinical R&D Cooperation

**Now:** Clinical partners engage in the planning, and guide our strategy

**18 months+:** Workshop programme begins, call for (joint) research projects

- **Flexible opportunity** - three levels of clinical partnership: **Informed, Participating or Contributing Partner**
- **Engagement at many stages** throughout the clinical trials process
  - Conceptual Development
  - Initial R&D
  - Early Clinical Prototyping
  - Regulatory Processes
  - Clinical trials planning and implementation

## Clinical collaboration, driven by...

- practical application of scientific and clinical concepts
- funds awarded to the Centre to support R&D projects
- co-supervision of PhD students to address research interests

# Opportunities for industrial cooperation

**Now:** Industrial partners engage in the planning, and guide our strategy

**18 months+:** Joint research projects begin, to bring concrete results

- **Flexible opportunity**, three levels of industrial partnership as **Contributing, Supporting or Preferred Partner**.
- **Engagement at many stages** throughout the R&D cycle
  - Conceptual Development
  - Initial R&D
  - Early Clinical Proving
  - Commercial Development
  - Regulatory Processes
  - Market Exploitation

## Industrial collaboration, driven by...

- Intellectual Property creation, across multiple domains
- Commercial development and integration around international healthcare standards
- A disciplined academic environment delivering a trained workforce

# Towards Cooperation with the Centre

Research agenda and  
scientific collaboration

**Marian Bubak**

Sano Scientific Affairs Director



bubak@agh.edu.pl

Talent development  
and career

**Karolina Jarosińska**

Managing Partner



karolina.jarosinska@execmind.com

Communication  
Commercialisation &  
Business development

**Kazimierz Murzyn**

Managing Director



fundacja@lifescience.pl

URL: [sano.science](http://sano.science)