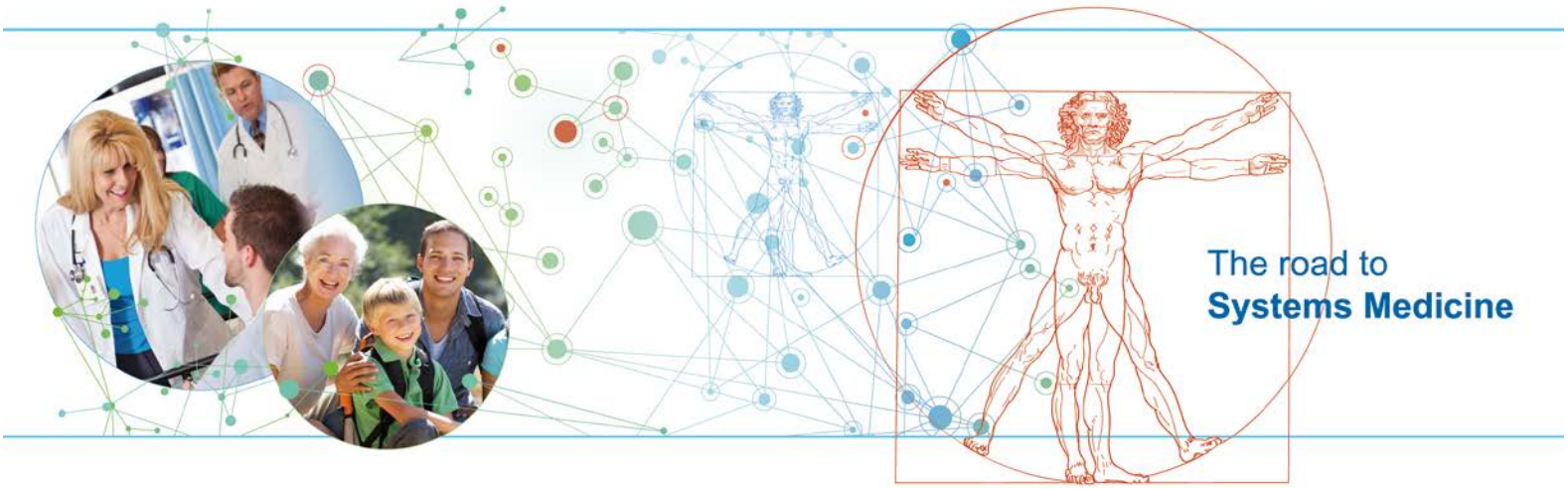
CASYM EUROPE

Coordinating Action Systems Medicine
Implementation of Systems Medicine across Europe

SEVENTH FRAMEWORK PROGRAMME



Action plan for integration of national efforts

CASyM report

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References

CASyM report: Action plan for integration of national efforts, April 2017.

TABLE OF CONTENT

STRATEGIC ACTION PLAN FOR SYSTEMS MEDICINE

Introduction

The current action plan is part of the CASyM work package #5 “Integration of national efforts”. Central to this WP is to identify the existing European programmes in Systems Medicine, relations to programmes in Systems Biology/Medicine and Personalised Medicine and to explore the best ways of setting up new pan-European programmes. Setting up new programmes requires a close interaction and a constructive exchange of relevant information with European funding bodies and that have a mutual interest in initiating, continuing or expanding Systems Medicine funding. To achieve this networking between potential funders and funders of integrated activities in Systems Medicine inside and outside the CASyM consortium is a major part of the work of this WP and the corresponding Task 5.3 “Setting up pan-European activities or programmes in Systems Medicine”/Deliverable 5.6 “Action plan for integration of national efforts”.

The following sections describe the short- to medium strategic plans for the integration of national efforts in Systems Medicine. Within that timing the development of the ERA-NET ERACoSysMed, initiated through the work in CASyM and WP5, plays a major role. The long-term plans of the last sections take the current and future development of the International Consortium for Personalised Medicine (IC PerMed) into account and reflect on a complementary development of Systems and Personalized Medicine.

Short-term to midterm plans – ERACoSysMed

The implementation of an integration of national efforts in Systems Medicine is currently realised through the ERANet ERACoSysMed consortium of funders (www.eracosysmed.eu). ERA-Net ERACoSysMed was recently established as a first step towards joint funding initiatives dedicated to Systems Medicine. In this sense ERACoSysMed will serve as a test case to decide on a long-term strategy. Its success will provide an important reference for funding bodies for a national commitment in further joint funding initiatives for Systems Medicine in the EU.

Aim of ERACoSysMed

- Supporting Systems Medicine projects with a tangible output towards personalised medicine.
- Duration of programme: 2015 – 2020
- 13 member countries:
  Austria, Belgium, France, Germany, Ireland, Israel, Italy, Luxembourg, The Netherlands, Norway, Slovakia, Slovenia, Spain.

Frist call was published in 2015

- Focus: Demonstrator projects
- Key words: Disease complexity and patient stratification, identification of common underlying mechanisms in diseases, new mathematical models
- Budget 12 Mio Euro
- 9 funded proposals (more on: https://www.eracosysmed.eu/calls/jtc-1-2015)

Second call published in 2017

- Focus: Demonstrator projects

- Key words: Disease complexity and patient stratification, shared common early pathways among diseases such as metabolism, immunology and cell proliferation to predict disease manifestation and progression, influences of gender, age, ethnicity or other relevant data for the development and treatment of diseases.
- Budget 7,23 Mio Euro

Third call planned for 2019

There are currently ongoing negotiations to extend the consortium also for private foundations who could complement the national/regional funding of the current consortium members.

Midterm evaluation

A review of the success of Systems Medicine as innovation driver for personalised medicine will be performed. Key success criteria will be the clear demonstration of clinical added value through Systems Medicine.

Midterm to long-term plans – Systems Medicine and Personalized Medicine

The goal in the future is to establish Systems Medicine as an important innovation platform and toolbox for personalised medicine: Systems Medicine is an enabler for personalised medicine. Therefore the communities are partly overlapping and many activities identified as important prerequisite are the same (e.g. provision of longitudinal data, data harmonisation, new types of clinical trials etc.). A comparison of the Systems Medicine Roadmap[1] developed through the CSA CASyM and Strategic Research and Innovation Agenda for Personalised Medicine[2] developed by the CSA PerMed (www.permed2020.eu) shows the following needs for a better awareness, the need for high quality, harmonised and accessible longitudinal data, the requirement of a new type of clinical trials as well as IT tools have been identified by both.

However, the PerMed Strategic Research Agenda is much broader, tackling also the translational gap, regulatory, health-economic and legal issues. On the other hand, the envisaged IT tools are more focussed: the PerMed Agenda has an emphasis on machine learning methodologies and decision support systems to meet the “big data” challenge.

Systems Medicine comprises, in addition to big data approaches, also mechanistic computational models as an essential element to tackle the complexity of diseases as a perquisite to realise personalised medicine. These (predictive)models help to advance diagnosis, identify new treatment targets, improve existing treatment regimes and develop preventive strategies. The development of mathematical and computational models, based on molecular and clinical data, on *in vivo* and *in vitro* and *in silico* models, are highly challenging. An understanding is achieved based on underlying molecular pathways and networks as well as biochemical reactions. As such, Systems Medicine delivers a basis and a toolbox to enable personalised medicine.

The Systems Medicine Roadmap demonstrates also a deeper analysis of the hurdles in the development and implementation of Systems Medicine based tools. In addition to the aspects identified similarly to PerMed, the need for community building across disciplines, training and the need to convince people outside the field of the usefulness and relevant input of such computation based methodologies.

Consequently there will also in the mid- to long-term future be a need to fund dedicated activities in Systems Medicine with the aim to:

- Develop and improve mathematical and *in silico* models
- Support projects for clinical applications of Systems Medicine that demonstrate the value for personalised medicine

[1] Download CASyM roadmap: https://www.casym.eu/index.php?index=90

[2] Download PerMed Strategic Research and Innovation Agenda on Personalised Medicine: http://www.permed2020.eu/1428.php

- Enable training and community building

Therefore it is important that the awareness of challenges and the innovation potential of Systems Medicine for personalised medicine remain on the agenda of all involved stakeholders. Consequently the term Systems Medicine should be continually used as an important field that delivers a toolbox to enable personalised medicine. This will allow dedicated calls and community education.

As there is a large overlap of the overall goals in Systems Medicine and the International Consortium for Personalised Medicine (IC PerMed; http://www.icpermed.eu), a separate community building of funders and policy makers with a focus on Systems Medicine is not necessarily needed. The SysMed community will seek proximity and exchange with IC PerMed. The aim is to establish a bi-directional communication and where possible/appropriate meetings will be used to seek exchange and discussion fora. The Systems Medicine stakeholders not yet integrated in IC PerMed could eventually become integrated in the near future.

However, the continued and specific needs of Systems Medicine for the development of *in silico* models and community education will require on-going strategy developments and support. This should still be possible in an integrated approach of Systems Medicine within IC PerMed, e.g. through a focussed subgroup and the organisation of dedicated calls to further improve the toolbox of mathematical and computational models. Here, a continued organisation within ERA-Nets and bi- or multi-lateral calls can be suitable instruments. The newly founded European Association of Systems Medicine (EASyM; www.easym.eu) of clinicians and researchers working in Systems Medicine can serve as a scientific advisor on the future evolution of this field.

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