



**ISBE** Infrastructure  
for Systems Biology  
Europe

## Infrastructure for Systems Biology Europe

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“Mapping of current European funding for systems biology of relevance for establishing ISBE”

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## **Infrastructure for Systems Biology – Europe (ISBE)**

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# **Mapping of current European funding for systems biology of relevance for establishing ISBE**

**Report by Work Package 11 (Funding, Governance and Legal)**

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**Version 1 - Final draft January 2014**

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## Executive Summary

The Infrastructure for Systems Biology – Europe (ISBE) is a proposal to establish an infrastructure that is designed to meet the needs of European systems biology, in terms of development, applications and training.

ISBE is the result of the catalytic work of the ERANET in Systems Biology, ERASysBio, and a long-term partnership between the funding organisations and to continue joint working taking place since 2005. It is set in the context of ongoing engagement with funding organisations involved in other European activities in systems biology such as ERASysApp and CASyM, and in the context of ongoing development of other ESFRI infrastructure projects, especially ELIXIR.

It has long been recognised that innovative and ground breaking research is dependant of readily accessible research tools and facilities, physical and virtual resources, the latter of which is made possible by improving computation and communication technologies. In order to establish viable, long term, sustainable funding that adds value to existing support from European national ministries and funding agencies, ISBE must build upon these investments in order to address the strategic aims of these agencies and engage with them in establishing support.

One of the first activities for ISBE has therefore been to identify how coordination of funding relevant to systems biology might be linked together, notably to existing national centres of excellence, pre-existing regional collaborations, and interactions with planned European-wide infrastructures. By knowing this we can help to determine how ISBE, as a pan-European resource might best realise opportunities for delivering greater coherence and cohesion to maximise operations, and address the limitations in capacity, capability and expertise in the most timely way.

For the first 12 months of the ISBE project WP11 staff sought to engage representatives from a range of national funding agencies, free from any discussion of financial commitments. This information was supplemented by a desk review of publically available information on national activities to develop and review national research infrastructure roadmaps, as well as the roadmap documents themselves.

This information was also made available to other work packages of ISBE in order to identify complementarities, synergies and overlaps with existing support, and to map potential funding opportunities to help support the development of a feasible and realistic structure for ISBE.

This mapping of the scope and duration of different funding segments will the enable the project to understand how they might be effectively and efficiently integrated into the development of the possible models for candidate structure of ISBE. It will allow the project to identify funding mechanism(s) and structure(s), and help in defining associated legal and governance strategy to firstly establish ISBE, and then consolidate its operation in the longer term. This will therefore be incorporated into the final business plan for the construction phase, expected in mid-2015.

# INTRODUCTION TO NATIONAL REPORTS

Between September 2012 and December 2013, ISBE project WP11 staff engaged representatives from a range of national funding agencies through one-to-one engagement, and via updates and the twice yearly meetings of the Work Package 11 meetings.

Input following interviews was received from 16 Countries and further information on roadmap activities was obtained for a further 6 countries. The summary of those discussions is provided within this document.

This draft report was then reviewed by the ISBE Work Package 11 Funding Governance and Legal Advisory Committee.

## CONCLUSIONS

The identification of systems biology as a major priority in the early part of the previous decade has resulted in significant and directed investments in systems biology in various European countries, in order to underpin and promote tighter cooperation of large numbers of scientists from different disciplines.

Support by national funders was often via the establishment of centres of excellence, together with directed funding for research programmes, and training, across the life sciences portfolio. Many of these funders have also been engaged European-level in support, notably via ERANets under FP6 and FP7.

This has led to the create a network of prominent European Systems Biology institutes that have invested effort in standardisation of experimentation, modelling and data management, and making data and models and available to the whole scientific community. Accompanying this has been to development of a range of teaching programmes that integrate biology, chemistry, physics, mathematics and engineering approaches.

### Current status of national support for systems biology

While systems biology has previously been prioritised, it is clear that as of 2013 this had either finished entirely, or had been significantly reduced in most countries.

#### *National Directed Programmes in Systems Biology*

Specific reference is made to coherent support via the mechanism of directed national programmes finishing (**Netherlands** and **UK**) or has already ended (i.e. **Austria**). While funders continue to operate schemes that target support for research infrastructures in many cases, these must be through open competition against proposals across the entire scientific research portfolio (**Czech Republic** and **Denmark**). However, ongoing support is for highlighted within targeted programmes in **Germany** and **Italy**.

### *National Systems Biology Centres*

Specific investments in directed programmes for funding to national systems biology centres had recently finished in some countries (i.e. **Netherlands**, and **UK**). Systems biology-focused institutes and centres must now compete for funding within standard research awarding mechanisms. Where they are offering services to the wider communities they are being expected, in most cases, to move towards 'self-supporting' funding by charging on a cost recovery basis for their services and resources.

### *Related national funding priorities*

Lastly, and most importantly, the overall envelop for research funding has contracted significantly as a consequence of the present economic downturn. This is quoted as being a key factor in either the significant reduction or removal of targeted funding for thematic research programmes (**Austria, Ireland and Slovenia**); or contractions in the budgets for wider support for large Research Infrastructures, *and/or* biomedical research (i.e. **Denmark**), or indeed the overall research base (i.e. **Spain**).

### National support for European Research Infrastructures and related activities

However, many funding agencies indicated that they have, or expect to focus investment into relevant European infrastructures, and also continue to see the requirement to highlight data standardisation and management, and the ongoing integration training in biology with other (physical) sciences. Virtually all national roadmaps detail the ongoing involvement of national funders in several biological and medical sciences (BMS) ESFRIs Research Infrastructure.

Coherent support for systems biology was referred to in **Finnish, French, Lithuanian, and British** roadmaps. While specific mention is only made to ISBE in the **Czech, Dutch, and Italian** roadmaps, it should be noted that most have not been updated since the launch of ISBE in autumn 2012. However, several countries have recently undergone an update to their road maps (**France** (2012), **Netherlands** (2012), **Norway** (2012), **UK** (2012), or are currently being undertaken (**Finland, Greece, and Poland**).

Directed funding for *synthetic biology* has been identified by funding agencies in **Denmark, Germany, Norway, Slovenia** and **UK**, as being linked to national consideration of international commitments in systems biology. While synthetic biology uses many of the same tools and experimental techniques, to design and engineer biologically based parts, novel devices and systems as well as redesigning existing, natural biological systems, the work is fundamentally an engineering application of biological science, rather than an attempt to investigate biological and natural systems (using tools of modelling, simulation, and comparison to experiment). However, the resources and services that ISBE might offer, could be of value to both communities.

### Potential national engagement with ISBE

In some cases, reference to systems biology is specifically mentioned in the context of (potential) national involvement of ELIXIR nodes (**Czech Republic; Germany, Lithuania, Slovenia, and Spain**). The Netherlands also lists potential linkage with ANAEE in the 'virtual plant' with **Belgium** and **UK**. Also representatives from the **Czech Republic** underlined that its national funders would expect to see evidence of exclusivity in the role of ISBE from other ESFRIs in order to avoid double funding, and provide added value to national activities.

Some representatives indicated that broader acceptance for ISBE would be required from the national research community, prior to achieving directed support (**Czech Republic, Denmark Norway, and Spain**), with two highlighting that this was not yet clearly evident (**Czech Republic and Denmark**).

Several countries have significant support for Research Infrastructures that is derived from EU structural funding. In addition, the **Czech Republic, Italy, Lithuania, Poland and Slovenia** all indicate intention to use EU structural funding for further research Infrastructures.



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## **National Reports**

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# Austria



## Summary

*The main agency for support in this area is the Austrian Research Promotion Agency (FFG). Support the FFG is through both the Federal Ministry for Transport, Innovation and Technology (BMVIT) and the Federal Ministry of Economy, Family and Youth (BWFJ).*

*There is currently no directed funding for systems biology, although Austria was a partner in ERASysBio (BMWF).*

*There is currently no long-term national roadmap for Research Infrastructures, The Ministry has redirected funding from all thematic projects in all research disciplines. However, Austria is involved in BBMRI.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

The Austrian Research Promotion Agency (Forschungsförderungsgesellschaft - FFG) is the central Austrian funding institution for promotion of research and innovation. The mission of the FFG is to strengthen Austria as a major location for business and research. The FFG manages a large number of public funding programmes and offers a variety of services, e.g. for participants in European research programmes.

## CURRENT INVESTMENTS IN SYSTEMS BIOLOGY

Genomic Research Project that had funded research including that focused on systems biology (including for ERASysBio), had finished in March 2013.

Following the Genomic Research Project, there are no more thematic projects in the life sciences, as the Ministry has redirected funding from all thematic projects in all research disciplines, to support for 'infrastructure'.

This has meant no more directed funding for Institute for Medical Genome Research and Systems Biology (IMGUS, Head: Nicolas Zachera), and relevant money is now going to a range of different institutions. Some money for basic research has been awarded to the Austria Institute of Technology, near Vienna, which includes research in Synthetic Biology.

Presently, the only way for Austrian researchers to get money is from open competition. Systems biology funding is possible via FFG, but has to have involvement of companies, or via SWF, which support basic science research.

## **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

Austria (through the Federal Ministry for Science and Research - BMWF) was involved in ERASysBio, but not in any of the related “follow-up” projects (i.e. ERASysAPPs and CaSyM), and this position is unlikely to change.

There is no Austrian Roadmap for research Infrastructures at present.

## **OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY**

While there is some funding directed at phase I and II clinical trials. However, this is not relevant to systems biology.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

Austria is involved in BBMRI (led by Kurt Zatloukal, University of Graz).

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

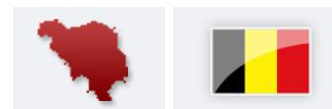
Evaluation of the Genome Programme is ongoing and although due to be completed in September 2013, is not likely to be published until the end of the year. Whilst this is an independent review, the Ministry has already indicated that recommendations for further coordinated support in the area would be very unlikely to be taken up.

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

It was planned for Austria to prepare a long term national research infrastructure roadmap, and to secure adequate financial resources sustainably. This following recommendations in 2009 to connect Austrian R&D closer with international infrastructures, and to plan research infrastructures in a more integrative manner. However, preparation and publication of a roadmap appear on hold due to the need to consolidate the public budget in response to the economic crisis.

The Ministry has been redirecting funding from all thematic projects in all research disciplines, to support for 'infrastructure'. The Ministry is undergoing bilateral discussions with the senior members of the academic community, but it is unlikely that the Ministry will change its policy on thematic funding, and the decision to move to infrastructure support was as a consequence.

# Belgium



## Summary

*Belgium has a decentralised decision-making and governance system for R&D funding.*

*Belgian involvement (for the French Community) in ERASysBio was via National Scientific Research Fund (FNRS).*

*The Federal Council for Science Policy adopted in December 2009 a series of recommendations on the participation of the Federal Authority to 10 projects of the ESFRI. The Flemish government has shortlisted engagement with BBMRI.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

Funding, based on competition, for researchers and research teams in the French Community is channelled through National Scientific Research Fund (Fonds (National) de la Recherche Scientifique – FNRS).

The Flemish government has set up a foundation for investments in heavy infrastructure: the Hercules Foundation. Hercules is however relatively small, and budgets decreased substantially between 2010 and 2011.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

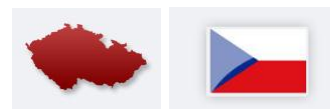
The National Fund for Scientific Research (FNRS) was a partner in ERASysBio.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The eventual selection of research infrastructures was initially planned for the end of 2009, However, there is still no public information available.

The Federal Council for Science Policy adopted in December 2009 a series of recommendations on the participation of the Federal Authority to 10 projects of the ESFRI. The Flemish government has developed a priority shortlist of infrastructures that match the Flemish competences to select new opportunities for cooperation, which included BBMRI.

# Czech Republic



## Summary

*The Ministry of Education, Youth and Sports (MSMT) is one of the main funders of public research institutes and universities.*

*There is a growing community in the Czech Republic on metabolomics, proteomics, data analysis and management, image-based systems biology as well as in organ-level modelling, which are topics which are not covered in other ESFRI infrastructures involving Czech participation.*

*MSMT sees that it is crucial to avoid double funding, so is primarily concerned that ISBE is shaped towards exclusivity among the other ESFRI structures.*

*“The Roadmap for Large Research, Development and Innovation Infrastructures in the Czech Republic” was approved in 2010. Whilst ISBE is specifically listed in the roadmap, MSMT would expect to see broader community acceptance for ISBE inside the Czech Republic, prior to achieving directed support. Present consideration is ongoing and final allocation of potential national support would be made in 2 years (by 2016).*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The largest shares of institutional funding are distributed between the Academy of Sciences of the Czech Republic and the Ministry of Education, Youth and Sports (MSMT) which, in turn, provide this type of funding to individual recipients, predominantly to public research institutes and universities.

## **CURRENT INVESTMENTS IN SYSTEMS BIOLOGY**

There is a growing Czech community researching metabolomics, proteomics, data analysis and management, image-based systems biology as well as in organ-level modelling. These are the topics which are not covered in other ESFRI infrastructures in which the Czech Republic participates.

However, there is also a possibility of additional support for the Czech systems biology community via EU structural funds.

## **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

Broader community acceptance for ISBE would be required inside the Czech Republic, prior to achieving directed support. While the Centrum výzkumu globální změny AV ČR, v.v.i is perhaps very active at international level, there is very little signs of activity towards the Czech systems biology community. Moreover, the core research of Centrum výzkumu globální změny AV ČR, v.v.i group is structural biochemistry rather than systems biology.

## **OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY**

There are no specific open directed programmes in systems biology, presently or in preparation.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

The Czech Republic lists its involvement in INSTRUCT; Openscreen; EATRIS; ELIXIR; BBMRI; & Eurobioimaging.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The Roadmap for Large Research, Development and Innovation Infrastructures in the Czech Republic<sup>1</sup> was approved in 2010 as a strategic document for development of large infrastructures for research, development and innovation.

ISBE is listed as one of the ESFRI Biomedical Sciences Research Infrastructures currently receiving prioritisation on the national roadmap.

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

Government consideration of support for ISBE is ongoing, leading to possible approval, which should take about one year. If national support is agreed in principle, agreement for funding should take about 2 years. This would also include allocation of funds for a subscription fee.

MSMT expect that the ISBE proposal would require better support/community building before any approval was agreed. MSMT sees that as it is crucial to avoid double funding, ISBE should primarily be shaped towards exclusivity among the other ESFRI structures.

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<sup>1</sup> <http://www.msmt.cz/file/12262>

# Denmark



## Summary

*Denmark allocated over DKK 800m for large-scale research infrastructures since 2007. This followed the 2004 survey of existing national and international research infrastructures by the Danish Council for Strategic Research (on behalf of the Ministry for Science, Innovation and Higher Education),*

*The Danish Roadmap for Research Infrastructures was published in 2011, subsequent to a further review in 2010. Specific support EATRIS and ELIXIR was identified for the short term (up to 3-5 years), with funding also committed for INSTRUCT.*

*There is currently no specific statement on ISBE.*

*At present there, is a specific scheme on the finance bill for investment in Research Infrastructures. However, the funding level has seen a dramatic drop in recent years. Previously, about £100M was invested from 2007-10, which has now fallen back to about £2.5M per annum. This latter amount is intended only to support initial investments, which the expectation that the institutions applying should take over the longer-term maintenance of these infrastructures.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The Ministry with the highest share of R&D funding is the Ministry for Science, Innovation and Higher Education (formerly the Ministry of Science, technology and Innovation). The Danish Councils for Independent Research (Det Frie Forskningsråd) is responsible for researcher-driven research. The Council for Strategic Research (Det Strategiske Forskningsråd) administers strategic research programmes in areas of political priority. It funds research projects and gives advice to applicants. The Council also contributes to increased university-industry collaboration.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

Support for the following ESFRI Research Infrastructures is identified for the short term (up to 3-5 years)

- EATRIS - European Advanced Translational Research Infrastructure in Medicine 30 5 27
- ELIXIR - European Life Sciences Infrastructure for Biological Information

It also lists of priority Biological and Medical Sciences projects with Danish interests “interest for the short term” on the ESFRI roadmap:-

- BBMRI
- EATRIS
- ELIXIR
- INSTRUCT

Danish engagement with the following ESFRI projects is also listed:-

- INFRAFRONTIER
- EuroBioImaging project

A principal membership decision has been taken on INSTRUMENT and EATRIS, and funding has been committed. Consideration is on-going for Danish involvement in BBMRI and EuroBioImaging, with no final decision having yet been made.

Previous projects that have worked best have been those that have developed a collaborative model, and that demonstrate researcher engagement. Commitment from University management is seen as critical for the success of a national RI project.

The European ELIXIR project was seen as successful, as being able to demonstrate a clear focus on creating something that will be a real upgrade of current RI, and not just doing the same in a different package. This is seen as setting a good example for future involvement in ESFRIs.

### **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

Denmark has allocated in excess of DKK 800m for investments in large-scale research infrastructures of national importance since 2007, subsequent to a 2004 survey of both existing national and international research infrastructures by the Danish Council for Strategic Research (on behalf of the Ministry for Science, Innovation and Higher Education), and assess the need for access to new national and international research infrastructures and to propose a Danish strategy for the area.

Following a further review in 2010, the Danish Roadmap for Research Infrastructures was published in 2011<sup>2</sup>, in which a total of 19 proposals for projects or initiatives have been identified, together with six new projects.

Whilst neither systems biology nor ISBE are specifically listed in the current Infrastructures roadmap, short term support for national research infrastructures in Mass spectroscopic proteomics has been identified. The Roadmap states that selection of new research infrastructures “*should be informed by the ESFRI roadmap...*”

### **CURRENT INVESTMENTS IN SYSTEMS BIOLOGY**

The main initiatives in Denmark within systems biology are:

- Danish Technical University Center for Biosustainability: <http://www.biosustain.dtu.dk/>
- The Synthetics Biology Centre at Copenhagen University: <http://synbio.ku.dk/>
- DTU Centre for Systems biology: <http://www.bio.dtu.dk/>

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<sup>2</sup> <http://fivu.dk/en/publications/2011/files-2011/danish-roadmap-for-research-infrastructure-2011.pdf>



- The Novo Nordisk Foundation Center for Basic Metabolomics:  
<http://metabol.ku.dk/about/>

The University of Copenhagen received about £80M funding for systems biology in 2011.

### **OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY**

In Denmark, the current main research foci are on Synthetics Biology or biotechnology as opposed to specific prioritization of Systems Biology.

The Danish Agency for Science, Technology and Innovation will be publishing a strategic landscape paper within this field in late October 2013.

### **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

Currently there is limited national strategic funding for BMS research as a whole, and no specific targeted funding for systems biology.

The present Roadmap is expected to be updated, and a decision making body involving the management level of the Danish Universities is being established as a first step of this process. However, it is not yet clear when a renewed roadmap would be published.

Funding in the area is very limited in Denmark at present, and that projects that are to be supported must usually first have strong community support for a consortium, which will then highlight to the Ministry. Once any submission is made, it usually takes about a year to reach a funding decision.

# Estonia



## **Summary**

*Most public R&D expenditure comes from the Ministry of Education and Research or via Estonian Research Council for project-based researchers groups on a competitive basis.*

*The 2010 Estonian Research Infrastructures Roadmap, has no specific statement on ISBE, nor systems biology support. However, the Roadmap refers to links with BBMRI, Instruct and EATRIS. Estonia is also a member of the ELIXIR Interim Board.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The majority of public R&D expenditure is distributed via the Ministry of Education and Research. Project-based state funding, irrespectively to the institutions, is provided directly to individual scientist(s) and research groups on a competitive basis, mainly in two forms: by the targeted funding and the Estonian Research Council grants. The Estonian Research Council, is a new funding agency for Estonian research, being established in March 2012 (taking over the functions of the Estonian Science Foundation).

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

The Estonian Research Infrastructures Roadmap<sup>3</sup> refers to the following 3 Research Infrastructures that have links to ESFRIs:

- Estonian Centre for Genomics (ECG) would be a genomics hub for BBMRI.
- Estonian Structural Biology Infrastructure (ESI) project would be a facility for INSTRUCT, with possible cooperation planned with EU-OPENSREEN.
- National Centre for Translational and Clinical Research is seen as the main partner in EATRIS.

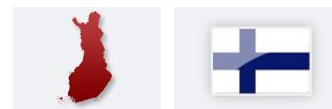
## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The Estonian Research Infrastructures Roadmap was published in 2010 by the Ministry of Education and Research, as a “long-term planning instrument (10-20 year perspective) that includes a list of nationally significant objects, either new or in need of renovation, pertaining to the research infrastructure.” There is no specific statement on ISBE, or on systems biology support more generally.

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<sup>3</sup> <https://www.etis.ee/Portaal/includes/dokumendid/Teekaart.pdf>

# Finland



## Summary

*Most funding is via the Ministry of Education and Culture and the Academy of Finland*

*In Finnish Roadmap was published in 2009. Specific mention is made of systems biology as being “recognised as an increasingly important field of science. It also lists associations with BBMRI, EATRIS, ELIXIR, and Infrafrontier.*

*The 2010 review by the Research and Innovation Council proposed an additional €120m for research infrastructures between 2011 and 2015.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The direct funds for R&D in higher education institutions (HEIs) are mainly distributed by the Ministry of Education and Culture through core funding and by the Academy of Finland through research grants and funding of Centres of Excellence in Research and individual research posts.

The 2009 Roadmap lists associations with BBMRI, EATRIS, ELIXIR, and Infrafrontier. In addition, INSTRUMENT is included a further 13 proposals that could have possibilities to develop into significant national research infrastructures.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

Academy of Finland (AKA) was a partner in ERASysBio.

The 2009 Roadmap lists associations with BBMRI, EATRIS, ELIXIR, and Infrafrontier.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

In February 2009, the Finnish Ministry of Education published the “National-Level Research Infrastructures: Present State and Roadmap”<sup>4</sup> for organising a national research infrastructure policy in within the next 10–15 years. This summarised the conclusions of a review by a specially appointed steering committee. 24 projects were identified and 13 further proposals for significant national research infrastructures.

The Roadmap states that the biocentres of six Finnish universities have established the Biocenter Finland cooperation network coordinating the infrastructures of the centres and their use. However, it noted that coordination at that time had been insufficient, as there had been no assembly into national-level research infrastructures.

Specific mention is made of systems biology as being “*recognised as an increasingly important field of science because of the potential of mathematical modelling to integrate*

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<sup>4</sup> <http://www.aka.fi/Tiedostot/FIRI/Roadmap.pdf>

*and make sense of vast quantities of biological data. Our view is that those responsible for science policy and investment need to take a strategic view of the contribution of a field of science to advancing knowledge before investing in the necessary infrastructure.”*

In December 2012, the Academy of Finland announced that it would be updating its Research Infrastructure Roadmap, as a “consequence of rapid European and national developments”.

The national expert group has been tasked with updating the national roadmap in 2013, and evaluating urgency of projects and to make proposals for prioritisation, implementation and funding. The same evaluation criteria as for the 2009 roadmap will be used, covering the following aspects:

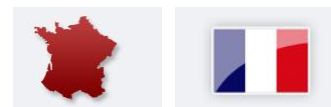
- importance to Finnish scientific community
- scope of user community
- need for funding in the coming years
- commitment by funding bodies.

The exercise is specifically stated as not being “*a funding application but, in addition of prioritisation, it will produce extensive background information for the basis of funding decisions to be made at a later stage.*”

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

The 2010 review by the Research and Innovation Council proposed an additional €120m for research infrastructures between 2011 and 2015.

# France



## Summary

*Funding for public research is split across several national research agencies, notably National Centre for Scientific Research (CNRS). However, the National Agency for Research (ANR) now holds a significant budget, notably funding international joint calls, since its creation in 2005.*

*The 2012 French RI roadmap listed interactions with EATRIS, ECRIN, ELIXIR, ERINHA, and INSTRUCT. Systems biology is specifically mentioned under the heading the French 'strong point' of "From integrating structural biology to the emergence of personalized medicine."*

*CNRS and ANR were partners in ERASysBio, and Institut National de la Recherche (INRA) is a partner in ERASysAPP.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The share of block grants in public research funding in the total budget of public research performers has decreased over the past years to about 74% of resources of Universities and of the National Centre for Scientific Research (CNRS) and to 78% of resources of the other PROs

Following the creation of the National Agency for Research (ANR) in 2005, a share of the government funding for public research is now allocated through this intermediary research agency. €759,85m budget for 2012 - partly used for funding international joint calls.

Secondly, ANR holds an important function through the competitive selection processes it steers for the "Investments for the Future programme".

## **INVOLVEMENT IN ASSOCIATED ESFRIs AND ERANets**

CNRS and ANR were partners in ERASysBio. In addition, the Ministère délégué à la recherche (MdR) was the "Governmental programme-owners".

Institut National de la Recherche (INRA) is a partner in ERASysAPP

Interactions with the following biological and medical sciences are listed in the 2012 French RI roadmap:-

- EATRIS (French node: Neuratris with UHI)
- ECRIN – France Coordinates (French Node: F-CRIN)
- ELIXIR (French node: RENABI network)
- ERINHA - France coordinates (French Node: HIDDEN project)
- INSTRUCT (French node: Frisbi)

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

France established a roadmap for research infrastructures in 2008. This identified 90 infrastructures, including 36 on the 2008 ESFRI roadmap (BBMRI; EATRIS; ECRIN; Infrafrontier; and INSTRUCT). The French revision of the Roadmap for 2012 – 2020 was published in October 2012<sup>5</sup>.

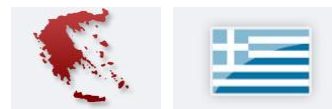
Systems biology is specifically mentioned under the heading of a French ‘strong point’ of *“From integrating structural biology to the emergence of personalized medicine.”* It states that *“Systemic biology, allowing for an integrated interdisciplinary approach and for the modelling of diseases, is emerging in France. As of yet, the actors are of small size and not very visible in spite of encouraging signs such as the installation of the European Institute for Systems Biology and Medicine, in Lyon, in partnership with China and the United States. National strategy aims at reinforcing this sector, with new methods and work tools, to take into account the life science revolution.”*

In addition, the brief description of EMBL includes it as being *“World leader in bioinformatics, digital simulation in biology and systems biology.”*

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<sup>5</sup> [http://cache.media.enseignementsup-recherche.gouv.fr/file/TGIR/29/8/infrasUK\\_mcg2\\_243298.pdf](http://cache.media.enseignementsup-recherche.gouv.fr/file/TGIR/29/8/infrasUK_mcg2_243298.pdf)

# Greece



## Summary

*The major Greek funding agency is the General Secretariat for Research and Technology (GSRT).*

*The Greek Large Scale Infrastructures Roadmap is currently in preparation (due for publication in December 2013). As of 2011, Greece participates in BBMRI, EATRIS, and Infrafrontier.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The major Greek funding agency is the General Secretariat for Research and Technology (GSRT). The largest part of the public funding on R&D is channelled to universities and research centres in the form of block grants.

Until 2009 the most important budgetary sources were the Ministries of Education, Religion, Culture and Sports and the Ministry of Development, which monitored the operation of the GSRT as well at that time. After the move of GSRT to the Ministry of Education, Religion, Culture and Sports in October 2009, the latter became the only important source of funding.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

As of 2011, Greece participates in nine ESFRI infrastructures, including BBMRI and EATRIS (€5.7m); and Infrafrontier (€3.9m).

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

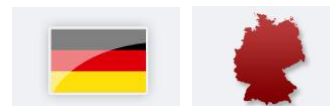
The Greek Large Scale Infrastructures Roadmap (10 to 15 Year Outlook) is currently in preparation as a follow-up roadmap of "Greek Large Scale Infrastructures Roadmap: A 10 to 15 Year Outlook", 2006. In December 2008, GSRT launched feasibility studies for the development of a National Infrastructure Road Map which was finalised in. However, the document is not publicly available.

The present GSRT call for Expressions of Interest to the research community of the country comprises two main phases:

- Initial mapping: collection of brief information of RI proposals – *completed Feb 2013*
- Submission of detailed RI proposals: announced May 21st 2013 – *open until July 2013.*

The 1st Phase resulted in 138 applications, 31 of these proposals from the field of Biological and Medical Sciences. Evaluation is expected to be completed by the end of October 2013, with the draft Greek Roadmap for Research Infrastructures Roadmap released for consultation, prior to its publication in December 2013.

# Germany



## Summary

*The main public funders for research Bundesministerium fuer Bildung und Forschung (BMBF), and Project Management Jülich (PtJ). In addition, institutional funding is distributed among 5 different funders, including the Helmholtz Association.*

*The Helmholtz published a roadmap for Research Infrastructures in 2011. This states German involvement in EATRIS; ELIXIR and Infrafrontier. BMBF recently announced support for several projects including EU-Openscreen.*

*Over the last decade there had been thematic calls in areas such as the Virtual Liver and SysMO. Over the coming two years, the BMBF systems biology strategy will base three research 'pillars':-*

- *e:Bio: "Innovation Competition Systems Biology"*
- *e:Med: "Paving the Way for Systems Medicine"*
- *e:Top "Innovative Toxicology for the Reduction of Animal Experimentation"*

*Germany was active in a number of national instruments and related European Initiatives, including bi- and trilateral calls in systems biology. Both BMBF and PtJ were partners in ERASysBio, and are also partners in ERASysAPP, ERASynBio and CASyM.*

*A National Bioinformatics Network that is currently in preparation, might serve as an interface for both ISBE and ELIXIR.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

The German system of federal R&D funding is based on two different pillars: institutional or basic funding and project funding. Federal institutional funding for research is mainly provided by the BMBF (Federal Ministry of Education and Research), which finances the large research organisations jointly with the Länder governments.

## CURRENT INVESTMENTS IN SYSTEMS BIOLOGY

During the last decade, BMBF has funded a variety of systems biology projects. Most of them were thematic calls funding collaborative projects such as GerontoSys, HepatoSys or The Virtual Liver Network. Others, such as the FORSYS initiative were conducted to create and support systems biology centres.



## **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

Currently, the most important international SB activities are noted as:-

- ERASysApp (ERA-Net)
- ERASynBio (ERA-Net)
- CASyM (CSA)

It is currently discussed to integrate e:Bio Module IV, "Ideas competition international" into one or more ERASysApp calls. Furthermore bi- or tri-lateral calls on applied systems biology research remain possible outside of ERASysApp.

## **OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY**

Over the next two years, the BMBF systems biology strategy will be based on three columns.

- **e:Bio: "Innovation Competition Systems Biology"**

### *Objectives*

- Strengthening excellent science and infrastructures in systems biology:
- Establishing systems biology as a "standard method" in the life sciences.
- Accelerating transfer from research to innovative products and services.

The first call was in 2011 and supported 34 projects (~€ 65M; 3-5 years)

- **e:Med: "Paving the Way for Systems Medicine"**

### *Objectives*

Establishment of Systems Medicine, i.e. bringing the systems biology approach to medical research, in contrast to classical medical research, which is rather reductionistic, concentrating on a disease or indication.

e:Med is organised in five modules, and is planned to run from 2013 to 2020, with an expected budget of over €100M.

The call deadline for Module I "systems medicine research consortia" was in January 2013.

- **e:Top "Innovative Toxicology for the Reduction of Animal Experimentation"**

### *Objectives*

Applying systems biology approaches to selectively develop *in vitro* test methods to replace toxicological risk assessment experiments on living animals. This will result in a paradigm shift from phenomenological towards mechanistic understanding of toxic reactions in biological systems.

The call deadline was in January 2013

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

BMBF and PtJ were partners in ERASysBio, and are also partners in ERASysAPP.

Due to financial restrictions, BMBF has not presently joined neither ISBE, nor ELIXIR as a full partner. However, on a smaller scale, a national "Bioinformatics Network" is in preparation, to foster bioinformatic infrastructures and services for the life sciences. This may later serve as an interface with ISBE and/or ELIXIR.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

A national roadmap which defines priorities across disciplines does not exist in Germany. Instead, the German Science Council (WR) regularly provides recommendations on large research infrastructures of national or international significance. Moreover, the Helmholtz Association (HGF) - which operates large equipment and complex infrastructures - has developed and published a roadmap for research infrastructures in 2011<sup>6</sup>.

The Helmholtz-Roadmap for Research Infrastructures (2011) states German involvement in EATRIS; ELIXIR and Infrafrontier, involving various links with German institutions.

This roadmap notes that "*Systems biology analyses and modelling of disease processes contribute to better understanding of complex relationships concerning the origin of a disease*". It also explains that, in 2008, the Federal Ministry of Education and Research announced the establishment of a National Diabetes Centre at the Helmholtz Zentrum München. The scientific background for this centre states that "*In order to combat the widespread disease of diabetes...requires an integrated research approach that would promote collaboration between basic researchers and clinicians using state-of-the-art biomedical technologies and systems biology.*"

BMBF recently announced (April 2013) funding for EU Open Screen, a platform for the provision of new biologically active substances.

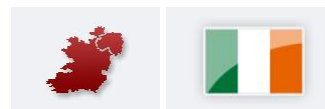
## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

Plans for future bioinformatics infrastructure network are under active, current discussion in BMBF (see above). BMBF will then look towards how the resultant network might interact with ISBE in the context of interaction with all relevant ESFRIs (notably ELIXIR). Discussions are ongoing, and may be affected by the September 2013 General Elections. The main intention was to rely on existing centres (with a small central hub) and increase services to open them up to the wider (national) community.

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<sup>6</sup> [http://www.helmholtz.de/fileadmin/user\\_upload/publikationen/pdf/11\\_Helmholtz\\_Roadmap\\_EN\\_WEB.pdf](http://www.helmholtz.de/fileadmin/user_upload/publikationen/pdf/11_Helmholtz_Roadmap_EN_WEB.pdf)

# Ireland



## Summary

*The largest state agency is the Science Foundation Ireland (SFI). There are no specific agencies for cross-thematic funding agencies, and requests for support need to go to the specific funding agencies.*

*University College Dublin hosts the Systems Biology Ireland with funding from SFI, under its 'Centres of Excellence' scheme.*

*In 2006, a review of the research infrastructure in Ireland, noted planned involvement of the national clinical research network as future member in ECRIN.*

*Research groups in Ireland are associated with the preparatory actions for at least eight of the projects on the ESFRI roadmap, including BBMRI and ECRIN. SFI is also currently involved in informal links with ELIXIR and EuroBioImaging.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

Project-based research funding is primarily provided to the higher education sector by a number of state organisations. The largest state agency, by funding, is the Science Foundation Ireland (SFI).

## **CURRENT INVESTMENTS IN SYSTEMS BIOLOGY**

University College Dublin hosts the Systems Biology Ireland with funding from SFI, under its 'Centres of Excellence' scheme.

Systems Biology Ireland was supported by the CSET programme. This programme began in 2000 and was funded through Department (Ministry) of Enterprise, Trade and Employment, with sister agencies; IDA Ireland, Enterprise Ireland, FORFAS. This covered the SFI research remit, which includes Life Sciences, and Information Communication and Emergent Technologies. As of 2009, the annual budget was €176M covering 550 Research Groups, and 2,500 Researchers. This included partnerships with industry (20% cost share).

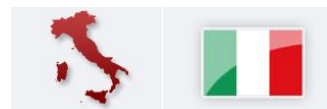
## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

Research groups in Ireland are associated with the preparatory actions for at least eight of the projects on the ESFRI roadmap including BBMRI and ECRIN. SFI is also currently involved in informal links with ELIXIR and EuroBioImaging.

**INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS  
ETC.**

In 2006, the Higher Education Authority (HEA) and FORFAS conducted a review of the research infrastructure in Ireland. This noted planned expansion of the national clinical research network to include other partners, as future membership in ECRIN.

# Italy



## Summary

*Most government institutional funding is via the Ministry of University and Research (MIUR), with the National Research Council (CNR) also funding interdisciplinary scientific and technological research, in several sectors, including biotechnology and medicine. Regional funding is also available, notably, from Autonomous Province of Trento who was a partner of ERASysBio. Italy takes part in ECRIN, through the Ministry of Health.*

*The Italian Roadmap of Research Infrastructure lists ISBE (referred to as “SysBioNet”) as an infrastructure ready for the implementation phase, selected to the Ministry of Education’s public call. Also includes BBMRI, EATRIS, ECRIN, ELIXIR, Instruct; and Infrafrontier.*

*A national distributed network for systems biology involving Milan, Rome, and Naples has received 3 years funding (€4.5M) from CNR.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

In Italy, most of the government institutional funding for research and development is under the responsibility of Ministry of University and Research (MIUR). Funding is also available via regional funding. Notably, the Autonomous Province of Trento (Department of University and Scientific Research), which was a partner of ERASysBio. Italy also takes part in ECRIN, through the Ministry of Health.

The National Research Council (CNR), is a public organisation that also funds interdisciplinary scientific and technological research, concerning several sectors: biotechnology, medicine, materials, environment and land, information and communications, advanced systems of production, judicial and socio-economic sciences, classical studies and arts.

Trento has received regional funding (Autonomous Province of Trento) for systems biology, but has not yet been receptive to wider Italian engagement.

## CURRENT INVESTMENTS IN SYSTEMS BIOLOGY

Groups in Milan, Rome, and Naples have been finance to establish a distributed network as part of a wider MIUR initiative. (60 people in total). 3 years funding (€4.5M) has been received from CNR (following agreement MIUR/CNR for CNR to support facilities). Evaluation will take place after 3 years for consideration of funding for a further 2 years. In this following period, it is hoped to expand the group beyond the initial 3 centres.

Scientific focus is on:-

- Yeast metabolism and signalling modelling
- Cancer metabolism(in collaboration with Hans Westerhoff)
- Neuro-degeneration

## **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

Funding is also available via regional funding. Notably, by the Autonomous Province of Trento (Department of University and Scientific Research), which was a partner of ERASysBio.

Italy also takes part in ECRIN, through the Ministry of Health.

## **OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY**

The groups funded under the MIUR initiative meet every 2 months to discuss work and develop a common culture, including how to open up to other groups, including those in Trento.

An open national meeting in Italy is being planned for September 2014 on systems biology.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

The Autonomous Province of Trento (Department of University and Scientific Research) was a partner of ERASysBio. Italy also takes part in ECRIN, through the Ministry of Health.

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

Italy would intend to apply for EU structural funding (IT and Health area) through Horizon 2020.

# Latvia



## **Summary**

*Institutional public funding is allocated by the Ministry of Education and Science. Funding for basic and applied research is managed by the Latvian Council of Science.*

*The Latvian national roadmap was published in 2010, which lists research infrastructures on national importance, including those connected to ESFRI.*

*The competition calls for the National Research Programmes scheme are open once every four years. The current scheme runs from 2010-2013.*

*The Latvian Academy of Sciences (LAS) is a member of ERASysAPP.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

Institutional public funding is allocated by the Ministry of Education and Science. Funding for basic and applied research is managed by the Latvian Council of Science.

## **Involvement in associated ESFRI's and ERANets**

The Latvian Academy of Sciences (LAS) is a member of ERASysAPP.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The Report on Latvia National Level Research Centres (NLRCs) is the Latvian national roadmap, and was published in 2010 as a long-term planning instrument that lists research infrastructures on national importance, either new or in need of upgrading, including those connected to ESFRI. The current National Research Programmes (2010-2013) built on the previous National Research Programmes (2005-2009).

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

The National Research Programmes scheme, administered by the Ministry of Education and Science, finances top-down research within five main thematic priorities (*energy and environment - 20%, innovative materials and technologies - 20%, local resources - 20%, public health - 20%, national identity - 20%*). The total budget for the period 2010-2013 is approximately €20m. The competition calls are open only before the launch of the whole scheme once every four years.

# Lithuania



## Summary

National block funding operates via the Ministry of Education and Science Assistance, with competitive programmes funded by the Lithuanian Research Council. Institutional support via EU Structural Funds is also significant.

The 'Roadmap for Research Infrastructures of Lithuania' was published by Ministry of Education and Science in 2011 for the following 10–15 years. One of the projects listed is the Center for Computational, Structural and Systems Biology (CossyBio), being a distributed RI, intending to consolidate three different centres: Computational Biology Centre, Structural Biology Centre, and Systems Biology Centre. The document notes that the centre could serve as a national branch "of the European RI network.", and specifically linkage with ELIXIR & INSTRUMENT.

The Roadmap also notes that Lithuania intends to become a full member of Infrafrontier, and that BBMRI is attractive for some national RIs.

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

Assistance from the Structural Funds for the programming period 2007-2013 as well as the institutional 'block' funding for research remain two main R&D funding instruments. The ratio of block funding via the Ministry of Education and Science to competitive funding was around 50/50 in 2011 and 2012. Operational Programmes for competitive funds are administered by the Lithuanian Research Council, the European Social Fund Agency and the Lithuanian Business Development Agency.

## Involvement in associated ESFRI's and ERANets

Research Infrastructure of Experimental Animals (RIEA) is listed under the national roadmap as intending to become a full member of INFRAFRONTIER. In addition the following ESFRI projects are listed as being 'attractive for some national RIs':-

- BBMRI
- ELIXIR & INSTRUMENT (via CossyBio)

## INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.

Building on the results of two extensive reviews carried out in 2007, €450M are to be invested over 2010-2015 in new and existing RIs under the 'National Complex Programmes'. This will support building and upgrading existing research centres, of which €300M will be used specifically for strengthening the leading RIs.

The 'Roadmap for Research Infrastructures of Lithuania' was published by Ministry of Education and Science in 2011 for the following 10–15 years. It notes that "Several countries are now using the ESFRI Roadmap as a model for the development of national roadmaps



*and setting of national priorities, including existing and new research infrastructures.*” It also notes that in late 2009, twenty project proposals were received, including seven from Biomolecular Sciences.

One of the projects listed is the Center for Computational, Structural and Systems Biology (CossyBio), being a distributed RI, intending to consolidate three different centres: Computational Biology Centre, Structural Biology Centre, and Systems Biology Centre. This will provide computational resources, scientific competence and training in their respective fields via open access to research facilities. Specific mention is made that the centre “*could serve as a national branch of the European RI network.*” Specific linkage with ELIXIR & INSTRUCT is also noted.

# Netherlands



## Summary

*The Netherlands Organisation for Scientific Research (NWO) supports competitive research proposals. ZonMw (The Netherlands Organisation for Health Research and Development) funds health research and stimulates use of the knowledge.*

*€33M funding for the national bioinformatics infrastructure (NBIC) will end in 2013, and the three Centres of Systems Biology were due to continue till 2015. While systems biology now has lower priority within NWO, some areas were relevant to the planned “Biomedical” Priority.*

*The Netherlands’ Roadmap for Large-Scale Research Facilities was published in 2012, with an available annual budget of €40M, plus a further €75M in 2014 from NWO for some roadmap projects. A call for projects on the large scale infrastructure roadmap is taking place in 2013, with a roadmap call for new initiatives planned for 2015.*

*Specific mention is made of Dutch involvement in ISBE (via the Systems Biology Natural Technology Facility). Netherlands has provided €1M for BBMRI, and is involved in EATRIS, EuroBioImaging Infrafrontier, and INSTRUCT. The Netherlands is also a member of ELIXIR, and also lists potential linkage with ANAEE in the ‘virtual plant’ with Belgium and UK.*

*NWO was a partner in ERASysBio+. ZonMw is lead for ERASysApp and CASyM.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The Netherlands Organisation for Scientific Research (NWO) supports competitive research proposals. There are four different types of NWO research grants: Big facilities, Cooperation and Exchange, Individual Investments, Open Access, Programmatic. €150M is available annually for healthcare and medical research. NWO’s focus is on use of knowledge (implementation), and is increasingly interacting with industry in funding programmes and research projects.

ZonMw (The Netherlands Organisation for Health Research and Development) funds health research and stimulates use of the knowledge.

## **CURRENT INVESTMENTS IN SYSTEMS BIOLOGY**

National Systems biology investments:-

- Netherlands Consortium for Systems Biology: 30 M€ (NGI, institutes, industry), until 2013
- Centres for Systems Biology Research, 13 M€ (ZonMw & NWO), until 2015
- Systems Biology Centre for Energy Metabolism and Ageing (Groningen)
- Cancer Systems Biology Centre (Amsterdam)

- Centre for Systems Biology and Bioenergetics (Nijmegen) Europe Systems biology

The Systems Biology Natural Technology Facility (SYMBIONT) is identified as having a 10 year timeline, and is setting up an academic-industry network in the Netherlands and the MODUTECH facility (2011-2013). The core facility is at Wageningen University, and is a close partnership between the WUR and other universities and researchers in this field.

€33M funding for the national bioinformatics infrastructure (NBIC) will end in 2013, and the three Centres of Systems Biology were due to continue till 2015. NBIC is planning to continue operating, although not specifically focused on genomics.

### **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

- ERASysBio+ (until 2011): 16 partners, 1 call, (€2.2M from the Netherlands), projects running until Sept. 2013
- ERASysApp: 16 partners, 3 calls envisioned, start January 2013, 3 years Systems Medicine
- CASyM has 22 partners from academia, industry and government, aiming for roadmap in systems medicine, 7 work packages (e.g. training, methodological basis, innovation and tech transfer, integration of national efforts, communication), started Nov 2012, for 4 years.

ZonMw is lead for ERASysApp and CASyM, and this included several leading industrial partners.

### **OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY**

Following political changes, scientific priorities for NWO focused on economic priority areas and Systems Biology was seen as a lower level priority. The National Genomics Initiative was due to end in 2013, and there would be a review of the three ongoing centres.

### **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

NWO and Netherlands Council for Health and Development (ZonMw) were partners in ERASysBio. ZonMw are also a partner in ERAsysAPP.

Biobanking and Biomolecular Research Infrastructure, the Netherlands (BBMRI-NL) has received €1M 'seed capital'. Netherlands infrastructure for Translational Biomedical Research (EATRIS-NL) is headed via the VU University Medical Centre.

Population Imaging Infrastructure in the Netherlands (EPI2) is identified as applying "to become a node for the population imaging infrastructure within the EuroBioImaging".

NWO noted that there is opportunity for discussion of systems biology aspects of plant biology within ANAEE, with potential for discussion between UK, the Netherlands and Belgium on developments in 'virtual plant'. The new Roadmap for large-scale infrastructures for 2013 was associated with a call for a new initiative for 2015 that might include systems biology (including data generation and stewardship).

**Table 1:** Roadmap projects and their European counterpart

Towards a consolidated Dutch Biobanking Hub, integrating the Dutch Biobanking Infrastructure in the European ESFRI Roadmap	BBMRI
EATRIS-NL: Shaping the Netherlands' Infrastructure for Translational Biomedical Research	EATRIS
NL-Biolmaging Advanced Microscopy	EuroBiolmaging
Population Imaging Infrastructure in the Netherlands (EP12): A node of EuroBiolmaging	EuroBiolmaging
Mouse Clinic for Cancer and Aging research (MCCA)	Infrafrontier (and EMMA)
Proteins@Work; A large-scale proteomics research facility for the life sciences	INSTRUCT
An ultra-high field NMR facility for the Netherlands (uNMR-NL)	INSTRUCT
Systems Biology Natural Technology Facility	ISBE

### **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

In 2008, the Committee National Roadmap Large Scale Research Facilities published 'The Netherlands' Roadmap for Large-Scale Research Facilities'<sup>7</sup>. This identified 66 publicly funded large-scale facilities, with almost half having an (at least partly) international orientation. It prioritises twenty five large-scale research facilities, including five in Life Sciences and Medical Sciences. A total budget of €63M was then made available.

The Ministry of Education, Culture and Science published "Uncharted Frontiers: the Netherlands' Roadmap for Large-Scale Research Facilities", in 2012. This listed 28 "progressive projects which are nationally and internationally important for meeting future challenges". The available annual budget for the National roadmap is €40M. In addition an annual budget of €15M is available for e-Infrastructure facilities. In 2014, NWO will grant another €75M to some projects of the roadmap.

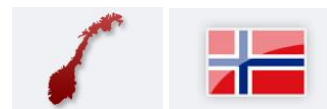
<sup>7</sup>[http://ec.europa.eu/research/infrastructures/pdf/roadmap\\_research\\_infrastructures\\_the\\_netherlands\\_2012.pdf](http://ec.europa.eu/research/infrastructures/pdf/roadmap_research_infrastructures_the_netherlands_2012.pdf)

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

There are plans within NWO for a “Gravitation Force” to look at needs in six areas including ‘Biomedical’ – which would include systems biology. This might result in possible further funding and could help build the case for ISBE.

A call for projects on the large scale infrastructure roadmap is taking place in 2013, with a roadmap call for new initiatives planned for 2015.

# Norway



## Summary

*Most institutional funding of public R&D in HEIs is channelled directly from the Ministry of Education and Research. The Research Council of Norway (RCN) supports responsive funding of researcher-initiated basic research projects. The scheme is funded by appropriations from the Ministry of Research and Education.*

*The Norwegian Roadmap was published in 2010. 21 of the projects listed are now under implementation. The strategy was revised in March 2012.*

*The national BIOTEK2021 programme started at the beginning of 2012, is still at an early phase, and has not yet a dedicated and committed strategy to support systems biology in Norway and elsewhere. However, the programme will run for 10 years with an expected annual budget of ~€20M, and Norwegian involvement in several ERA-net calls is coordinated through it, including ERA-SynBio and ERA-IB, where systems biology is a vital component.*

*Norwegian interests in ESFRI projects include ANAEE, BBMRI, EATRIS, ECRIN, ELIXIR EU-Openscreen, EuroBioImaging. RCN states that Norway is a constructive partner in trying to establish BMS infrastructures such as BBMRI and ELIXIR.*

*RCN acknowledges the importance of ISBE, and would expect strong support from the national community.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

About 80% of public funds for R&D in HEIs are channelled directly from the Ministry of Education and Research to the institutions, almost all of which is institutional funding.

The Research Council of Norway runs the FRIPRO scheme for responsive funding of researcher-initiated basic research projects. The scheme is funded by appropriations from the Ministry of Research and Education. The main strategic “Large-scale” programmes relate to the government’s priorities. The seven areas include BIOTEK2021 - Biotechnology for Innovation.

## **CURRENT INVESTMENTS IN SYSTEMS BIOLOGY**

January 1<sup>st</sup> 2012 RCN started the new BIOTEK programme (BIOTEK2021)<sup>8</sup>: This will run for 10 years with an expected annual funding of close to €20M.

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<sup>8</sup> [http://www.forskingsradet.no/prognett-biotek2021/Home\\_page/1253970728140](http://www.forskingsradet.no/prognett-biotek2021/Home_page/1253970728140)

## **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

The Research Council of Norway (RCN) was a partner in ERASysBio.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

The BIOTEK2021 programme is still at an early phase, and has not yet a dedicated and committed strategy to support systems biology in Norway and elsewhere. However, the programme already takes part in several ERA-net calls, including ERA-SynBio and ERA-IB, where systems biology is a vital component.

Norway is in general very positive to European infrastructure collaboration and is a constructive partner in trying to establish BMS infrastructures such as BBMRI and ELIXIR.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The Norwegian Roadmap corresponds closely to similar national roadmaps. The initial roadmap covered 23 projects; which has now grown to 38. In the 2010 roadmap, nine of the national projects had received funding from the National Financing Initiative for Research Infrastructure and were under implementation, while the remaining projects were characterized as investment-ready. Fully 21 of the projects in the current roadmap are now under implementation.

Norwegian interests in ESFRI projects in the roadmap have also expanded from six in 2010 to twelve ESFRI projects in which Norway has entered into binding agreements or has clearly signalled its desire to participate. Three of these will be hosted by Norwegian institutions.

The new versions of Tools for research<sup>9</sup> – Part I (2012-2017) and Part II set out the Research Council's vision for Norway's research infrastructure landscape and present the strategic foundation for the approach to and prioritisation of activities relating to research infrastructure.

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<sup>9</sup><http://www.forskningradet.no/servlet/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobhead ername1=Content-Disposition%3A&blobheadervalue1=+attachment%3B+filename%3D%22tools-for-research-part-i.pdf%22&blobkey=id&blobtable=MungoBlobs&blobwhere=1274493730686&ssbinary=true>

**Table 2:** Norwegian involvement in BMS ESFRI Projects

Project	Participation status	Participating Norwegian institutions	Comments
ANAEE	Preparatory phase		
BBMRI	In operation	NTNU, UiO, UiB, UiT, Norwegian Institute of Public Health	<i>Norwegian participation in the project has not yet been determined at the political level.</i>
EATRIS	Preparatory phase		
ECRIN	Preparatory phase		
ELIXIR	Under establishment	UiB, UiO, NTNU, UiT, Norwegian University of Life Sciences (UMB)	<i>The Research Council has awarded funding to a Norwegian project that may come to comprise a node within the ESFRI project. The pan-European cooperation has not yet been defined sufficiently to warrant recommending Norwegian membership.</i>
EMBRC	Preparatory phase		
EU-OPENSOURCE	Preparatory phase		
EUROBIOMAGING	Preparatory phase		

### **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

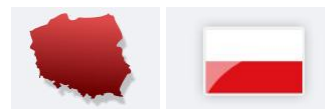
For the moment, the financial source for ERA-NET participations in systems and synthetic biology calls lies within the BIOTEK programme's responsibility. Since the Research Council has a strategy to increase its international participation, release of funds for such is normally quite straight forward<sup>10</sup>.

With regard to RCN's involvement in ESFRI projects, it considers this after a Norwegian research community takes an active role and express interest for RCN's participation. Norway is in general very positive to European infrastructure collaboration.

<sup>10</sup> [http://www.forskningsradet.no/en/International\\_strategy/1253964686548](http://www.forskningsradet.no/en/International_strategy/1253964686548)



# Poland



## Summary

*Funding for competitive research projects and research infrastructures comes via the Ministry of Science and Higher Education and its agencies.*

*The Polish Roadmap was published in 2011, detailing 76 proposals. The last roadmap prioritised ELIXIR and Openscreen ESFRI BMS projects.*

*The Roadmap is currently under revision and is expected to include 12-15 new proposals.*

## **MAJOR NATIONAL FUNDING BODIES OF COUNTRY**

The institutional, non-competitive funding used to represent the largest single part of the science budget (~32.8% of the total). However, ~58% of the science budget is distributed through competitions as research grants for R&D projects, research infrastructure, promotion of science, as well as scientific scholarships & awards. Funding comes via the Ministry of Science and Higher Education and its agencies.

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

The last roadmap had 5 projects in the area of biomedical and biological sciences, including ELIXIR, Openscreen and EMBL.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The Ministry of Science and Higher Education defined the priorities for 76 large research infrastructure related to investments in the Polish Roadmap for Research Infrastructures (PMDIB). This includes 33 investment projects, selected in a nation-wide competition from 2009. The Minister of Science and Higher Education endorsed the Roadmap in 2011.

The inclusion in the roadmap does not guarantee the funding for a specific infrastructure investment, but it indicates a pre-existing preference for investment. In addition, the project can be considered for financing from the EU Structural Funds and strengthens the project's chances of being funded from the state budget.

The Ministry of Science and Higher Education supports 13 propositions from scientific community to participate in other EFSRI projects, including two from the BMS area – EuroBioImaging, and ELIXIR.

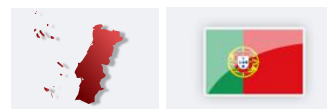
In January 2013, the Minister initiated a process of updating the Roadmap by issuing a new call for submissions from research institutions. 100 proposals in 13 scientific domains have been received and it is expected that about 15 new projects will be added to the roadmap,

with none removed. While there is no preference in scientific domain, the Ministry had been concerned about seeing no projects submitted in the first round, in the area of social sciences and humanities.

### **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

The funding window for the new roadmap projects was expected to be for 2014-2020.

# Portugal



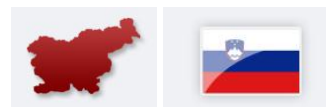
## Summary

*All the funding provided by Foundation for Science and Technology (FCT) acts as the national research council to support research projects on a competitive basis.*

*There is no national roadmap for the building of new research infrastructures.*

*Portugal's involvement in ESFRI roadmapping is changing. While previous financing was provided to the participation in ESFRIs, the former Minister for Science and Higher Education considered that ESFRI projects had not been validated by the EU Council of Ministers. However, the present Secretary of State for Science has recently announced the intention to strengthen the commitment to ESFRI roadmapping.*

# Slovenia



## Summary

*The Ministry of Education, Science and Sport (MIZS) is the main public funder for research in this area. As of 2011, around 10% of total R&D funds were allocated through this special call for Research Infrastructure.*

*The Research Infrastructures Roadmap 2011–2020 prepared by MHEST (now MIZS), was published in 2011. The Roadmap lists Slovenian involvement in ELIXIR and EATRIS (discussed jointly), together with BBMRI being a priority international project still undergoing expert assessment.*

*There were currently no national science priorities, and the 2011 roadmap had made reference to ELIXIR but not ISBE. It was expected that the national ELIXIR node would also function as the ISBE node, together with linking to ERASynBio, ERASysAPP & CASyM.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

The Ministry of Education, Science and Sport (MIZS) is the main public funder for research in this area.

## INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY

Ministry of Higher Education, Science and Technology (MHEST) was a partner in ERASysBio,

## OPEN & FUTURE DIRECTED PROGRAMMES ETC. IN SYSTEMS BIOLOGY

There were currently no national science priorities.

## INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets

The Roadmap notes that BBMRI is among the priority international projects that were not proposed during the preparation of the document, but would be undergoing expert assessment with the viewpoint of including them among priority international projects, at the first revision of the Roadmap. Slovenia was as an associate member during the 2008–2011 preparatory period.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

In May 2009, the MHEST (now MIZS) organised a public consultation event on the preparation of national development priorities with emphasis on research infrastructure, at which the researchers and economists presented some initiatives and needs for the inclusion of Slovenia into international projects and incentives for the development of national research infrastructure. In 2011, around 10% of total research and development funds were allocated through this special call for Research Infrastructure.

According to the Research Infrastructures Roadmap 2011–2020<sup>11</sup>, the key problems of the current state of Slovenian research infrastructure, are two-fold; namely the (a) lack of cooperation between research institutes within the RI and (b) fragmentation and sub-optimisation of RI utilisation, which is why the Research and Innovation Strategy of Slovenia (RISS) and Research Infrastructures Roadmap 2011–2020 (which is part of RISS) addressed this problem.

Within the Research and Innovation Strategy of Slovenia, a special section is devoted to the issue of research infrastructure, stipulating the need for a special Slovenian roadmap (chapter 4.3). The RISS states that the current fragmentation often causes duplications and lack of efficiency in the exploitation of the resources.

MHEST (now MIZS) prepared a new national strategy on Research Infrastructure, published at the end of April 2011. The Research Infrastructures Roadmap 2011–2020 lists ten priority areas, including “Biotechnology, biomedicine and biological sources”, with 20 proposals from received. The Roadmap lists ELIXIR and EATRIS as being “priority international projects” that are mutually complementary, and therefore discussed jointly.

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

There were currently no national science priorities, and the 2011 roadmap had made reference to ELIXIR but not ISBE. There had been changes in Government and review of financial positions, and Slovenia was now looking towards European Structural funds. It was expected that the national ELIXIR node would also function as the ISBE node, together with linking to ERASynBio, ERASysAPP & CASyM.

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<sup>11</sup> <http://www.arhiv.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/znanost/RISS/SIR.pdf>

# Spain



## Summary

*The main relevant funder of scientific projects is the Ministry of Economy and Competitiveness (MINECO) (previously, Ministry of Science and Innovation-MICINN). The National Institute of Health Carlos III (ISCIII) also has a role in strategic development of Spanish large infrastructures in the area of health research.*

*The Spanish strategy for the participation in international research infrastructures was reported by the MICINN in 2010, and this is likely to be reviewed in the next couple of years.*

*Spain contributes significantly to a broad range of ESFRI facilities, including 13 BMS Projects - ELIXIR, Infrafrontier, INSTRUCT; ECRIN; EATRIS; EuroBioImaging, BBMRI, EU-Openscreen, EMBRC & High Security BLS4 Labs.*

*The document makes it clear that all successful projects require strong support by the scientific community, fairly wide potential use as well as the existence of an industrial context where the potential application and innovation seem to be guaranteed.*

*Systems biology is specifically mentioned in the context of the Spanish node for ELIXIR.*

*In 2011, Spanish Government Budget Appropriations or Outlays on R&D decreased by 12.2%. The poor economic situation is currently restricting the possible commitment to ESFRIs by Spain (as for other countries), and any significant review of investments would only follow should this situation improve.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

Several agencies offer funds for R&D-related projects and activities. However, the main relevant funder is the Ministry of Economy and Competitiveness (MINECO) (previously, Ministry of Science and Innovation-MICINN), which finances projects (mostly by subsidies) for academic or scientific projects mainly carried out in Public Research Organisations and universities or carried out through private-public cooperation.

Institutional funding or direct block funding has reduced its importance over the last years in the Spanish R&D system. By contrast, competitive project-based funding has gained importance.

In 2011, Spanish Government Budget Appropriations or Outlays on R&D decreased by 12.2%.

The National Institute of Health Carlos III (ISCIII) also has a role in strategic development of Spanish large infrastructures in the area of health research (with other areas being dealt with elsewhere in the Secretary of State for Research, Development and Innovation's portfolio)

## **INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets**

MINECO is a Partner in ERASysBio, and ISCIII is a partner in ERASysAPP.

The roadmap makes it clear that all successful projects require strong, support by the scientific community, fairly wide potential use as well as the existence of an industrial context where the potential application and innovation seem to be guaranteed. The following 13 BMS Projects are listed in the Strategy:

- ELIXIR; Infrafrontier (PhenomeFRONTIER); Instruct - *Very high priority (for direct MICINN support)*
- ECRIN; EATRIS; EuroBioImaging; BBMRI - *High priority (projects of great interest to the scientific community, with high potential)*
- EU-Openscreen, and Infrafrontier (ArchiveFRONTIER) - *Medium priority (of interest to community, but at preliminary stage)*
- EMBRC & High Security BLS4 Labs – *Low priority (limited interest to community, or not mature enough to be prioritized).*

While Spain is involved with BBMRI, it is currently not a signed member (there are still issues to be finished before Spain signs up as a member). There is also Spanish involvement in the on-going preparatory phase of ERINHA.

It is currently unclear on what decision will be made on involvement in Openscreen (pending the stakeholder meeting for Openscreen in November 2012).

Any final decision on member state's commitment will need the IWG to finish its works, which will take around one and a half to two years.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

In recent years the Spanish government reinforced the domestic policy for research infrastructures, increasing the annual budgets and initiatives on this policy area. The Spanish National R&D and Innovation Plan 2008-2011 promotes the effective use of such infrastructures through, among others, the implementation of specific outward mobility schemes.

Spain contributes significantly to a broad range of ESFRI facilities, aiming to participate in 25 of the 44 European research infrastructures. The Spanish strategy for the participation in international research infrastructures was reported by the MICINN in 2010.

Systems biology is specifically mentioned in the context of the candidacy of the Spanish node for ELIXIR, which is focused on the following technical objectives - 'Provide first class bioinformatics resources, both nationally and internationally, with application to life science in key areas such genomics, proteomics, systems biology and biomedicine'.

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

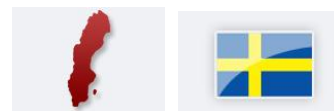
In recent years the Spanish government reinforced the domestic policy for research infrastructures (RI), increasing the annual budgets and initiatives on this policy area. The Spanish National R&D and Innovation Plan 2008-2011 promotes the effective use of such infrastructures through, among others, the implementation of specific outward mobility schemes.

A review of the roadmap is expected in the next couple of years, and this would also look at how those ESFRIs already underway have progressed, including the development of the operation of ERICs.

Spanish representatives have noted that consideration of any ESFRI's mandatory services (for central hub and its operations and common services) are for consideration by the member states, but that funding for activities at specific centres needs to involve funding from other source on competitive basis and nodes should be funded by those centres at least in part.



# Sweden



## Summary

*Swedish Research Council (VR) supports basic research in all fields of science. Government support for research and innovation continues to increase and is expected to be SEK 4 billion, by 2016.*

*Sweden had published its roadmap in 2012 and ISBE was mentioned, including indicative numbers for the overall budget (Swedish cost for 2012– SEK 15 - 85 million; Swedish operational cost 2016–19 - SEK 114 million).*

*In the call for proposals on infrastructure funding 2012, VR funded a planning grant (for two years) for systems biology. It is expected that this planning grant would lead to an application which could include a proposal to fund both a national node and participation in ISBE.*

*In addition to ISBE, VR also currently lists Swedish participation in ANAEE; INSTRUCT; BBMRI; EATRIS; ECRIN; ELIXIR; ERINHA; EuroBioImaging.*

*VR, together with Region Västra Götaland (VGR), are partners in ERASysAPP.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

"Bottom-up"/"free funding" projects at universities and university colleges are either directly disbursed from the government, 43%, or managed by three research councils. Of these, the Swedish Research Council (VR) supports basic research in all fields of science.

Government support for research and innovation continues to increase and is expected to be SEK 4 billion, by 2016.

## CURRENT INVESTMENTS IN SYSTEMS BIOLOGY

Stockholm Science for Life Facility was coordinating Swedish high-throughput data collection in collaboration with four universities, including a bioinformatics node. The budget was expected to eventually grow to €500m, from €200k in the planning phase.

## INVOLVEMENT IN ASSOCIATED ESFRI'S AND ERANets

VR, together with Region Västra Götaland (VGR) are partners in ERASysAPP.

## **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS ETC.**

The Swedish Research Council's Guide to Infrastructures<sup>12</sup> was published in 2012. The document emphasised the following BMS ESFRI infrastructures as being the most relevant for Swedish research and development: BBMRI; ELIXIR and INSTRUMENT.

ISBE is defined as being "under construction with Swedish participation". The VR website also currently lists Swedish participation in the following ESFRI infrastructures: ANAEE; INSTRUMENT; BBMRI; EATRIS; ECRIN; ELIXIR; ERINHA; EuroBioImaging

By contrast, the first roadmap for research infrastructure roadmap, which was published in 2006, recommended that Sweden should primarily contribute to only 2 BMS ESFRI projects- ELIXIR and Infrafrontier, together with BBMRI and EATRIS were given a letter of support.

## **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

VR have stated that during the period when it only funds a planning grant, the level of commitment of time and resources by the VR representatives is usually low. If however, a proposal for national infrastructure, or participation in an international RI, is funded it will become highly prioritized.

Planning grants are VR's mechanism to fund researchers on a national level to work on a more comprehensive collaboration platform, which often results in an application for a full infrastructure. For RIs where there is an ESFRI-project in the field, the applications often include a proposal to fund both a national node and participation in the ESFRI-project.

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<sup>12</sup><http://www.vr.se/download/18.48d441ad1363c4c099af9/1332772643222/Swedish+Research+Council%C2%B4s+guide+to+infrastructures+rapport+3+2012.pdf>

# Switzerland



## Summary

*Funding in Switzerland is mainly channelled through institutional funding, with nearly all of the remaining funds channelled in a bottom-up approach. Competitive funding is distributed via the two funding agencies Swiss National Science Foundation (SNSF) and CTI. Both have a relatively high degree of autonomy from the government, but only fund about 8% of university resources.*

*The issue of research infrastructure is not very prominent in the Swiss context because of the decentralised organisation of research activities with limited steering from the State, the lack of focus on strategic thematic domains requiring large infrastructures and the small size of the country which drives the delegation of many infrastructure issues to international organisations.*

*Switzerland is a member of ELIXIR (via the Swiss Institute of Bioinformatics). SNSF SystemsX) is a partner in ERASysAPP.*

## **INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

Swiss National Science Foundation (SNSF) is a partner in ERASysAPP.

# UNITED KINGDOM



## Summary

*There are two major types of institutional support in the UK. One stream of support is that allocated to the universities in the HE Sector, in the form of a block grant from the Higher Education Funding Council for England (HEFCE) and equivalent bodies in the devolved administrations. The largest category of project-oriented, competitive or 'responsive mode' funding is that provided via Research Council grants and programmes. In 2010-11, the Research Councils provided research funding amounting to £3.2bn (around €3.8bn).*

*There are 3 Research Councils (BBSRC, MRC, and EPSRC) who support research in systems biology. Support for Research Infrastructures is provided through the Large Facilities Capital Fund operated by Department for Business Innovation and Skills (BIS), as well as through Research Council's own budgets.*

*Key Challenges & Opportunities in systems biology include*

- *Data Sharing, Data Standards and Data Management*
- *Software and Algorithms*
- *Skills and Training*
- *Big Data*

*There is currently no specific statement on ISBE in the current RCUK Strategic Framework for Capital Investment 2012.*

## MAJOR NATIONAL FUNDING BODIES OF COUNTRY

- *Biotechnology and Biological Research Council (BBSRC) Government funded Research Council*
- *Medical Research Council (MRC) – Government funded Research Council*
- *Engineering and Physical Sciences Research Council (EPSRC) – Government funded Research Council*
- *Department for Business, Innovation and Skills –(BIS) Government Ministry*

*Other significant investors in research/infrastructure at the national level*

- *Wellcome Trust (WT) – Research Charity*

## UK INVESTMENTS IN SYSTEMS BIOLOGY

*BBSRC overall Investment*

*~£118.5M (€147.M ) or 12% of total research spend (including initiatives & normal grant funding)*

*BBSRC Directed investments*

- *2005/06 - 6 Centres for Integrative & Systems Biology - (£47M/€58.4M) for ~100 posts)*
- *2006/07 - SABR Initiative - (£25M/€31.1M) (joint with EPSRC) 6 collaborative projects with industrial engagement. (60 researchers & 20 studentships)*

- 2009 - 4 Integrative Mammalian Biology (IMB) Centres Systems approaches in animal physiology

#### *BBSRC Graduate Training*

- 2007 - 3 Doctoral Training Centres (DTCs) (*joint with EPSRC*)
- 2012 - DTP programme - 78% [172 students] in 'ENWW'

### **UK INVOLVEMENT IN INTERNATIONAL PARTNERSHIPS FOR INVESTMENT IN SYSTEMS BIOLOGY**

- ANR-BBSRC SysBio (£5M/€6.2M; 10 projects/13 UK groups),
- SysMO1 (£7.4M/€9.2M; 11 projects/ 19 UK groups),
- ERASysBio+ (£5.5M/€6.8M; 16 projects/18 UK groups)
- SysMO2 (£5.8M;/€7.2M; 7 projects/ 12 UK groups).
- SysMO-DB (£2.5M/€3.1M) for - web-based data management platform (joint support from BBSRC & BMBF)
  - for exchange of data, models & processes generated by SysMO1, SysMO2 and ERASysBio+ research groups.
  - Led by University of Manchester & Heidelberg Institute of Theoretical Studies (HITS).

### **OPEN & FUTURE DIRECTED PROGRAMMES IN SYSTEMS BIOLOGY**

BBSRC & MRC "Systems Immunology" Initiative : -£5M (€6.2M) - to applying modelling to ageing (particularly using MRC cohort data), and immune system.

BBSRC Bioinformatics and Biological Resources Fund - £6M per annum (since 2006) for sustainable bioinformatics (and biological resources) & develop the tools to support them  
Held annually – *Next call planned for March 2014.*

### **UK involvement in associated ESFRIs and ERANets**

MRC, BBSRC and Natural Environment Research Council (NERC) support UK payment of ELIXIR. All three Councils, together with Wellcome Trust support £85M (€100M). Large Facilities Capital Fund investment that enables EBI to act as central Hub for ELIXIR.

MRC support UK payment for INSTRUMENT. BBSRC involved in EuroBioimaging, and ANAEE, and also in ERACAPS & ERASynBio ERANets

### **INCLUSION OF ISBE/SYSTEMS BIOLOGY ACTIVITIES ON NATIONAL ROADMAPS**

RCUK Strategic Framework for Capital Investment 2012 - Synthetic Biology identified as 1 of 7 "Research Challenges and Opportunities for Capital Investment".

- £600M(€746M) funding (Dec 2012) for development of innovative technologies in areas such as "Big Data" and "Synthetic biology", includes £100M for:-
  - Training new researchers in genetics, and wider healthcare community to harness technology.

- pump-prime DNA sequencing for cancer & rare inherited diseases; & build NHS data infrastructure

BBSRC Strategic Plan 2010-2015 – ‘Integrative and systems biology’ is a strategic priority under ‘Exploiting New Ways of Working’ (ENWW) enabling theme (1 of 3 areas cross-cutting entire BBSRC remit). BBSRC recently refreshed its Strategic Plan (next 5-10 years) highlighting the under the themes key priorities to “ *Enhance the UK’s international lead in systems biology and exploit integrative and systems approaches to research across a range of scales*”.

### **POTENTIAL FUNDING OPPORTUNITIES FOR RESEARCH INFRASTRUCTURES & OTHER RELEVANT ISSUES**

UK Government-wide spending review for 2015/16 onwards announced at start of July 2013. Commitment Science Budget for Research Councils remains flat in real terms, together with an including the increase to £1.1Bn (~€1.3Bn) in total capital investment. Individual Research Councils are presently awaiting details of their individual (budget) allocations.

Large Facilities Capital fund Projects prioritised every 2 years. The next prioritisation exercise planned for 2014.

## ANNEX 1

**Table of interviewees for consultations on national funding landscapes (including those pending)**

Country	Representative	Organisation	Member of WP11 Funding Governance and Legal Advisory Committee
Austria	Oliver Kemper	FFG	Yes
Czech Republic	Dalibor Štys	MSMT	Yes
Denmark	Troels Rasmussen	DASTI	Yes <sup>+</sup>
Finland	Eeva Ikonen	AKA	No
France	Emanuelle Maguin	INRA	No
Germany	Christian Rückert	PtJ	Yes
Ireland	Magnus Ward	SFI	No
Italy	Lilia Alberghina	University of Milan (representing MIUR)	Yes <sup>+</sup>
Netherlands	Frans Martens & Robert Diemel	NWO & ZonMw	Yes <sup>+</sup>
Norway	Steinar Bergseth	RCN	Yes
Poland	Wiesław Studencki	MNiSW	No
Slovenia	Marta Sabec	MIZS	Yes
Spain	Rafael De Andres Medina	MINECO	No
Sweden	Anna Wetterbom & Stefan Hohmann	VR (& Guttenberg University)	Yes
Switzerland	Daniel Vonder Mühl	SNSF (Systems X)	Yes <sup>+</sup>
United Kingdom	Gabriela Pastori & Adrian Pugh	BBSRC	Yes

### Key

(<sup>+</sup>) – ISBE WP11 FGLAC members from November 2013