

# Evaluation of the Hercules Mechanism and the Hercules Foundation



*On behalf of:*

*Flemish Government – Department of Economy, Science and  
Innovation (EWI)*

## **Executive summary – February 2013**

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## Table of Contents

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p.

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<b>INTRODUCTION</b>	<b>3</b>
<b>KEY CONCLUSIONS</b>	<b>4</b>
<b>The Hercules Foundation as an organization</b> _____	<b>4</b>
<b>The Hercules Mechanism</b> _____	<b>7</b>
<b>Results and impacts</b> _____	<b>11</b>
<b>Hercules' other tasks</b> _____	<b>12</b>
<b>Positioning and Collaboration</b> _____	<b>12</b>
<b>SWOT</b> _____	<b>14</b>
<b>Draft Strategic Plan 2013-2017</b> _____	<b>15</b>
<b>RECOMMENDATIONS</b>	<b>15</b>
<b>Operational Recommendations</b> _____	<b>15</b>
<b>Strategic Recommendations</b> _____	<b>17</b>

## INTRODUCTION

In 2008, the Flemish Government set up the so-called 'Hercules Mechanism' as a structural instrument for funding research infrastructure<sup>1</sup>. This Mechanism subsidizes both medium-scale and large-scale infrastructure for fundamental and strategic basic research in all scientific disciplines. The Hercules Mechanism is managed by the Hercules Foundation. Within the framework of a co-operation agreement between the Flemish Government and the Hercules Foundation an annual budget is awarded to the Hercules Foundation by the Flemish Government. Two thirds of the Hercules Foundation's investment endowment are earmarked for the financing of medium-scale infrastructure and one third is reserved for large-scale research infrastructure. Subsidization rates foresee incentives for collaboration within and between university associations, as well as with public research centres and with third parties.

The Hercules Directive of 26 October 2007 states that in 2012 an evaluation of the Hercules Mechanism (as well as its operations and impacts) should take place. The evaluation was assigned to IDEA Consult by the Flemish Department of Economy, Science and Innovation (EWI) through a public procurement procedure<sup>2</sup>. The evaluation conducted by IDEA Consult covered both the Hercules Mechanism and the Hercules Foundation, as the latter is paramount to the functioning of the first.

The evaluation's first objective was to assess the operations and impact of the Hercules Mechanism in terms of scientific, economic and societal valorisation, but it paid also due attention to:

- The functioning and organization of the Hercules Foundation, its management bodies and specific committees;
- The wider policy and research context, both nationally and internationally.

In order to answer the evaluation questions, a mix of methods both quantitative and qualitative in nature were applied:

- Desk research with an analysis of the available documents and data, including a detailed portfolio-analysis, i.e. an analysis of key characteristics of (both selected and not selected) projects.
- The insights we derived from the analysis of the available documents and data were complemented and enriched on the basis of a series of interviews, 33 in total.
- Through a focused international benchmark<sup>3</sup>, we compared the Hercules Foundation and the Hercules Mechanism to similar initiatives abroad.
- We have complemented our own evaluation results and recommendations with the outcomes of an evaluation by a team of five international experts which took place on November 7 and 8, 2012<sup>4</sup>.

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<sup>1</sup> The formal legal base for the Hercules Mechanism is the Hercules Directive of October 2007, which is a decision by the Flemish Government, implementing the Decree of 19 March 2004, altered by the Decree of 22 December 2006, approved by the Flemish Parliament. The Decree(s) mentioned provide the legal base for the establishment of the Hercules Foundation. The 'Co-operation agreement' between the Flemish Government and Hercules Foundation was effective from the 1<sup>st</sup> of January 2008.

<sup>2</sup> Overheidopdracht "Specifieke opdrachten in het kader van de evaluatie van (de investering van de Vlaamse overheid in de Herculesstichting en het Herculesmechanisme" – bestek met nummer EWI-2012-07

<sup>3</sup> The following research infrastructure funding programmes were selected as benchmarks: The Netherlands Organisation for Scientific Research (NWO), The Netherlands; Large Facilities Capital Fund (LFCF), United Kingdom; Canada Foundation for Innovation (CFI), Canada.

In what follows we present the key conclusions of our evaluation and our recommendations for each evaluation dimension we identified, i.e.:

- The Hercules Foundation as an organization (internal organization, governance, human resources policy, financial policy, communication policy);
- The Hercules Mechanism (evaluation and selection procedures, financial allocation keys, subsidization rates);
- Results and impacts (of both the Hercules Mechanism and the Hercules Foundation);
- Hercules' other tasks:
  - The Simon Stevin, the new Flemish research vessel;
  - The Flemish Super Computer Centre;
  - The (Flemish participation in the) European Strategic Forum on Research Infrastructures (ESFRI).
- Positioning and Collaboration (in the Flemish STI Policy landscape and in the international STI policy landscape);
- Hercules' Draft Strategic Plan 2013-2017 (of the Hercules Foundation).

## KEY CONCLUSIONS

### The Hercules Foundation as an organization

#### Evaluation of the internal organization and governance

- Overall we conclude, along with the Expert Panel, that the Hercules Foundation has discharged its initial mandate very well. Stakeholders overall have an excellent view at and impression of the Hercules Foundation, its staff and its activities.
- The Hercules Foundation has a very simple and transparent organisational structure with an operational director supported by a staff of 2 FTEs, a Board of Directors with a Chairman appointed by the Flemish Government and different commissions involved in the evaluations of the project applications that need to report to the Board of Directors. As such, the Hercules Foundation is a small agency. In reality, the Hercules Foundation is bigger than it looks like because one should take into account that many tasks have been outsourced.
- The operating costs have been kept to a minimum which makes the organisation cost-efficient.
- At a more strategic level, we doubt whether it was necessary to set up a separate agency when it was decided to launch the Hercules programme. Today, like most interviewees as well as the Expert Panel, we agree that the Hercules Foundation has proven its "raison d'être" and that the Hercules Foundation works properly and in general delivers according to expectations.

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<sup>4</sup> The panel was engaged by the department of Economy, Science and Innovation (EWI) and its composition was validated by the Steering Committee for the evaluation. The composition of the panel was based on suggestions by both the Hercules Foundation, the Steering Committee for the evaluation, the university associations and the consultant and also screened by all parties involved to prevent possible conflicts of interest.

- The operations, composition, duties, responsibilities and powers of the Board of Directors in general fulfil the general principles of good governance. The composition of the Board of Directors mirrors the mandate of the Hercules Foundation, although one could argue that industry is underrepresented<sup>5</sup> while the strategic research centres, another target group, are not represented at all.
- But the environment in which the Hercules Foundation operates is quickly changing and it must anticipate and react quickly to address these changes, as is mentioned in the Expert Panel's report. Looking to the future, it would be expected to see the Board evolve to adapt its role and functions to reflect this changing environment and mandate.
- The main operational activities of the Hercules Foundation relate to the organisation of the calls, setting up and supporting the evaluation procedures for the applications and the conclusion and follow up of the subsidy agreements. In the course of the years, all these processes have been improved on the basis of regular evaluations with the involvement of the different stakeholders. This was also explicitly noticed by the Expert Panel. As a result, these major processes today are both effective and efficient, as confirmed by almost all interviewees amongst the different categories of stakeholders.
- The Hercules Foundation cooperates in a loyal and constructive way with the other entities within the Flemish Government and in particular the department of Economy, Science and Innovation (EWI).
- Based on our screening of the annual reports and the year plans and on the fact that they have always been approved, we conclude that the Hercules Foundation has also fulfilled the formal reporting requirements as described in the co-operation agreement.

#### Evaluation of the human resources policy

- The Hercules Foundation has opted for a small staff and the outsourcing of supporting non-core activities. All of them have the required background and expertise to do the required tasks both efficiently and effectively, as confirmed by the interviewed stakeholders, who are all very positive about their interaction with, and the support provided by, the Hercules Foundation director and the staff members.
- In terms of size, there are risks though in case the director or one of the staff members would be absent for a longer period of time because of the backup capacity which is by definition limited in such a small organisation. Also, when in the future additional tasks would be allocated to the Hercules Foundation, this will require an expansion of the staff.
- Because of the size of the Hercules Foundation, one cannot really talk about a human resources "policy". But it seems nevertheless the case that the most critical elements are there, although maybe in a "light" format.

#### Evaluation of the financial policy

- The Hercules Foundation received the following types of grants for the attainment of its objectives:
  - an operating grant to fund the operational activities of the Hercules Foundation;

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<sup>5</sup> One of the two industry representatives nominated by IWT (Agency for Innovation by Science and Technology) is seldom present at the meetings of the Board of Directors.

- an investment grant to finance the subsidies for the medium<sup>6</sup>- and large-scale<sup>7</sup> infrastructures;
- an investment grant for special research infrastructure.

An additional source of income are the returns on the financial investments made.

- During the first years, the operating grant was large enough since it was not fully spent. However, in 2012 the operating grant only amounts to about 2.5% of the investment grant. This is no longer sufficient and already resulted in savings that had to be implemented and which may be at the expense of the quality of the evaluation and selection procedures.
- The control of the budget is sufficient as it takes place at different levels, both within the Hercules Foundation, as well as externally (for example by KPMG as external accounting services provider, by a company auditor, the Belgian Court of Audit and by the Inspection of Finance that needs to give its (mandatory) advice upfront about the budget allocation to the Hercules Foundation as well as the changes to it).
- Initially, the Hercules Foundation every year received the full investment grant as well as the payment credits to spend this money, even if there was no call to be organised that year. Today, the Hercules Foundation in a given year only receives the amount of money that it will actually spend. This is an improvement in terms of transparency. The drawback is a serious increase in the administrative working load of the Hercules Foundation and the research institutes. Delays in the performance of the projects lead to less being paid than foreseen in the budget and to the need to draw up addendums to the agreements with an adjusted payment calendar.

#### Evaluation of the communication policy

- We are pretty sure that the researchers' community by now knows the Hercules Foundation very well as the funding agency for research infrastructure in Flanders. This is the merit not only of the Hercules Foundation but also of the university associations, the natural allies of the Hercules Foundation in this.
- Because of the regular (personal) contacts and the presence of four of them in the Board of Directors in the capacity of representatives of FWO and IWT, the communication with the university associations is also effective.
- The communication with industry can and should be improved. Contacts with professional associations remain limited and there are no contacts with individual companies. It is neither clear for the Hercules Foundation what the effectiveness of these contacts has been nor of the announcements (about the calls for proposals) made in professional magazines.
- The website is quite attractive and very informative. The current version is the result of a number of extensions and improvements over the years.
- The annual reports are quite extensive, partially repeating every year the same information about the Hercules Foundation.
- Up to now the communication activities of the Hercules Foundation did not really target the general public. In our opinion this should also not be the priority for the future.

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<sup>6</sup> H1-grant between € 150,000 and € 600,000 and H2-grant between € 600,000 and € 1.5 million

<sup>7</sup> H3-grant above € 1.5 million

- Similarly, the Hercules Foundation distributes no electronic newsletter nor does it use social media to communicate and to network with its client and target groups. However, we do not consider this to be a priority Hercules Foundation should invest in.

## **The Hercules Mechanism**

### *Evaluation of the evaluation and selection procedure*

- The Hercules Mechanism is working very well. The excellent work by the staff of the Hercules Foundation is highly appreciated by all participants including the applicants, the representatives of the university associations and the international experts of the Hercules Science Commission. Applicants are also very satisfied about the course and outcome of the processes and the information provided.
- Given the success rate of about 1 out of 3 applications that can be supported, it seems that participation does not need further encouragement, except maybe by companies. The participation of industrial partners is rather low in both schemes, while it seems there is an established need for supporting infrastructure for applied research projects as well. At this moment, however, the funding of applied research lies beyond the mandate of the Hercules Foundation and Mechanism.
- The distinction between the evaluation and selection procedures for medium versus large-scale research infrastructure has proved to be well justified. The procedures, both for medium-scale and the large-scale infrastructure, are moreover very transparent, smooth and effective.
- The selection and award mechanism for the large-scale research infrastructure calls are implemented by the Hercules Foundation exactly as prescribed in the Hercules Directive. We consider the quality of this mechanism as (very) high, because of the following reasons: (1) the use of external referees, (2) the possibility of applicants to react to the referee reports, (3) the high profile and relevant expertise of the members of the Hercules Science Commission and the fact that they are all from abroad, (4) the interviews with the applicants selected after the first meeting of the Hercules Science Commission, (5) the involvement of the Hercules Invest Commission and (6) the evaluation of the procedure which takes place after each call and in which each of the different stakeholders is involved. Moreover, the selection process for medium-scale infrastructure has significantly increased intra- and inter-university co-operation.
- The organisation of the calls for the medium-scale research infrastructure is, to a large extent, the responsibility of the university associations, coordinated though by the Hercules Foundation. Each of the university associations has developed a rigorous procedure which seems to guarantee a qualitative selection and award procedure. Moreover, based on an evaluation of the procedures that takes place after each call, the university associations and the Hercules Foundation have gone through a learning curve allowing the processes to become more streamlined during the successive calls.
- The Hercules Foundation has an internal appeal procedure against decisions its Board of Directors has taken about applications for grants for medium-scale and large-scale research infrastructure. The major steps of the procedure are explained on the website of the Hercules Foundation and the full details are explained in a document that is downloadable from the website. Up to now, no appeal procedure has been started (which is another indication of the quality of the procedures).

- The general principles of the procedures are stable and need no change, as they are in line with the professional standards of research evaluation practice as applied elsewhere. An important question though in terms of both efficiency and effectiveness is about the value added of the intervention by the Hercules Foundation in the context of the calls for medium-scale research infrastructure. The role of the Hercules Foundation is minor in this process. However, the approval of the university associations' funding lists by the Hercules Board of Directors is seen as an essential contribution, as well as the Hercules Foundation's contribution to the gradual development and application of coherent evaluation and selection procedures at the level of the university associations when they evaluate the medium-scale research infrastructure applications.

#### Financial allocation keys

- The Hercules Mechanism uses a series of financial allocation keys to distribute its means across projects and host institutions. These allocations keys were carefully designed with the aim to:
  - Guarantee a minimum share of budget for large-scale investment (the so-called "2/3 – 1/3 key");
  - Guarantee a minimum share of budget for each host institution (the so-called "Hercules key");
  - Stimulate collaboration between and within university associations and between university associations and third parties (strategic research centres or industry) (varying subsidization rates according to the size of the project);
  - Limit, within a funded project, the share of funding going to other costs such as personnel costs (highly-skilled technicians) or modifications to buildings (the so-called "maximum 15% rule").
- These allocation keys remained unchanged since the beginning of the operations of the Hercules Foundation in 2008, except for the "Hercules key" which is updated each year according to the evolution in the indicators underlying the respective BOF and IOF keys<sup>8</sup>, both of which are used in the composition of the Hercules key.
- The "2/3 – 1/3 key" is implemented as a very strict allocation key: deviations can only be allowed through a very rigid procedure. Moreover, it is questionable whether such a fixed allocation key should be kept, while needs have been changing over time (continuous decrease in the number of medium-scale applications against continuous increase in the number of large-scale applications).

Therefore, one could think of introducing more flexibility with regard to this allocation key, e.g. by:

- Dropping the strict 2/3 – 1/3 rule of budget allocation to medium (H1-H2) and large scale (H3) infrastructure and allow more flexibility aiming at an equal funding for both schemes, also adapting the cut off between H1-H2 and H3 to € 1 million instead of € 1.5 million;
- Making the procedure for deviations less cumbersome;
- Making use of a 'range' instead of a precisely fixed percentage;
- Applying the key over various calls and/or years cycle (and maybe also alternating calls).

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<sup>8</sup> BOF = Bijzondere OnderzoeksFondsen (Special Research Funds), IOF = Industriële OnderzoeksFondsen (Industrial Research Funds)

- An important pre-requisite for a flexible and timely adjustment of the allocation key is a more structural, a more accurate and a more centralized follow-up and monitoring of demand/needs. Such a monitoring should be organized through the university associations and centralized by Hercules, implying that:
  - The Hercules Foundation centralizes the micro-data of all applications;
  - The coordinating and overseeing role of the Hercules Foundation with regard to the evaluation and selection procedure of medium-scale projects is reinforced, including active participation in the intra-university selection procedures and meetings.
- The use of the 'Hercules key' for the Hercules Mechanism corresponds to the commitment to support only excellent research infrastructures and excellent researchers, but with a specific focus on cooperation with the industry. One can question the use and relevance of 'allocation keys' defined on beforehand, also because it appears to be quite unique in an international context. But this allocation key does largely take into account the accumulated level of excellence of an institution, even though competition occurs in the first place within the university association (rather than between research groups from different university associations). Moreover, this key 'protects' the smallest host institutions by guaranteeing a minimum share in budget, while, according to the international experts panel, it gives the university associations a stable framework for the respective investments. However, many interviewees had reservations on the complexity of the formulas used and the lack of transparency in the computation process. But as the Hercules Foundation itself is not involved in defining and calculating this key, these reservations should be addressed to the relevant authorities (i.e. the Flemish Government).
- The use of varying subsidisation rates according to the size of the project (i.e. a lower subsidization rate above € 600,000) did have a substantial impact on the 'application behaviour' of researchers. In particular, one can observe a significant drop in the number of applications (successful or not) just above the € 600,000 threshold, and a strong concentration of projects in the range just below € 600,000. Obviously, research groups often experience huge difficulties to find financial resources for the required additional funding. Moreover, not every infrastructure above € 600,000 can be used for collaboration with third parties, while on the other hand, cross-university collaboration occurs already in projects in the range of € 400,000 to € 600,000 even in the absence of specific incentive for collaboration. Finally, it was observed during the Expert Panel session with the industry that there is a clear interest from the private sector to make more use of H1-research infrastructure by companies, indicating that incentives for collaboration should be foreseen even below the threshold of € 600,000.
- Therefore, one could think of the following adjustments:
  - To drop the 'superficial' threshold of € 600,000 between H1 and H2, since some cross-university association collaboration occurs below that threshold anyhow;
  - To 'merge' H1 and H2 categories and lower the upper threshold of the latter from € 1.5 million to € 1 million;
  - To expand the 100% funding rate of the H1 scheme over the whole range of the 'new' H1+H2 (thus from € 150,000 to € 1 million);
  - To consider an additional "bonus" on top of the 100% already allocated over the whole range of the 'new' H1+H2 (thus from € 150,000 to € 1 million) if there is collaboration outside the university association with another university association or with a third party ("SOC" or private company). The

use of this bonus would be further detailed in respect of the current legal and financial framework.

- To allow companies to act as co-promoters ensuring their involvement in the development of an application as early as possible, this for both the 'new' H1+H2 and the H3 (> € 1 million) schemes.
- In addition, one could consider relaxing the rules to allow for international collaboration for both the 'new' H1+H2 and the H3 (> € 1 million) schemes.
- With regard to the "maximum 15% rule", many interviewees and principal investigators acknowledged that, finding and retaining highly-skilled technicians able to work with top-level research equipment represent one of the main challenges nowadays (in Flanders and beyond). The question remains thus whether limiting these cost to 15% is not too restrictive. The question is of course strongly related to overall funding: 15% would probably be sufficient if means for the Hercules Mechanism are substantially increased, but current budgetary constraints tend to limit such an option. Besides, other possibilities than the Hercules Mechanism are rather scarce, even though university associations usually have their own, specific funding channel.

### Portfolio-analysis

- The number of applications for medium-scale research infrastructures has been decreasing over the last three calls. At the same time the number of applications for large-scale infrastructure has increased. The success rate of the applications in different project categories fluctuates between approximately 30% and 40%, which is a rather common value for such type of funding programmes. The corresponding success rates in terms of the approved budget volume are much lower however and lie in the range between 26% and 36%.
- A clear majority of project applications and approved projects falls into the category of Hercules 1 with a budget between € 150,000 and € 600,000 euro. This can partially be explained by the most favourable funding conditions for these types of projects. Furthermore, there is apparently a larger demand for less expensive but basic equipment to maintain the research capabilities of the institutions.
- There is an apparent increase in the number of applications for the large-scale infrastructures, which are ranked excellent but not funded due to the limited budget. We consider this as an indication of the increasing quality of applications at the top part of the ranking.
- In the recent calls the average value of funding provided to the medium-scale and the large-scale infrastructures remained at the lower range of the corresponding funding limits.
- The large-scale infrastructure projects are much more likely to involve an inter-institutional partner than the medium-scale ones. Also the degree to which private firms' participate is a lot higher in the large-scale projects.
- Looking at the developments between the second and the third call we do not detect substantial shifts in the main characteristics of the submitted and approved projects. One can argue that at this stage the programme has achieved operational stability.
- Comparing the data about the size of the funded projects by the Hercules Mechanism with these at the benchmarking institutions we observe that the Hercules Mechanism is quite comparable to Canada Foundation for Innovation (CFI) and The Netherlands Organisation for Scientific Research (NWO) if one considers the lower limit of the financing interval. In general however, the

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investments in large infrastructures are of a smaller size compared to those by the benchmark institutions.

## Results and impacts

- Regarding a broader economic and societal impact of the Hercules Foundation and Mechanism it is rather early to give a comprehensive and reliable assessment.
- Most of the funded infrastructures are used for the research in life and medical sciences, followed by the infrastructures for material sciences and nanotechnology. A minority of projects are situated in the field of ICT and social sciences and humanities.
- The funded research infrastructures which are operational and for which the scientific reports are available, report that their utilisation rate is above 30% of available time and up to 100% utilisation rate in projects with a high degree of collaboration. As the optimal degree of utilisation varies for different types of equipment, we suggest that the actual effectiveness of use is assessed on a case by case basis and is presented in the scientific reports.
- The average leverage effect for the large-scale infrastructure is around 20% and it is higher than the leverage effect of the medium-scale infrastructures. Promoting, where possible and needed, greater openness of the medium-large research infrastructures and an earlier involvement of the third parties in proposal preparation, may contribute both to a larger capacity utilisation and to realising a greater leverage effect of the programme.
- The interviewees and the available scientific reports provide evidence that the funded facilities are being used both by the interested scientists from inside the own university association as from other institutions as well, locally and internationally. Most of such interactions take place in the framework of joint research projects. The openness of the infrastructures is an important criterion for funding and it appears that the current operational infrastructures are accessible enough to satisfy it.
- The infrastructures commissioned in the framework of the first call have already produced a growing number of scientific publications in top journals and have been used in project applications for international collaborative projects and international funding. There is growing interest from the private companies to gain access to these infrastructures as well.
- The excellent infrastructures funded by the Hercules Mechanism are considered as one of the important factors which attract excellent young and experienced researchers, although the factual data supporting this finding have yet to be collected.
- Other improvements that have been achieved as a result of the Hercules Mechanism are the increase of professionalism in use of equipment and the increased awareness of running costs by the users of all three types of equipment, H1 to H3.
- The distribution of the list of all approved medium-scale Hercules projects to all five university associations increases the transparency of existing facilities and needs in the academic domain in Flanders, which initiates closer collaboration and sharing of equipment, and/or knowledge transfer.

## Hercules' other tasks

- In general and taking into account the limited means (staff-wise) at its disposal, the Hercules Foundation did play a very active and very beneficial role in performing its other tasks. Again, this has demonstrated the ability of the Hercules Foundation to undertake special assignments efficiently and effectively. In a nutshell, its key contributions can be summarized as follows:
  - The Hercules Foundation played a central (unique) role in organizing and coordinating the proposal evaluation procedure, which had to be accurately reconfigured given the specific nature of the Flemish Super Computing Centre (FSCC) or the European Strategy Forum on Research Infrastructures (ESFRI). By doing that, it also interacted very actively with the Flemish researcher's community and the universities, e.g. by informing them on procedures and opportunities, initiating consortium formation (e.g. ESFRI);
  - It was, together with other funding agencies, an important sounding board for policy-makers on how to actually select, evaluate, implement or fund new projects in a domain which is relatively new to Flemish policy-makers;
  - One of the Hercules Foundations main merits is also to have initiated and developed a coherent, legal framework of procedures that can be applied for all very large-scale research infrastructures projects in Flanders. It is desirable that such a coherent legal framework is further consolidated.
  - Related to this, the Hercules Foundation also set up an important network of experts with internationally recognized expertise in the specific field of large-scale research infrastructure, which represents an important asset for this new domain of Flemish science and innovation policy;
  - Finally, the Hercules Foundation did play an important role in terms of institutional collaboration and follow-up, in a Flemish, Belgian and European context.
- The current operational endowment (2.5% of the investment budget, which corresponds to 3 FTE), however, remains critical for the Hercules Foundation to be able, on top of the costs and the workload for finalizing the 3<sup>rd</sup> call medium-scale and large-scale research infrastructure, to fund the additional tasks (2<sup>nd</sup> round ESFRI, follow-up ESFRI and FSCC). If these additional tasks are to be receiving increased attention, an increase of the share of operational endowment towards 3 to 4% of investment endowment (allowing an expansion 4 to 5 FTEs) is necessary. The Expert Panel too is concerned that in future the Hercules Foundation may not have the capacity to respond to further demands while exercising proper oversight of the present additional infrastructure (ESFRI and FSCC). Therefore, it is also recommended to appoint an Associate Director, reporting to the Director, to take responsibility for, and exercise oversight of, the additional (ESFRI and High Performance Computing) infrastructure.

## Positioning and Collaboration

### Role and positioning in Flemish policy framework

- The Hercules Foundation and Mechanism represent a clear added value for the Flemish science and innovation policy, for at least four reasons:
  - **Increased policy attention and funding:** "Research infrastructure" has now been put 'in the middle of the picture', thus following broader, international trends towards more policy attention for research infrastructure and equipment. There is now one main, specific channel for funding research

infrastructure in Flanders. The Hercules Foundation has also contributed to more policy coordination and to more policy concentration with regard to research infrastructures within and outside Flanders.

- **Catching-up effect** for medium-scale and large-scale research infrastructure: the Hercules Mechanism has filled in a 'policy gap' in terms of medium-scale equipment and large-scale infrastructure and has made possible a catching-up phenomenon to occur in both areas (first for medium-scale, afterwards for large-scale). Moreover, there has been an increase in *quality* in the large-scale proposals: Flemish research groups clearly underwent a 'learning curve', which is very likely to have other positive side-effects later on, e.g. for EU or ESFRI applications.
- Conception and application of **coherent procedures**: Compared to the situation before Hercules, where the assessment of research equipment's quality/relevance was totally embedded in a project's assessment (for small-scale equipment) or happened through ad-hoc procedures and decisions, a major added value of the Hercules Mechanism consists of the elaboration and application of coherent procedures in Flanders.
- Increase in **collaboration and critical mass**: the Hercules Mechanism has led to an increase in collaboration between partners from different university associations (and to a lesser extent with the industry) for projects above € 400,000 (i.e. close to and above threshold of € 600,000). Collaboration (through sharing costs, reducing redundancy, increasing coherence) is one of the means to increase critical mass.
- With regard to the alignment of Hercules Foundation's activities to activities of other actors (agencies –FWO/IWT– and university associations) and the necessary complementarity between them, it has been observed that there is both a clear-cut distribution of roles and a complementarity in the work performed. Compared to FWO and IWT, Hercules occupies a specific 'niche' in that sense that it deals with the 'higher-end segments' of research equipment, which often require a coordinated and multi-partner approach, which are (almost) never to be related to one single project and which very often encompass both fundamental research and basic strategic research. With regard to the medium-scale infrastructures (evaluation and selection), the operations of the Hercules Foundation ensure that procedures are applied coherently and in a transparent manner, while they create the possibility to 'oversee' the whole landscape across university associations. Moreover, the two-stage approach stimulates collaboration across university associations.
- It appears, however, that the coordinating and overseeing role of the Hercules Foundation should be reinforced with regard to the evaluation and selection of medium-scale projects. On the one hand, it is justified to do so in order to maintain the highest possible level of coherence in the applied procedures (which may tend to 'diverge' across university associations over time) and the highest possible level of cross-university association collaboration. On the other hand, a more active participation of the Hercules Foundation in the intra-university association procedures is needed to allow the Hercules Foundation to better monitor shifts in demand (and hence, justify possible adjustments of allocation keys).
- Finally, the Hercules Foundation also has some competencies in terms of policy coordination (ESFRI, ESF, FSCC). Here, the division of labour is not as clear as above. More clarity in the respective distribution of roles should be provided for mainly ESFRI (EWI versus Hercules Foundation) and the ESF (Hercules Foundation versus FWO, e.g. 'Big Science Initiative').

### International role, reputation and collaboration

- In addition to the ESFRI-related activities the Hercules Mechanism contributes to the international visibility and excellence of Flemish researchers by providing an excellent infrastructure basis for their activities. The infrastructures funded by Hercules give Flemish researchers a good starting position to enter the international collaboration consortia.
- The Hercules Foundation in its role of the main research infrastructure funding provider in Flanders operates in close contact with other Flemish and international research funding organizations. From this position the Hercules Foundation is able to contribute to the international discussions and the international scientific research agenda.
- In the line with the opinion of the Expert Panel we argue that the role of both Hercules Foundation and Mechanism the international scene can be further improved by developing more direct links and better coordination with the authorities responsible for research infrastructure funding at Belgian federal and also at European level.

## **SWOT**

### Strengths

- Creation of a structural and recurrent investment channel for large en medium-scale research infrastructure
- Accessible for all scientific disciplines
- “Delegation” of the medium-scale research infrastructure calls to the university associations
- Competitive and qualitative procedure for large-scale infrastructure
- Promotion of collaboration
- Considerable leverage effects
- The excellent administrative follow-up and the customer friendly actions by the Hercules Foundation
- The Hercules Foundation keeps an eye on international developments in research infrastructure

### Weaknesses

- No (explicit) funding for applied research infrastructure
- Difficulties to find co-financing
- Required strict financial planning
- Exclusion of most overhead costs
- Communication and collaboration with industry may be improved

### Opportunities

- Priority for research and innovation
- Priorities for research and innovation in the Horizon 2020 Programme
- Opportunities offered by ESFRI

### Threats

- The lack of adequate resources (e.g. staff) to properly support the expanding mandate of the Hercules Foundation
- Increased pressure on the available budget to fund research infrastructure
- Uncertainty about the financing
- Some slow decision-making processes due to the complex Belgian administrative structure

### **Draft Strategic Plan 2013-2017**

- The key chapters on the strategic and operational objectives are very extensively developed. The draft Strategic Plan also contains quite a detailed presentation of potential indicators to monitor the realisation of the operational objectives.
- Missing however are both a more precise time-framework for the implementation of the operational objectives and a separate chapter about the current and expected (international) developments in research infrastructure and about the Flemish and international policy context. Nevertheless, we consider the strategic and operational objectives to be in line in general with the evolutions in the research as well as the policy context.
- 4 out of 5 of the identified weaknesses are (explicitly) covered by one or more of the operational objectives. The Expert Panel concluded as well that the operational objectives are to a reasonable extent in line with their findings and recommendations. But it would be good to adapt the Strategic Plan into a final version taking into account the final conclusions of this evaluation process.
- The request for an increased budget is in line with three of the threats we identified in the SWOT-analysis. What we miss though is a more elaborate justification of the required budget.
- We consider the Hercules Foundation a suitable organization and the Hercules Mechanism a suitable instrument for the implementation of the proposals in the Strategic Plan, under the condition that the Hercules Foundation's resources and staff can grow to support its expanding mandate.

## **RECOMMENDATIONS**

### **Operational Recommendations**

#### Towards the Flemish Government/EWI

- **Drop the strict 2/3 – 1/3 rule** of budget allocation to medium (H1-H2) and large scale (H3) infrastructure to allow more flexibility in the allocation and a better response to gradual shifts in the demand.
- **Consider using a 'range' instead of a precisely fixed percentage or applying the key over various calls and years.**
- As pre-requisite for a better and more flexible adjustment of the financial allocation between schemes, **set up a more structural, a more accurate and a more centralized follow-up and monitoring of demand/needs**, coordinated by the Hercules Foundation and implying that:

- The Hercules Foundation centralizes the micro-data of all applications;
- The coordinating and overseeing role of the Hercules Foundation with regard to the evaluation and selection procedure of medium-scale projects is reinforced, including active participation in the intra-university selection procedures and meetings.
- **Adapt the cut off between H1-H2 and H3 to € 1 million instead of € 1.5 million.**
- **Drop the threshold of € 600.000 between H1 and H2 and merge the H1 and H2 categories** (the upper threshold of the latter to be lowered from € 1.5 million to € 1 million).
- **Expand the 100% funding rate of the H1 scheme** over the whole range of the 'new' H1+H2 (thus from € 150,000 to € 1 million).
- **Consider an additional "bonus" on top of the 100% already allocated** over the whole range of the 'new' H1+H2 (thus from € 150,000 to € 1 million) if there is collaboration outside the university association with another university association or with a third party ("SOC" or private company). This bonus would be further detailed in respect of the current legal and financial framework.
- **Allow companies to act as co-promoters** ensuring their involvement in the development of an application as early as possible, this for both the 'new' H1+H2 and the H3 (> € 1 million) schemes.
- **Consider relaxing the rules to enable international collaborations** for both the 'new' H1+H2 and the H3 (> € 1 million) schemes.
- **Increase the share of the operational endowment** (allocated to the Hercules Foundation) in the total investment endowment to between 3% and 4% through targeted, highly skilled recruitment, to ensure critical mass and continuity of operations.
- **Further develop and consolidate the coherent framework of procedures set up in the context of the FSCC**, so that it can be applied for all very large-scale research infrastructures projects in Flanders.
- **Reinforce the coordinating and overseeing role of the Hercules Foundation over the university associations with regard to the evaluation and selection procedure for medium-scale research infrastructures.** Therefore, consider:
  - a more active participation of the Hercules Foundation in the intra-university association procedures to allow the Hercules Foundation monitoring better shifts in demand, and;
  - organising the effective centralization of the micro-data for all applications at the Hercules Foundation.

#### Towards the Hercules Foundation

- **Enhance the focus of Board meetings on strategy matters.** Now that major procedures have settled, the Board should focus more on strategy matters such as strategic planning and programme impact assessment.
- **Allow for a rotation in the mechanism for the composition of the Hercules Science commission.** The members of the Hercules Science commission are appointed for a period of 6 years and most of them were appointed at about the same time. This implies that all these mandates will also end at about the same time. This would be at the expense of the experience that has been built and should be safeguarded. Therefore we suggest that the mandate of part of the

members is prolonged and that in the future, for example, every 2 years, 1/3<sup>rd</sup> of the members is replaced.

- **Make a template available allowing the infrastructure owners to report more details:** increase of use, by whom, which projects, related publications, etc.
- **Include a search engine on the website inventory of research infrastructure,** which will increase the visibility of the Hercules Mechanism and, more importantly, will facilitate more collaboration among different actors around these infrastructures.
- **Maintain and further develop the network of foreign experts** set up by the Hercules Foundation and with internationally recognized expertise in (very) large-scale research infrastructure.
- **Appoint an Associate Director,** reporting to the Director, to take responsibility for, and exercise oversight of, the additional (ESFRI and High Performance Computing) infrastructure.
- **Ensure valorisation criteria (economic and/or societal) are given sufficient attention** into the evaluation format for Hercules projects, both in the medium as in the large scale systems next to the existing excellence criteria.

#### Towards the university associations

- **Investigate how the smaller scale investments can be used to support service type measurements** which have less impact on the research; sharing this kind of equipment (e.g. for service measurements to industry) could be a source of funding for the university associations, and increases the societal impact.
- **Increase the visibility of the Hercules Mechanism in industry and society.** Organise open door events at university associations with the Hercules logo on the corresponding machines as these would increase the societal impact of Hercules.

## Strategic Recommendations

#### Towards the Flemish Government/EWI

- **The government should make a clear statement about its long term view on funding research infrastructure and funding the Hercules Foundation.** The budget available for the Hercules Foundation to fund research infrastructure has been cut and later on increased again in the period 2007-2012. There is a need for more stability on the long term for the Hercules Foundation and the funding of it by the government, in order to allow research programmes to be developed on the long term. The demand for large-scale infrastructure is so high that projects ranked excellent cannot be funded. The evolution of the budget should also be in line with the expansion of the responsibilities of the Hercules Foundation. The integration of the academic education organised by the university colleges into the universities may also result in additional requests for research infrastructure funding. The structural activities of the Hercules Foundation require structural funding sources.
- **Consider the need to fund applied research infrastructures at private research organisations and companies.** There is no structural system to fund applied research infrastructure at private research organizations or to fund applied research infrastructure for a consortium of companies. This seems to be a

gap in the Flemish portfolio of research and innovation support measures which needs to be explored further.

- **Keep the Hercules Foundation informed about *ad hoc* government support** for R&D infrastructure to allow the Hercules Foundation to keep a complete overview of research infrastructure before making decisions and to avoid duplication.
- **In the future, ensure the presence of the leading civil servants of IWT and FWO in the Board of Directors of the Hercules Foundation**, which apparently is not foreseen in the legislation change planned by the government; without this, complementary actions are needed to coordinate between Hercules, IWT and FWO before each major decision.
- **Provide more clarity in the respective distribution of roles for mainly ESFRI** (EWI versus Hercules) **and the ESF** (Hercules versus FWO, e.g. 'Big Science Initiative'), with regard to Hercules' competencies in terms of policy coordination.

#### Towards the Hercules Foundation

- **Develop and implement a competency/skills matrix model for the Board of Directors composition.** Looking to the future, it would be expected to see the Board evolve to adapt its role and functions to reflect the changing environment in which the Hercules Foundation operates and its changing mandate. The Board of Directors will have to play a more coordinating role, must acquire an understanding of the impact of its past investments and focus more on matters of strategy and less on operational issues. Therefore, the Hercules Foundation is encouraged to develop and implement a competency matrix, considered a governance best practice, to ensure the availability of the right set of skills to fully discharge its evolving mandate.
- **Widen the access to the complete set of funded infrastructures** (both large and medium-large) **to partners outside the academic world to further spur the collaboration with industry.** As a way to measure the impact of the increased use of the equipment, consider such criteria as the corresponding increases in collaboration with academic and industry partners separately.
- **Support and encourage earlier involvement of companies/end users** in the genesis process of new proposals, both in the medium and large scale systems e.g. by giving the possibility to companies/end-users to be co-promoters in the application; this would allow that end-users requirements are taken into account systematically from the beginning and could create stronger involvement from industry and society.
- **Open the installed base of medium scale & large infrastructure** to allow for more use by third parties (industry, end users, other labs, etc.) and where the Hercules Foundation could play a role in creating transparency about available infrastructure, organising matchmaking between companies and research labs, probably in different ways for the R&D intensive companies (via the Hercules Foundation itself or via Technology Transfer offices of the university associations, ...) and for the rest of industry, mainly Small and Medium-scale Enterprises (SMEs) via the "light structures", the collective centres, the sector associations, the innovation centres, ....
- **Keep the Hercules Mechanism horizontal** (i.e. without thematic orientation) since it is a bottom-up system designed to be used in all research areas.
- **Further develop the Hercules Foundation's central role concerning research infrastructure in the relation/coordination with the Flemish scene versus the Belgian and the EU scene.**

- **Develop a framework for collaboration opportunities with foreign agencies**, implying co-funding of joint infrastructures abroad.
- **The Strategic Plan should include a context section and a more elaborate reasoning on the required budget**

The Strategic Plan should incorporate a discussion on the evolving context of the research and innovation landscape, both internationally and in Flanders.

The Strategic Plan would also benefit from including a more elaborate justification of the required budget with (1) an updated estimate of the future needs for research infrastructure in Flanders, (2) a clear overview of the required budgets in relation to the different allocations and (3) a budget estimate on the required resources (e.g. staff) to support the expanding mandate of the Hercules Foundation properly.

- **The Strategic Plan should be updated regularly**

The Hercules Foundation should also consider developing a document related to or derived from the Strategic Plan which is reviewed and revised every two years, because there is a new call every two years, with a series of short-term time-bound operational objectives and a set of longer-term aspirational objectives.

- **The Strategic Plan should take into account the results of this evaluation**