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28 January 2014 (revised 20 April 2014)

Latvia

Research Assessment Exercise: Summary report

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Table of Contents

Table of Figures

1. Introduction

This document summarises the Research Assessment Exercise undertaken for the Ministry of Education of the Republic of Latvia in the latter months of 2013. The organisation of the assessment work was contracted to the Technopolis Group and was undertaken by six panels of scientific peer reviewers. Their names are listed by panel at the Appendix. Each panel has produced a detailed report, together covering the 150 research groups, which asked to be included in the exercise and submitted self-assessment reports to the Ministry.

2. Method

The method adopted for the research assessment exercise is loosely based on the past UK RAE model. NordForsk kindly agreed to provide quality control to the RAE process.

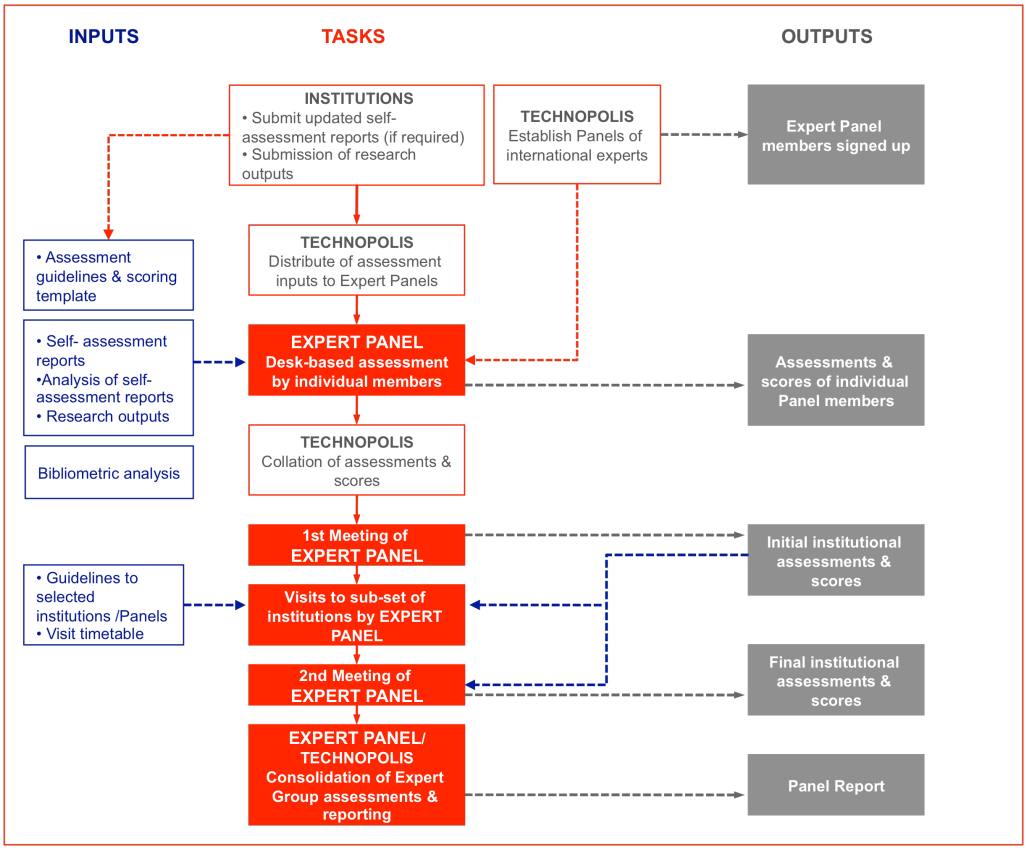
We recruited a total of 36 peer reviewers to serve on six panels, respectively covering: natural science and mathematics (panel 'M'); life sciences and medicine (L); humanities (H); engineering and computer science (E); social sciences (S); and agriculture, forestry and veterinary science (A). The panellists are all recognised experts in their fields, whom we identified through their roles in the European Science Foundation, disciplinary journals and in equivalent research assessment exercises. NordForsk and the Ministry of Education approved all the panellists. The panellists were expected to be independent, to be recognised experts in their fields and collectively to have a diversity of experience as well as knowledge of the breadth of the field handled by each panel.

Some 150 research groups recognised by the Ministry of Education presented self-assessments of their research performance, using a common format devised by the Ministry, and were assessed by the panels. They also provided sample research papers for the panels to read. The panels were additiomnally provided with analyses of data presented in the self-assessments as well as simple bibliometric indicators per research group, based on the Scopus database. (This background information is presented in the individual panel reports.) Two panellists reviewed each research group and led the discussion of performance in the respective panel.

Each panel was in Latvia for a week. This meant that they were able to make site visits to about half the groups. A deliberate choice was made to focus the visits on the larger and apparently better-performing groups, in the expectation that this would enable the panels to identify the leading researchers and groups. The panels provided a separate report on each research group that had submitted a self-assessment. This included 11 groups, which the panels did not regard as performing research. These were however not allocated numerical scores. The assessment process is summarised in Figure 1

The RAE aimed to assess Latvian research in international context – in effect using the standards prevailing at the global level to define the benchmark. This necessarily means that the scores for a small research community in a small country are likely to be on the low side. However, the alternative – namely, to devise a Latvia-specific scale – would have left the meaning of the assessment unclear. Panels expressed their assessments in both prose and numbers. The reader is referred to the full documents for a nuanced understanding of the assessments; for reasons of space, only a fairly brief summary and overview can be given here.

Figure 1 The research assessment process



The panels assessed the groups on five dimensions

- Scientific quality
- Impact on science
- Economic and social impact
- Research environment and infrastructure
- Development potential

They additionally provided a qualitative Overall score based on their overall view (and not, therefore, generated by doing arithmetic on the other scores).

The panels met at the beginning and at the end of their week in Latvia. The assessment scales and the way they are to be interpreted was discussed at length on each occasion, with the aim of making the panels' use of the scales as consistent as possible. The Technopolis staff who worked with the panels believe that a high degree of consistency was achieved. There is nonetheless always room for different interpretations and the comparisons among the scores allocated by different panels below must read with a little caution.

Figure 2 shows the assessment criteria used for scientific quality. The panels used similar scales (Figure 3 to Figure 6) to assess the other dimensions, except that the 'social and economic impact' dimension was referenced to impacts in Latvia, rather than the world. The Development Potential dimension was intended to reflect the panels' view of how worthwhile it was likely to be for the state to invest in the particular research group, given its quality and circumstances.

Figure 2 Assessment criteria for Sub-element A: scientific quality

A: SCIENTIFIC/RESEARCH QUALITY		
Particular factors to take into account		• Pure and applied research shall be evaluated as being of equal significance
SCORE	**DEFINTION**	**DESCRIPTION**
5	**Outstanding**	**The institution is a Global Leader** In terms of the quality, the research output of an institution is comparable with the best work internationally in the same area of research. The research possesses the requisite quality to meet highest international standard in terms of originality, significance and accuracy. Work at this level should be a key international reference point in the respective area.
4	**Very good**	**The institution is a Strong International Player** Research by the institution possesses a very good standard of quality in terms of originality and importance. Work at this level can arouse serious interest in the international academic community, and international publishers or journals with the most rigorous standards of publication (irrespective of the place or language of publication) could publish work of this level.
3	**Good level**	**The institution is a Strong National Player with some International Recognition** The importance of research by the institution is unquestionable in the experts' assessment. Internationally recognized publishers or journals could publish work of this level.
2	**Adequate**	**The institution is an Satisfactory National Player** The international academic community deems the significance of the research by the institution to be acceptable. Nationally recognized publishers or journals could publish work of this level.
1	**Poor**	**The institution is an Poor National Player** Research by the institution contains new scientific discoveries only sporadically. The profile of the research by the institution is expressly national, i.e., the institution is not involved in international debates of the scientific community. It focuses on introducing international research trends in Latvia.

Figure 3 Sub-element B: impact on the scientific discipline

B: IMPACT ON THE SCIENTIFIC/RESEARCH DISCIPLINE		
Particular factors to take into account		• The impact of the research on the development of the scientific discipline
SCORE	**DEFINTION**	**DESCRIPTION**
5	**Outstanding**	**The institution is a Global Leader** The research outputs of the institution are published in the leading international forums of the respective discipline, and they have a considerable impact on the development of the discipline worldwide; the institution is highly valued as a partner in international research projects.
4	**Very good**	**The institution is a Strong International Player** The institution is internationally recognised in its discipline and is highly regarded as a partner in international research projects and networks.
3	**Good**	**The institution is a Strong National Player with some International Recognition** The institution occupies a stable position in the international scientific community, is considered a respected and recognized centre of competence, and possibly hosts national research centres.

B: IMPACT ON THE SCIENTIFIC/RESEARCH DISCIPLINE		
2	**Adequate**	**The institution is an Satisfactory National Player** The institution occupies a stable position in the national scientific community. The position of the institution within the international scientific community is still evolving; it still has to vie for its status as a recognised member of the discipline; its impact on the international scientific community is undetermined.
1	**Poor**	**The institution is an Poor National Player** The publishing strategy and scientific impact of the institution are predominantly geared towards the national scientific community.

Figure 4 Sub-element C: economic and social impact

C: ECONOMIC AND SOCIAL IMPACT		
Particular factors to take into account		• The economic and social impact (including culture and gender)
SCORE	**DEFINTION**	**DESCRIPTION**
5	**Outstanding**	**Highly Important Research AND Highly Sought-after R&D Partner by Non-academics** Research of the institution is highly important for society, which renders the institution a highly esteemed partner in research and development projects outside the academic environment. Staff members of the institution are in high demand as experts in the public and private sector, and the institution is an important driver of societal development.
4	**Very good**	**Very Important Research AND Sought-after R&D Partner by Non-academics** Research of the institution is very important for society. The institution's interactions with non-academics (i.e. business, policy-makers, the public) stand out in terms of their extensive and dynamic nature.
3	**Good**	**Important Research AND Satisfactory Level of Interaction with Non-academics** Research of the institution is important for society. The institution's interactions with non-academics (i.e. business, policy-makers, the public) are at a level that is expected of recognised academic institutions.
2	**Adequate**	**Important Research BUT Low Level of Interaction with Non-academics** Research of the institution is important for society. The research activities of the institution are characterised by a low level of interaction with non-academics (i.e. business, policy-makers, the public).
1	**Poor**	**Important Research BUT No Interaction with Non-academics** Research of the institution is important for society. The interaction by the institution with the public is yet to be established.

Figure 5 Sub-element D: research environment and infrastructure of the institution

D: RESEARCH ENVIRONMENT AND INFRASTRUCTURE OF THE INSTITUTION		
Particular factors to take into account		• Organisation of the management of research at the institution • The long-term strategic and financial resource planning, including the human resource development strategy • The goal orientation of the research work • The availability and quality of support services, research infrastructure, databases, technical staff, staff teaching and training workload, the ratio of students involved in research to the overall number of staff members, etc.
SCORE	**DEFINTION**	**DESCRIPTION**
5	**Outstanding**	**The institution is a Global Leader** The institution's research environment is fully comparable to the best international institutions in the discipline, in terms of the organisation, strategy and infrastructure of research work. It can attract the highest quality international researchers.
4	**Very good**	**The institution is a Strong International Player** The institution is able to provide an internationally comparable excellent research environment to high-level international researchers in the given discipline.
3	**Good**	**The institution is a Strong National Player** The institution is able to provide a research environment that is comparable with globally recognised academic institutions in its discipline.
2	**Adequate**	**The institution is a Satisfactory National Player** The institution's research environment is still evolving to achieve a level that is expected in the international scientific community of a respected institution in the given discipline.
1	**Poor**	**The institution is an Poor National Player** The institution is still only in the process of creating an internationally comparable research environment.

Figure 6 Sub-element E: development potential of the institution

E: DEVELOPMENT POTENTIAL OF THE INSTITUTION		
Particular factors to take into account		The development potential of an institution comprises: • The ability of researchers to participate in international competition • The capability of the scientific environment to support the chosen research • The capability of the selected scientific objectives and research themes to impact the international scientific community and society at large • The ability to initiate new research directions The assessment should focus on: • The institution's future vision and plans • How realistically the institution assesses its strengths and weaknesses, opportunities and threat, and whether the institution has a carefully considered plan to manage such factors • Plus – The age and career progression of the active scientific staff – The size of the institution (does it have critical mass) and its ability to attract high-level doctoral students and scientists from abroad – Ability to raise funding that is awarded competitively – Its orientation towards topical issues in the selection of research themes – Involvement in promising international collaboration projects and networks, etc.
SCORE	**DEFINTION**	**DESCRIPTION**
5	**Outstanding**	**High potential to become Global Leader** The institution is able to assume (or maintain) scientific leadership in the given scientific discipline. It is expected that over the next 5-10 years it will achieve a significant international breakthrough in the particular scientific discipline, and it will attract leading researchers and promising doctoral students. Within the foreseeable future, the institution is able to achieve a level of excellence that is comparable with the most outstanding institutions in the world within their discipline.
4	**Very good**	**Potential to become Strong International Player** The institution is able to establish (or maintain) itself as a recognized and respected player in the international scientific community within the given scientific discipline. It is expected that over the next 5-10 years it will achieve an excellent level of scientific quality and influence and will become a highly regarded partner in international collaboration projects and networks.
3	**Good**	**Potential to become International Player** Over the next 5-10 years the institution will be able to strengthen (or maintain) its position in the international scientific community as a convincing actor and a trustworthy partner within international collaboration networks.
2	**Adequate**	**Potential to become Strong National Player** The institution is capable of being (or remaining) a visible local player in its area of research, which from time to time can be expected to contribute to the activities of the international scientific community.
1	**Poor**	**Very Limited Scope for Developing its Research Quality and Reputation** The institution has to work hard to establish itself as an internationally notable institution in its discipline within the foreseeable future.

3. What we can infer from research units' self assessments

Analysis of self-evaluation reports and bibliometric performance of Latvian research groups allows some observations can be made.

- The number of research-performing institutions and the number of research groups are very large in relation to the population of the country. Multiple groups work in similar areas. The structure is therefore fragmented and probably in many respects under-critical – especially in fields where infrastructure is important for doing research
- The proportion of 'indexed' publications (Web of Science, Scopus, etc) in total publications is very low, suggesting that a lot of the research is primarily of local interest. This reinforces the impression of limited international contact identified in the systems review that accompanies this report
- In many cases, indexed articles are not much cited, suggesting there may be a quality issue
- There is a small number of groups, who seem to perform well and to be visible in the international literature
- Funding per researcher varies greatly, even within similar fields
- PhD production is concentrated in the major universities but with a long 'tail' across many institutes. If this is a symptom of joint working it is likely to be useful – many PhDs benefit from an institute context, where the worker can focus on specialised research. But it may also be a symptom of fragmentation and failure to create effective graduate schools, sharing infrastructure, teaching on methods etc.
- Only a modest number of groups obtain Framework Programme funding. Where people work in areas of relevance to the Framework Programme, the ability to participate is an important 'litmus test' of research groups' international networks and quality
- The humanities always tend to be more national and less orientated towards academic journals than the sciences. Nonetheless, the impression from the output performance in Latvia is of a high degree of national focus. The humanities are increasingly seen as places for international rather than just national scholarship, so this may give grounds for concern

4. The panels' views on Latvian research overall

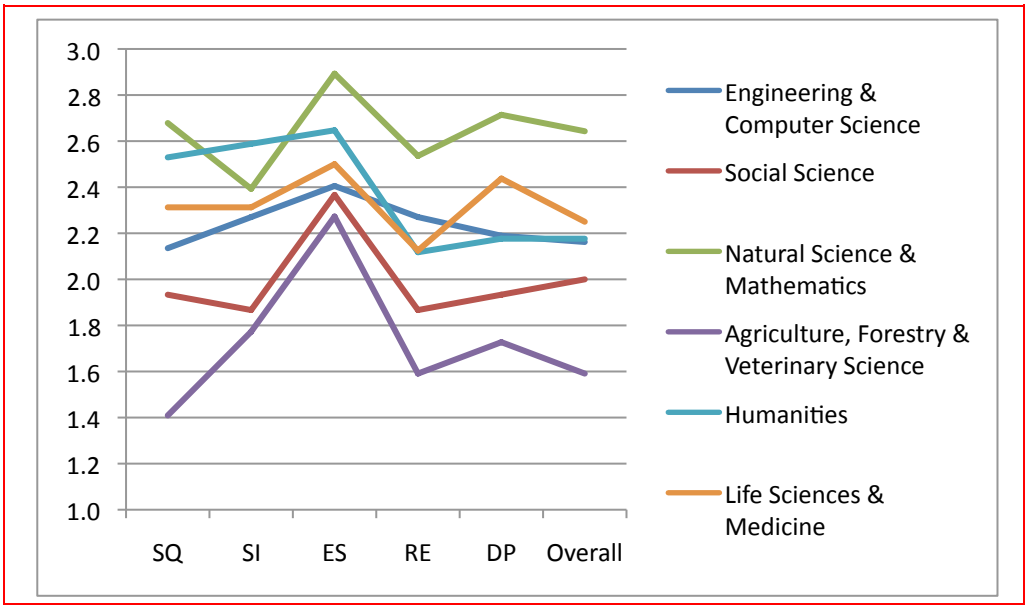
Figure 7 shows the mean scores each panel gave on each dimension. Eleven of the units were adjudged by the panels not to be performing research and scored zero. The panels were carefully briefed on the use of the scales at the start of their visits to Latvia, with the aim to encourage them to use the scales in similar ways. Since it is not possible to triangulate across the panels, we cannot be certain that despite the efforts of those supporting the panels the scores are fully comparable. However, there is also a good level of consistency between panels' verbal and numerical accounts.

Figure 7 Mean RAE scores per discipline

	Engineering & Computer Science	Social Science	Natural Science & Mathematics	Agriculture, Forestry & Veterinary Science	Humanities	Life Sciences & Medicine
Overall score	2.2	2.0	2.6	1.7	2.2	2.3
Quality	2.1	1.9	2.7	1.4	2.5	2.3
Scientific impact	2.3	1.9	2.4	1.8	2.6	2.3
Economic and social impact	2.4	2.3	2.9	2.3	2.6	2.5
Research environment	2.3	1.9	2.5	1.6	2.1	2.1
Development potential	2.2	1.9	2.7	1.8	2.2	2.4

Figure 8 contains the same information as Figure 7 but presented in a graphical format.

Figure 8 Mean scores per discipline (graphic)



As the numbers suggest, overall the panels found that the average level of research quality, management and infrastructure left much to be desired. At the same time, there are important high points, such as the Institute of Organic Synthesis, the Latvian Biomedical Research and Study Centre, the Institute of Electronics and Computer Science and that of Food Safety. These and others provide potential nodes for future investments.

The averages shown in Figure 7 of course conceal a range of scores[1]. Figure 9 shows the distribution of 'overall' scores. One research group in the life sciences scored '5'. The commonest score was '2', a satisfactory national player.

Figure 9 Distribution for 'overall' scores

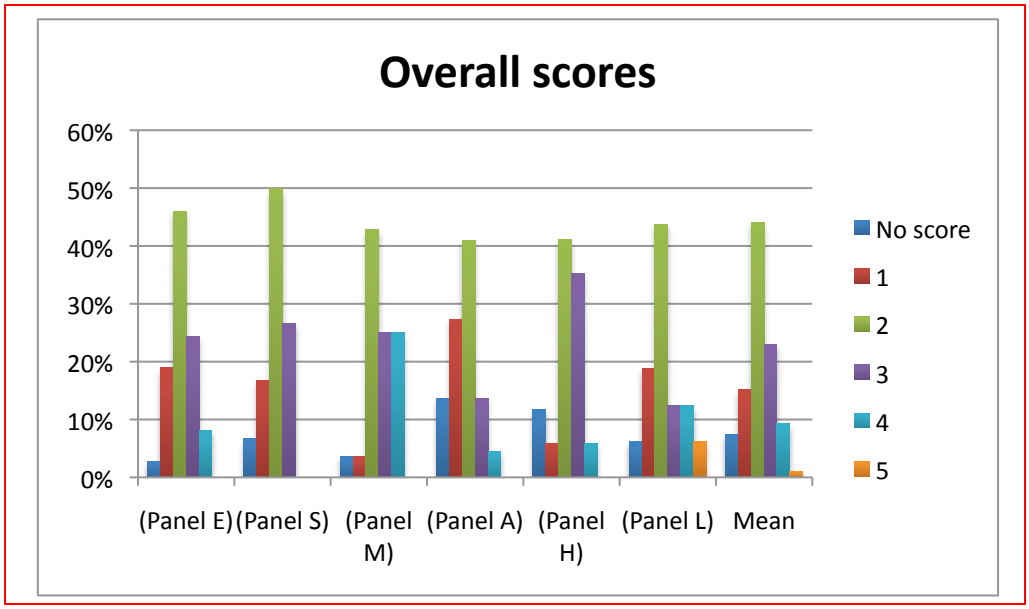
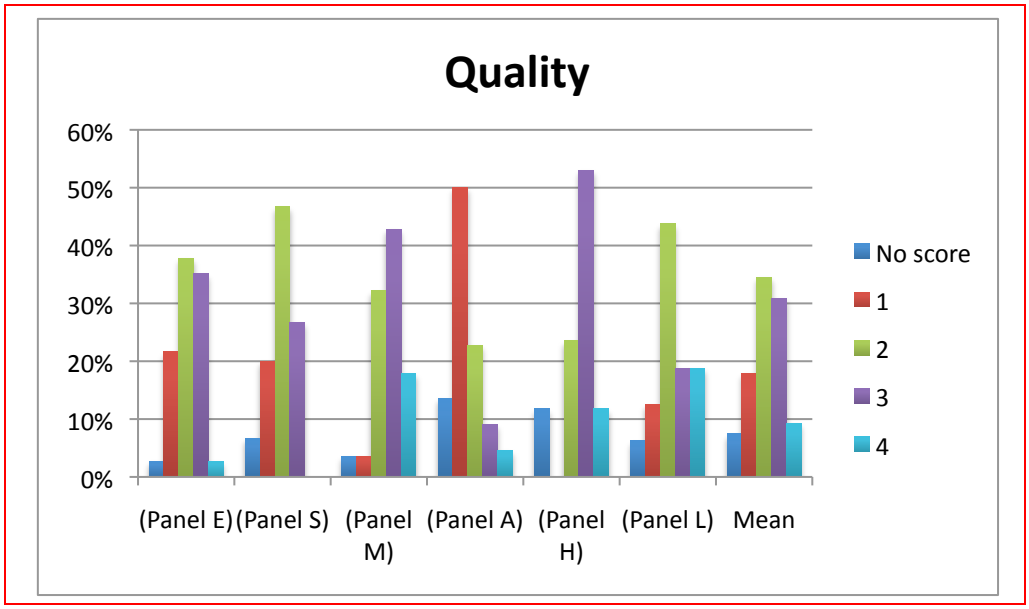


Figure 10 shows the distributions for scientific quality. Twelve groups scored '4' for quality; there were no 5s. The commonest score was '2' – a satisfactory national player but not good enough to operate internationally. In maths and the natural sciences, the commonest score was 3, while in Agriculture it was 1.

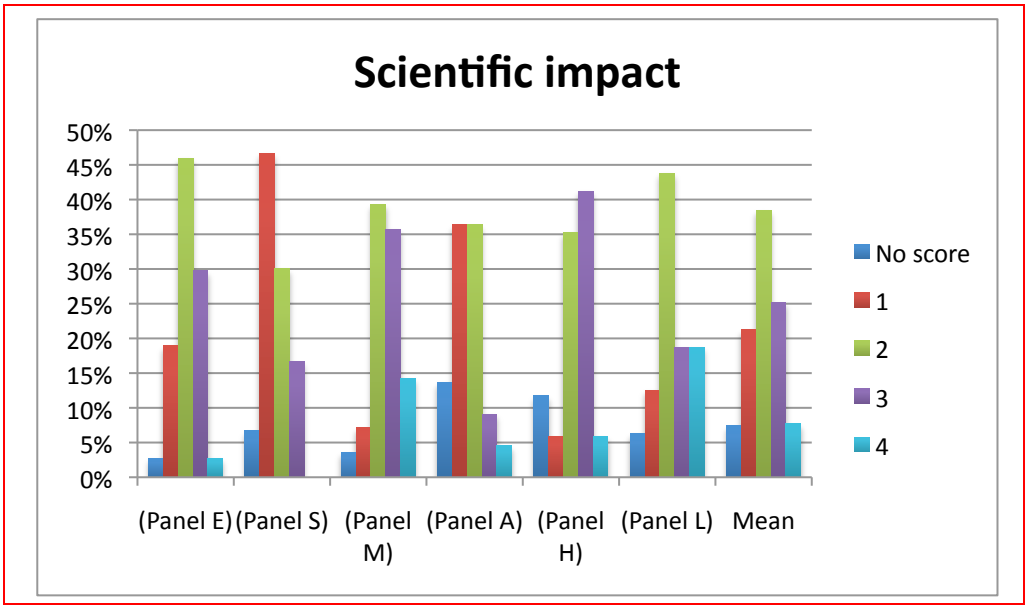
Figure 10 Score distributions for scientific quality



[1] Strictly, because the scales used are qualitative, Likert scales where the 'distance' between numbers is not mathematically defined, distributions rather than averages should be used. However, showing averages provides a useful shorthand if (as is the case here) score distributions are not multi-modal

As with quality, the commonest score for impact or influence on the scientific field was '2'. There were ten 4s (mainly in maths and the sciences) but no 5s. The social scientists were the weakest, reflecting the novelty of many of the fields in Latvia while the humanists (by a small margin) were the strongest with a peak of 3. But both they and the mathematics and natural sciences fields had rather similar numbers of 2s and 3s.

Figure 11 Score distributions for impact on science



The economic and social impact dimension represents a judgement about the effects of the groups **in Latvia**, which is one reason the scores are a bit higher than for other dimensions. Overall, there are about as many 3s as 2s. The humanists have the biggest proportion of 4s, reflecting their importance not only in culture but also in areas like pedagogy.

Figure 12 Score distributions for economic and social impact

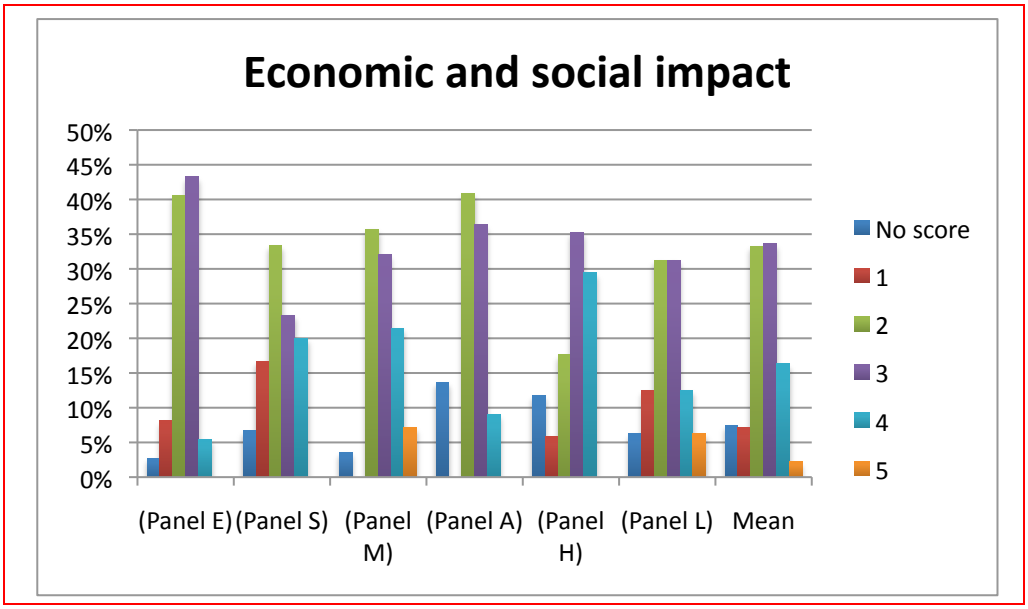
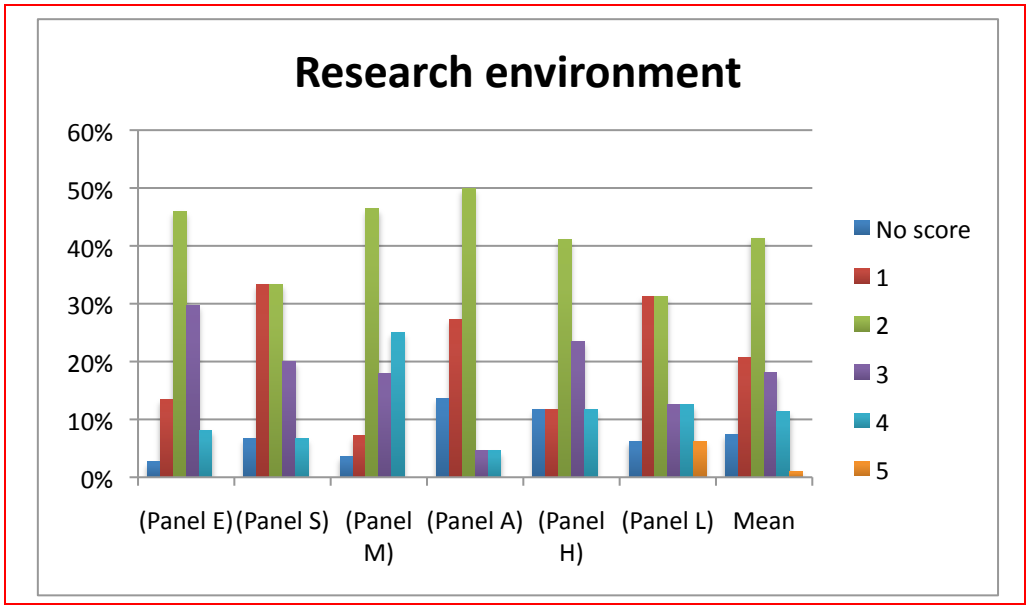


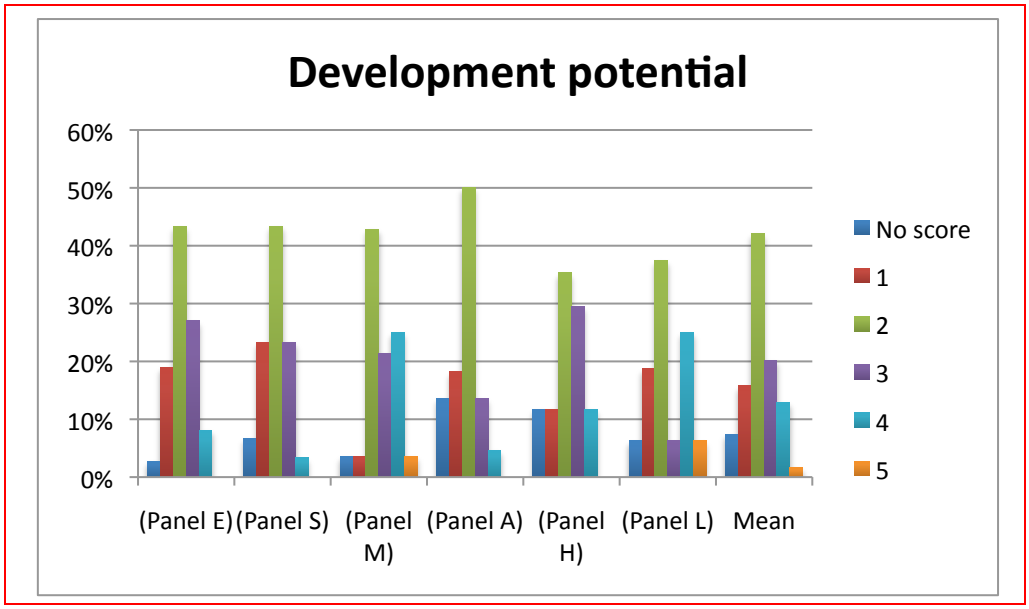
Figure 13 shows score distributions for research environment and infrastructure, which represents a composite judgement about both the physical infrastructure and the appropriateness of management, especially in relation to research strategy and human resources. Again, '2' is the commonest score, but both the life and the social sciences have as many 1s. But the distributions also show quite a number of higher-performing groups on this dimension.

Figure 13 Score distributions for research environment and infrastructure



The scores shown in Figure 14 represent the panels' judgements about which groups are promising enough to be worth an investment. The majority are unpromising (2s) but there is nonetheless a substantial number of 3s and 4s – and even a small number of 5s – that suggest the research system contains a number of nodes around which it could usefully coalesce – reducing fragmentation and building strength.

Figure 14 Score distributions for development potential



Overall, the panels' judgement is that

- Engineering and computer science (Panel E) is surprisingly fragmented, with a great deal of activity at levels below international norms but also with important high spots. Given the importance of these disciplines for the economy, strengthening their performance should have high priority
- Social sciences are not very mature in Latvia, with many of the disciplines involved having being developed mainly in the post-Soviet era
- Mathematics and the natural sciences (Panel M) are comparatively strong and well established, though there are low as well as comparatively high performers. This strength represents an important economic opportunity
- Agricultural research (Panel A), like humanities, needs to a fair extent to be focused on national needs but is overly so, fragmented and in need of more international perspective. The division of labour between the ministries of education and agriculture seems to exacerbate the fragmentation – perhaps because the distinction between fundamental research and education on the one hand and the legitimate need for government laboratories in agriculture is not clearly made
- Humanities (Panel H) is especially fragmented – though it should be noted that this is the case in most countries – and especially focused on Latvian issues and norms
- Life sciences (Panel L) groups are mainly national players but there are high points with a handful of units that can functional at international levels of quality and relevance

5. Institutional-level findings

Figure 16 shows the mean scores for the universities and higher education institutions as a group and for the other organisations, which for simplicity we refer to as 'research institutes'. At this highly aggregated level, the mean scores are close to identical. Nor is there much difference between the maximum and the minimum scores obtained in each category – both contained some very good groups and others whose performance leaves something to be desired.

Figure 15 Mean, maximum and minimum scores for universities/higher education and research institutes

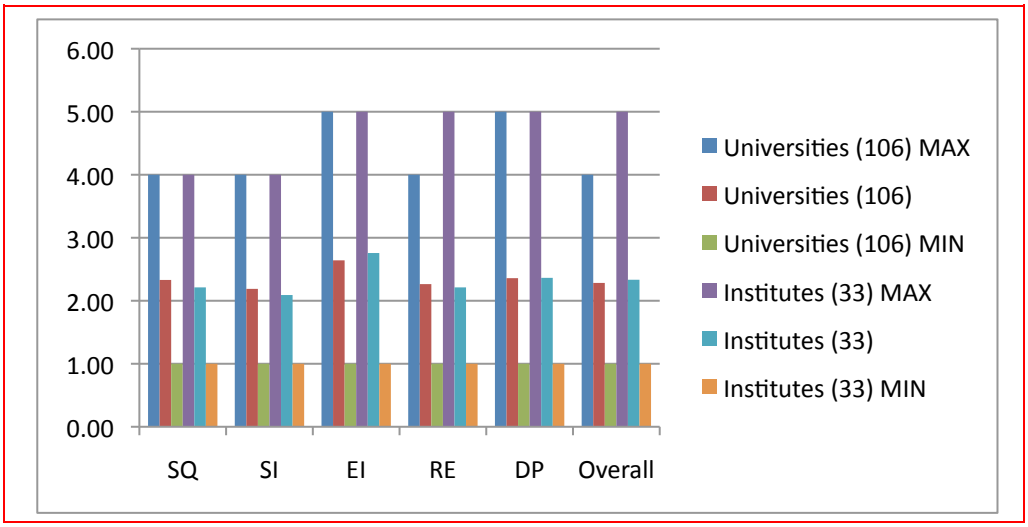


Figure 16 shows the mean scores for the universities and higher education institutions assessed. The numerical dominance of Riga TU and the University of Latvia is clear – and the large number of research groups assessed at these universities means that a simple average conceals a great deal of variation. Comparing large numbers of groups at these big universities with other universities that have small numbers of groups is also problematic in that the average scores of the big universities naturally tend towards the overall mean of all the groups investigated. Thus, for example, it would be problematic to conclude from the higher scores for Daugavpils University that this is comprehensively 'better' than Riga TU or the University of Latvia. On the other hand, it is clear that the larger organisations offered a number of group for assessment, which were less highly rated than the small number (6) submitted from Daugavpils.

Figure 16 Mean scores by university

	SQ	SI	EI	RE	DP	Overall
Business University Turiba (1)	2.00	1.00	3.00	3.00	2.00	2.00
Daugavpils University (6)	2.67	2.50	3.00	3.17	3.17	2.83
ISMA University of Applied Sciences (1)	1.00	1.00	1.00	1.00	1.00	1.00
Latvia University of Agriculture (13)	1.69	1.85	2.15	1.77	2.00	1.85
Liepaja University (3)	2.00	2.00	3.33	2.33	2.33	2.33
Rezekne Higher Education Institution (3)	2.00	2.00	3.67	3.00	2.67	2.67
Riga Stradins University (2)	3.00	2.50	2.50	2.50	3.00	2.50
Riga Technical University (42)	2.19	2.05	2.38	2.17	2.14	2.10
University of Latvia (32)	2.81	2.59	3.03	2.34	2.66	2.63
Ventspils University College (2)	3.00	3.00	4.00	4.00	4.00	4.00
Vidzeme University of Applied Sciences (1)	1.00	1.00	2.00	1.00	1.00	1.00

SQ = scientific quality; SI = scientific impact; EI = economic and social impact; RE = research environment; DP = development potential
Numbers in brackets denote numbers of research groups assessed

If we disaggregate the large universities, we get a better sense of their high (and not so high) points. Figure 17 shows how research groups at the Agricultural University fared by discipline. The picture conforms to the overall one, namely that agricultural research in Latvia is at best nationally viable, lagging behind international developments.

Figure 17 Latvia University of Agriculture mean scores by field

	SQ	SI	EI	RE	DP	Overall
Latvia University of Agriculture E (3)	2.00	2.00	2.00	2.33	2.00	2.00
Latvia University of Agriculture A (8)	1.50	1.75	2.25	1.63	1.88	1.75
Latvia University of Agriculture S (2)	2.00	2.00	2.00	1.50	2.00	2.00

Riga TU (Figure 18) does best in mathematics and physical sciences, which is a surprise for an essentially applied university. Even in maths and physical sciences, however, the mean score is no cause for celebration. The weaker performance in engineering and computer science may be connected with the low R&D-intensity and low innovation propensity of Latvian manufacturing industry more widely. But if Riga TU is to fulfil its natural role of leading innovation in Latvia it clearly needs to raise its game in terms of research.

Figure 18 Riga Technical University mean scores by field

	SQ	SI	EI	RE	DP	Overall
Riga TU E (26)	2.19	2.12	2.42	2.19	2.15	2.12
Riga TU H (1)	2.00	2.00	3.00	2.00	3.00	2.00
Riga TU M (9)	2.67	2.44	2.44	2.56	2.33	2.33
Riga TU S (6)	1.50	1.17	2.00	1.50	1.67	1.67

The University of Latvia is a traditional 'omniversity' that – presumably because of the presence of Riga TU – tends to shy away from two engineering-related research groups, its scores are much better than those of Riga TU – but this results precisely from the effect of averaging that we discussed earlier. The University of Latvia seems not to do very well in life sciences but is otherwise – compared with other universities – fairly strong on a Latvian scale.

Figure 19 Latvia University mean scores by field

	SQ	SI	EI	RE	DP	Overall
U Latvia E (2)	3.50	3.50	3.50	3.50	3.50	3.50
U Latvia H (6)	3.17	3.00	2.83	2.17	2.33	2.50
U Latvia L (6)	2.17	2.17	2.50	1.67	1.67	1.83
U Latvia S (6)	2.83	2.00	3.50	2.50	3.00	2.83
U Latvia M (12)	2.83	2.75	3.08	2.50	3.00	2.83

Turning our attention away from the universities to the research institutes, we can see that at the top of the scale there are several that perform well (Figure 20).

Figure 20 Research institutes with an overall score of 4 or 5

Group	SQ	SI	EI	RE	DP	Overall
Latvian Institute of Organic Synthesis	4	4	5	5	5	5
Institute of Food Safety, Animal Health and Environment "BIOR"	4	4	4	4	4	4
Institute of Electronics and Computer Science	3	3	4	4	4	4
Transport and Telecommunication Institute	3	3	3	4	4	4
Latvian Biomedical Research and Study Centre	4	4	4	3	4	4
Paul Stradins Clinical University Hospital	4	4	4	4	4	4
Latvian State Institute of Wood Chemistry	4	4	5	4	4	4

In fact, 7 of the 15 research groups with an overall score of '4' or above were research institutes – which, given that there were over three times as many university groups as institute groups assessed, suggests that in aggregate the peak quality of the institutes is above that of the universities. Key institutes should therefore play key roles in any consolidation of research groups within Latvia.

Figure 21 Research groups with an overall score of 4 or 5

University	Group	SQ	SI	EI	RE	DP	Overall
	Latvian Institute of Organic Synthesis	4	4	5	5	5	**5**
Daugavpils University	G.Liberts Innovative Microscopy Centre, Department of Physics Mathematical Research Center	3	3	4	4	4	4
University of Latvia	Faculty of Computing	4	4	3	3	4	4
University of Latvia	Institute of Literature, Folklore and Art	4	4	4	4	4	4
University of Latvia	Department of Physics and Department of Optometry and Optical Science	4	4	4	4	4	4
University of Latvia	Faculty of Geography and Earth Sciences	3	4	4	4	4	4
University of Latvia	Institute of Atomic Physics and Spectroscopy	4	3	4	3	4	4
University of Latvia	Institute of Solid State Physics	4	4	5	4	5	4
Ventspils University College	Ventspils International Radio Astronomy Centre	3	3	4	4	4	4
	Institute of Food Safety, Animal Health and Environment "BIOR"	4	4	4	4	4	4
	Institute of Electronics and Computer Science	3	3	4	4	4	4
	Transport and Telecommunication Institute	3	3	3	4	4	4
	Latvian Biomedical Research and Study Centre	4	4	4	3	4	4
	Paul Stradins Clinical University Hospital	4	4	4	4	4	4
	Latvian State Institute of Wood Chemistry	4	4	5	4	4	4

The next six Figures look at the fields in turn, and identify those groups scoring '3' or above, namely those that the panels saw as internationally competitive. Remembering the small absolute size of Latvia, this is not a bad showing – it reinforces the idea that there are a number f areas of comparative strength within the research community that could provide growth and development nodes in any consolidation.

Figure 22 Agriculture groups scoring 3 or more overall

University	Group	SQ	SI	EI	RE	DP	Overall
	Institute of Food Safety, Animal Health and Environment "BIOR"	4	4	4	4	4	4
	Latvian State Forest Research Institute "Silava"	3	3	4	3	3	3
	State Priekuli Plant Breeding Institute	3	3	3	2	2	3

Figure 23 Engineering and computer science groups scoring 3 or more overall

University	Group	SQ	SI	EI	RE	DP	Overall
	Institute of Electronics and Computer Science	3	3	4	4	4	4
University of Latvia	Faculty of Computing	4	4	3	3	4	4
	Transport and Telecommunication Institute	3	3	3	4	4	4
Riga Technical University	Institute of Information Technology	3	3	2	3	3	3
Riga Technical University	Institute of Telecommunications	3	3	3	3	3	3
Riga Technical University	Institute of Industrial Electronics and Electrical Technologies	3	2	3	3	3	3
Riga Technical University	Institute of Power Engineering	3	3	3	2	3	3
Riga Technical University	Institute of Energy Systems and Environment	3	2	3	2	3	3
Riga Technical University	Institute of Mechanical Engineering	3	3	3	3	3	3
University of Latvia	Institute of Mathematics and Computer Science, Computer Science Direction	3	3	4	4	3	3
Riga Technical University	Institute of Materials and Structures	3	3	3	3	3	3
Riga Technical University	Institute of Biomedical Engineering and Nanotechnologies	3	3	3	3	3	3

Figure 24 Humanities groups scoring 3 or more overall

University	Group	SQ	SI	EI	RE	DP	Overall
University of Latvia	Institute of Literature, Folklore and Art	4	4	4	4	4	4
	Latvian Academy of Music Jazeps Vitols Scientific Research Centre	4	3	3	3	2	3
	Latvian Academy of Art Institute of Art History	3	3	4	2	3	3
University of Latvia	Faculty of Humanities	3	3	3	2	3	3
Daugavpils University	Faculty of Humanities	3	2	3	4	4	3
Rezekne Higher Education Institution	Institute for Regional Studies, Humanities Direction	2	2	4	3	3	3

Figure 25 Life sciences and medicine groups scoring 3 or more overall

University	Group	SQ	SI	EI	RE	DP	Overall
	Latvian Institute of Organic Synthesis	4	4	5	5	5	**5**
	Latvian Biomedical Research and Study Centre	4	4	4	3	4	4
	Paul Stradins Clinical University Hospital	4	4	4	4	4	4
Riga Stradins University	Division of Medicine	3	3	3	4	4	3
Daugavpils University	Institute of Systematic Biology + Department of Anatomy and Physiology	3	3	2	3	4	3

Figure 26 Mathematics and physical sciences and medicine groups scoring 3 or more overall

University	Group	SQ	SI	EI	RE	DP	Overall
	Latvian State Institute of Wood Chemistry	4	4	5	4	4	**4**
Daugavpils University	G.Liberts Innovative Microscopy Centre, Department of Physics Mathematical Research Center	3	3	4	4	4	**4**
University of Latvia	Department of Physics and Department of Optometry and Optical Science	4	4	4	4	4	**4**
University of Latvia	Faculty of Geography and Earth Sciences	3	4	4	4	4	**4**
University of Latvia	Institute of Atomic Physics and Spectroscopy	4	3	4	3	4	**4**
Ventspils University College	Ventspils International Radio Astronomy Centre	3	3	4	4	4	**4**
University of Latvia	Institute of Solid State Physics	4	4	5	4	5	**4**
University of Latvia	Institute of Astronomy	3	3	3	2	4	**3**
University of Latvia	Institute of Chemical Physics	3	3	2	2	3	**3**
Riga Technical University (Faculty of Material Science and Applied Chemistry)	Institute of Technology of Organic Chemistry	4	3	3	3	3	**3**
Riga Technical University (Faculty of Material Science and Applied Chemistry)	Institute of General Chemical Engineering	3	3	3	4	3	**3**
Liepāja University	Natural Sciences & Mathematics	2	2	4	3	3	**3**
University of Latvia	Institute of Mathematics and Computer Science	3	3	3	2	2	**3**

Figure 27 Social sciences groups scoring 3 or more overall

University	Group	SQ	SI	EI	RE	DP	Overall
University of Latvia	Advanced Social and Political Research Institute	3	2	4	3	3	3
University of Latvia	Institute of Pedagogical Science	3	2	3	3	3	3
University of Latvia	Department of Educational Sciences and Institute for Educational Research	3	1	4	2	3	3
University of Latvia	Department of Psychology	3	3	3	3	3	3
University of Latvia	Faculty of Law	3	3	4	3	4	3
Daugavpils University	Institute of Sustainable Education, Department of Pedagogy and Psychology, Department of Social Psychology	2	3	3	4	2	3
Rezekne Higher Education Institution	Personality Socialization Research Institute	3	2	4	3	3	3
	Riga Teacher Training and Educational Management Academy	3	3	4	4	3	3

6. Summary of the panels' observations

The panels' overall conclusion is that while there are some high points, the average level of quality and performance in the Latvian research system has scope for

improvement. Underpinning this pattern is a series of problems, the most fundamental of which is the absolutely low level of research funding in the system as a whole. Much of that limited funding has come from Structural Funds in recent years and is therefore at risk. Ultimately, any developed country must be financing its own research on a permanent basis. Temporary funds are useful for supporting transitions but cannot sustainably fund 'business as usual'.

The separation between teaching and research that has in Latvia been perpetuated beyond the end of the Soviet system is generally problematic. While large countries like Germany can coherently maintain parallel university and institute systems with critical mass, doing so in a very small country is difficult. The fact that many of the best and most robust research units in Latvia are institutes is a symptom of this fact rather than a reason to keep them separate from the teaching system. Generically, teaching requires breadth while research needs depth. In order to have a robust research-based teaching system that produces relevant human capital and good-quality research the two elements need to be merged in a small country – or at the very least to be closely integrated.

Incentives for both teaching and research in the Latvian system encourage fragmentation – which is the opposite of what is necessary in a small country. The practice of registering any qualifying, self-defined group of researchers as a research unit is one of the causes of this fragmentation. The result is a structure that is fragmented and duplicative across all areas of research. The panels found many cases where infrastructure and equipment were poorly tied to units' research programmes, so there is scope for better planning and utilisation of such resources. Strengthening the research system will depend upon reducing this fragmentation, using the capabilities of stronger research units to lead the way towards fewer centres, which should have critical mass and a meaningful international profile, so that Latvia can participate more fully in international science.

Human resources are a problem. Except in social sciences, there is generally a bimodal age distribution, in many cases with leaders who are well beyond a normal retirement age. This poses important problems of renewal. The positive aspect is that there are generations of younger researchers – and in the view of the panels, many promising PhD students – who, with adequate training and funding support, can step in and lead Latvian research towards a more dynamic and internationally integrated performance. Achieving this requires improved understanding of research leadership and management as well as funding and internal career incentives that support development, including funding for young researchers and post-docs. Better support to mobility, reducing inbreeding in the research community and connecting it better to the international community, is also needed.

The mediocre quality of much (but by no means all) of the research the panels reviewed is manifested in over-focus on Latvian issues, Latvian channels of communication, Latvian conferences. This isolates the Latvian research community from international science, reduces competitive pressure on that community and its understanding of international quality norms and impedes the communication and integration even of good-quality Latvian research results with world science. Of course, national issues are important – more so in some fields than in others – but in the unanimous judgement of the panels this balance is in the wrong place. More internationalism is needed. That requires recruitment and career development incentives that are more orientated to the international research community and not least to publication in international, peer-reviewed English-language journals. While the predominance of English publications undoubtedly represents an unfortunate sort of cultural imperialism, the reality is that English is the language of modern scholarship, just as Latin was in the distant past. Incentives need to be adjusted accordingly.

The disciplinary coverage of Latvian research is broadly good: there is at least some competence in most subjects. The social sciences in this respect are – for historical reasons – less well placed. Economics lacks strong centres and needs further

development. Business and management are important subjects that are largely tackled outside the public system, and are correspondingly over-focused on education at the expense of research. These also need strengthening within the public system.

7. Policy implications

The biggest question is, as earlier indicated, the absolute lack of money. This is completely understandable in the current economic context. However, the plain fact is that you cannot build and sustain a modern economy without making a significant expenditure on research and higher education. If you fail to make this investment, the supply of high-quality human resources to society and industry is too small and those people who could be driving socio-economic development and growth tend to drift abroad. The production of knowledge is of course one very important reason for funding research; but the production of human capital is probably an even more important reason for doing so. Lack of human capital means not only that the country has difficulties in exploiting its own knowledge production but also, crucially, that it is hard to exploit the more than 99% of new knowledge that is generated abroad. Without these capabilities, the country will enter a declining spiral that infects the performance of the economy as a whole.

Major policy needs are

- Allocation of permanent national funding to research, using Structural Funds as far as possible only to pay for the costs of reforming and transitioning the system to higher levels of performance
- De-fragmenting and strengthening the research system by consolidating research units – primarily around the 'cores' provided by the existing well-performing units – and proving incentives for quality and international reach
- Provision of a higher level of competitive, project-based funding, using a number of instruments to
  - Support different stages of the researcher career, not least post-docs and young researchers
  - Support the formation of larger centres and groups, through centre funding and the provision of large as well as small research grants
  - Encourage better research-industry cooperation, raising industrial capabilities and providing signals to the research community about relevance and which problems are especially interesting from a societal perspective; here the experience of VINNOVA and TEKES in developing such links may be especially valuable to Latvia
- Use of an institutional funding system that is based on a balance of prospective planning, international peer review and performance indicators, so as to combine strategic development, incentives related to measurement and embedding in the international research system

8. Recommendations

This is the second time a research assessment exercise has been done in Latvia. The first one was done over 20 years ago in a time of radical systems transition when it was perhaps especially hard to implement change. As a result, it has almost no impact on the research system. For all intents and purposes it may as well not have happened.

In an important sense, therefore, the current exercise is the 'first' and is an important learning exercise for research performers as well as for the Latvian system as a whole. The variable quality of the self-assessments and in many cases the uncertainties

people experienced in knowing how to represent themselves and their units testify to the fact that many of them lack sufficient experience of research strategy, leadership and communication. These skills should improve over time. But the fact that in many cases learning is at an early stage means that the results of the exercise should be used in a way that reflects the fact that not everyone was able to present themselves well. A harsh, UK-style reallocation of resources, unaccompanied by developmental measures, may do as much harm as good.

Latvia therefore needs to adopt a softer, but nonetheless robust, approach. It would not be wise to make a one-to-one translation of RAE scores into resource allocation – and it would be especially unwise top-down to decide who should merge with whom. The first step is to use the RAE results as a mirror and to ask the research units to explain how they can use this feedback to improve. The requirements for consolidation and improvement are clearly written into the individual unit reports and in a number of cases the panels have cautiously indicated opportunities for merger.

The Education Ministry should now consider what incentives to use to promote consolidation – taking care that it does not in the process needlessly damage individual fields. Clearly, those units scoring 4 and 5 (on a 5-point scale, where 5 is high) are likely to form the nodes round which to consolidate. In a number of cases (but by no means in all of them) units scoring 3 also have strong potential to act as points of consolidation. Units scoring 2 should be strongly encourage to merge themselves into larger and better groups, unless they can develop convincing arguments that they are at an early stage of development and therefore need time and opportunity to grow. (It is important in this process of pruning to cut off the dead wood but to leave the fresh buds intact.) The case for providing institutional funding to units scoring 1 or which were not scored at all on the grounds that they are not doing research would be hard to make.

The next step should therefore be to invite groups themselves to propose mergers and transitional arrangements. More widely, the ministry should be reluctant to tolerate the perpetuation of parallel research and academic units in or near the same university in the same field. Structural Funds provide a transitional opportunity to support such change. Shifting the focus of institutional funding from the research groups to the institutions that host them is a necessary step, in order to enable institutions to have strategies and to provide them with reasons to manage.

Appendix A Panel members

Agriculture, forestry and veterinary science
Professor Ken Thomson, chairman
Professor George Coupland
Professor Katri Kärkkäinen
Professor Viktor Nedović
Professor Paul Struik

Engineering and Computer Science
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Professor Seddik Bacha
Professor Martin Berggren
Professor Simon Deleonibus
Professor Laurens Katgerman
Professor Roger Sierens
Professor Thanasis Triantafillou

Humanities
Professor Naomi Segal – chair
Associate Professor Daniela Koleva
Associate Professor Erika Sausverde
Professor Svend Erik Larsen
Professor Emeritus Wim Blockmans

Life Sciences and Medicine
Professor Roland Pochet, chairman
Professor Bill Baltzopoulos
Rósa Björk Barkardóttir (Clinical Professor)
Professor Aleksandar Dimovski
Professor Herfried Griengl
Professor Igor Konieczny

Social Sciences
Professor Christofer Edling, chairman
Professor Fernando Ballabriga Clavería
Professor John Furlong
Professor Thomas Hartman
Professor Colin Hay
Professor Roman Wieruszewski

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