

SciLifeLab

Den nationella styrelsen för Science for Life Laboratory

Protokoll från styrelsemöte nr 13
2015-05-13, kl. 10.00-13.00
Alfa, plan 6, Stockholm

Närvarande ledamöter: Göran Sandberg (ordförande), Hans Adolfsson (SU), Maria Anvret (GU), Sophia Hober (KTH), Hans-Gustaf Ljunggren (KI), Karl-Eric Magnusson (LiU), Margareta Olsson Birgersson (näringslivsrepresentant), Stellan Sandler (UU), Gunilla Westergren-Thorsson (LU)

Frånvarande ledamöter:

Övriga närvarande: Mathias Uhlén (Director, KTH), Karin Forsberg Nilsson (UU), Fredrik Sterky (sekreterare)

Vid punkt 8-9: Bengt Persson, Ina Schuppe Koistinen

Protokollförrare: Fredrik Sterky

Bilagor:

- A. Organisationsschema för ny organisation från 150701
 - B. Rapport från Scientific Advisory Board
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1. Formalia

Ordförande Göran Sandberg öppnar mötet.
 Karin Forsberg Nilsson adjungeras till mötet.
 Sophia Hober utsågs att jämte ordförande justera protokollet.
 Föregående protokoll lades till handlingarna.

2. SciLifeLabs Ledning och organisation

Styrelseledamöterna sammanträdde enskilt vid denna punkt. Mathias Uhlén, Karin Forsberg Nilsson och Fredrik Sterky lämnade rummet. Beslut som tagits på möte nr 12 och 13 sammanfattas i ett organisationsschema (bilaga A).

Styrelsen beslutar i övrigt avseende centrets exekutiva ledning:

- Att SciLifeLabs Executive management team skall bestå av fem personer:

Director
 Co-Director
 Platform Director
 Site Director Stockholm
 Site Director Uppsala

- Att uppdra åt Professor Kallionemi att till styrelsen föreslå innehavare av tjänsten som Plattform Director. Tjänsten skall tillsättas efter intern intresseanmälan, främst inom KTH. Vid tillsättningen bör beaktas att Executive Management team bör ha representation från de fyra grundaruniversitetet.

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- Att uppdra åt Uppsala universitet att tillsätta en Site Director med ansvar för SciLifeLabs verksamhet i Uppsala.
- Att i avvaktan på att Site Director i Uppsala utses erbjuda Uppsala universitet att till 1 juli utse en tillförordnad Site Director som kan verka i ledningsgruppen till en formell innehavare av tjänsten utses.
- Att i avvaktan på att Platform Director utses erbjuda KTH att till 1 juli utse en tillförordnad Platform Director som kan verka i ledningsgruppen till en formell innehavare av tjänsten utses.
- Att en tjänst som informationschef efter extern annonsering skall tillsättas vid SciLifeLab. Informationschefen rapporterar till centrets Director eller den som Director utser.
- Att uppdra åt Professor Kallionemi att till styrelsen föreslå innehavare av tjänsten som informationschef.

Styrelsen beslutar avseende administrativt stöd till Director:



- Att ge Ina Schuppe Koistinen i uppdrag att under hösten utveckla en funktion som Directors office.
- Att en tjänst som assistent till director skall inrättas finansierad från centrets nationella resurs.
- Att ge styrelsens ordförande i mandat att ta nödvändiga kompletteringsbeslut för att ge den nye directorn optimala arbetsförhållanden.

3. Satelliter – reviderade ansökningar

Mathias Uhlén informerade om de sex reviderade ansökningar om satellitverksamhet som kommit in. Förslagen har granskats av värduiversitetens ledamöter i nationella referenskommittén (NRK).
Informera alla andra faciliteter

Styrelsen beslutar följande avseende satelliter:

- Sex förslag på satellit-faciliteter godkänns med avsikten att dessa sex satelliter finansieras under 2016 och att de utvärderas i samband med utvärderingen av alla faciliteter som planeras att genomföras vinter/vår 2016. En revidering av styrning och prioriteringar för "Integrative clinical genomics" ska tas fram i samråd med styrgruppen för plattformen Clinical Diagnostics. Beslutet om finansiering av satelliter villkoras med att SciLifeLab budget utökas för 2016 enligt forskningspropositionen 2012. Nedanstående förslag beviljas finansiering:
- Systems Biology (Chalmers): 2 MSEK
Systems Biology kommer ingå i plattformen Bioinformatik (ny styrgrupp).

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- Metabolomics (SLU-Umeå): 3 MSEK

Metabolomics föreslås bli en ny plattform med egen styrgrupp.

- Integrative Clinical Genomics (Göteborgs universitet, efter revidering enligt ovan): 2 MSEK

Integrative Clinical Genomics kommer ingå i plattformen Clinical Diagnostics.

- NMR for Life (Göteborgs universitet): 3 MSEK

NMR for Life kommer ingå i plattformen för Strukturbiologi (ny styrgrupp).

- Next generation sequencing (Lunds universitet): 2 MSEK

Next generation sequencing kommer ingå i plattformen Clinical Diagnostics.

- U-READ (Lunds universitet): 2 MSEK

U-READ kommer ingå i plattformen Drug Development.

Styrelsen beslutar att ge Mathias Uhlén, Göran Sandberg och Karin Forsberg Nilsson i uppdrag att skicka beslutsbrev till godkända satelliter.

Punkten beslutas vara omedelbart justerad.

4. Science and SciLifeLab Prize

Mathias Uhlén informerade om resultatet av hans tidigare uppdrag att förhandla med AAAS/Science om ett nytt avtal för *Science and SciLifeLab prize for young scientists*. Avtalet innebär en utökad kostnad för promotion och andra kommersiella åtaganden, främst beroende av valutakurser.

Styrelsen beslutar att allokera 545 000 SEK årligen i fem år (2015-2019) från den nationella SciLifeLab-budgeten till projektet Science & SciLifeLab Prize for Young Scientists. Kostnaden tas av uppindexerade medel, varav 70% tillräknas Stockholmsnoden och 30% tillräknas Uppsalanoden. Det nya MOU som formulerats med Science gäller till och med 2020. Om KAW ej vill nyteckna avtalet längre fram, behöver MOU avbrytas senast 120 dagar före årsskiftet 2019-2020 för att inte MOU för 2020 skall träda i kraft utan extern finansiering.

Beslutet ersätter tidigare beslut om finansiering på nivån 365 000 SEK per år.

5. Proteinproduktion

Mathias Uhlén presenterade Gunnar von Heijnes förslag på utlysning på utlysning av en facilitet för proteinproduktion. Det finns ett stort nationellt behov av ett sådant stöd inom flera områden.

Styrelsen beslutar att ge Gunnar von Heijne uppdraget att förbereda en utlysning för en nationell distribuerad infrastruktur för proteinproduktion med primär avsikt att stödja följande forskningsområden, alla med relevans för SciLifeLab; (i) strukturbiologi med användning av cryo-EM, (ii) strukturbiologi med användning av röntgenkristallografi med särskild tonvikt på MaxIV, (iii) strukturbiologi med användning av NMR, (iv) läkemedelsutveckling inklusive utveckling av screening och assays och (v) proteomics (affinity och MS-baserad)

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med särskild tonvikt på utveckling av metoder för individualiserad medicin. Avsikten är att fatta ett beslut om utlysning på styrelsemötet i september, inkluderande tidsplan, budget och utvärderingsplan.

Styrelsen beslutar att ge Gunnar von Heijne i uppdrag att ordna en öppen hearing innan mötet i september för att möjliga avnämare ska vara involverade i förberedelserna för en utlysning. Den öppna hearingen bör innefatta korta synopsis från de intressenter som deltar.

6. SAB-rapport

Mathias Uhlén informerade om rapporten som lämnats in av Scientific Advisory Board (bilaga B), samt de kommentarer från ledningen som sammanställts. SciLifeLabs kommande ledning förväntas arbeta vidare med denna.

7. VR-utvärdering

Mathias Uhlén informerade om resultatet av Vetenskapsrådets utvärdering av de strategiska forskningsmiljöerna som gjordes 2014. SciLifeLab fick högsta betyg både i Stockholm och Uppsala.

8. Strategisk samverkan inom toxikologi

Ina Schuppe Koistinen informerade om intresse och diskussioner som förts om att skapa samverkan mellan Swetox och plattformen för läkemedelsutveckling vid SciLifeLab. Styrelsen var positiv understryker vikten av samverkan.

Styrelsen uppdrar till plattformen för läkemedelsutveckling (Per Arvidsson och Kristian Sandberg) att tillsammans med Ina Schuppe Koistinen ta fram ett förslag på samverkan och en strategisk plan till styrelsens september-möte. Förslaget ska rymmas inom plattformens budget och redovisa krav och motkrav från respektive part.

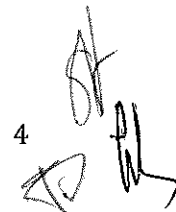
9. Bioinformatik, reviderad budget

Bengt Persson presenterade olika typer av behov inom bioinformatik och en uppskattning av kostnader för att kunna möta dessa behov. Bioinformatikplattformen arbetar med att samla sin verksamhet under en organisation – National Bioinformatics Infrastructure Sweden (NBIS), vilket kommer att underlätta optimalt utnyttjande av resurserna. NBIS startar 2016 och omfattar nuvarande BILS, WABI, SILS samt SciLifeLab. Styrelsen understryker vikten av bioinformatikverksamheten. Vid utvärderingen av SciLifeLabs faciliteter 2016 finns möjligheter till ökad finansiering, och det är lämpligt att flera olika finansörer samverkar. Styrelsen pekar också på att användaravgifter är en viktig komponent i framtida verksamhet. Detta gäller också andra plattformar.

10. Nationella projekt - granskare

Karin Forsberg Nilsson presenterade ett förslag som skulle underlätta hanteringen av nationella projekt i omgång 2. Målet är att tre personer ska granska varje ansökan. En sammanvägd bedömning görs sedan av en panel med fem medlemmar inklusive ordförande Ulf Petterson. Panelen lämnar sitt finansieringsförslag till Styrelsen.

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Styrelsen beslutar att den operativa ledningsgruppen får mandat att utse externa granskare, samt att Ulf Petterson får mandat att utse panelens medlemmar. Vidare ska Ulf Petterson personligen presentera panelens förslag för styrelsen.

11. Reviderat fyrpartsavtal

Mathias Uhlén informerade om det nya fyrpartsavtalet som är klart och distribueras för underskrift av de fyra rektorerna. Avtalet kommer att möjliggöra stärkt koppling mellan nationell och regional verksamhet samt mellan rektorerna och SciLifeLabs ledning.

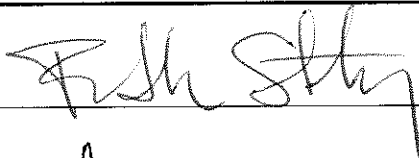
12. Övriga frågor

Inga övriga frågor

Kommande möten:

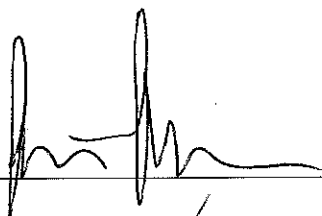
- Inga kommande möten bokade

Fredrik Sterky, protokollförare

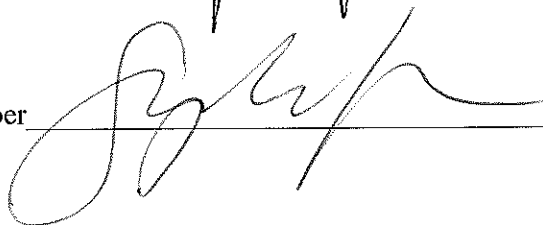


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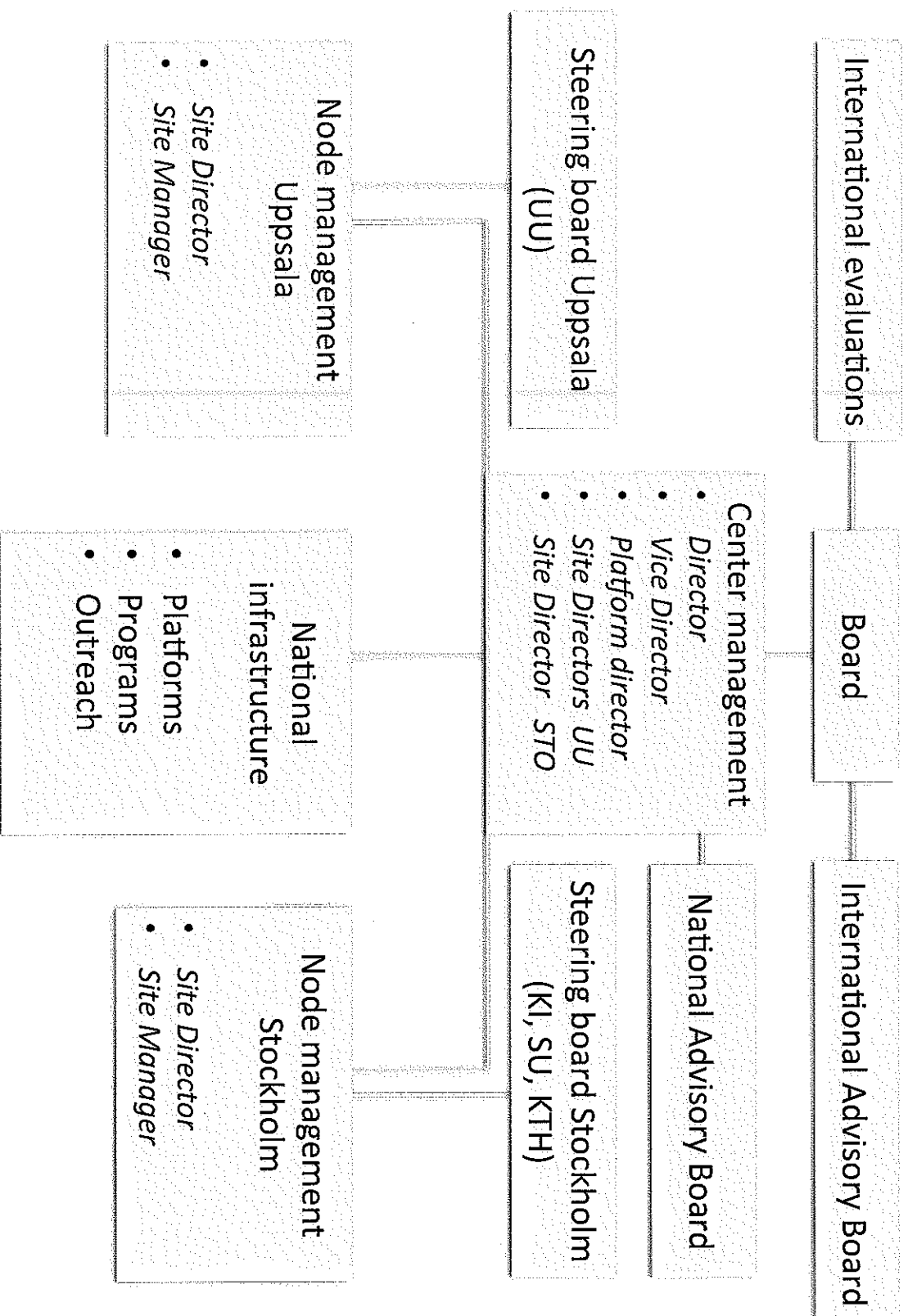
Göran Sandberg



Sophia Hober



Ny organisation, styrelsebeslut, Mars 18 och Maj 13



Version 10 - Final

SciLifeLab

First Report of the Strategic Advisory Board

Chairman: Professor Bertil Andersson

February 2015

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SciLifeLab – Report of the Strategic Advisory Board

1. Preamble and Introduction

The Strategic Advisory Board (SAB) is part of the governance structure of the SciLifeLab (SLL) with a mandate to advise and report to its Governing Board on scientific, technological and organizational matters. The first meeting of the SAB, together with site visits to both the Stockholm and Uppsala nodes took place on 1-3 February 2015. The meeting programme forms *Appendix 1* of this report. Brief details of the composition of the SAB, chaired by Professor Bertil Andersson, President, Nanyang Technological University, Singapore, are given in *Appendix 2*.

The SLL is a multi-institutional structure to promote, support and undertake advanced life science research in biomedicine and environmental sciences through an inter-university collaboration in the Uppsala-Stockholm region (Mälardalen). It is built on existing research excellence in life sciences in the four partner universities of Karolinska Institutet (KI), Royal Institute of Technology (KTH), Stockholm University (SU) and Uppsala University (UU). The SLL represents a major investment of public funds by the Swedish Government and research and innovation agencies (VR and VINNOVA), together with funding through private Foundations, especially the Knut & Alice Wallenberg Foundation (KAW).

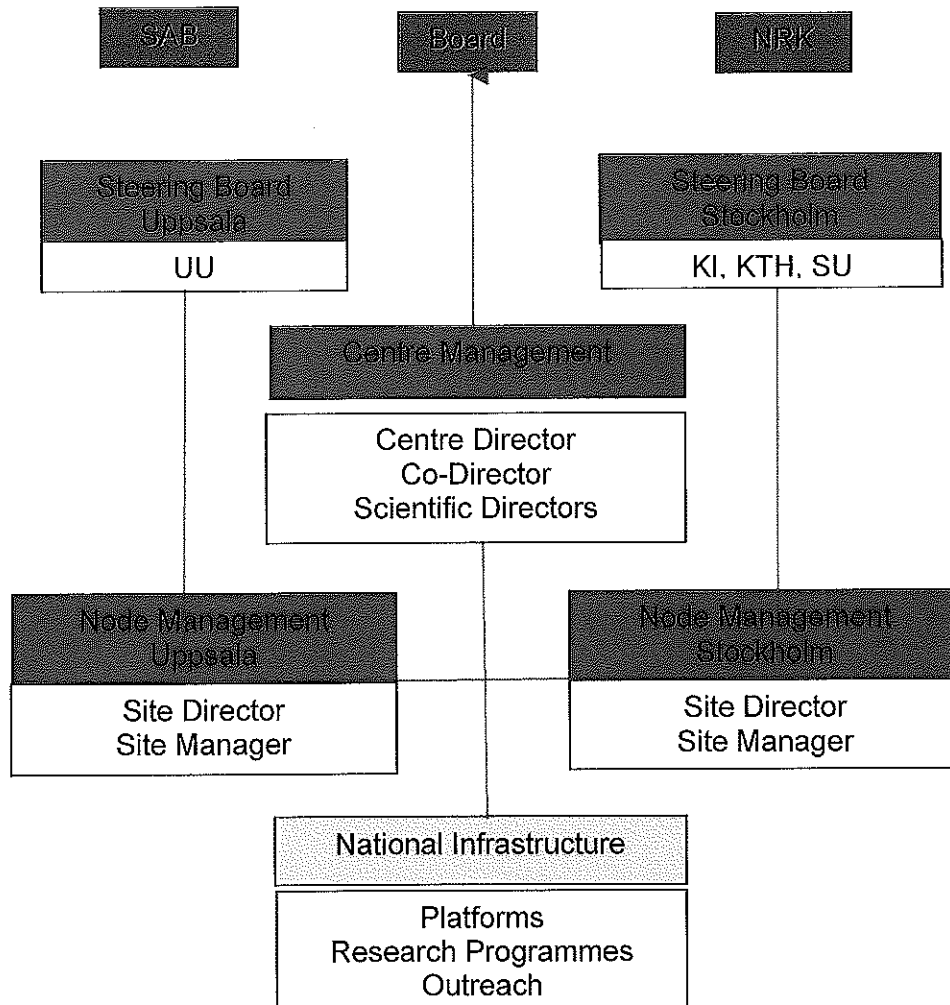
It is part of the investment in national research infrastructures within Sweden. In 2009 the Swedish government initiated the process to form Strategic Research Initiatives (SRI) focusing on key areas of science. Later tranches of funding increased the total national funding for research by 37 % to 10 billion SEK. This has provided funding for 24 strategic research areas including molecular bioscience and research infrastructures.

The largest SRI within biomedical sciences was devoted to 'molecular biosciences', with the aim of building research communities with access to large-scale technologies. Two centres were selected after an international peer review process: Stockholm - a collaborative effort between KTH, KI and SU - and Uppsala University.

In 2010, there was initial support of 35M SEK and 15M SEK respectively for life sciences in the three major Stockholm Universities and at Uppsala University. This enabled the establishment of advanced life sciences research programmes in the four universities with an increasing collaboration developing between them. In the following years to 2012 these funds were increased respectively to 101.5M SEK and 43.5M SEK in which these centres became a firmly established research alliance. Then, in 2013, the Government provided a substantial uplift in funding with grants of 150M SEK for the creation of national platforms and a further 40M SEK for drug discovery. This led to the formal merger of the institutional centres at Stockholm and Uppsala into the SLL operating with a two-node structure. These nodes (Stockholm, located at KI, and the Biomedical Centre, UU) provide 9 technology platforms encompassing cutting-edge research facilities serving as a national facility open to researchers from across the country. The current SLL budget is 335M SEK p.a. planned to rise to 395M SEK p.a. in 2016.

The SLL also receives substantial additional funding from the Swedish Research Council (VR), VINNOVA (the agency supporting innovation) and private Foundations especially the Knut & Alice Wallenberg Foundation (KAW). Although only coming formally into operation in July 2013, SLL brings together and builds on life science research funded far-sightedly by the four constituent universities, who's Rectors should be congratulated for their support and coordination of this nationally important research endeavour.

The structure and governance of the SLL is shown below.



The Governing Board, chaired by Professor Göran Sandberg (Executive Director, KAW and former Rector of Umeå University), consists of representatives from the four host universities, three representatives from other Swedish universities, and one representative from the industry, all appointed by the Swedish Government. It is responsible for setting the overall strategy and direction of the SLL. The National Reference Committee (NRK) is charged with technical assessment of the various facilities with SLL and consists of representatives from the four host universities and a further six members representing other universities. The SAB is an international committee constructed to give strategic and scientific advice and assessment. Overall direction is by two Directors – Professor Mathias Uhlén, who has been a

leading figure in the development of the SLL concept, and Co-Director Professor Kerstin Lindblad Toh, who directs the Uppsala site. The SAB noted that Professor Uhlén will shortly be stepping down as Director and a new appointment will be made in early 2015.

2. Overall Context and Achievements

Given that SLL has only existed in its present configuration since July 2013, its creation, operation and research, so far, represents an impressive achievement. At the same time, we recognise that it has been built on previous activity and investment by Swedish research funding agencies and the four partner institutions which are, themselves, major universities of international repute. Normally, coming together in this way is a difficult operation within the university sector and the institutions and the Director and Co-Director of the SLL should be congratulated on their achievement. This is even more impressive, when one considers that it operates on two sites with a significant geographical separation.

The SLL represents a farsighted ambition to present advanced life science research at the highest level in Sweden through synergy and the provision of national research platforms which are more than just clustering or networking. The SLL may be compared with other examples of such forefront initiatives such as, for example, the Broad Institute (between Harvard University and MIT) in Boston, USA, and the Francis Crick Institute in London.

The SLL represents integration at a number of levels –

- between disciplines,
- within individual universities,
- between universities, and
- across geographical areas.

This has been a demanding and necessary task to promote world-leading forefront research in the life sciences, biomedicine and the environmental sciences. It has a national function within Sweden to promote research and create technologically advanced platforms accessible to the whole Swedish life sciences community and has to be judged within this context.

Its remarkable progress in working towards these aims within its short life is due to the efforts of key individuals involved. We particularly commend Professor Mathias Uhlén who has played an inspirational and coordinating role; Professor Kerstin Lindblad-Toh, Co-Director and holding a key responsibility at Uppsala University; Professor Göran Sandberg and the Governing Board of SLL for its strategic direction; and, not least, the four Rectors and senior management of the constituent universities. We also commend Professors and individual researchers who have moved out of their 'comfort zone' to work on collaborative and inter-disciplinary projects.

The SAB received presentations on the nine technological platforms and a representative selection of highlights from the research programmes.

Despite its impressive progress to-date, there are both challenges and opportunities that need to be addressed to ensure the future successful development of the SLL. These include streamlining of structure and governance, quality control and prioritisation of projects, career development opportunities and enhancing the role of the environmental sciences. These, and other issues, are addressed below.

3. Technological Platforms

Infrastructure in the life sciences is changing rapidly and becoming increasingly resource dependent, especially in terms of the need for high throughput analytical devices and bio-imaging technologies. This new technology brings, in its wake, the need for both computer control, large scale data management and data analytics, and especially bioinformatics support.

Such crucial analytical and imaging tools require key investments and expert competence and in a relatively small population country such as Sweden, duplication is costly and inefficient and it is important to sustain a critical mass of expertise for the efficient utilisation of expensive resources as well as deployment and use of best-practices. It should also be noted that the equipment is evolving rapidly so creating the need for frequent upgrades and continuous development in order to remain at the cutting edge of research.

The SLL has 9 core national technological platforms with a varying amount of specialised equipment which make up 32 constituent facilities. The platforms are:

- National Genomics Infrastructure;
- Functional Genomics;
- Drug Discovery & Development (DDD);
- Chemical Biology Consortium Sweden (CBCS);
- Affinity Proteomics;
- Structural Biology;
- Clinical Diagnostics
- Bioinformatics; and
- Bio-imaging

Each platform has a Director, Manager and Board and encompasses various advanced facilities, each with its own Manager.

The platforms are due to be evaluated in early 2016 together with their facilities – these are listed in *Appendix 3*.

The SAB considers the evaluation to be extremely important to assess the quality, user relevance and technological competence of the platforms, together with the level of their funding. Thus, the evaluation needs to address the platforms/facilities performance and user satisfaction, their continuing role, the facilities/technology 'mix' and evolution; their usage by the community; and their sustainable funding (which will be an issue for the Governing Board) and, in particular, their internal and external usage.

The platforms and facilities are crucially dependent on their skilled staff provided through the partner institutions. Issues of staff and career progression are addressed in the Human Capital section.

There are high level technological competencies and resources outside Stockholm/Uppsala which are formalised as Satellite Platforms e.g. NMR in Gothenburg and Metabolomics in Umeå. They are part of the SLL in respect of their relevance and national uniqueness. In addition, there are around 30 'regional' facilities principally associated with UU and KI. The regional facilities are not integral to the SLL core mission but are part of normal collaborations between institutions. In terms of the SLL, there is no national funding provided for them nor have they been evaluated. However, if a regional facility develops special capabilities due to a technological breakthrough, and with upgraded human capital, then it may be considered, after evaluation, as a future part of the SLL framework. Otherwise, the regional platforms should remain as part of their host university who have the funding responsibility for them. The SAB notes that a clearer definition of the role of regional facilities and satellite platforms is desirable and a merit-based and independently reviewed procedure to consider regional facilities as satellite platforms would be a useful development.

The SAB noted that there is no formal procedure for evaluating user proposals to access the platforms and, generally, a 'first-come-first-served approach' is used. At present, this may not cause a problem since none of the platforms are operating at maximum capacity. Nevertheless, it is imperative that the SLL operates a merit-based peer-reviewed prioritisation system for access to its platforms as well as for quality control in order to introduce a formal rigour into the operations, in accordance with best international practice. This is especially important given that the platforms have a national task and must avoid any suspicion of bias towards insider and local users. The platforms also need to be cognizant of disciplinary variations and be flexible to meet dynamically-evolving research user needs.

We recognise that platforms have a difficult task to combine service provision while pushing at the frontiers of technology, in order to avoid stagnation and obsolescence. Platform Directors have to create a delicate balance between reliable service and ensuring technological progress and biological relevance.

Bioinformatics is a key platform both in its own right and also as an enabling technology for the other platforms. The large amount of data produced, especially by high throughput sequencing and bio-imaging, demands new approaches to data handling, analysis and interpretation. The Bioinformatics Platform provides a general service (BILS) and a more advanced programme (WABI) for users.

The SAB supports the evaluation of the national platforms and their constituent facilities and some of its members wish to be involved and contribute to it.

It is not the task of the SAB, at this stage, to assess platforms but the platforms must provide cutting-edge, state-of-the-art, infrastructure for the life sciences.

However, following the 2016 evaluation, the SAB may select one or more platforms for a more in-depth review. In particular, recognising the importance of bioinformatics, the **SAB wishes to engage in greater depth in the Bioinformatics Platform in its next review.**

In the opinion of the SAB, the SLL should only have **2 layers** – the core technological platforms and the satellite platforms. This simplifies the structure and provides a more coherent approach to the SLL operation.

The SAB will also wish to **assess the usage of the platforms and the way in which peer review and quality control has been introduced into the prioritisation of projects** being serviced by the platforms.

4. Research Programmes

Research in the life sciences is in a stage of rapid development. With the availability of high throughput sequencing and bio-imaging ('big data'), major international, collaborative research programmes and research infrastructures are being established in addition to the more traditional individual investigator led projects and local facilities. This may be termed the arrival of "Big Biology", especially in genomic research, akin to the major international programmes in physics. Furthermore, while top-level research is dependent on Principal Investigators (PIs) and their specialised competencies, it has to be recognised that today's breakthroughs are as much due to integration, collaboration and multi-disciplinary science. Both large programmes and Principal Investigator (PI)-led projects are necessary parts of the life sciences for the foreseeable future and the SLL has to embrace both.

Surprisingly, despite the excellence of the SLL, its platform and programmes, during the visit we heard little about the bigger picture of the contextual position of the SLL in terms of its academic, economic or societal impact. The SLL is not only the provider of national technological platforms but also has to synergise researchers and the community and create critical masses, beyond individual PIs and the capacity of a single university. This is especially important given that UK Royal Society's ten Grand Challenges reside within the multi-disciplinary sustainability and health sectors and that the EU has also announced a compatible set of Grand Challenges. It is important that the SLL can properly address such 'Grand Challenges'. What is now needed is for a revised Vision and Mission Statement to be drafted for the SLL to take into account the advances and trends in international life sciences research, especially "Big Biology".

The SAB thinks that the inspiration and creation of some flagship programmes to respond to these Challenges is needed. So far, the only strategic or flagship programme is the very successful Human Protein Atlas, led by Professor Matthias Uhlen. The SLL needs to identify a few more flagship projects that can take advantage of inter-disciplinary knowledge and its integration as well as the advanced

infrastructure that exists in the SLL. The SAB recommends the involvement of independent expert advice in selecting such flagships.

With regard to the Human Protein Atlas, this should continue and be accelerated. Many papers have resulted from tissue mapping. It now needs to be advanced to the cellular level and applied in an increasingly deeper way to the understanding of human disease, e.g. topics such as cancer diagnostics, through a greater investment in automated image analysis. Furthermore the anti-bodies created in the Atlas activity may be used in further studies both within and outside SLL.

Generally, the SLL, through its facilities and nationally funded infrastructure, can coalesce national research into key areas such as integrating molecular life science research and clinical studies of metabolic and rare diseases, as shown in the project on clinical paediatrics of metabolic and rare disease, led by Professor Anna Wedell. This area has the potential to develop into a national flagship project. This successful model and the proximity to the Karolinska Hospital provides SLL with opportunities to develop links between medical life sciences and genomics and clinical practitioners, which is a challenge for health systems in all countries and SLL is well-positioned to take a global lead. This would be well aligned with, for example, the new mission in the US around Precision Medicine. This is due to a special combination of an advanced research 'centre', the SLL, and Sweden's unique set of biobanks and population regulation and natural biodiversity. SLL has a critical mass of people and infrastructure to go far beyond project level research. Another topic with 'flagship' potential is the study of evolutionary mechanisms involved in artificial and natural selection, led by Professor Kerstin Lindblad Toh, and in which Swedish scientists are already considered leaders.

The SLL was established to support a range of life sciences and, yet, at least in terms of the presentations received, there was a general feeling in the SAB that the environmental sciences are substantially under-represented. We are concerned at this although it is not clear whether the balance of presentations reflects the real imbalance in the SLL user community or is an artefact of the SAB programme. At the next review, the SAB will wish to look closely at the progress in this area.

From a bibliometric view point, the SAB considers that Sweden is at least as well positioned in environmental life sciences as in biomedical research and the SLL should address key research issues related to agricultural and forestry sciences. The SAB considered the project on the Norway spruce genome to be a good example for SLL environmental projects. It is important that more consideration is given to potential impact on the environment to encourage courageous multidisciplinary approaches.

Regarding bibliometrics, what is not clear is which publications have their origin in research which pre-dates the SLL, and which projects actually involved SLL facilities, rather than just SLL associated investigators. This needs to be clarified. For example, clear acknowledgement of platform usage in papers should be mandatory.

The SAB would have also appreciated more and more transparent metrics of both usage and outputs of the SLL and the national investment in it.

Despite these remarks, the SAB considered the scientific presentations to be of high quality even though they often failed to highlight inter-disciplinarity. Overall, the presentations were project-focused rather than reflecting a more general SLL strategic approach with the ambition to become a truly global leader. However, the SAB appreciates the many outstanding presentations from both established and many junior top-level recruits.

Intellectual and social interaction is another important success factor. An enhanced inter-disciplinary seminar culture is needed both within and between both nodes. Social space and interaction is easier within the integrated Uppsala site. SLL management needs to consider how a similar level of inter-personal interaction can be achieved by adapting the current physical infrastructure at the Stockholm node to create informal meeting spaces, something for which it was not originally designed.

We recognise that there is a one hour travelling time between the Uppsala and Stockholm nodes and both have their own traditions and cultures. However, the long-term success of the SLL demands further pro-active integration of the two nodes. Further exchanges of staff between both nodes are essential through joint opportunities, common seminars and “micro-sabbaticals”.

The SAB advocates the establishment of more ‘flagship’ programmes within the SLL alongside PI-led projects. Such ‘flagships’ could help address the Grand Challenges in the life sciences and **should take advantage of the unique data infrastructure of biobanks and other health records in Sweden.** Two projects have been identified that could be the foundation of new ‘flagships’ with the continuation of **the Human Protein Atlas programme which should be accelerated.**

There is a general feeling that **environmental life sciences are under-represented in the SLL research portfolio.** This needs to be addressed given that is especially important in relation to the environmental, agricultural and forestry sectors. A greater effort is needed **to encourage and support environmental life sciences.**

In viewing bibliometrics, **what is not clear is which publications have their origin in research which pre-dates the SLL and which has made active use of SLL resources** and this needs to be addressed.

The SAB would have also appreciated more information and more transparent metrics of both external usage and outputs of the SLL and the national investment in it.

The SAB appreciates the many outstanding presentations from both established and many junior top-level recruits.

In order to encourage greater strategic thinking within the SLL, **the SAB recommends a revision of the Vision and Mission Statements.** The SAB wishes to encourage a higher level of ambition in terms of potential impact to maximise the academic and social achievements of this significant investment and place it at a truly global level.

Intellectual and social interaction within the SLL is another important success factor. **The SAB advocates the development of an enhanced inter-disciplinary seminar culture** both within and between both nodes. Furthermore, the **establishment of informal common spaces** where staff can meet and exchange needs to be addressed at the Stockholm node.

The long-term success of the SLL demands **further pro-active integration of the two nodes**. Further exchanges of staff between both nodes are essential through joint opportunities, common seminars and “micro-sabbaticals”.

5. Industry, Society and Innovation

We recognise that there is a close link between life sciences research and innovation with this research being close to pharmaceuticals, diagnostics and treatment, and prophylactics. *A priori*, there should be no conflict between the need for high-level research and exploitable innovation – in fact, such translational research must be strongly encouraged.

This link was recognised by the Swedish Government in its support for the SLL because of the high impact of the research for the Swedish economy. In part, this was a reaction to decisions taken by the pharma industry in response to economic globalisation. Pfizer, following its take-over of Pharmacia, closed its operations, and AstraZeneca (AZ) substantially reduced its research operations in Sweden. The public investment in SLL was part of an effort to mitigate the effect of these company decisions and to pave the way for the establishment of new industry in the region. We note that AZ has retained a presence in the Stockholm node of SLL and, thus, SLL may be having an influence in ensuring a continued AZ research presence in the country.

In the biological environmental sciences, research in forestry and plant sciences is essential to underpin the well-being of these economic areas (especially forestry in Sweden). In addition, such research also supports innovation in diverse areas such as sustainable water, energy, and biodiversity. The underlying research has to be sustained at a high quality in order to support innovation.

Several of the SLL senior personalities have outstanding track records in commercialisation of discoveries. What is needed now is to spread this expertise to junior faculty through both formal and informal mentoring and the exchange of experiences and best practice. The collaborative nature of SLL research is such that this cannot be promoted through each institutional innovation office.

The SLL management and its Governing Board, together with the host universities must address, as a matter of priority, the need for a single SLL-based commercialisation activity, or, at the very least, a very strong coordination between the four host universities for innovation development.

In terms of societal impact, close interaction between SLL and internationally recognised advanced hospitals (at Uppsala and the Karolinska Institutet in Stockholm) is essential. Therefore, pro-active steps need to be taken to ensure the active involvement of clinicians in the work of the SLL and representation in the appropriate management and governance bodies. In fact, it would be advantageous for the Swedish healthcare system as a whole to become more closely associated with the SLL. Again, SLL could play a leading role in establishing best practice to join molecular life sciences and clinical research into truly productive translational efforts, in part through a change in reward systems

In order to promote better and more efficient innovation culture, **the SAB recommends that there should be a single SLL commercialisation activity** or, at the very least, a strong coordination between the universities in relation to this important part of the SLL mandate.

There is a need to have a **closer interaction between SLL and clinicians** from the internationally renowned hospitals in Stockholm and Uppsala with the active involvement of the latter in the work of the SLL.

Human Capital

People (and their brains) are the most important factors for SLL success. The main source of SLL staff comes from the host universities and hospitals and from researchers previously employed in the pharma industry, notably from AZ and Pharmacia. In addition, there has been a strategic SLL recruitment from Swedish academia and especially of top-notch young researchers, many with very prestigious ERC Young Investigator awards. Similarly, advantage should also be taken of the Wallenberg Academic Fellowships for outstanding young recruits in the range of 5/10 years post-doctorate. All such faculty are primarily employed by the universities and then "seconded" to SLL. The career prospects of these recruits need to be factored into the less than flexible Swedish employment system. However, the anticipated investments from SLL and the host universities is such that this should provide sufficient short to medium term flexibility and tenure prospects for the younger recruits. However, to qualify for tenure, it is imperative that these young recruits are given some teaching opportunities.

There is a need for academic and research mentorship, particularly of young faculty, and it is important that both senior and junior recruits from outside Sweden should be given the facility to integrate into the Swedish academic and funding system. Formalizing a mentorship programme for junior faculty would be a step forward in this direction.

The SAB did not discuss details of the SLL and host universities' employment systems and policies. However, in future, the SAB will want to consider and review career progression policies and staff renewable strategies within SLL within the interface of the four host institutions.

Another important point is that it is essential that more senior faculty from the four partner universities should engage fully with the SLL and have both an intellectual and physical presence in SLL laboratories. This is an important factor for the long-term sustainability and success of the SLL, especially as such staff can provide experienced mentorship to their junior colleagues. The SAB had the impression that senior faculty from KI were under-represented and not fully engaged in the SLL programme.

Special consideration needs to be given to career progression structures for platform and facilities directors and managers. This specific role is to provide advanced research services as national infrastructure operators. This normally does not lead to co-authorship or other academic recognition. We heard that, frequently, authors did not even acknowledge SLL or its staff. This may pose a problem in terms of career development and mechanisms need to be developed to fix this.

Attractive career prospects and professional training programmes should be planned because, unless done, then facilities will not be able to attract staff of the right calibre to provide the cutting-edge research envisaged and will struggle to maintain their technical knowledge at the cutting edge.

Human capital (expert staff) is at the core of the SLL success and needs to be nurtured to ensure continuing success.

The career prospects of recruits need to be factored into the less than flexible Swedish employment system. This has to be done while **retaining flexibility in terms of human resources management while, at the same time, developing the tenure prospects of the younger recruits**. To achieve this, these **young recruits need to be given some teaching opportunities**.

There is a **vital need for academic and research mentorship** which is especially important **for younger and international recruits**. **A procedure for this should be developed**.

Senior faculty from the hosting institutions need to have a greater engagement in the programmes, projects and platforms of the SLL.

The need for well-developed career progression and professional training structures is vital for the continuing health of the technological platforms and facilities and for the recruitment of well-qualified staff.

6. Governance and Structure

The SLL has grown rapidly and organically from two nodes at Stockholm and Uppsala with separate budgets to which additional funds have been added after the merger to become the SLL. Thus, SLL has the complexity of two sites and four host universities and with a variety of funding sources. This has resulted in far from

simple governance and structure. All the funding components relating to and intended for the SLL need to be brought within the purview of the Governing Board.

To cope with this complexity requires the SLL Board, its senior management and the host universities to act with flexibility outside institutional self-interest to synergize towards their common goal in making the SLL an internationally leading and sustainable research infrastructure and centre of excellence, embracing both strategic and 'bottom-up' initiatives.

We commend all the 'actors' for the pragmatic manner in which the issues of governance and structure have been addressed so far. However it is now an opportune moment to review and further develop revised governance structures to create a more efficient overall governance and management.

Research will be based increasingly on collaborative research in flagship projects (if the SAB recommendations are accepted). This will require a more structured governance of the technological platforms operating within a common strategic budget.

The SAB strongly advocates a better budget coordination for the future development of SLL. Ideally, all funds supporting the SLL, including institutional funding should be merged under the Governing Board. This must have high level representation from the four universities, ideally by the Rectors but, at the very least, at the Vice-Rector for Research or equivalent level. In addition, there is a need for SLL to make increased overhead payments to the host universities (at a percentage to be agreed) in respect of the service and responsibility undertaken by the universities for staff appointments and their long-term careers.

The Director and Co-Director, the four university Rectors and the Chair of the SLL Board should have occasional informal 'brainstorming' meetings to consider SLL progress, challenges and opportunities.

The SLL has a complexity resulting from it being based on two sites with four host universities and a variety of funding sources. This requires **the SLL Board, its senior management and the host universities to act with flexibility outside institutional self-interest norms towards a common goal.**

The SAB **strongly advocates a better budget coordination** for the future development of SLL. Ideally, **all funds supporting the SLL, including institutional funding should be merged under the Governing Board.**

The governing body needs **representation from the four host universities, ideally at the Rector level.**

There is a need for **SLL to make increased overhead payments** to the host universities (at a percentage to be agreed) **in respect of the service and responsibility undertaken by the universities.**

The SAB **recommends that top management of SLL, the Chair of the Governing Board and the four Rectors** need to create informal opportunities for 'brainstorming'.

7. Conclusions and Recommendations

1. The SAB is impressed with the initiative to create the SLL and commends the Swedish authorities, a number of key individuals and the four hosting universities for their far-sighted actions.
2. Very substantial progress has been made in establishing the SLL and its platforms, especially given that it only became operational in mid-2013.
3. Governance and financing reflect the ad-hoc growth of the SLL. It is now opportune to revise and streamline both and move to a more efficient operation under the Governing Board, with top level representation from the host universities.
4. There should be budget integration under the Board.
5. SLL would benefit from a revised or new Mission and Vision statements to reflect the SLL's strategy and ambition, especially in relation to research and the new trends in life sciences to move towards major collaborative programmes. Multidisciplinary Programs with more ambitious goals and social impact would help in increase further the impact of the SLL both in basic and applied science
6. Future developments spearheaded by the identification and initiation of collaborative flagships projects across the span of the life sciences community. The Human Protein Atlas is a good example already in existence.
7. The SLL should give emphasis to the environmental life sciences by ensuring that environmental research is accorded a full and high priority within the work programmes.
8. Procedures for accessing the technological platforms need to be revised based on a peer-review system for both quality control and transparency.
9. We strongly endorse the evaluation of the technological platforms in the first half of 2016 in which some members of the SAB are willing to participate.
10. The regional facilities, as defined today, are not an integral part of the SLL and we advocate a 2-tier structure with a core and satellites, open for enlargement as life sciences research develops. The regional platforms are the responsibility (including funding) of the host institutions unless they can demonstrate a

national relevance (after peer review) in which case they would become constituent platforms within SLL.

11. Attention needs to be given to career development and professional training of the service staff of the technological platforms and their constituent facilities.
12. There is a need for leadership and better coordination in creating further industrial and societal collaborations and providing procedures and best practice for them.
13. Ideally there should be a single unit for innovation exploitation or at least a very strong coordination between the four universities in this area.
14. There is a need for dedicated mentorship of younger faculty to develop their academic progress and innovation capacity, and especially for those recruited from abroad to ease their way into the Swedish academic and funding system.
15. There is a requirement for the dedicated engagement of senior faculty from the parent universities in SLL coupled with their relocation to and physical presence in the SLL.
16. Even more pro-active efforts are needed to integrate the two geographically separate nodes.
17. SLL facilities should be optimised to create the physical exchange between those involved in the SLL. Common activities and space are needed and the Stockholm node, in particular, suffers from a lack of informal common meeting spaces.

8. Afterword

The SAB appreciated its reception, service and information and hospitality provided by the SLL and the enthusiastic participation of staff at all levels. Our only complaint was about the weather!

Progress has been impressive and exciting. We would have appreciated more time for discussions with staff but we accept that it was our first meeting and that we and the SLL are in a learning phase.

Our second meeting is proposed for September 2016 following the platform evaluation, which must take place in the first half of that year in order to feed into the SAB meeting.

This time scale allows for the new Director to report after being in the post for approximately one year.

For the next SAB meeting we have the ambition that we, with the SLL, can identify key issues for consideration in advance of the meeting.

For that meeting, we also ask that SLL provide improved metrics on all aspects of the internal and external technological platform usage and output as well as a 'customer-satisfaction' survey.

The Strategic Advisory Board wishes to thank Professor Göran Sandberg (Chair of the SciLifeLab Governing Board), Professors Mathias Uhlén and Kerstin Lindblad-Toh, Platform Directors, Research Project Leaders and the administrative staff at both sites for the excellence of the visit arrangements and for their hospitality as well as for their clear and informative presentations with which the SAB became fully engaged in stimulating discussions. The SAB looks forward to its second visit in September 2016.

Appendix 1

SAB Visit Programme 2-3 February 2015

Sunday February 1

19.00 Dinner at Hotel Reisen, Skeppsbron 12, Stockholm
(SAB, Director, Co-Director and Chairman of the Board)

Monday February 2 – STOCKHOLM

9.30 General information from Chairman – *45 minutes (Göran Sandberg)*

- Responsibility of the SAB – outline of review
- History SciLifeLab
- SciLifeLab organisation

9.15 Status and organisation – *45 minutes (Matthias Uhlén & Kerstin Lindblad Toh)*

- Overview on platforms and output
- Overview on scientific publication
- SciLifeLab Fellows and community building
- Overview education, outreach nationally, to industry, to healthcare

10.00 Coffee Break

10.30 National Platforms

(20 min presentation + 10 min discussion)

- National Genomics Infrastructure
 - Bioinformatics
 - Affinity Proteomics
- (10 min presentation + 10 min discussion)*
- Structural Biology
 - Bioimaging
 - CBCS

13.00 Lunch & lab tour

14.30 **Scientific Highlights** *(15 min including discussion for each topic)*

- Contrasting the evolutionary mechanisms involved in artificial and natural selection: from rabbits to fish *Kerstin Lindblad Toh*
- MTH1 inhibition eradicates cancer by preventing sanitation of the dNTP pool *Thomas Helleday*
- Nanobiophotonics *Ilaria Testa*
- The Capsella rubella genome and the genomic consequences of rapid mating system evolution *Tanja Slotte*
- In situ sequencing for RNA analysis in preserved tissue & cells *Mats Nilsson*

- Whole genome sequencing for comprehensive, acute clinical diagnosis of monogenic disorders *Anna Wedell*
- Increased ethanol production in yeast *Jens Nielsen*
- Interplay between genome organisation and gene expression *Magda Bienka*
- Subcellular localisation of human proteins *Emma Lundberg*

17.00 The Stockholm site (*Mats Nilsson*)

17.30 Closing

18.30 Dinner at den Gyldene Freden, Österlånggatan 51, Stockholm
(SAB, Board and selected Directors)

Tuesday February 3 – UPPSALA

9.15 The Uppsala site (*Kerstin Lindblad Toh*)

9.45 **National Platforms**

- Functional Genomics (*10 min presentation + 10 min discussion*)
- Clinical Diagnostics (*10 min presentation + 10 min discussion*)
- DDD (*20 min presentation + 10 min discussion*)

10.45 Coffee break

11.15 **Scientific Highlights** (*15 min including discussion for each topic*)

- The promise of the Human Protein Atlas *Matthias Uhlén*
- Vulnerability of Glioblastoma Cells to Catastrophic Vacuolization and Death induced by a Small Molecule *Karin Forsberg Nilsson*
- Direct measurement of transcription factor dissociation excludes a simple operator occupancy model for gene regulation *Johann Elf*
- Genetics of obesity *Erik Ingelsson*
- Smoking, chromosome Y and cancer *Jan Dumanski*
- The Norway spruce genome sequence and conifer genome evolution *Stefan Jansson*

12.45 Lunch & tour

14.00 SAB internal discussions, start of reporting

17.00 Wrap up with comments from SAB to Directors

18.00 Closing (taxi back to Stockholm)

19.30 Dinner (*informal, for those who wish*)

Appendix 2

Scientific Advisory Board

Membership:

Chair:

Professor Bertil Andersson

President, Nanyang Technological University (NTU), Singapore

Previously Chief Executive of the European Science Foundation, Rector of Linköping University and Chairman of the Nobel Committee for Chemistry and a Trustee of the Nobel Foundation. Professor Bertil Andersson is a plant biochemist of international reputation. Formerly he was a Professor of Biochemistry and then Dean of Chemical Sciences at Stockholm University.

Professor Søren Brunak

Professor of Bioinformatics and Director, Disease Systems Biology, Centre for Biological Sequence Analysis, Technical University of Denmark (TUD)

Professor Brunak has pioneered new computational strategies for the analysis of biological data in molecular biology, medicine and biotechnology, especially through machine learning techniques and data integration

Dr Jan Ellenberg

Interdisciplinary Group Leader, Gene Expression and Cell Biology/Biophysics Programmes and Coordinator, Centre for Molecular and Cellular Imaging, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

Dr Ellenberg's fields of interest are in cell biology, especially cell division (mitosis), cell nuclear structures and live cell imaging.

Professor Yoshihide Hayashizaki

Chief Scientist and Director, Omics Science, Centre, RIKEN, Japan

Professor Hayashizaki has been responsible for the establishment and direction of the mouse full-length cDNA encyclopaedia and is currently working on its extension to a full-length cDNA library construction technologies for rarely expressed genes.

Professor Sirpa Tuulikki Jalkanen

Professor of Immunology, Institute of Biomedicine, Turku University, Finland

Professor Jalkanen's research specialisation is in the fields of biomedical and clinical medicine and is one of the world's leading researchers in the area of lymphocyte

migration in the human immune defence system particularly in the treatment of autoimmune diseases and in preventing the spread of cancer.

Dr Janet Jansson

Division Director of Biological Sciences, Pacific Northwest National Laboratory (PNNL), Richland, Washington State, USA

Dr Jansson's key interest is in microbial ecology and specifically in the use of molecular approaches in the study of complex microbial communities especially those in soil, sediment and the human gut. She is currently coordinating Microbiomes in Transition, a major new PNNL initiative. In her earlier career Dr Jansson had been a member of Stockholm University and the Swedish University of Agricultural Sciences, Uppsala.

Professor Jonathan Knowles

Distinguished Professor in Personalised Health Care, University of Helsinki, Finland. Visiting Professor, University of Oxford; Visiting Fellow, Pembroke College, Cambridge; Professor Emeritus of Translational Medicine, Ecole Polytechnique Fédérale de Lausanne, Switzerland; Executive Chairman of Immunocore Ltd; and Chairman of Adaptimmune Ltd

Professor Knowles' diverse career experience spans both academia and industry as he served as the president of group research at Hoffmann –La Roche for 12 years, a long term board member of Genentech, Chugai Pharmaceuticals and Caris Life Sciences, and the founding chairman of the Innovative Medicines Initiative.. His research current interests are focused on translational and personalised medicine.

Dr Svante Pääbo

Director, Department of Genetics, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Dr Pääbo is one of the founders of palaeogenetics focussing on genetics in the study of early humans and other ancient populations. He has published a draft sequence of the Neanderthal genome and has also identified, through DNA analysis, the Denisovan hominin. Dr Pääbo is an alumnus of Uppsala University where he completed his Ph.D and is currently a guest professor there.

Professor Aviv Regev

Director, Klarman Cell Observatory, Broad Institute and Investigator, Howard Hughes Medical Institute and Professor, Department of Biology, MIT, USA

Professor Regev's research focuses on how complex molecular networks function and evolve in the face of genetic and environmental changes. Previously, at Harvard University, Professor Regev has also worked in the biotechnology industry directing bioinformatics research.

Dr Dame Janet Thornton, FRS

Director of the European Bioinformatics Institute (EBI) of EMBL, Cambridge, UK

Dr Thornton is a leading research in structural bioinformatics. She has worked in molecular biophysics and in biomolecular structures. She coordinated the preparatory phase of the European Life Sciences data infrastructure – ELIXIR.

Tony Mayer

SAB Secretary

Appendix 3

National Platforms and their associated facilities

National Genomics Infrastructure (NGI)

NGI Stockholm - Genomics Production
NGI Stockholm - Genomics Applications
NGI Uppsala - Uppsala Genome Centre
NGI Uppsala - SNP & SEQ Technology Platform

Functional Genomics

Karolinska High Throughput Centre (KHTC)

Drug Discovery and Development

Protein expression & characterization
Human antibody therapeutics
Biochemical & cellular screening
Medicinal chemistry – Hit2Lead
Medicinal chemistry – Lead ID
Biophysical screening & characterization
ADME (UDOPP)
In vitro & systems pharmacology
Compound handling & IT – not a formal facility but essential infrastructure

Chemical and Biological Consortium Sweden

LCBKI
LCBU
UDOPP

Affinity proteomics

Protein and peptide arrays
Biobank profiling
Cell profiling
Fluorescence tissue profiling
Tissue profiling
PLA Proteomics

Structural Biology

Protein Science Facility
Bio-imaging

Clinical Diagnostics

Clinical Genomics
Clinical Sequencing
Clinical Bio-markers

Bioinformatics

Short-term support and Infrastructure (BILS)
Long-term support (WABI)
Compute and Storage (UPPNEX)

Bio-imaging

Advanced Light Microscopy (ALM)
Fluorescence Correlation Spectroscopy (FCS)