

# Report of the Expert Group Appointed to Evaluate the Integration of Finnish Biobanks

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## Glossary of Terms and Abbreviations

BB	Biobank
BBMRI.fi	Finnish National Node of BBMRI-ERIC
BBMRI-ERIC	Biobanking and Biomolecular Resources Research Infrastructure- European Research Infrastructure Consortium
BBMRI-LPC	Biobanking and Biomolecular Resources Research Infrastructure – Large Prospective Cohorts (an EU Framework Program 7-funded project)
BM	Biomarker
CFB	Central Finland Biobank, Jyväskylä
CSC	IT Center for Science Ltd.
DNA	Deoxyribonucleic acid
EATRIS	European Advanced Translational Research Infrastructure in Medicine
EFB	Biobank of Eastern Finland, Kuopio
EG	Expert Group
EHR	Electronic Health Record
ELIXIR	European life-sciences Infrastructure for biological Information
ELSI	Ethical, Legal, and Societal Issues
EMR	Electronic Medical Record
FFPE	Formalin-fixed, paraffin embedded
FHRB	Finnish Hematology Registry and Biobank
FIMM	Institute For Molecular Medicine Finland
FTE	Full-time employee
GWSNP	Genome-wide single nucleotide polymorphism assay
IC	Informed consent
IHC	Immunohistochemistry
IRB	Institutional Review Board
IT	Information Technology
LIMS	Laboratory Information Management Software
PPP	Public-private partnership
PTE	Part-time employee
R&D	Research and development
SNP	Single Nucleotide Polymorphism
SoTe	Finnish Health Care System
SSP	Single Service Provider
STM	Finnish Ministry of Social Affairs and Health
THL	National Institute for Health and Welfare
TMA	Tissue micro-array
WES	Whole exome sequence
WGS	Whole genome sequence

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## I. Preamble

In a worldwide unprecedented step, recognizing the pivotal importance of biobanking for progress in biomedicine, the Finnish government issued a visionary call for nationwide coordination and integration of the country's biobanking resources to optimize the realization of value for science, health care, and commerce. An Expert Group (EG) was commissioned to evaluate and recommend options.

## II. Vision and Synopsis

Given the fundamental importance of access to biological specimens for both real-time patient care and for future progress fueled by continued research, this report embraces the vision that biobanking will increasingly become an integral part of health care systems and their operations. The impending major reform to the Finnish Health Care System (SoTe) provides a unique and timely opportunity to include biobanking in the respective planning.

The requirements for realizing the full value of the Finnish biobank potential are:

- (1) Coordination, integration, and standardization of Finnish biobanks;
- (2) Establishment of intimate linkage between biobank specimens and detailed electronic medical record and other health care-relevant data;
- (3) Dedicated funding to allow the overall biobanking resources as described above reach the critical mass necessary to deliver value (i.e., availability of 100s of 1000s of prospective specimens).

The country's 100<sup>th</sup> anniversary next year may be a perfect opportunity to highlight and advance Finland's leadership and vision in integrating biobanking into the larger context of the health care ecosystem by moving forward with appropriate structural changes and the commitment of respective funding. Indeed, given the progress that has already been made, biobanking could serve as an exemplary pilot project for the larger-scale program to create a National Data Hub (*Isaacus*).

The potential and value proposition of biobanking efforts in Finland are unique due a number of key attributes, including (i) the Finnish population's exceptional genetic founder characteristics, (ii) the depth, breadth, and decades-long track record of Finnish Electronic Health Records (EHR) linked to a unique personal ID number, (iii) the enactment of a progressive biobanking law, and (iv) the generally positive attitude vis-à-vis participation in biomedical research of a highly educated populace.

## III. Executive Summary

However, the full potential of biobanking in Finland can only be realized if the three requirements outlined above can be met: standardization/integration, annotation with EHR/EMR, and funding to attain critical mass. It should be recognized that without the latter, implementation of the former two requirements will only be of nominal impact. The Ministry of Social Affairs and Health's call for integration, addressing the first of the three requirements, reflects the recognition of the potential value proposition and is exemplary and unique in its forward-looking nature; however, it will need to be matched by action on other two requirements to reach meaningful potential.

The EG which was assembled to evaluate the options for such integration conducted in-depth interviews with the leadership of all accredited Finnish biobanks to understand their current operational status, and their aspirations as well as concerns regarding models of integration at the national level. Among regional biobanks, Turku (AURIA) and in Helsinki have established the requisite informatics and operational infrastructures, and are at an early, nascent stage of specimen collection, whereas the other biobanks are still at various stages of planning. The biobanking resources represented by the registries agglomerated under the auspices of THL represent a sizeable resource but are not linked to the EHR/EMR. Consideration and implementation of measures of national coordination based on the three key requirements elaborated above is therefore very timely, and should be undertaken as soon as possible before additional, less than fully coordinated and integrated infrastructure capacity building takes place.

The EG concluded, in agreement with responses received from all biobanks that leveraging the full potential of biobanking in Finland as a national resource will only be realized if individual biobank resources are integrated as parts of an overarching ecosystem that, by virtue of creating interoperability, results in critical mass. Thus, the activities of individual biobanks need to be harmonized to allow utilization of resources in the most impactful fashion. Such a harmonization effort is also expected, by providing economy of scale and cost efficiencies, to accelerate the requisite scaling up of the overall effort and make it more cost-effective.

Considering the fundamental importance of direct linkage between biobank specimens and EMR/EHR data for all aspects of biobank value proposition, the current lack of establishment of such linkage (with the exception of the Helsinki and AURIA biobanks) is of significant concern. In particular also, the currently planned infrastructure with at least two different EMR systems to be installed in Helsinki (EPIC) and the rest of the country (Una), respectively, will create added complexity to the design of an integrated and coherent biobanking ecosystem that provides EMR linkage/annotation for all specimens across Finnish biobanks. On the other hand, planned changes in legislation allowing less encumbered secondary use of health care data are seen as an important initiative to broaden the utilization potential of biobanks and associated individuals' health care data.

Creating the requisite critical mass will require coordinated upfront investment at a level significantly higher than currently available to the regional biobanks through local municipality and other funding, before Finnish biobanking can be expected to generate benefits that may ultimately serve to sustain its operations and have broader impact on the Finnish economy. This investment will have to support both the physical infrastructure and operations of the biobanks and the scale-up of educating and training of a skilled bioanalytics (computational biology, bioinformatics, statistics) workforce to ascertain that data processing, knowledge extraction, and commensurate value creation will take place within Finland. Only the provision and coordination of this investment at the national level will ensure that this national resource will be optimally leveraged to benefit Finnish academic and commercial interests. The government's recent decision to provide significant start-up funding to a Finnish Genome Center, Cancer Center, and Biobanking represents an important first step and signal of commitment in this regard. At the same time, the current track record of both the THL and Aria biobanks in terms of attracting both academic and industry research projects clearly indicates the potential in this regard.

**Recommendation:**

**The Expert Group recommends a model of national coordination of biobanks, which would be established in the form of a new legal entity representing a formal consortium of all biobanks, with an appointed Managing Director and a Board of Directors that represents the individual biobanks. This entity will be the official representation of all Finnish biobanking activities, and be responsible for transparency and accountability with regard to the public, and for assurance of compliance with all applicable ethical, legal, and societal considerations, in particular data safety and access control. The EG was advised that, based on a number of considerations, the best legal entity option is a Cooperative (421/2013, Fi: osuuskuntalak).**

**While the individual biobanks will continue to operate independently on a local level, as is consistent with the vision that biobanking will become an integral part of health care system activities, they will do so adhering to standardized processes. They will be accountable to the consortium leadership in this regard by committing to utilize for their operation the services of a Single Service Provider (SSP). Thus, essentially a two-layer structure consisting of a formalized consortium as a new legal entity governing the biobanks, and a SSP ensuring standardized and harmonized operations, is recommended as the currently optimal solution. Notwithstanding governance under a consortium structure, provisions should be made for individual biobanks to carry out local projects, applying SSP-provided standardized operating procedures and returning data generated to the general database.**

The SSP will provide standardized tools and services, as specified by the consortium leadership, thus ensuring harmonization across biobanks as well as recognition of economies of scale. The SSP will provide informatics tools and infrastructure for both biobanking operations with particular attention to linkage to the EHR/EMR, standardized processes for operations and quality management, the services of a unified, central IRB that will govern biobanking activities for all consortium members (including format, content, and administration of Informed Consent), harmonized communications and public relations, intellectual property rights management, and various other administrative and logistic support, such as marketing and pricing of sample and data access, business development, and legal services. The SSP will serve as a single point of contact for interested users/customers of the biobanking resources and will safeguard the principle that value from data and specimens shall be created in Finland, thus conserving a national resource in support of Finnish economy and scientific interests. Lastly, it can serve as a central procurement agent for instrumentation, equipment, reagents and consumables as well as certain outsourced services (e.g. DNA extraction).

The EG recommends that due consideration is paid to ensure adequate funding for setting up the SSP as well as for the build-up of a critical-mass biobanking resource. Consideration should be given how this will be supported as part of the plans for the Finnish Genome Center, although the currently approved funding under this plan was considered not to be sufficient to achieve an internationally competitive biobank volume.

The Finnish biobanks have been largely in favor of this model as the preferred scenario for national coordination of efforts, a concept that all of them supported in principle. However, there was a strong sentiment that local presence and control of day-to-day operations is essential to maintain the momentum and motivation among both biobank operators and participants. This would appear to be aligned also with the emerging recognition that biobanking will increasingly become an integrated part of all health care systems. For these reasons, concerns against a fully centralized “national operator” model were raised by all but the THL and Helsinki biobanks.

#### **IV. The Ministry of Social Affairs and Health’s Call and Mandate; Expert Group Process**

##### **A. Mandate**

Earlier this year, the Finnish Ministry of Social Affairs and Health (STM) and National Institute for Health and Welfare (THL) agreed on an assignment to compile a report of possibilities to consolidate the Finnish biobank cluster.

To this end, THL nominated an expert group (EG) to investigate the possibilities to establish a single biobank or a joint operator/organization/legal entity. The tasks of the EG include exploration and evaluation of the different possibilities of collaboration, as well as, reporting the results based on the initial feedback received from the Ministry. Furthermore, THL nominated steering group that evaluate and guide the work performed by the EG.

The specific questions the EG was supposed to address include:

- Description of current status and observed needs for a change
- Description and evaluation of different organization models for the joint operator, including assessment of financial impact
- The relations of the joint operator to the national health care system, the future genome center, national cancer center, registries and the National health hub.
- Evaluation of the legal effects of the most prominent organization models – to be done in collaboration with the Ministry of Social Affairs and Health.

##### **B. Expert Group Process**

The EG was constituted on April 7, 2016 and developed its agenda in a number of meetings. As part of this process, the biobanks received a detailed questionnaire to ascertain the current state of their

operations, which they returned to the EG. The EG then conducted on-site visits at all biobanks between April 18 and 20, 2016. All biobanks had received instructions as to how to prepare for the visits and to address specific questions.

Visits at each biobank lasted between 1½ and 2½ hours and included a brief presentation by the EG on the Ministry of Social Affairs and Health's mandate and the EG process, followed by the biobank's responses to the questions posed. Subsequently, the EG presented four possible models of integration (see Section VIII). Subsequently, in-depth discussions on the biobank's aspirations, concerns, and priorities took place.

Subsequent to the visits, the biobanks also provided in-depth written commentary on the topics raised and discussed.

A draft of the report was submitted to the Ministry on 31 May, 2016, and subsequently shared with the Steering Group of the Finnish Biobanks, who provided comments back to the EG on 10 June, 2016.

## **V. Background and Rationale**

### **A. Biobanking: General Remarks and Finnish Context**

Biobanking as a distinct discipline has been increasingly recognized for about the last 15 to 20 years, and is today considered a key activity to create and maintain critical resources that enable biomedical research, specifically translational investigation. The parallel rapid evolution of genetic and genomic technologies that took place during this period, with the need of increasingly larger sample sizes to meet the statistical challenges of genome-wide research projects has further accentuated the need for large, well-annotated collections of biospecimens and associated clinical and phenotypical data. Thus, large-scale efforts such as the UK Biobank in England, or the Helmholtz cohort in Germany have been initiated as national projects; and in the US the "Precision Medicine Cohort Study" is about to be launched.

Finland represents a particularly attractive and powerful opportunity for the development and deployment of biobanks, based on its unique population structure, the availability of a well-curated and comprehensive medical record system, the recent the enactment—first of its kind—of a national biobanking law, and the presence of a highly educated population with a generally supportive and enlightened attitude towards biomedical research.

A genetic founder effect, dating back to a population "bottleneck" some 4000 years ago, concurrent with the arrival of agriculture and animal husbandry by a limited number of new settlers, has resulted in strongly disease-relevant genetic variants to be considerably overrepresented compared to populations that had not experienced this kind of bottleneck, enriching dramatically the utility for medical genetics research. This same bottleneck also reduces the allelic complexity of the population, i.e. deleterious alleles are commonly encountered in many individuals rather than only a few, thus providing a strong advantage for genotype-based analysis and recalling of subjects.

The availability of a comprehensive electronic medical record system initiated some 20 years ago across Finnish health care institutions, and of a number of diverse population-wide registries, all using as a common denominator the 11-digit ID code, provides the potential for powerful and essential leverage of biospecimen collections and other biobanking activities, representing a unique advantage compared with most other countries and environments.

Lastly, the Finnish Biobanking Act provides a unique and robust legal framework for biobanking activities, including the permission to re-contact study subjects for follow-up data collection across all domains of biomedicine. This is of particular relevance in the context of applying biobanking resources to pharmaceutical research, where more sophisticated phenotypic characterization of carriers of genetic variants of interest is viewed as being of particular impact.

The unique potential of Finland in health care research and innovation has been widely recognized and other initiatives parallel to the biobanking efforts have emerged. The government has recently

launched two strategic programs, “Health Sector Growth Strategy for Research and Innovation” ([https://www.tem.fi/files/40138/TEMrap\\_16\\_2014\\_web\\_26052014.pdf](https://www.tem.fi/files/40138/TEMrap_16_2014_web_26052014.pdf)) and “Finland’s Genome Strategy” ([Genomestrategy](#)), both of which are currently being implemented. Both of these strategies are intimately linked with biobanks and related activities. As part of the genome strategy, the government recently reserved € 17M in funding for establishment of a national genome center, a national cancer center, and for biobanking activities. In addition, Sitra, a public fund for economic growth reporting to the parliament, has initiated a project aiming at building a National Health Hub ([NationalHub](#)). This hub project, termed Isaacus, would provide a platform to link Finnish health and wellbeing information from different sources (registries, health care operators, biobanks and individuals) for various research and innovation activities. Sitra is currently funding several pilot projects and Isaacus is expected to be functional by Q3/2017. Other harmonization activities include the Tekes-funded project DigPhen ([DigPhen](#)), which aims to harmonize EHR data within selected disease categories.

It is important to recognize that the requirements for biobanks to deliver true value, i.e. to allow the discovery and interrogation of relatively rare gene variants, are now viewed as only being addressable with very large-scale collections of specimens (100,00s to millions) which, critically important, need to be annotated with high quality, very detailed clinical, demographic, and other personal health-relevant data.

The Finnish biobanks have the potential to provide a major boost to medical research, transfer of research results to clinical care, and to initiate and expand public-private partnerships with commercial impact. However, to reach the full potential and international competitiveness, biobanking activities must be carried out in a concerted fashion, and certain bottlenecks must be resolved. Since most of the Finnish biobanks are still in a nascent phase and the number of specimens in these biobanks is very limited (except for legacy FFPE samples), this is an opportune time to address these issues.

The international competitiveness of the Finnish biobanks will critically depend on three elements: (i) the capability – i.e. logistics and funding— to prospectively collect large numbers of new samples in a standardized and integrated fashion, (ii) the ability to link relevant health information comprehensively and with simple procedures to the biobank specimens, and (iii) the capacity to effectively transfer these assets to research and R&D activities in a nationally coordinated and integrated fashion that maximizes the critical mass necessary for these studies. As the real value for all sample types comes from the associated EHR (longitudinal and comprehensive) information, it will be important to focus on data access and training of bioinformatics experts, who can parse, mine and utilize the data according to project requests. An important current bottleneck is sample collection, which is hampered by the current informed consenting processes that have turned out to be less than optimally effective. Since a great majority of Finns is willing to provide biobank consent and samples, we need new ideas and resources to address this critical bottleneck. The planned change in legislation regarding a liberalization of the secondary use of data is one important step in the right direction in this regard.

#### B. Biobanking Value Proposition

The biobank sample types, their value for academic research, public health, and public-private partnership projects with commercial connotation, their respective strengths and weaknesses, and some of the typical challenges in sample collection and utilization are listed in Table 1.

The value to be derived from biobanking – always directly dependent on the associated clinical and other data on the sample donor— can generally be viewed as occurring in 3 areas: (i) contribution to academic research; (ii) direct public health impact by identifying risk factors and other clinically actionable information; and (iii) derived from commercialization, either by collaborations with industry or the creation of new commercial entities (start-ups). To leverage the value of any one of these, an initial investment is necessary to create a resource that satisfies the critical minimal resource size necessary to serve these purposes. Given current consensus that several 100,000

samples will need to be available for truly meaningful studies, this upfront investment is sizeable. There is, however, the expectation that it will eventually be able to be recovered: directly by user fees from academic users supported by research grants and from industry collaborations, and by milestone, licensing and/or royalty payments (depending on negotiated contact) from industry partners; and indirectly by improvements in public health and a stimulus effect on Finnish biotechnology and life science industry from start-up companies. Last, but not least, medical progress and new, more cost-effective medicines, and associated improvements of the human condition, may be seen as most aspirational and visionary ultimate payback of biobanking and associated research and development efforts.

	Sample category	Academic / Public Health value	PPP/commercial value	Strength	Weakness	Challenge
Existing today	Retrospective diagnostic pathology samples, partly in biobanks (FFPE)	tissue-based biomarkers (restricted genotyping, transcriptomics)	<u>Modest</u> : similar samples available from many sources; value only if phenotypic annotation (EHR, IHC etc.)	large numbers available ( $\approx 2$ M), low cost, limited structured information (SNOMED); TMAs increase value	limited use; labor intensive	pathology expertise; lab techs
	Retrospective research samples from registries in biobanks (THL) (blood, DNA)	Genotyping, sequencing, blood-based biomarkers	<u>Significant</u> : value from annotation with disease-specific registry data	Currently available $\approx 200,000$ ; utilized in research; deep phenotype in disease studied	no general EHR <sup>s</sup> data annotation	Legacy IC may be narrow
	Retrospective research samples in various academic archives, not in organized biobanks (blood, DNA)	Genotyping, sequencing, blood-based biomarkers	<u>Significant</u> : value from annotation with disease-specific registry data	Currently available $\approx 10-100,000$ ; utilized in research; deep phenotype in disease studied	no general EHR <sup>s</sup> data annotation	Legacy IC may be narrow, access/transfer process
	Specialized registries with longitudinal samples (HUB, FHRB) (fresh-frozen tissue, blood, DNA, body fluids, living cells, iPSCs etc.)	All omics tissue and blood biomarkers; translational research	<u>Very high</u> : but niche market	needed for high-end application; only option for translational research; $\approx 3000$ available	sample number small; expensive; requires special infrastructure (by acad. researchers) cost/benefit may be low	funding, sample collection
New effort	Prospective consented samples, hospital/clinic or population-based (blood, DNA, etc.)	Genotyping, sequencing, blood-based biomarkers	<u>Very high</u> : if quantity is high (preferably 100,000s) and extensive EHR data annotation	Low cost per sample, prospective phenotype/EHR annotation can be planned, re-contacting possible;	current sample number small, high cost to collect sufficient number	IC, sample collection; funding; coordination

**Table 1: Biobanking Value Proposition:** PPP: public-private partnership; FFPE: formalin fixed paraffin embedded; TMA: tissue microarray; EHR: electronic health record

### C. Bio banking integration efforts to date

#### 1. *BBMRI-ERIC*

BBMRI.fi is a National Node of BBMRI-ERIC and operates under collaboration between all eight national biobanks. BBMRI.fi organizes an interface with the National Network of Biobanks and Biological resources and coordinates their activities with those of BBMRI-ERIC. Overall, BBMRI.fi

aims to create an internationally leading biobank infrastructure providing strategic support to biomedical research, healthcare and biomedical industry. BBMRI.fi is operated by the following working groups with participation from all the national biobanks:

- BBMRI.fi network coordination
- Coordination of biobank IT infrastructure development
- Harmonization of activities within BBMRI.fi
- Biobank quality issues
- Ethical and legal issues

BBMRI.fi is hosted by the National Institute for Health and Welfare (THL) and its partners include all biobanks in Finland registered by Valvira. Importantly, BBMRI.fi builds on the national network of biobank professionals and top-level scientists, representing areas like epidemiology, clinical practice, genetics, molecular biology, statistics and computer sciences. The Finnish approach and favorable regulatory framework for biobank related samples and data is foreseen to serve as a model to other European BBMRI-ERIC Member States. Representatives of BBMRI.fi have actively participated in planning and implementation of the BBMRI-ERIC Work Program, Common Services for Ethical and Legal Issues (ELSI) and IT as well as Collaboration of European Clinical Biobanks. BBMRI.fi organized the third BBMRI-ERIC symposium, HandsOn: Biobanks, 2014 in Helsinki. BBMRI.fi operates in close collaboration with EATRIS and ELIXIR through the Biomedinfra.fi consortium. This collaboration has been important for both the development of biobank information systems and the storage and analysis capacity for genomic data, provided in collaboration with FIMM and CSC. The long-term goal of BBMRI.fi activity is to create a single entry portal for the Finnish biobank specimens and related data and to harmonize procedures between different biobanks. The aim is to develop a novel platform between Hospital Districts, universities and other biobank operators, business community, and national stakeholders by improving mutual learning and exchange of experience and best practices between the actors. The public-private collaboration model development activities will play a major role in the future BBMRI.fi operations, along with active collaboration with the related technological development in an intertwined manner. This development would not have been possible without the joint commitment of all the major universities, hospital districts and THL. It is clear that the activities and goals of BBMRI.fi are fully aligned with the Ministry's expressed interest to move towards a coordinated integration of the Finnish biobanking landscape.

## 2. *BBMRI-LPC*

BBMRI.fi is closely linked to BBMRI-LPC ([www.bbmri-lpc.org](http://www.bbmri-lpc.org)) which is coordinated by Institute for Molecular Medicine Finland, FIMM. BBMRI-LPC (Biobanking and Biomolecular Resources Research Infrastructure – Large Prospective Cohorts) is one of the largest biobanking networks in Europe aiming to facilitate scientists' access to large prospective study sets on human health and disease. Europe has unique strengths in epidemiological studies for which data have been accumulated for decades, often complemented by the collection of biological samples. Prospective population biobanks are amongst the oldest European research infrastructures. BBMRI-LPC currently provides and facilitates access to more than 20 large European biobanks for several high-class scientific projects on various phenotypes, including cancer, cardiovascular and gastroenterological disease and rare diseases. However, the most important result of BBMRI-LPC will be the recording of the Process of the Access, i.e. detailed mapping of the pathways for a scientist to have access to these high value European resources: well handled, high-quality follow-up studies of hundreds of thousands of volunteering European individuals. Not only does the BBMRI-LPC assemble massive resources in terms of specimens and data, the consortium has also assembled deep expertise in the complementary disciplines that are required to effectively improve and facilitate exploitation of the cohorts. Jointly, the members of BBMRI-LPC have a vast experience in building, follow-up, and facilitating exploitation of cohorts by interaction with

interdisciplinary networks of user scientists that are well balanced (by countries and by disciplines) to contribute expertise in areas like public health, epidemiology, molecular biology and genetics, high throughput omics technologies, biostatistics, and bioinformatics. A significant part of BBMRI-LPC action has been in networking the European biobanks including not only well-established biobanks but also major actors in countries where as of yet no significant biobank activities have taken place but where there is interest in initiating such activities. BBMRI-LPC has established a data connectivity network that includes most EU countries as well as several non-EU countries. As the coordinating country of this unique EU FP7 project, Finland finds itself at a competitive advantage with regard to accumulating expert knowledge and experience on how to coordinate biobanking resources. This is expected to directly benefit the Ministry's vision of an integrated Finnish biobanking ecosystem.

### 3. Proposal to merge Turku and Tampere biobanks

The operators of the Turku (Auria) and Tampere biobanks have recently engaged in in-depth discussions on merging their operations, taking advantage of some of the infrastructure elements that have been developed by Auria, even envisioning this as "the first step towards a national operator". As a result of these discussions, a detailed report has been issued that reaches conclusions that are very similar to the recommendations by the EG contained in this report, including the nature of the legal entity, albeit falling short of the level of granularity for the coordination of services contained in this report. The Turk-Tampere Merger report is publicly available and may be viewed as a complementary document to this report.

## VI. Current Status of Finnish Biobanking

### A. General Assessment

There are currently eight individual biobanks in operation in Finland, all registered with and accredited by Valvira. Six of the biobanks are regional enterprises and are owned and operated by local hospital districts, universities, and, variably, laboratories. Two of the biobanks are centralized and nationwide efforts with headquarters located in Helsinki area.

Among these biobanks, by far the largest and most advanced one is the biobank operated by THL in close collaboration with the Finnish Institute of Molecular Medicine (FIMM). It represents the agglomeration of a number of large registries that have been set up over the last two decades, has advanced biospecimen storage facilities (fully automated -80°C freezer, large specimen processing facility), and has carried out genome wide SNP (single nucleotide polymorphism) analyses as well as genome-wide or exome-wide sequencing on a substantive number of its specimens. The Finnish Hematology Registry and Clinical Biobank (FHRB) maintain a small number of highly characterized samples. Among the regional biobanks, Auria and Helsinki are currently actively collecting specimens from their clinic visitors, but to date, the number of specimens collected is quite limited, and no analytical work has been performed. The remaining six biobanks are in various preparatory stages but have as yet not collected any specimens. The strategies (planned to be) pursued of the regional biobanks differ with regard to prioritizing collection of disease- or specialty-defined samples (e.g., Tampere plans to focus on cardiovascular disease), or more randomly of random clinic visitors (e.g. Auria and Helsinki).

All regional operators have access to large numbers of legacy tissue samples (FFPE) which are at various stages of incorporation into their biobanks and LIM systems.

THL and FHRB biobank specimens are annotated with registry-specific subject data, but are not linked to the EMR databases. The AURIA and Helsinki biobank specimens are (being) linked to the EMR, while the remaining regional biobanks are in various stages of planning to do this.

Table 2 provides a summary overview of a number of salient parameters describing the status of the eight biobanks. Additional detail is provided in the Appendix (Section I) to the report.

	THL	FHRB	Helsinki	Auria	Tampere	CFB	EFB	Borealis
ann. funding	1,500,000	170,000	1,100,000	1,200,000	850,000	200,000	550,000 +194 350 *	634,000
FTE	10	3	7	15	5	3	4	2
PTE	10	3	5	3			3	3
DNA	70,000	1105	2000	22 050	0	0	0	0
FFPE		0	(1,200,000)	650,000	350,000	(500,000)	(250,000)	(1,000,000)
plasma	120,000	1105	2,000	25 000	0	0	0	0
GWSNP	32,000	0	0	18 000	0	0	0	0
WGS	2,700	0	0	1050	0	0	0	0
WES	13,200	0	0	3000	0	0	0	0
Metab.	10,700	0	0	2500	0	0	0	0
BMs	120,000	0	0	26 500	0	0	0	0
LIMS#	SamWise	SamWise	undecided	custom/BCP	undecided	QPat3	SamWise	undecided
Data Infrastr	KITE REMS	Granics Oy cooperation	Miranda/Oberon	Miranda/Oberon	Miranda/Oberon	Effica	Miranda/Oberon	Esko Oberon
acad. proj.	23	7	0	23	0	0	0	0
comm. proj.	2	0	1	22	0	0	0	0

Table 2: Current state of Biobanking in Finland: FTE/PTE: full time/part time employees; DNA: samples for genetic investigation; FFPE: formalin—fixed, paraffin-embedded tissue; GWSNP: genome-wide single nucleotide polymorphism assay completed, data available; WGS: whole-genome sequence completed, data available; WES: whole-exome exome sequence completed, data available; Metab: samples analyzed for various metabolites, data available; BMs: samples analyzed for various biomarkers, data available; LIMS: laboratory information management system; Data Infrastr: data infrastructure system; acad. proj: academic research projects utilizing the resource currently being conducted; comm. proj.: (collaborative) projects with industry partners currently being conducted; FHRB: Finnish Hematology Registry and Clinical Biobank; CFB: Central Finland Biobank, Jyväskylä; EFB: Biobank of Eastern Finland, Kuopio; n/a: not available; BCP: BC Platforms. Numbers represent subjects represented, not biospecimens stored (in many cases, more than one [longitudinal] specimen is available); numbers in parentheses refer to FFPE specimens that are available but have not yet been transferred to biobank operations

\* external funding

#All hospital biobanks have Qpati as a pathology LIMS

## VII. Proposed scenarios for coordination and alignment of Finnish biobanks

Two major aspects of coordination and alignment were considered: functional/operational coordination and governance coordination. It was anticipated that for the former, agreement in principle was likely, and hurdles are anticipated to be primarily of a practical nature and relatively straightforward to be resolved. For the latter, finding agreement was expected to be somewhat more difficult. There was consensus that coordination of governance without functional/operational coordination will be ineffective/meaningless, and that both will have to be closely linked such that (perceived) drawbacks of either are being compensated by the other. Overall, a balance between centralized and federated

approaches will need to be struck. Options for coordination among biobanks in Finland have previously been examined based on a model of merging the Turku and Tampere University hospital biobanks.<sup>1</sup>

#### A. Options for Coordination and Harmonization of Biobanks

The EG considered four basic models, across the spectrum from a minimally coordinated to a maximally centralized scenario. In doing so, they gave important consideration to the fact that strong and visible local/regional presence of the biobank operators is likely a key success factor as it provides the basis of community buy-in and acceptance. Local ownership and empowerment will influence motivation among both subjects and investigators/operators in a critical way.

##### 1. *Informal consortium*

Individual biobanks agree on informally discussing and voluntarily implementing some degree of operational harmonization; use proposals and marketing of resources would largely be pursued on an individual basis, while joint approaches may, on a case-by-case basis, be undertaken.

There would be no specific performance commitments by members; and funding would be exclusively based on local resources and on revenue from user fees etc. No new legal entity would be formed. This model would reflect the current BBMRI.fi model, where all biobanks are allied within an informal network.

##### 2. *Informal consortium, single service-provider*

All regional and central biobanks (including their network of owners) agree to contract with (or form) a legal entity that serves as a single service provider (SSP) responsible for rendering harmonized infrastructure and operational support, including, most critically, a common IT-infrastructure (see below for details of the SSP). In this model, the biobanks would remain independent except for the commitment to use the single service provider, and no new legal entity would be formed. While operation of biobanks would be largely harmonized, and economies of scale realizable, there would be no commitment to joint marketing of the resources, in as much as it may occur on a case-by-case basis.

##### 3. *Formal consortium, single service provider*

This model is based on setting up a new legal entity of which the individual biobanks would be voting members, via a management board. A director would be appointed with certain, well-defined levels of authority for day-to-day management, while for more important decisions the board would be consulted and decisions would be made by majority vote, as governed by the bylaws of the legal entity. All operational/technical aspects would be commissioned to an SSP (see below) which the new legal entity would operate or contract with; the director or the managing board, depending on magnitude/impact of the topic, would make decisions regarding the specifications of the services and products supplied to the biobanks by the SSP, as well as regarding resource utilization and marketing. The consortium leadership would make all decisions regarding cross-biobanks-use of specimen/data; and would likely appoint a Scientific Advisory Board. The members of the formalized consortium would be accountable to the legal entity regarding compliance and performance. Operating the SSP will require dedicated central funding, and central subsidies for the regional operational aspects would be expected.

##### 4. *National operator*

A single centralized entity is responsible for all aspects of operations and utilization of biobank resources across all participating biobanks; individual biobanks may still have a consulting role but function primarily as conduits of specimen collecting activities operated by the national biobank. All funding will come from central resources, and the individual biobanks will be held accountable for reaching set performance metrics.

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<sup>1</sup> Report on merging the biobanks belonging to the catchment areas for highly specialised medical care of Tampere University Hospital and Turku University Hospital. Report of a Working Group chaired by Heli Salminen-Mankonen.

### Summary Table of options

	Model 1: Informal consortium	Model 2: Informal consortium + SSP*	Model 3: Formal consortium + SSP*	Model 4: Single National Operator
Legal entity**	none	none	yes	yes
Operations	Locally organized	Single service provider	Single service provider	Single service provider
Sample acquisition	Locally organized and conducted	Locally organized and conducted using SSP services	Locally organized and conducted using SSP services	Centrally organized and conducted by SSP across BBs
Sample storage	Local	Local	Local (possibility of aliquots stored centrally)	Centrally
• Operational alignment	Encouraged, voluntary	Binding/formalized	Binding/formalized	Binding/formalized
• Quality Management	No single standard	Harmonized	Harmonized	Harmonized
• Physical BB installations	Local	Local	Local	Central
Utilization decision power	Local	Local	Central, board consultation mandatory	Central, board consultation optional
Marketing/commercialization	Local, coordination non-binding	Single service provider – use non-binding	Single service provider – use binding	Single service provider – use binding
User access to local BB only	Primary scenario, non-restricted	Primary scenario, non-restricted	Possible, but Consortium to be notified	All use is centrally governed
User access to cross-BB resources	Single point of contact possible, non-binding	Single point of contact possible (SSP), non-binding	Access only via official single point of contact (SSP)	Access only via official single point of contact
Performance metrics	None	None	Accountable to consortium	Accountable to the public
Financial support	local	Local + support for central service provider	Local + support for central service provider	Centralized funds

\* SSP: “Single Service Provider”: non-for-profit company that provides all operational and logistic services that are desired to be aligned (to be defined) either directly or via subcontractors.

#### B. Legal Entity options:

There are three main possible solutions for the legal entity acting as the “formalized consortium”. The options are a public foundation (Fi: *säätiö*), a limited liability company (Fi: *osakeyhtiö*) and a cooperative (Fi: *osuuskunta*).

##### 1. Foundation

The renewed Act on Foundations (487/2015, Fi: *säätiölaki*) came into force quite recently. A foundation is an independent legal entity the purposes and functions of which are laid down in its rules. A foundation may conduct operations or support activities which promote its purposes. The purposes of a foundation may be changed only in case certain criteria are met, and the new purpose may not materially deviate from the original purpose of the foundation. The Finnish Patent and Registration Office must further approve any such changes to a foundation’s rules. A founda-

tion may only conduct economic activities to the extent such activities directly relate to its functions, and economic activity as such cannot be the purpose of a foundation. We further deem that the legal entity actualizing the formalized consortium model must be able to conduct legal acts on behalf of its members effectively, and these acts might well include economic activity. In light of the above, foundation is not a desirable solution as it is rather inflexible and conducting economic activities might be more difficult compared to companies and cooperatives.

## 2. *Limited Company*

Companies are regulated in the Limited Liability Companies Act (624/2006, Fi: *osakeyhtiölaki*). A company is a legal person distinct from its shareholders and it is established through registration. The shareholders shall have no personal liability for the obligations of the company. The management of a company shall act with due care and promote the interests of the company. Articles of Association of a company regulate the operations and functions of the company. The purpose of a company is to generate profits for its shareholders, unless otherwise provided in the Articles of Association. The shareholders exercise their power of decision at the General Meeting or by making unanimous shareholders' resolutions. Operating a company is in principle very flexible and it naturally allows economic activities. The management and decision-making is also somewhat simple in a company – at least if the shareholders are unanimous. However, if the formalized consortium would act in the form a private company, this could perhaps cause unwanted negative attention and reservation towards it. This would naturally not be optimal, as the legal entity should enjoy trust from all stakeholders, including private citizens (donors) and governmental agencies.

## 3. *Cooperative*

Organizing the consortium as a cooperative in accordance with the Finnish Cooperatives Act (421/2013, Fi: *osuuskuntalaki*) would provide various benefits. The main characteristics of a cooperative under Finnish law are outlined below:

### a) *An independent legal entity with limited responsibility*

Like a limited liability company, a cooperative is a legal entity that is fully independent from its members. Further, a member's liability for the cooperative's liabilities is as a general rule restricted to the cooperative's share capital.

### b) *The purpose of a cooperative*

Unlike a limited liability company, a cooperative's purpose is not to create profits for its members, but rather to promote their economic and business interests by way of the pursuit of economic activity where the members make use of the services provided by the cooperative or services that the cooperative arranges through a subsidiary.

### c) *Capital structure and payment of dividends*

Unlike a limited liability company, a cooperative does not have a fixed minimum share capital. Typically, a cooperative's share capital is subject to change in accordance with the development of the number of its members. Further, a cooperative is as a general rule entitled to pay any residual amounts originating from its activities to its members, if not stated otherwise in the rules of the cooperative. If residual payments are however made, they are as a general rule allocated among the cooperative's members based on their usage of services produced by the cooperative.

### d) *Personal membership*

Unlike a limited liability company, ownership of a cooperative is based on membership, not the ownership of shares. As a general rule, a cooperative's membership is personal and cannot be assigned to a third party.

### e) *Decision-making*

Like a limited liability company, a cooperative has two mandatory governing bodies: a general meeting and a board of directors. Each member of a cooperative has as a general

rule one vote when decisions are made at the general meeting of the cooperative. However, the cooperative's rules can stipulate on a different allocation of votes between the members. The cooperative's general meeting is responsible for electing the members of the board of directors.

### C. Single Service Provider Model

The concept of a single service provider is one that has been used effectively by Finnish universities and hospital districts in a number of different areas, where both harmonization of effort in the interest of creating a standardized ecosystem, and avoidance of duplication in the interest of cost-effectiveness and creation of critical mass and negotiating power was considered advantageous. Examples are the institution of a centralized emergency air-evacuation provider (FinnHEMS), a central service provider, Certia (<http://www.certia.fi>), the Finnish Universities joint enterprise property management provider (<http://sykoy.fi/home/>), and Finland University, a joint provider of educational services marketing (<http://www.finuni.fi/>). All of these service providers are set up as legal entities, owned by the clients, with clients making a legally binding commitment to use them exclusively as providers of services. In a similar vein, a single service provider company for biobanking services and supplies could be created or appointed, and would be given authority to decide on certain best practices and joint solutions, with input from the individual biobanks or the consortium management, if a legal entity is formed. It should be noted that the Finnish Red Cross, which has deep and longstanding experience in operating and infrastructure building of (a specialized case of) biobanks, and has offered assistance with implementation of a single service provider solution. Alternatively, BBMRI.fi or the planned Finnish Genome Center could be the entity providing the SSP services. If a legal entity is formed (model 3 or 4 above); it in itself could, as part of its activities, serve as the SSP. Lastly, the SSP function could be outsourced to a non-for-profit or for-profit company. There was a strong sentiment that the SSP not be set up as a public legal entity since the applicable constraints with regard to inviting and deciding on tenders would greatly affect the agility of operations. Whatever the entity is that will serve as the SSP, appropriate due diligence by the biobanks or the legal entity coordinating biobank activities should be exercised before a contract is signed, and in an ongoing fashion to ensure quality of the services provided.

Specifications of products and services that the SSP will provide will be defined by a panel representing the biobanks, based on consensus/majority vote. Once a product or service is in the repertoire of the SSP, all biobanks will have a contractual obligation to use the SSP's products and services and not engage with other providers.

The services that the SSP will provide may be categorized, according to the EG's assessment, into mandatory and optional ones. For the mandatory activities, the SSP will be reporting and accountable to the governing legal entity, in case model 3 or model 4 are adopted; if optional services are decided upon, the same will apply:

#### 1. *Basic SSP services*

- a) IT/data harmonization and consolidation:
  - (i) Laboratory Inventory Management System (LIMS)
  - (ii) Interface between LIMS/specimens and EMR/EHR;
  - (iii) Coordination with existing/other service providers to reduce costs e.g. Kela – Kanta, CSC
- b) Informed Consent (content and administration/procurement process)
- c) Issue of standard operating practices and processes for specimen acquisition, including format specifications for equipment, reagents, consumables to ensure standardized ecosystem
- d) Quality management services and oversight, including harmonized processes and tools
- e) Central Institutional Review Board services:
  - (i) IRB approval for specimen acquisition (ethical review)
  - (ii) IRB review/approval for all studies (ethical and scientific review)

- f) Processing of all study proposals requiring specimens from more than one biobank (point-of-contact, negotiations, contracts), in conjunction with IRB services, for approval by the governing legal entity, if one is formed (model 3 or 4)
- g) Specimen and data transfer services, including monitoring, as appropriate, that
  - (i) Formal control over biospecimens and biospecimen-associated data remains with the Finland-based owners of biospecimens and biospecimen-associated data and not be permanently ceded to persons or entities located outside of Finland, and is in accordance with the biobank act.
  - (ii) All results of individual projects conducted using the biobanking resource are fed back into the appropriate data bases
- h) All intellectual property-rights-related activities
- i) All communications and public relations, including (review prior to release of) communications at the regional level
- j) All sales and marketing and business development; portfolio management; productization;
  - (i) Definition of service packages to be offered to customers
  - (ii) Pricing: expected to define separate standards for academic (at cost) and industry (with margin) customers.
- k) Legal services including processing of contractual agreements with collaborators/partners/customers and/or spin-offs; with particular attention to
  - (i) Possible downstream revenues (licenses, royalties)
  - (ii) Publication rights
  - (iii) Intellectual property rights

**Note:**

Under the “formal consortium, single service provider” option (“model 3”) the individual biobanks may opt to collect, in parallel with and by leveraging the specimens/aliquots collection carried out under the governance of the formal consortium, additional specimen aliquots, using and adhering to the same protocols and standardized processes described under (a), (b), (c), (i) and (g) above. These additional specimens/aliquots would, however, not be subject to the stipulations of (e), (f), (h) above. Consultation and harmonization with the SSP regarding points (i), (j), and (k), would still be required, with escalation to the consortium management in case no consensus can be found.

Under the “informal consortium, single service-provider” option (“model 2”) none of the specimens collected would be subject to the stipulations of (e), (f), (h) above, other than on a voluntary basis.

**2. Optional services**

- a) Procurement/invitations for tender of instruments, equipment, reagents, consumables: leverage economy of scale/volume negotiating power
- b) Assistance with processing and approval of study proposals utilizing resources from only one biobank (under all models except 4, this could also be done locally; exception see above (1)(e)(iii))
- c) Data analysis services – collaboration with bioinformatics units of universities
- d) Outsourced services such as DNA extraction, sequencing assays etc.

**D. Feedback on coordination and alignment scenarios provided by the Biobanks after the EG visits**

**1. Summary of Biobank Comments to Coordination/Fusion Proposal**

All regional biobanks favored deeper national collaboration and efforts, which would lead to a model where there would be a single service provider responsible for some coordinated support. Among these services, the most central ones would be providing a common IT-infrastructure “backbone” and harmonizing the collection of samples and data. Biobanks’ value relies

heavily on the type and quality of collected samples and data. It is important that locally collected samples and data can easily be combined and compared on the national level. Among other actions of importance that could be centrally provided, are areas such like IPR-management, procurement (applicable to some projects), development portfolio management, projects concerning health care services.

Most regional biobanks endorsed formal consortium and a central service provider (model 3). Some biobanks had concerns regarding the formal consortium, and favored an informal one. Those that favored informality (especially Tampere and Jyväskylä) stressed the importance of local activities and independence. Tampere biobank also emphasized that the structure and administrative model of the coming national Biobank should motivate Finnish scientists to use the biobank services, and should attract more preferentially national investors to collaboration than international. A concern that was raised in the feedback from some of the regional biobanks was that Big Pharma should not be the main beneficiary of the resources.

Concerns were raised by many biobanks about the optimal location of the consortium management's administrative center and of the SSP's base of operations. To ensure optimal functionality, the respective decisions should be governed by appropriate due diligence based on objective, performance-oriented, rather than politically motivated criteria.

One of the main roles for the Operator should be facilitating large-scale national level projects, which combine resources and samples from several local biobanks. Operator should have the expertise and the mandate to prepare national level collaborations on behalf of the local biobanks, providing a single access point for large-scale projects. Fulfilling this task requires also international marketing power.

The biobanking infrastructure needs to be built mostly locally, but a centralized infrastructure should be in use to obtain cost savings and/or operational benefits. The build-up of the Operator should not slow down or hinder the progress of the most advanced local biobanks. It should be realized, that the Operator does not compensate for the need for local investments in biobanking. A national biobank may act as a single point of contact in nation-wide and international business, but each regional biobank should have independence in respect to sample repository and data archive.

Fusion of all different national biobanks into one biobank for whole country was considered as too big one step, since it could be not attractive for local stakeholders, hospital staff & patients. However, a common national Operator can be seen even advantageous offering interesting new projects, collaboration for local researchers and efficiency in operations. The current cohort biobanks (THL and FHRB) should also be linked to the national consortium during the process of Finnish biobanking reform.

In biobank reform, all should win! Benefit for all regional biobanks and stakeholders should be found. This may be the case, if agreed activities would be run centrally in certain "regions", when the rest of the regional biobanks would acquire them. Ideally, there should be as much centrally run activities as there are regional biobanks. Preserving locality would leave room for local innovation and in focusing in collecting locally the most dedicated samples that represent the arrowheads of the research in respective "region". This kind of distribution of work may be needed in order to form a national biobank that is more than sum of individual biobanks. By encouraging innovation across the board in all "regions", more ideas can be expected to emerge than in a model where innovation is restricted and controlled centrally.

In biobank reform it should also be perceived, that the patients (donors) see the Biobanking as an improvement of the health care quality, and valuable for science. Furthermore, the clinicians should be likewise convinced of the importance of biobanking, as they are the ones that recommend and "market" for the patients the act of giving samples to the biobank. The scientists should see biobanking (and related expenses) as a prerequisite for breakthrough in their future research. Stakeholders should understand the benefit of the biobanking that is run uniformly in

the whole country. Lastly, the public and media should understand the importance and value of biobanking.

## *2. Individual Biobank responses*

See Appendix (Section II)

### **E. Expert Group Recommendation**

**Based on a broad range of considerations, including, importantly, the feedback obtained from consultation with the individual biobanks, and considering the interest voiced regarding harmonization and coordination of processes and access to a single provider for operational services, on the one hand, and concern about the feasibility of successfully carrying out federated biobanking activities as a mere service provision by regional health care facilities for a centralized national operator (disconnect from health care provider-biobank participant relationship and rapport, unclear motivation on both the part of the biobank agent and the participant), the EG recommends that Ministry for Social Affairs and Health consider Model 3, essentially a two-layer structure consisting of a formalized consortium under a new legal entity for all biobanks, and a Single Service Provider ensuring standardized and harmonized operations, as the currently optimal solution.**

The EG was advised, with regard to the nature of the legal entity, that the model of a Cooperative would be best suited for organizing the activities of the contemplated consortium. This is due to (i) the fact that a cooperative's main purpose is not the maximization of the shareholders' profit and (ii) the personal nature of the cooperative's membership. Further, the Finnish Cooperatives Act provides a flexible basis for organizing the cooperative's activities. However, further analysis on e.g. the tax implications relating to the choice of the legal entity is required before making any final decisions on this.

The EG recommends that, in due course, the structure and operation of this model, once implemented, should be reviewed, and adapted as appropriate by considering changes in the conceptual and practical aspects of the Finnish biobanking landscape.

The EG also points out that unless significant and sufficient funding for the aggressive build-up of biobanks is made available, the efforts at coordination and harmonization recommended in this report will likely fall short of realizing the intended impact on science, the health care system, and economic development.

### **VIII. Financial considerations**

Financial independence is a clear aspiration for the integrated biobanking resource. After the initial set-up phase, biobanking activities should begin to recoup this investment and, ideally, become self-sustaining or even profitable, with profits being applied to further extension of resources or activities. It is expected that biobank clients, i.e. both academic and industry researchers, will pay use fees for biobank services. For academic clients, the use can be funded by public sources, but possibly also by external grants by non-profit organizations & foundations (such as Finnish Cancer Foundation).

At present, biobanks are financed mainly by the founders or owners (hospital districts and universities). The hospital funding comes either directly from the municipalities or from the VTR (state reimbursement for research). The National Institute for Health and Welfare biobank is funded by the government and the others by their founders.

Some specific activities have been funded by other sources, such as competitive research funding granted by Academy of Finland and The Finnish Funding Agency for Technology (Tekes). Those two are the major sources of so-called outside funding, also comprising public governmental or state funding. Some of the funding has been granted directly to a biobank, some has been national.

To reach the critical mass that would be considered as competitive in a rapidly evolving environment the EG considered that a competitive Finnish Biobanking hub would probably need to have anywhere

between 250,000 and 500,000 prospectively collected specimens, across the entire spectrum of medical indications (“all comers”). Assuming current estimates for the overall costs of acquiring and processing a blood specimen of between € 60.00 and € 100.00 (to be more specifically determined, and depending on the scale of operation), an overall initial investment of € 15M and € 50M will be required for specimen acquisition. The EG estimates that the SSP will require ongoing operational funds of about € 2M per year. Since this is clearly beyond the funding capabilities of regional operators, serious consideration must be given to how this initial investment can be obtained. The estimate given does not take into account any wet-lab analyses, such as DNA SNP typing or sequencing (which presumably could be charged to users) or computational processing of results.

Possible sponsors for the biobanks besides the pharma industry are insurance companies and other health care related businesses. For publicity and general acceptance of biobanks, participation of private business in the activities of the biobanking organization can be a sensitive matter that needs to be handled carefully and, above all, with full transparency. In the next budget, the government has allocated total of 17 million € in 2017-2020 for the development of national cancer center, biobanks and genome center. While there has not yet been communications as to the fractional allocation to any of the three named recipients, this is considered an excellent opportunity to fund the establishment of the integrated biobanking effort including the SSP; for all intents and purposes, the Genome Center and the Biobanking effort are so closely aligned and interdependent for successful operation and value creation that they may well be regarded as a single effort. However, it is important to realize that the currently committed funding will not be sufficient to allow adequate scaling-up of biobanking, and additional funds will need to be made available.

## **IX. Additional Considerations**

### **A. Health Care Reform**

Finland has been preparing for a major health care reform for several years now. The latest proposal was published in April. The structure, services, and financing of healthcare and social welfare services and the duties of regional government will all be reorganized. The reform is due to go into effect on 1 January 2019.

According to the proposal, the public administration of all aspects of health care will be organized on a three-tier level: central government, counties and local government. There will be 18 counties, which are responsible for all public healthcare and social services in their area. The state will have primary responsibility for financing the counties. The current system of multi-channeled financial resourcing will thus be simplified, and users of the services will have more freedom of choice.

This also means that there will be a change with regard to ownership of and responsibility for the biobanks. The hospital districts will be replaced by counties and the financing reorganized. Since the reform aims at bridging a large part of the sustainability gap in general government finances, the reform will be a challenge for biobanks. How exactly this will affect the regional biobanks – where an expansion to 18 is viewed by the panel as not desirable from a multitude of considerations including economy of scale and scarcity of expertise—is presently unclear but will need to be addressed with urgency.

### **B. Genome Center**

Finland has composed a genome strategy in 2015. In the next few years, the use of genomic data in healthcare is expected to increase rapidly. In the future, decisions regarding the prevention and treatment of diseases will be increasingly based on an individual's genetic makeup (personalized medicine).

There is an expectation that personalized healthcare, by virtue of more accurate diagnostics and treatments, and more effective prevention of disease will not only increase health and wellbeing, but will also help to make healthcare more cost-effective.

Finland is also aiming to become a recognized collaborative partner in genome research and in business activities in the field of genomics. High quality biobank sample collections and a long tradition of high-quality genetic research are widely acknowledged strengths.

The organization and location of the genome center have not yet been decided. Most university centers have, or are in the process of establishing state of the art equipment and highly qualified personnel so that all work can be conducted in in Finland. This ensures that the data keeps in our hands.

#### C. Secondary use of health care data

The accumulation and linked availability and of personal health- and related data is imperative for efficient use of biobank samples. Most of the value of a sample depends on the accessibility and quality of respective patient data. Data protection legislation has hindered this use so far. However, a strategy for secondary use of patient data has been developed, and a working group is preparing its application.

For secondary use of data, there are basically three options:

1. *Option A*: Use personal data with consent or other assent from the data-subjects. To make this both fairer and more practical, in many circumstances broader definitions of consent, or permission or approval, need to be explored and instituted.
2. *Option B*: Anonymize the data prior to using them. For most research, this is the most practical and desirable option.
3. *Option C*: Use personal data without explicit consent, under a public interest mandate. Whether and how the data are anonymized will depend on the situation. Public health mandates and protections deserve to be clarified, strengthened and extended for a variety of surveillance, registration, clinical audit, health services research and other types of investigation.

Currently, secondary use is permitted only in options A and B. The reversibility of the anonymization is not permitted, which constitutes a serious problem regarding the accumulation of longitudinal patient data. However, a new EU-law that is currently being drafted which is expected to allow the secondary use of data in research and for administrative purposes on the condition that it is coded. Decoding would be allowed for research purposes.

#### D. Legal Environment

The legal environment for the biobank activities is changing significantly in Finland and in Europe. The new European Regulation on Personal Data Protection ([EUDataProtection](#)) will enter into force on 24 May, 2016, and it shall apply from 25 May, 2018, onward. The new regulation is applicable as such on the national level but it also requires implementation activities. Thus, it will have impact on the Finnish Biobank Act (688/2012) and other legislation covering processing personal data. The modifications that need to be made to the Biobank Act will, in particular, have impact on the activities of the biobanks.

Another important issue is the development of new legislation concerning the secondary use of health and medical data (see above). This will also affect the activities and possibilities of the biobanks. The intention is to utilize health and medical data more efficiently. It still needs to be clarified how this new legislation may benefit biobank activities and increase the possibilities for more efficient use of samples and linked data.

Third, and to be seen in connection with the developing legislation for secondary use of health and medical data are the plans for “one-stop-shopping” for health and medical data. The importance of having a single contact point for accessing data has been noted. However, the connection between “Biobank Finland’s contact point” and the “one-stop-shop” for all health and medical data has not been defined, although they may well be considered as being complementary.