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Gen.era
Digital Genomic Alliance To Explore New Market For Acceleration

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Summary

*The deliverable **D2.1: Single template model for genomic profile identification** is a public document delivered in the context of **WP2: Building a shared and inclusive genomics value chain identity** for the **GEN.ERA** project.*
This standardized document provides an overview of each cluster respective capabilities and positioning in a global value chain, an essential support for the implementation of the next GEN.ERA planned actions of strengthening our partnership and preparing SMEs internationalization.

Content

This report D2.1. Single template model for genomic profile identification was funded by the European Union's COSME Programme.

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Introduction

*GEN.ERA cooperation aims at foster a **European genomic value chain integration** through a global approach to outcomes geographic and industrial boundaries. Value chains emerge out of strategic choices by economic actors for specialization, diversification or integration. As part of our regular support activities, it is essential for clusters to understand its articulation in order to provide our companies with the most adapted support for their businesses development. GEN.ERA will apply this construction to the field of genomics, a discipline analyzing the function and structure of genomes (the complete set of DNAs within a single cell of an organism), thus this document will illustrate each partner's ecosystem positioning in the process by which genomic samples are transformed into useable information to guide and develop treatments or improve patient care.*

The **objectives** of this deliverable are to:

- Make an inventory of the **capacities** of each cluster in the field of genomics: Research centers, technical facilities, platforms, medical centers…
- Make an inventory of each cluster preexisting **international network**.
- Positioning our respective SMEs within a **global genomic value chain**.

To that purpose, this document is divided in the **following sections** (for each cluster):

- List and description of each companies' fields of activity
- Value chain structuration and positioning
- List and description of cluster support infrastructures

As **Expected outcomes** this document will constitute the first step to implement our strategic roadmap, by providing the following support elements for our next actions:

- Compare our respective **clusters' structure**
- Develop **SMART analysis** at a cluster and a partnership level
- Assist us in **identifying our complementarities,** developing next value-creating interactions and structuring our B2B and C2C collaborations

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Genomic Value Chain

Genomics is a discipline which analyses the function and structure of genomes (the complete set of DNA within a single cell of an organism). The genomics value chain describes the process by which genomic samples are transformed into useable information to guide and develop treatments or improve patient care. It can be divided into the following five stages

Sampling - The process of extracting, cleansing and transporting DNA (e.g., blood or saliva samples). Overall it is considered a low-value area since it does not necessarily require clinicians to complete it. Although this is where all the DNA data is derived from.	**Low value**: Can be performed with basic medical equipments.
Sequencing - The process of decoding the order of the nucleotides in a genome is called sequencing. The sequencing process has been made more efficient in the last few years by the development and use of high-tech machinery. The ability to sequence the genome on a large scale is the reason for the rapidly decreasing costs.	**High value**: backbone of genomic analysis
Exploration - This stage enables us to understand whether the sequence of nucleotides reveals any variation when compared to other genomes. Once DNA has been sequenced it can hold a variety of data forms. By performing analysis using software and other methods, this information can be standardised, compared, and areas for investigation can be identified.	**High value**: interdisciplinary process need for developing software and creating databases
Interpretation - Interpretation is the process of translating analyzed genomic information into insights for clinicians and pharmaceutical companies. Clinicians should be able to make treatment decisions based on this interpretation. It is currently the smallest of the sub-segments.	**Very High value:** Directly caters to the needs of key healthcare system and pharmaceutical buyers
Application - Genomic information is used to provide diagnostic treatments, targeted therapies or drug development. The main users of applied genomics are pharmaceutical companies and, in the long-term, healthcare systems and clinicians. This section will require significant data volumes and sufficient skilled workers to develop to the attainable level.	**Very High value**
Support - Control: preclinical studies, quality control of gene products for preclinical and clinical use, Follow-up of patients	**Medium value:** Significant needs in targeted sectors

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Companies

Companies	Keywords	Organisation type	Description of activities
ILLUMINA (2009)	High Throughput Sequencing Platforms / Sequencing Solutions / Bioinformatic / Training / Library Preparation	Corporate	*Illumina is improving human health by unlocking the power of the genome. Our focus on innovation has established us as the global leader in DNA sequencing and array- based technologies, serving customers in the research, clinical, and applied markets. Our products are used for applications in the life sciences, oncology, reproductive health, agriculture, and other emerging segments.*
INTEGRAGEN (2000)	Oncology / Metabolism /Diagnostics / Genetics / Autism	SME	*IntegraGen's mission is to translate molecular research to clinical practice through the identification of novel genetic biomarkers and the subsequent commercialization of molecular diagnostic tests based on these discoveries. The company also strives to be a leader in cutting edge genomic services to academic researchers and life sciences companies based on its technological expertise and scientific know how.*
NEW ENGLAND BIOLABS (2011)	Next generation sequencing qPCR & RT/ qPCR Nucleic acid amplification / Competent cells / Genome editing/ Epigenetic	SME	*NEB now offers the largest selection of recombinant and native enzymes for genomic research and continues to expand its product offerings into areas related to next generation sequencing, nucleic acid manipulation, protein expression, glycobiology and epigenetics. NEB serves the academic and industrial research market in addition to customized products for drug discovery and molecular diagnostic*
GENOSPLICE TECHNOLOGY (2008)	Bioinformatics / DNA chips Expression High-throughput sequencing RNA-Seq Splicing	Startup	*GenoSplice, with its unique expertise in bioinformatics, is a leader in the analysis of expression data. It develops and markets high value-added services internationally in the analysis of genomic data gathered through high-speed sequencing and/or DNA microarrays.*

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Companies

Companies	Keywords	Organisation type	Description of activities
PHARNEXT (2007)	Genomics / Big data/ Artificial intelligence/ Network pharmacology/ Drug repurposing/ Molecule combinations/ Biomarkers	SME	*Pharnext develops new therapies and biomarkers based on network pharmacology with a proprietary discovery platform. The company is focused on pathologies with high unmet medical needs. These include neurodegenerative, orphan and common diseases (Charcot-Marie-Tooth disease Type 1A, Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis (ALS)).*
HYBRIGENICS	Protein-protein interactions / Target identification for drugs/ Drug repositioning/ Nanobodies/ Single-domain antibodies	Startup	*Hybrigenics Services offers high-quality services to i) discover novel protein interactions, ii) identify the targets of drug candidates and iii) select novel, synthetic single-domain antibodies against any antigen (nanobodies).*
EUKARŸS (2010)	Synthetic gene therapy Hepatology / Oncology / Bioproduction / Protein/ Virus / C3P3 technology / Messenger RNA / Synthetic biology	Startup	*Synthetic gene therapy for the treatment of severe human liver diseases and tools for the bioproduction of recombinant proteins and viruses using the proprietary expression system C3P3.*
POLYTHERAGENE (2011)	Transfection / Gene therapy / Biomanufacturing / Therapeutic proteins / Vaccine	Startup	*Manufacture and sale of new high-performance transfecting agents for gene therapy, high through put screening and biomanufacturing.*

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Companies

Companies	Keywords	Organisation type	Description of activities
YPOSKESI (2015)	Rare diseases / Gene therapy / Cell therapy / Tissue replacement / GMPs / Contract Manufacturing	Corporate	*Contract and development manufacturing organization (CDMO) Contract manufacturing organization for gene and cell therapy products (pre-clinical and clinical batches).* *Innovation and development of process and analytical technologies in the field of gene and cell therapy.*
TRAASER (2016)	Bioinformatics / Genomics / Decision help or diagnostics / NGS / Personalized medicine	Startup	*Combines genomics expertise and informatics to develop software solutions that make it possible for clinicians to access complex and massive genomics data. By unlocking the bottleneck of data interpretation, Traaser facilitates therapeutic decision-making, providing better healthcare for patients.*
WHITELAB GENOMICS (2019)	Gene therapy / Gene editing / Artificial intelligence / Molecular biology / Genome engineering	Startup	*Help pharmaceutical companies accelerate the preclinical development of gene therapies using artificial intelligence. WhiteLab Genomics provides them with the most relevant protocols and precise analytical means to enable them to optimize the experimental design and progress more quickly during efficacy and toxicity tests.*
PHARMING (2015)	Recombinant protein / Protein production	SME	*Production of recombinant proteins in the milk of transgenic rabbit. Pharming Group N.V. is committed to the development of innovative products for the treatment of unmet medical needs. We focus on the development and production of human therapeutic proteins to provide life-changing solutions to patients.*

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Companies	Keywords	Organisation type	Description of activities
ENTEROME (2008)	Intestinal microbiota/ IBD/ Immunotherapy/ Metagenomics	SME	*Enterome develops and commercializes therapies and diagnostics for disorders associated with disruption of the intestinal microbiota. - Technologies: quantitative metagenomics and functional metagenomics platforms, biological research laboratories. Products: candidate treatments and complementary diagnostics for chronic inflammatory bowel diseases and various forms of cancer.*
GENOSAFE (2003)	Advanced-therapy medicinal products (MTI-ATMP)/ Gene therapy/ Cell therapy/ Vaccination	SME	*From the research phase through to the clinic, GenoSafe offers true project support in study design, analytical development and product testing in three main areas: preclinical studies (including biodistribution studies for gene transfer products), quality control of gene and cell therapy products for preclinical and clinical use, clinical Development: Follow-up of patients included in clinical trials, customized regulatory advice for the development, manufacturing and control of ATMPs.*
TEXCELL (2003)	Viral safety testing / Viral and prion validation / Immunomonitoring / Immunoprofiling /	SME	*Texcell acts both as a contract service organization (CSO) and as a central lab for preclinical and clinical trials. Texcell offers an immunology-dedicated technology platform with an exhaustive range of GLP assay development services (optimization and validation) for analyzing the immune response to humoral and/or cellbased mediation. Today, compound development timelines have to be as short as possible. Viral safety testing, viral validation studies and clinical studies must be continually improved, to optimize the therapeutic strategy. Texcell acts as a true partner for its customers and its staff is committed to offering the right experimental protocols and tools.*
PYMABS (2017)	Recombinant antibodies / therapeutic proteins / Transient expression / plant system	SME	*R & D services in the field of transient expression of recombinant proteins in plants. Benefiting from Medicago's high-throughput discovery platform (VLPExpress), Pymabs provides proofs of concepts for antibody expression in the setting of therapeutics. Its services range from antibody development to in vitro testing .*

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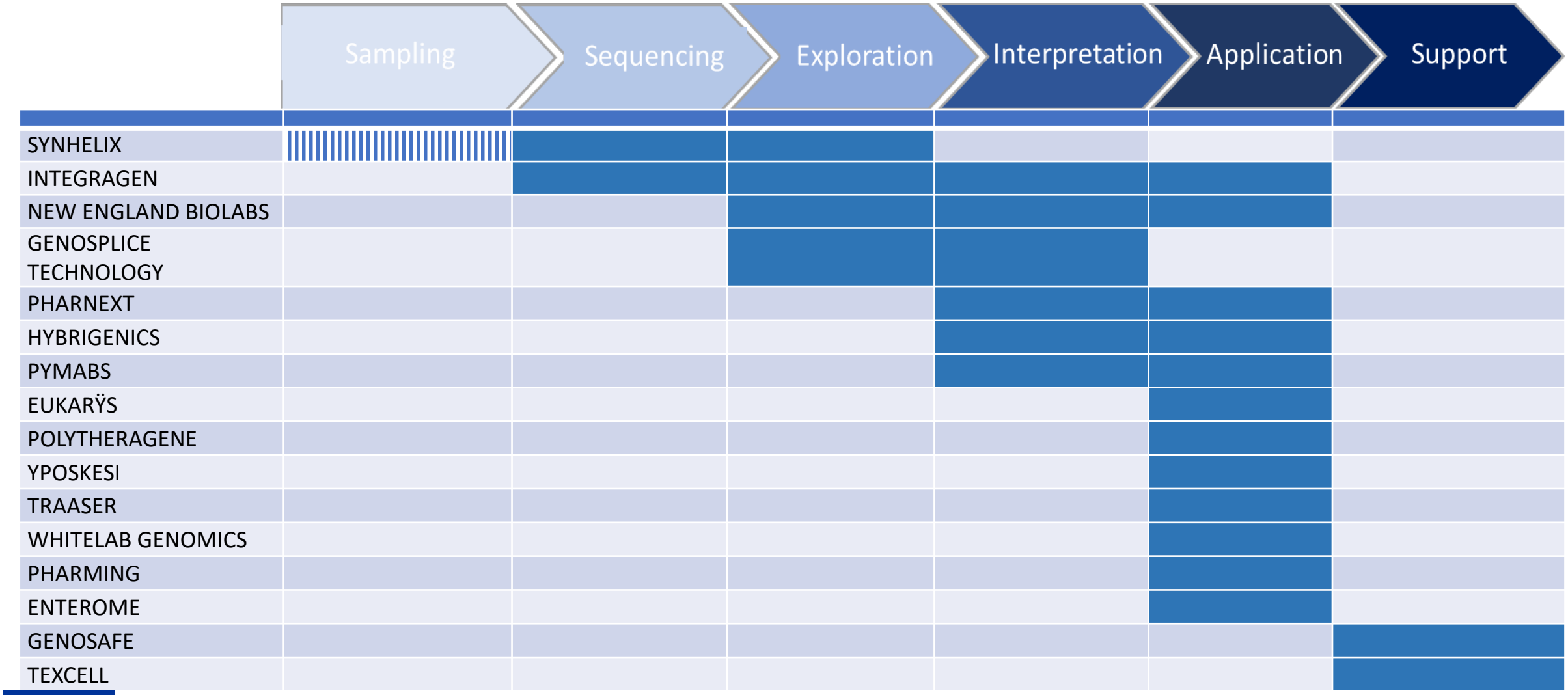
Value Chain Position



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Research centers

CNRGH	**National Center for Research in Human Genomics** Research in and the characterization of genes and biomarkers associated with human disease. Analysis of human genome variations in individuals and populations. 3D structural analysis of the human genome.
GenHotel	**European Research Laboratory for Rheumatoid Arthritis** Research on genetic susceptibility to complex diseases through genomic analyses with a focus on rheumatoid arthritis.
Integrare	**Integrated Genetic Approaches and New Therapies for Rare Diseases** The Integrare research unit aims to develop effective and safe gene therapies for rare genetic diseases such as neuromuscular disorders, metabolic diseases or blood/immune disorders.
ISSB Laboratory	The MEGA team is working on the implementation of synthetic circuits in episomes and chromosomes. To insert genes, a better understanding of genome architecture and better coordination of gene expression levels are needed.
LGRK	**Laboratory for the Genomics and Radiobiology of Keratinopoiesis** The research Institute of cellular and molecular radiobiology (IRCM) is unique in Europe and has internationally recognized research activities in radiobiology, radiotherapy, genome stability, cancer and tissue regeneration.
Genethon R&D Division	Research, preclinical and clinical development of gene therapies for neuromuscular and other rare genetic diseases.
LAMBE	**Laboratory for Analysis and modeling in biology the environment** Proteomic studies (analysis of post-translational modifications, immunopurified protein complexes, etc.)
	Laboratory for mathematics and modeling Conceptualization of statistical methods for the analysis of DNA or protein sequences and for the study of associated molecular expression, and the availability of these methods for the biology community via web-based technologies.

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Platforms & Facilities

BUSINESS INCUBATOR TECHNICAL FACILITY	Sample analyses room: spectrophotometers, DNA amplifier, real-time PCR, HPLC system, microplate reader, bioanalyzer, luminescence bioimaging.
CENTER FOR FUNCTIONAL INVESTIGATION AND EXPERIMENTAL RESEARCH IN AMPHIBIANS AND FISH	Creation and development of small aquatic model organisms: production of eggs and aquatic larvae, molecular genetics, functional genomics, creation of disease models, evaluation of environmental risks.
DNA AND CELL BANK	Processing and storage of human blood samples (serum, DNA, lymphocytes and lymphoblastoid B cell lines) and biopsy samples (primary cultures – mainly myoblasts and fibroblasts) for research in rare diseases
ISSB LABORATORY	The MEGA team is working on the implementation of synthetic circuits in episomes and chromosomes. To insert genes, a better understanding of genome architecture and better coordination of gene expression levels are needed.
DNA EXTRACTION AND ENCAPSULATION GENOPOLE FACILITY	Extraction and encapsulation of DNA in an anhydrous and anoxic state for its long-term storage and distribution at room temperature.
ÉVRY-VAL-D'ESSONNE REVE HIGHSPEED NETWORK (INFRASTRUCTURE	For business stakeholders, it provides an attractive, validated platform for reinforcing the area's hi-tech industrial fabric particularly in the field of genomics.
IRRADIATION RESEARCH PLATFORM	Personalized medicine: genomics of radiosensitive cohorts.
MASS SPECTROMETRY PLATFORM	Proteomic analyses (identification of proteins by peptide mass mapping or MS/MS sequencing, screening for mutations/post-translational modifications, semi-quantitative MS analyses, top-down protein analyses). Study of non-covalent interactions (protein-protein, polysaccharide-protein, DNA-ligand, protein-peptide and biomoleculemetalcation interactions).
ÉVRYRNA PLATFORM	ÉvryRNA is a web server that provides the scientific community with access to the range of non-coding RNA predictive tools and algorithms developed by Ibisc laboratory.
BIOBANKS, BIOPROCESSES AND HTS PLATFORM	

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Companies

Companies	Keywords	Organisation type	Description of activities
BIOUNIVERSA SRL www.biouniversa.com	Sequencing/Diagnostic and Therapeutic products	SME	*The Company is focused on discovery and development of Diagnostic and Therapeutic Products based on Founders' discovery of the biological properties of the BAG3 protein on cell death regulation. BAG3 specific reagents showed several applications in the diagnosis and treatment of human diseases involving a disregulation of cell death, specifically cancers and cardiovascular diseases. Specific kits based on BAG3 antibodies, owned by BIOUNIVERSA, have been validated or are in the validation phase as biomarkers for pancreatic cancer and some cardiovascular diseases.*
DIA-CHEM SRL www.diachem-srl.it	Sequencing/Molecular analysis of DNA, RNA and protein synthesis	SME	*Dia-chem S.r.l. core business is Molecular analysis of DNA, RNA and protein synthesis carried out in molecular diagnostics laboratories. Dia-Chem offers a wide range of technical tests based on Real-Time Polymerase Chain Reaction (PCR) technique (PCR RFLP), Sanger sequencing, PCR Cold (RFLP) Cold PCR Sanger sequencing. Diachem offers a wide range of technical tests based on Real-Time Polymerase Chain Reaction (PCR) technique such as PCR RFLP, COLD PCR and Sanger sequencing. These products are validated on the most common platforms as Rotor-Gene™ (Qiagen), LineGeneKTM (Bioer Technologies), iQ5, CFXTM (BioRad), SmartCycler™ (Cepheid), Applied Biosystems 7300/7500, StepOne, MX3005PTM, MX3000 PTM (Agilent Technologies).*
NOUSCOM SRL www.nouscom.com	Gene exploration/Immunotherapies /Vaccines/Oncology	SME	*Nouscom is a private oncology company developing next generation immunotherapies. Nouscom's proprietary technology platform, Exovax, harnesses the full power of immune response by combining viral vectored genetic vaccines based on neoantigens with other immunomodulators. Nouscom has carried a new diagnostic method that can quickly identify changes in DNA sequence specific to cancer cells (mutanoma) in order to develop a strategy personalized vaccination for cancer patients. Nouscom is led by an experienced management team that has worked together for many years in previous successful enterprises, including IRBM/Merck and Okairos (acquired by GSK), and are veterans in the field of genetic vaccines.*

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Companies

Companies	Keywords	Organization type	Description of the main business activities
BIOVIIIX SRL www.bioviiix.com	Gene Exploration/ Rare deseas/Hemophilia, hemocoagulopaty	SME	*BIOVIIIx is a biotech and pharmaceutical company operating in the field of hemocoagulopathies and rare diseases with specialization in the hemophilia segment*
NEUROMED SRL www.neuromed.it	Genetics and Molecular Biology / Neurosurgery , Neurology , Neurorehabilitation	Scientific Hospitalization and Care Institute	*The Neuromed Mediterranean Neurological Institute is a Scientific Hospitalization and Care Institute (IRCCS), a nationally important and highly specialized center for pathologies related to Neurosurgery , Neurology , Neurorehabilitation and all applications relating to Neuroscience in which Neuroradiology can be used. Its Centre for Molecular Genetics (CGM) is a high-specialization reference centre for Genetics and Molecular Biology. Neuromed carries out research, diagnosis and treatment activities in the context of neurological disorders, related neurosurgical and oncological pathologies, chronic degenerative and rare diseases of the nervous system.*
DOMPE' SPA www.dompe.com	Rare diseases with no approved treatment	Big Company	*Dompé is a privately owned biopharmaceutical company with 130 years of experience. Dompé is committed to medical and scientific advancement, through its own research and open innovation ecosystem. Dompé's research and production site is the first production Italian site authorized by the U.S. Authority for the Production of Biotechnology Active Ingredients with Recombinant DNA technology using procariote cells such as expression vector. Company's attention remains focused on rare diseases - often untreated – and on therapeutic needs - still unmet - in areas such as: OPHTHALMOLOGY, DIABETES, ONCOLOGY, ORGAN TRANSPLANTS*

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Companies

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TECNOBIOS SRL www.tecnobios.com	Genetic investigation	SME	*Technobios Procreation provides prenatal genetic counselling services, which has the function of determining which diagnostic assessment is most suitable to conduct genetic investigations on the embryo or fetus.*
ALTERGON Spa and TECHNOGENETICS HOLDINGS SRL www.altergon.com	Support/ Research and Development of In Vitro Diagnostics (IVD)	SME	*Technogenetics Holdings srl is a new company created by the integration of the innovative immunodiagnostics research mission of Technogenetics with a 30 years proved IVD manufacturing experience of KHB Shanghai Kehua Bio-Engineering together to Altergon Italia's departments, including 3 R&D sites located in Italy and 2 in China (Qingdao and Shenzhen). The company is mainly focused on the Research and Development of In Vitro Diagnostics (IVD) in the fields of laboratory diagnostics medicine. R&D Department is involved in the development of chemiluminescence immunoassays for Infectious Diseases both for kits and machines.*
KELYON SRL www.kelyon .com	ICT/Digital health	SME	*Kelyon stands as a certified and highly reliable supplier in the booming digital healthcare market. Kelyon provides quality healthcare support and solutions to pharma companies, medical-scientific associations, and healthcare structures for the sustainable management, prevention, diagnosis, and treatment of their patients suffering from complex diseases.*
TIGEM www.tigem.it	Rare genetics diseases	RESEARCH CENTER	*The Telethon Institute of Genetics and Medicine (TIGEM), a Telethon Foundation organization, was founded in 1994 as a leading Italian research center. Located in Naples, its new facility hosts over 200 staff members, including 18 research groups dedicated to understanding the molecular mechanisms behind rare genetics diseases. These diseases, often overlooked by pharmaceutical industries, are most common in children and adolescents. TIGEM's sole purpose is to provide the scientific basis for the development of treatments. The Institute boasts three research programs, Cell Biology, Molecular Therapy and Systems Biology, 10 core facilities and significant international support in the form of funding and collaboration opportunities.*

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Companies

Companies	Keywords	Organization type	Description of the main business activities
BIOGEM www.biogem.it	Gene Exploration/Genetics and traslational medicine (gtm) / medicinal investigational research (mir)	RESEARCH CENTER	*Biogem supports research in diagnostic Genetics and Molecular Biology. Research is mainly focused on those genes that cause embryonic stem cells and the molecular mechanisms of its oncogenic activity.*
CEINGE www.ceinge.unina.it	molecular biology/ advanced biotechnology/ research and diagnostics of genetic diseases	RESEARCH CENTER	*CEINGE operates in the field of molecular biology and advanced biotechnology applied to Human Health. It is an excellence in Italy and abroad for the research and diagnostics of genetic diseases (inherited and acquired). CEINGE's scientific mission includes: the study of the fundamental mechanisms that govern the expression and function of genes and their products, the study of mechanisms that as a result of gene alterations or environmental conditions cause pathologies in humans and other animal and plant species. CEINGE is characterized by the interdisciplinaryness of its research, held together by a common biomolecular approach, supplemented by the increasingly indispensable computer component.*

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Value Chain Position

	Sampling	Sequencing	Exploration	Interpretation	Application	Support
BIOUNIVERSA SRL		■	■			
DIA-CHEM SRL		■	■			
NOUSCOM SRL			■	■	■	
BIOVIIIX SRL			■	■	■	
NEUROMED SRL			■	■	■	
TECNOBIOS SRL			■	■	■	
DOMPE' SPA			■	■	■	
ALTERGON Spa and TECHNOGENETICS HOLDINGS SRL						■
KELYON SRL						■
TIGEM	■	■	■	■	■	
BIOGEM	■	■	■	■	■	
CEINGE	■	■	■	■	■	

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Research centers

TIGEM	TIGEM, a Telethon Foundation organization, is a leading institution for research on rare genetic diseases. With the support of Telethon, the European Union and many other funding agencies, TIGEM's 18 research groups are engaged in numerous clinical trials and collaborative projects. In addition, TIGEM's alliances with various universities, two of which being the awarding bodies for TIGEM's PhD programs, offer the institute additional resources and opportunities for excellent students. With TIGEM's carefully selected group of internationally-renowned researchers, the Institute's studies are able to span over many fields of study. Cell Biology, Genomic Medicine and Molecular Therapy are the principal disciplines involved in research, clinical trials and translational medicine at TIGEM. The Institute's success in biological research applied to genetic diseases has received international recognition; since 1994, TIGEM has published over 800 research articles in leading scientific journals and continues to be one of the most prolific research centers in Europe.
BIOGEM	Biogem supports research in diagnostic Genetics and Molecular Biology. Research is mainly focused on those genes that cause embryonic stem cells and the molecular mechanisms of its oncogenic activity. The scientific research activities, conducted by the Institute of Genetic Research "Gaetano Salvatore" (IRGS), take place within a structure called Genetics and Translational Medicine (GTM) and are aimed at understanding biological mechanisms and identifying genes involved in the development and proliferation of various human pathologies.
CEINGE	CEINGE fosters Basic Research and Applied Research in the field of Genetic Engineering and other Advanced Biotechnology, also carrying out activities of transfer knowledge and technological innovations. CEINGE has set up a series of Technological Facilities at its headquarters to provide high-tech services of strategic importance in both basic and applied research and to support the research activities of CEINGE itself and external researchers in public and private bodies. CEINGE supports the consolidation and performance improvement of high-tech Facilities by developing appropriate investment plans for the constant updating of the technologies and equipment needed to cope with the rapid technological and scientific evolution, characteristic of this sector.

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BIOGEM RESEARCH CENTER	**A) Genomics:** Robot Biomek FX Beckman Coulter, Prymark Q24 MDX Instrument, Ion PGM DX Sequencer Ion Proton Sequencer, Ion Chef Instrument, Pyro Mark Q24 MDX, Nanodrop **B) Proteomics e metabolomics:** triple quadrupole mass spectrometer, Exactive Orbitrap mass spectrometer, Hi resolution "Q exactive" mass spectrometer, HPLC ultiMate 3000, AKTAxpress chromatographic system, Spectropolarimeter **C) Imaging:** Citofluorimeer, Confocal microscopy, Vevolaser, Chemidoc, IVIS Spectrum Imaging System **D) Generation and phenotyping of animal models:** Ultrasound VEVO 2100, MicroCT Sky scanner

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Companies

Companies	Keywords	Organization type	Description of the main business activities
The Competence Centre on Health Technologies https://ccht.ee/	EXAMPLES: Sequencing Bioinformatic/Library Preparation/Genetics/Testing/ Sampling/	SME / CRO	*Tervisetehnoloogiate Arenduskeskus AS (The Competence Centre on Health Technologies, CCHT) is a biotechnology company focused on research and product development in personal medicine, drug development and both human and veterinary reproductive medicine. We collaborate closely with leading Estonian scientists, universities and biotechnology companies as well as scientific, medical and R&D institutions from Europe, Asia and America.*
FERTIFY https://ccht.ee/fertify2	Fertility, genetic testing	Startup	*Evidence-based genetic test FERTIFY™ is based on proprietary risk-assessment algorithm for predicting female fertility and age-related infertility.*
GENETO https://geneto.com	Nutrition	Startup	*Geneto was founded by Estonia's leading geneticists and IT specialists in 2016 to make gene technology beneficial in everyday life. We have an innovative solution to lose weight and get into shape with the help of science. This is brought to you via an easy and understandable app.*
LabToWellnes https://www.labtowellness.com	Diagnostics	SME	*Transform your existing laboratory reports, health checkup reports into patient friendly format or design completely new patient reports for your services. After setup reports will be delivered just in seconds via our secure platform or integration with your existing IT-system*
STACC https://www.stacc.ee/en	Bioinformatics, machine learning, AI	SME	*STACC is the leading machine learning and data science company in Estonia that develops artificial intelligence solutions.*

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Companies

Companies	Keywords	Organization type	Description of the main business activities
QURETEC , http://www.quretec.com/	Data management, health registries, software	SME	*Quretec is offering full package of clinical data management services and software solutions for web based electronic data capture. Our list of experiences includes software solutions development for biobanking, health registries, clinical trials, national statistics, bioinformatics, biostatistics, and other databases.*
GUARDTIME, https://guardtime.com/	Cyber security, trust systems	SME	*Guardtime has been building distributed zero-trust systems for the last 13 years. Our KSI technology has been productized and deployed in production by governments and enterprises around the world.*
NORTAL, https://nortal.com/	Digital health, big data	SME	*We combine a strategic approach and data-driven technology in order to simplify and optimize processes for governments, business and healthcare. Combining the unique experiences of transforming Estonia into a digital leader, our vision is to build a seamless society.*
Transformative AI, http://transformative.ai/	AI, data analysis	startup	*Our predictive patient monitoring software allows healthcare providers to respond to life-threatening medical events before they occur.*

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Value Chain Position

The Competence Centre on Health Technologies						
FERTIFY						
GENETO						
LabToWellnes						
STACC						
QURETEC						
GUARDTIME						
NORTAL						
Transformative AI						

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Research centers

IMCB	Specificity:Institute of Molecular and Cell Biology, University of Tartu, is the only institute in Estonia, which teaches molecular and cell biology disciplines at all three academic levels of education (bachelor, master and PhD) and supports the teaching with robust research programs at corresponding areas. Description of activities: The Institute covers wide competence from microbiology and eukaryotic models to bioinformatics. Our research groups study new developments in bioinformatics, epigenetics, cell biology and enzymology. Important for us is to support collaboration and synergy between different research groups (e.g. molecular biology and genetics; biochemistry and cell biology). We have strong research infrastructure (microscopy, incl. electron transmission microscopy, FACS cell sorting, equipment for proteomics, metabolomics and transcriptomics). We also have a lab animal facility, incl. for transgenic mice.
TalTech	Specificity: Gene technology Description of activities: Immunology, molecular neurobiology, reproductive biology, plant genetics, bioinformatics,
CCHT	Specificity: genetic testing Description of activities: genetic testing
Institute of Genomics	Specificity:Institute of Genomics was established to promote greater synergy between genomic-based research, teaching and other scientific fields Description of activities: Institute of Genomics contributes to transdisciplinary research and application based on omics reseach and methods and also teaches University of Tartu students.
SIME	Specificity:Our aim is to build up the EATRIS CENTRE FOR DISEASE MODELS AND BIOMEDICAL IMAGING to serve the regional needs in translational research and drug discovery. Description of activities: Its aim will be to develop and study advanced disease models with a specific focus on chronic immune/inflammatory diseases, neurological diseases and tumour therapy, and to combine these research areas with modern bioimaging technologies. The Centre will have a leading position and serve as an attractive competence centre in animal disease models and bioimaging in the Central and Eastern Europe.

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Institute of Genomics Core Facility	Made available by: Tartu University Description: Institute of Genomics Core Facility is dedicated to providing genotyping and sequencing services to researchers, clinicians and others with the state-of-the-art technology of Illumina. In 2006, we started with Illumina BeadArray platform. Today, the core facility is equipped with Illumina's HiSeq2500, MiSeq and NextSeq500 for whole genome and targeted sequencing projects, and a iScan for genome-wide genotyping and methylation analyses.

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Partner 4 - TSCP

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Companies

Companies	Keywords	Description of activities
MISVIK BIOLOGY misvik biology	High Throughput Biology Platforms / Imaging / Bioinformatic /diagnostics	*Misvik is focusing in imagine-based high-throughput biology for cancer researh. As general strategy for cancer research Misvik is aiming to (a) advance use of multi-parameter imaging technologies for cancer research, (b) use these methods together with genomics studies to interrogate how genomic features in human cancers encode the aberrant molecular, cellular and tisuestructures that define the tumors sensitivity to cancer treatments and (c) apply the resulting information to improve therapies and disease management of hiuman cancers*
BIOVIAN (2003) BIOVIAN	GMP CDMO services from gene to finished pharmaceuticals/biopharmaceutical/Viral Vector production/Microbial production/Process development/scale up/clinical manufacturing	*Biovian is a one-stop-shop providing full range services incGMP contract manudacturing of biologicals. Biovian's facilities are EMA certified and FDA inspected for cGMP production of investigational and commercial products. Company is established in 2003 and has extensive experience in biopharmaceutical process development, GMP-manufacturing and quality aspects.*
GENOMILL HEALTH (2015) genomill HEALTH	Next generation Sequencing/Diagnostics/Molecular Biology/Robotics	*Genomill Health's mission is to bring actionable and usable genetic information to clinical use by providing state-of-the-art genetic testing at affordable prices and using innovative technlogical solutions. Genomill constantly seeks to improve the genetic testing market by providing an easier access to genetic tests as well as redefining the testing landscape through technological innovation*
ABACUS DIAGNOSTICA (2004) ABACUS Diagnostica	Rapid Moelcular Diagnostics/infectious diseases like Influenza, MRSA/SARS-CoV-2	*Abacus Diagnostica Oy is a molecular diagnostics company specialized in rapid molecular testing utilizing the patented GenomEra® -technology. Abacus is currently developing new technologies and expanding assay selection for the GenomEra® CDX assay platform, intended for the identification of infectious diseases like Influenza, C. difficile, MRSA and other critical human pathogens and antibiotic resistance markers.*
AAVAGEN (2017) aavagen	Veterinary/Genetic testing	*Together with breeders, Aavagen create groundbreaking gene tests that benefit day-to-day training and breeding. Aavagen believes that the future horse will be healthier, faster and have better endurance than ever before. Be part of the development – test your horse or participate in cutting edge genetic research*

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Companies

Companies	Keywords	Description of activities
ORION	CNS/Oncology/Critical Care	*Finland's largest Pharma company. Together with the Finnish scientific community Orion is focusing on research into serious genetic rare diseases in "New Modalities" ecosystem project. Such diseases are still without treatments. "80% of rare diseases are genetic. In many cases the disease is caused by a genetic mutation in a single amino acid. 36 genetic rare diseases have been discovered in Finland that are more common here than in the rest of the world. This Finnish disease heritage has been studied for nearly 30 years and the genetic mutations causing these diseases are known" says Professor Antti Haapalinna from Orion.*
AURLIDE (2019)	Rare diseases / Gene therapy / Cell therapy / Tissue replacement / GMPs / Contract Manufacturing	*Aurlide Oy is **identifying your first hit molecules**. By using Aurlide's proprietary technology for vHTS, the hit rate for identification of the first-in-class molecule is very high. Further on the optimization of hit molecules, including core hopping, to novel high affinity ligands can be applied quickly. Simultaneous **optimization of binding into proteins from human and other wished species**. By using Aurlide's discovery platform*
PERKIN ELMER WALLAC	Newborn genetic screening program(market leader)	*US-based diagnostic giant. Global market leader in prenatal and neonatal genetic screening. Having its genetic screening business headquarters in Turku.*
ABOMICS (2013)	Pharmacogenetic database/testing/reporting	*By analyzing ca. 20 important genes and interpreting the raw data with Abomics' PGx service, doctors can get clear treatment guides for patients, based on their individual genome. This is a way to bring personalized medication into clinical practice and avoid adverse drug reactions and a lot of health care costs.*

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Value Chain Position

AAVAGEN						
PERKINELMER						
ORION						
MISVIK						
GENOMILL HEAL						
ABOMICS						
BIOVIAN						
AURLIDE						
AAVAGEN						

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Research centers

INSTITUTE OF BIOMEDICINE University of Turku	The group is studying both breast and prostate cancer genetics, the main goal being on prostate cancer. The group has identified many significant genomic risk regions, candidate genes and variants, which have been then further profiled and characterized by functional studies.

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Platforms & Facilities

GENOME EDITING CORE University of Turku	**Viral vector production/CRISPR Genome Editing/TransgeneOverexpression/shRNA Protein Downregulation/immortalization of primary cells** The Genome Editing Core is a facility within Turku Bioscience that specialises in various applications of transgenic technology. The primary focus of the core unit has long been viral vector-mediated transgenesis. Our expertise ranges from transient virus mediated transfection to stable celline genome editing and the services provided include a wide range of methods such as CRISPR genome editing, inducible expression systems, and shRNA interference. We offer consultations on vector and project design as well as courses on how to produce and purify viral vectors.
FINNISH FUNCTIONAL GENOMICS CENTER University of Turku	**Transcription analysis/epigenome aanalysis/genome analysis/Microbiome analysis/sequencing/quantitative Real-Time PCR** **Finnish Functional Genomics Centre** (**FFGC**) is part of the national Biocenter Finland infrastructure and an open-access core facility that supports high level research by offering a full range of services with **the latest cutting research technologies** and **instruments.** Among the key applications available are genome-wide or targeted analysis of **genomes**, **epigenomes**, **transcriptomes** and **metagenomes**.
TURKU CENTER FOR DISEASE MODELING University of Turku	**TCDM holds know-how on mouse model generation/In vivo Imaging/Biomarker analysis/phenotyping mouse models/histology/immunochemistry/electron microscopy** TCDM is a research and research service organisation at the Faculty of Medicine, University of Turku, and is part of the Bio Center Finland “Model Organisms” network. TCDM applies and provides state-of-art research facilities and expertise in studies in experimental animals to support both academic and industrial associated non-clinical research. The facilities and expertise are also available for contract research
SINGLE CELL OMICS University of Turku	**Drug Discovery/Preclinical Studies** Its mission is to provide a one-stop solution for single-cell analyses. We support high-level research by providing access to platforms allowing unbiased characterisation of cellular identities and regulatory states from heterogeneous samples. Such analyses of individual cells rather than bulk populations can provide new insights into cellular development, responses of individual cells to biological signals or other perturbations, and can even reveal new cell types. We currently provide services for single-cell gene expression and protein profiling as a part of the national Biocenter Finland infrastructure network.

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Companies

Companies	Keywords	Organization type	Description of the main business activities
Protinhi Therapeutics https://www.protinhi.com/	Viral infectious diseases, Protease inhibition, viral replication	SME	*Protinhi is focusing on finding new drugs for virus, such as COVID-19 and ZIKA-virus. Currently there is no therapeutic nor prophylactic treatment against these viral diseases. Their technology makes innovative compounds available for development into novel drugs to treat these diseases.*
Future Diagnostics https://www.future-diagnostics.com/	In Vitro Diagnostic Assay, Medical Device,	SME	*Future Diagnostics are highly skilled professionals are committed to accelerating healthcare innovation, providing high-quality assay development and manufacturing services. Their most promising product is STAT IO-I-PTH in vitro assay. They are also specialists in flexible support in pre-feasibility, design & verification and production & validations projects.*
Byondis https://www.byondis.com/	Precision Medicine, Cancer, Auto-immune diseases	Corporate	*Beyondis develops new biological entities (NBEs) and new chemical entities (NCEs) and it has developed a proprietary linker-drug (LD) technology to generate antibody-drug conjugates (ADCs). This linker-drug platform can be used to generate multiple novel ADCs targeting different indications.*
Nytor https://www.nytor.nl/	Molecular diagnostics Assays, PCR	SME	*NYtor designs, develops and validates novel molecular diagnostic assays. Their extensive expertise in multiplex qPCR (real-time PCR) development ensures design of robust and sensitive assays for application in e.g. gene expression, genotyping and detection of pathogens.*
Check-points https://www.check-points.com/	Molecular assay, PCR,	SME	*Check-Points uses specific characteristics of DNA to develop molecular assays to detect gram negative bacteria. This innovative molecular technology obtains faster results with higher accuracy and genotypic information. Check-points has also develops a range of rapid molecular assays.*
MDxHealth https://mdxhealth.com/	Cancer, Genomic test, Epigenetics, PCR, DNA Biomakers	Start-up	*MDxHealth is the leader in molecular diagnostics for urologic cancer research with a proven track record to identify, develop, validate and deliver molecular diagnostic assays for prostate cancer. MDxHealth uses methylation-specific PCR (MSP), a proprietary DNA-based technology that functions on PCR equipment. MSP has the ability to detect a single cancer cell, through DNA biomarkers, among 10,000 healthy cells in any type of bodily fluid or tissue.*

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Companies

Companies	Keywords	Organization type	Description of the main business activities
Drug Target ID http://www.drugtargetid.com/	Diagnostic Biomarkers, Genetic Disorders	SME	*Drug Target ID builds comprehensive molecular signaling landscapes underlying complex genetic disorders to reveal your novel diagnostic biomarkers and druggable targets. Drug Target ID provides through gene-enrichment and protein-protein interaction tools, and literature analyses to the top-list findings from several types of genetic studies more comprehensive understanding of the core biological process(es) for a given disorder.*
Vaxxinova https://www.vaxxinova.com/	animal genetics, - nutrition, - health	Corporate	*Vaxxinova are experts in disease prevention for production animals. This company specializes in animal genetics, animal nutrition and animal health.*
Predica Diagnostics https://www.predica-diagnostics.com	Cancer, ciRNA Technology	SME	*Predica diagnostics improves diagnosis, prognosis and treatment of cancer. Predica Diagnostics uses ciRNAseq to detect aberrant biological pathways, including overexpression of human and viral genes, mutations in expressed genes and alternatively spliced messenger RNAs (mRNA). This information can be used to find a matching cancer drug.*
Orikami https://www.orikami.nl/	Digital biomarkers, digital health solutions	Start-up	*Digital biomarkers: orikami discovers, develops, validates and certifies Digital Biomarkers: - actionable insights on a person's state of health consisting of digitally collected data and algorithms.*
MS Sherpa	Monitoring, Diagnostics	Start-up	*Spin-out company of Orikami. Day-to-day monitoring of disease state for people with multiple sclerosis. The product allows Multiple Sclerosis (MS) specialists to offer personalized diagnosis, prognosis and eventually, treatment of MS patients. Furthermore it allows MS patients to self-monitor and manage their condition.*
Linical https://www.linical.com/	Data management, monitoring	SME	*Support partner for pharmaceutical companies: Clinical data management, clinical monitoring, early oncology development.*

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Companies

Companies	Keywords	Organization type	Description of the main business activities
Mercurna https://mercurna.com/	Sequence engineering, mRNA, kidney disease	Start-up	*Mercurna develops novel therapeutics based on a highly innovative messenger RNA (mRNA)-based platform. This platform combines sequence engineered mRNA with lipid nanoparticles and peptide based homing with the goal of achieving highly localized protein expression.*
Saillant Therapeutics https://www.saillanttherapeutics.nl/	Protein expression, therapeutics	Start-up	*Sailllant Therapeutics has discovered a novel mechanism that is based on selective intra-cellular functional protein expression inhibition, selectively occurring only in stressed and infected cells.*
Orca Therapeutics http://www.orca-therapeutics.nl/	prostate cancer, immunotherapy, DNA	Start-up	*ORCA aims to significantly improve the lives of prostate cancer patients by developing safe and highly potent oncolytic virus immunotherapies. ORCA's lead product ORCA-010 is derived from the common cold virus adenovirus serotype 5 (Ad5). ORCA-010 was made by modifying 3 places in the DNA of Ad5.*
River BioMedics https://riverbiomedics.com/	hiPSC, assay, high troughput, drug discovery	Start-up	*River BioMedics is a biotech start-up company providing 3D human cardiac models for drug discovery. Compound validation, compound screening & lead selection*
BioLegio https://www.biolegio.com/	NGS Oligo MIPS,, PCR, genotyping, gene expression	SME	*Biolegio offers custom made oligonucleotides to highly modified oligonucleotides, fitted with every commercially available modification. Making them suitable for a wide range of applications including (Next Generation) Sequencing, PCR, Real-Time PCR, SNP detection, genotyping, gene expression and mutation detection.* *Biolegio is introducing the new Era of Genome Analysis: NGS Oligo's and MIPs (Molecular Inversion Probes)*

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Value Chain Position

Protinhi Therapeutics	■	■				
Future Diagnostics	■	■				
Byondis	■	■				
Vaxxinova	■	■				
Drug Target ID	■	■				
MDxHealth	■	■				
Nytor	■	■				
Check-points	■	■				
Predica Diagnostics	■	■	■			
Orikami	■	■	■	■	■	
MS Sherpa	■	■	■	■	■	
Mercurna	■	■	■	■	■	

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Value Chain Position

Sailliant Therapeutics						
Orca Therapeutics						
River Biomedics						
Linical						
Biolegio						

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Research centers

Radboud Department of Human Genetics	The department of Human Genetics treats and investigates hereditary diseases of patients and their families.

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Platforms & Facilities

X-omics.nl	The Netherlands X-omics Initiative is a new facility as part of the National Roadmap for Large-Scale Research Infrastructures. It is partly funded by NWO with a total budget of 40 million euro. The project started on September 2018 and will last for ten years. The project aims to establish a X-omics research infrastructure across the Netherlands consisting of several existing facilities with various expertise's related to molecular biology research (genomics, proteomics, metabolomics and data integration & analysis).
Wageningen Genomics Facilities	Comparison and composition of metabolites via GC(TOF)-MS, LC(QTOF)-MS/MS of HPLC Peptide sequencing via Q-TOP LC-MS/MS High and low capacity DNA sequencing Printing and analyzing of cDNA and oligo microarrays Data analysis
Radboud Technology Centers	The Radboudumc technology centers are an access point for technological expertise, high-end equipment and biobanks. They can support a wealth of research questions. Expertise: DNA isolation, DNA biobanking, High throughput sequencing using targeted strategies (like PCR, hybridization or MIP-based target enrichment both for Sanger and next generation sequencing) and Genome wide sequencing strategies using next generation sequencing (non-invasive prenatal testing, exome and genome).

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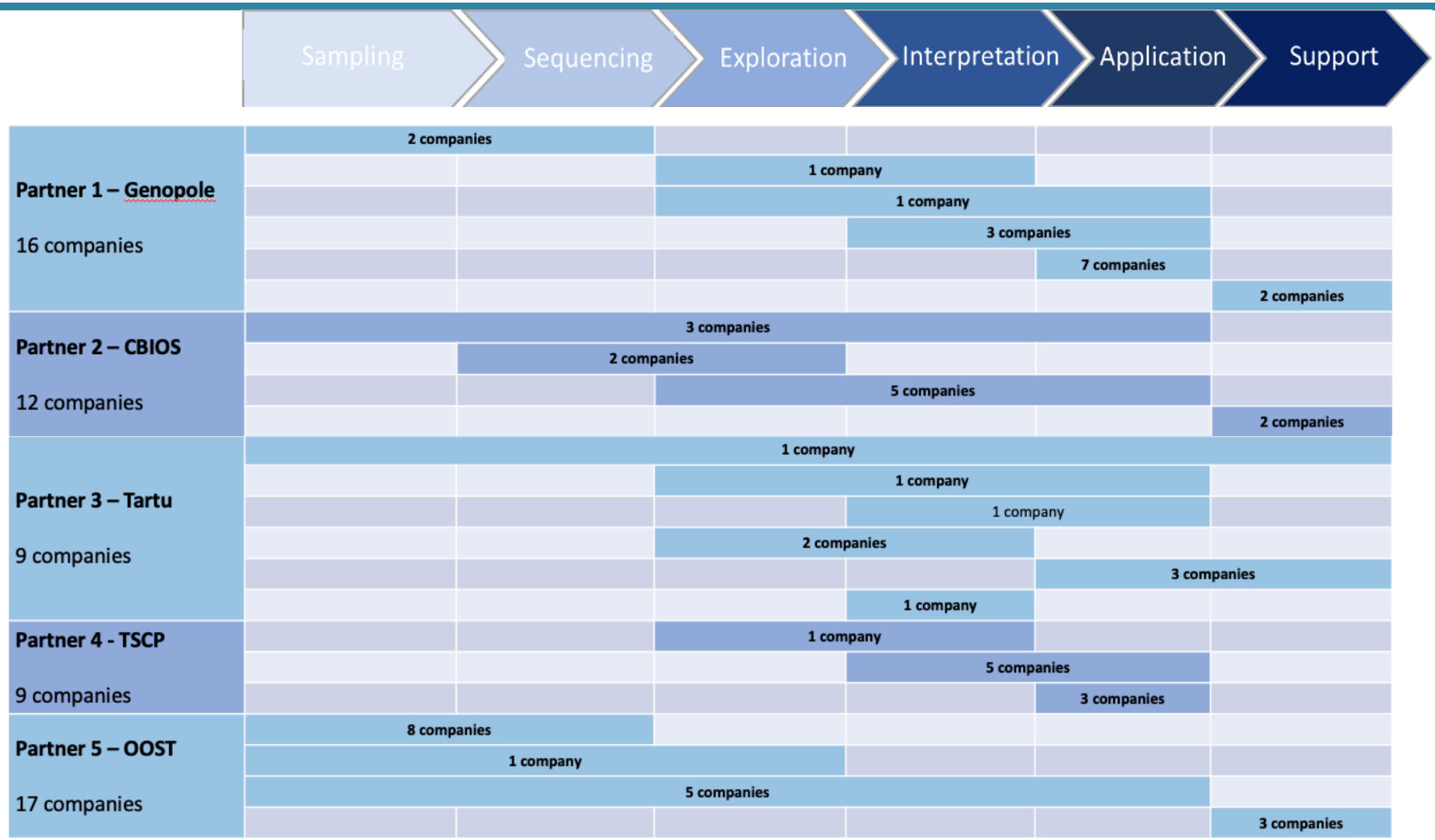
GEN.ERA Global Value Chain



63 Companies positioned on the GEN.ERA value chain

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