

6. TECHNOLOGY TRANSFER PROCESS

Innovations in biotechnology sector have a specific path regarding bringing technologies into the market as very often the latter is specific (such as in health care) and highly regulated (such as for biomedical products). Research in biotechnology is unique also due to rapid development of new advanced technologies and challenges the sector faces globally such as longevity of life and healthy aging, climate change and novel regulatory systems with advanced treatments and therapies to name a few. Due to rapid changes in biomedical and bioinformatics industries and societal changes as well as developmental trends in the industry, the technology transfer process in biotech is rapidly changing. Technology transfer in biotechnology and bioinformatics domain is a highly complex procedure that can be summarized as an R&D intensive action where getting Intellectual Property Rights (IPRs) is a long and cumbersome procedure.

Numerous organisations in the innovation ecosystems support endeavours of companies and research organisations to faster bring technologies to the markets by making sure technological innovations and intellectual properties are protected through patents, industrial design, copy-right and trademarks. Tech transfer offices in both countries actively search for collaboration between research and companies developing joint research contracts, technology licensing, support spin-offs and spin-outs in order to improve the well-being of citizens in many areas of living and working.

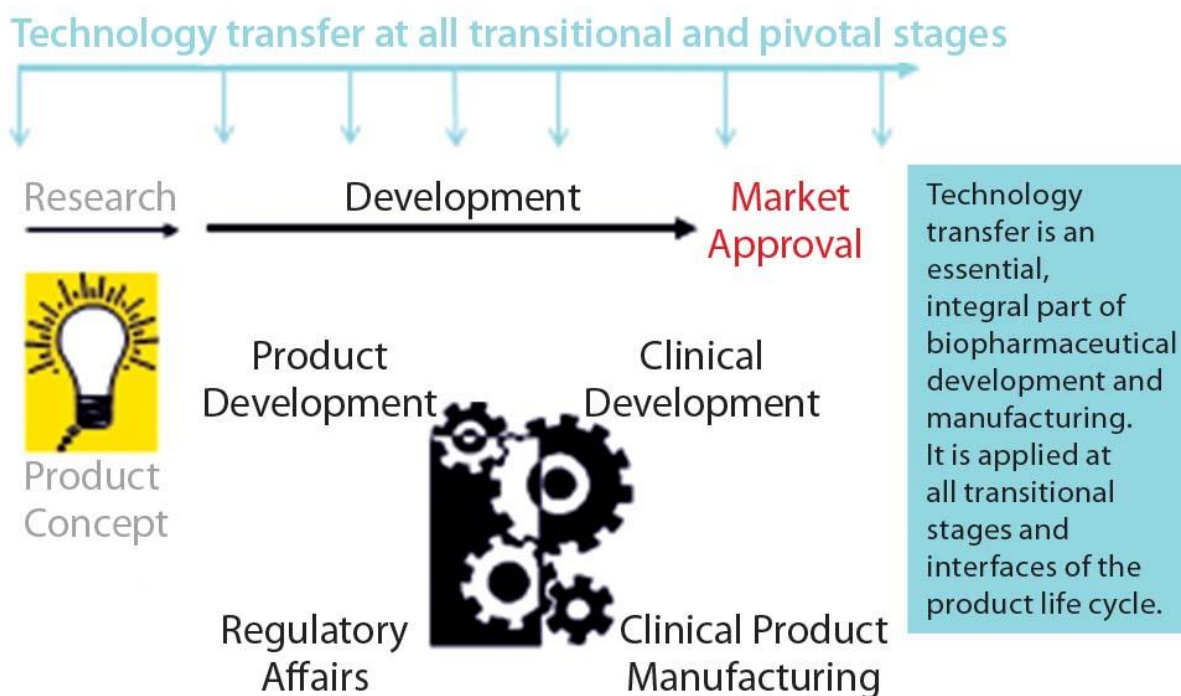


Figure 1: Technology transfer across the product development cycle ([Source](#))

Technology transfer process in Slovenia

In Slovenia, the innovation process in biomedicine is driven by the large pharma industry and recently by small and medium size companies including some of the ones studied in the scope of the TRAIN project. Another growth factor is that biotechnology is one of the world's fastest and most vibrant growing sectors. For example, in the scope of the TRAIN project just in the area of drug discoveries (i.e. »red biotech«) there were over 7.000 drugs under development in 2018 mostly in the field of cancer therapy. In Italy and Slovenia technology transfer plays an important role in bringing new technologies to the markets and thus bringing innovations from research to the end users.

In Slovenia, there are multiple technology transfer offices assisting companies with the processes of protecting intellectual property, with setting up spin-off companies, offering assistance with providing partnerships and contractual research, providing legal assistance with licencing, patent acquisition as part of common technology transfer actions.

Technology transfer office at the Ljubljana University

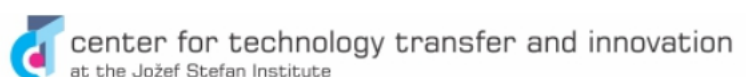
The [Technology Transfer Office at the Ljubljana University](#) assists researchers with setting up spin off companies, marketing of intellectual property to the prospective buyers, contractual research, partnership research. In the domain of life sciences and biomedicine the University tech-transfer office offers research lab infrastructure and research in neurosciences, behavioural neurobiology, target drugs development, genome and other researches. Main research groups in the domain of biomedicine are Institute for anatomy, histology, embryology Institute for physiology, pharmacology and toxicology, Center for genomics.

Univerza v Ljubljani



Jožef Stefan Center for technology transfer and innovation

The [Jožef Stefan Center for Technology Transfer](#) helps individual researchers with acquiring intellectual property rights, concluding contracts with business entities, establishing spin-out companies and their market penetration, patent applications and preparing business plans. It offers advice on optimization of intellectual property protection and actively markets intellectual property, provides professional legal assistance, especially in the field of IP law, identify possibilities of IP rights exploitation (technology assessment and market evaluation), seeks for suitable partners for IP transfer, carry



out negotiations and prepare high quality licensing and sales contracts.

Examples of successful biotechnological spin-offs/spin-outs in Slovenia

Jafral d.o.o.

[Jafral](#) is a research and development-based company with production services and analytics in the field of bacteriophages, plasmid DNA and recombinant proteins. It is an independent contract manufacturing organisation (CMO) and contract research organisation (CRO). It is the world's only CMO with the focus on non-GMP and GMP bacteriophages. Company developed a unique technology transfer system in biomedicine by bringing company research services closer to the public and private research institutions around the world.

Saving d.o.o.

The researchers at the Jožef Stefan Institute designed the innovative, easy to use water-resistant wearable ECG enabling accurate continuous heart monitoring. To push the product in real-world use, the institute began searching for a business partner. This is where Saving company purchased property rights to [SAVVY ECG](#) technology whereas the research institute further develops the product.

Technology transfer process in Italy

University of Trieste

Technology transfer process at the University of Trieste is managed by the [University Innovation Office](#). It offers intellectual protection services, manages patents, licence agreements, administers research activities



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for third parties and offers support to new business initiatives i.e. assists with the creation of spin offs.

Friuli Innovazione

[Friuli Innovazione](#) is an initiative of the University of Udine and regional partners from Friuli Venezia Giulia region whose aim is fostering collaboration between the University and the Friulian economic system, in particular collaboration between researchers and companies and the industrial use of scientific and technological results produced by



research. Friuli Innovazione assists young entrepreneurs, companies and researchers in the development of business ideas, innovative and high-tech ideas, through the search for partners and funding, the start-up of new businesses, incubation and settlement in the region in strategic sectors in the region including in biotechnologies. It is based in the Luigi Danieli Science and Technology Park in Udine.

Examples of successful biotechnological spin-offs/ spin-outs in Italy

BiopoLife

[BiopoLife](#) is a spin-off company of the BioMat groups of the University of Trieste. The company specialises in the development and production of green biopolymers for applications in the biomedical cosmetics and food sectors. Biopolife laboratories are



hosted by the University of Trieste. Their activities are focused on a particular polysaccharide derived from Chitosan, a natural polymer obtained from shellfish. Biopolife researchers have described the properties and applications of this biopolymer in more than 20 publications in International journals and 4 patents. The company also offers services such as *in vitro* biotests (Cytotoxicity and proliferation tests), Molecular biology tests, Antibacterial efficacy tests, Chemical and physical characterizations, Analysis of material properties etc.

Transactiva

[Transactiva](#) is a biotech SME, located in the Friuli Innovazione in Udine, focused on Plant Molecular Farming (PMF) R&D. This innovative, multidisciplinary technology uses higher plants as



bioreactors for the production of therapeutic proteins. Transactiva's proprietary expertise is based on the synthesis of biopharmaceuticals in rice seeds. R&D activities focus on therapeutics for rare, metabolic diseases and tumours. Complex, glycosylated molecules such as lysosomal enzymes and monoclonal antibodies have already been successfully produced, and more proteins are in the pipeline. Plant Molecular Farming (PMF) is the use of higher plants as bioreactors for the production of biopharmaceuticals. Company's main technology uses rice seeds as platform for PMF. After a phase of study and *in silico* planning of the process, an optimised DNA sequence is used to transform plant tissue and direct the expression of target protein in rice seeds.

References for managing intellectual property rights in Slovenia and Italy

The Italian Intellectual Property Office (SIPO)

[Ufficio Brevetti](#) is an Italian national body for managing industrial property rights. It offers information related to filing applications of patents, trademarks or designs in Italy.

The Slovenian Intellectual Property Office (SIPO)

[SIPO](#) grants protection for the industrial property rights: [patents](#), [supplementary protection certificates](#), [industrial designs](#), [trademarks](#), [topographies of integrated circuits](#) and [geographical indications](#), with the exception of agricultural products and foodstuffs.

Examples of technology transfer practices elsewhere in Europe with regards to Biotech

Technology transfer system at the European Molecular Biology Laboratory EMBL

[EMBL](#) as one of Europe's largest research infrastructure currently manages a portfolio of close to 300 individual patents, patent applications, copyrights, trademarks and utility models. The technology portfolio spans the life sciences in the broadest sense and includes enabling technologies, molecular tools and techniques, instruments as well as software programmes and databases. Technologies available for licensing are grouped in the categories: Animal Models, Instruments, Tools, Methods & Assays, and Software.

Germany

Technology transfer practices in Europe are various such as managing patent applications, licencing software programmes, tools and technologies, funding incentives and many others such as for example in [Germany](#): patent registration offices and IP support services developed just around the biotech companies.

Scandinavia

In Scandinavia fast track to public stock exchange programmes is a good example of a fast technology transfer as well as tax deductible donations for R&D, programmes for circulation of researchers from business, academia and public institutions in biomedicine. [Medicon Valley](#) is the crucible of Scandinavian life sciences. Located at the gateway to Denmark and Sweden it has a vibrant

ecosystem and deep talent pool underpinned by world-class life science universities and research infrastructure. [Swelife](#) supports collaboration within academia, industry and healthcare, with the goal to strengthen Life Science in Sweden and to improve public health.