

Evaluation report

Evaluated point	Grade	Comments
Scientific impact of research	Very good	<p>Icosagen Cell Factory OÜ (hereinafter Icosagen) is a biotech company situated in Tartu in Estonia. It employs ca 80 RD personnel of which 20 hold PhD degrees. Icosagen is situated close to the University Campus of Tartu and the only Medical Faculty in Estonia. Icosagen applies in order to be granted the right to apply for state research funding and for the ability to conduct doctoral studies. Icosagen holds 18 license agreements and relies on 4 core technologies: Hybrifree cloning of B-cell and antibody production and humanization 2) in vitro diagnostics by high quality antibodies. 3) clinical proof of concept studies and 4) development biological drugs until clinical testing. All approaches depend on knowledge in protein production. In 2019, 1200 proteins were produced. Recently Icosagen entered SARS-Covid research with promising neutralising antibodies. Ownership of IP rights opens the prospect of an income stream to fund further developments. The commercial success seems based on sound science. Icosagen have successfully established themselves in a niche part of the scientific enterprise where they provide antibodies and related reagents to other researchers/pharma. This appears to be an area of significant demand; nonetheless they have also been broadening their offering to ensure future sustainability. Although not explicitly unique, their technologies such as the HybriFree system provide valuable resources which are undoubtedly contributing added value to their client's R&D activity, and hence leading to significant research impact. Amongst the staff we met there was a scientific focus and desire to publish and an expressed incentive to collaborate with international and local partners – both in biotech, academia and pharma. The versatility of their technologies is superbly demonstrated by the recent rapid re-focussing of their activities towards coronavirus research, which is already producing some extremely promising reagents and potential future therapeutics. Many of their research (and managerial) staff retain meaningful links with academic institutions such as joint appointments with university hospital. These links and the resulting plentiful collaborations ensure Icosagen research activity is current and appropriate for cutting edge developments. This is demonstrated via the list of publications with Icosagen authors. The company is clearly commercially-driven, but it is engaged in innovative and high-quality research, with a substantial academic output completed in parallel with their commercial activities. The strategy was focused on innovative research and the translation of this research to commercially-viable products that could be licenced to others.</p> <p>Overall, in this focussed area of research there seems no doubt that Icosagen's scientific impact can be rated as very good mostly documented through patents and also by academic publications.</p>

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Sustainability and potential of research	Very good	<p>The premises of Icosagen comprise 4500 m2 laboratories including S1 classification areas in a single building. We were shown live-online the cell culturing facilities, open lab space and offices. Lab was focused on protein purification and large-scale protein production facilities. There is currently new laboratory space being built and space available for further growth. Icosagen has multiple partnerships with middle and larger pharma companies. Income is primarily from sales and agreements. Icosagen has, according to the founder, experienced a sound organic growth. Icosagen are agile and quickly adapt to use and develop high throughput techniques. The strategy of Icosagen was not clear to the scientists we met and also the reason behind this application was not clear. The business model relies on antibody development for diagnostic and pharmaceutical purposes, comprising discovery, production, and clinical testing. The aim is to develop mAb with pharma companies with therapeutic potential. Icosagen has developed technique for enriched production of membrane proteins. „Biologics“ is currently a growth area with increasingly diverse applications – and typically high returns from successful therapeutics. The Icosagen focus on complex products matches the expected direction of demand for future therapeutic targets. It may prove prudent to ensure there is sufficient future bioinformatics and structure/computational expertise available in house, to ensure maximal benefit from the laboratory focussed studies in future.</p> <p>We gained the impression of an open and collegial working environment, a non-hierarchical structure. Icosagen enjoys a highly motivated and highly trained workforce, many in their earlier career that have a high degree of independence. Employment contracts were essentially not time limited. Project continuation decisions are made jointly and the founding PI is accessible. Independent thinking is encouraged. There were regular personal performance interviews. Self-reported job satisfaction was at 8-9 out of 10. This bodes well for longer term sustainability. Retention relies on continuity of funding. There is an established track record of re-investing profits to maintain research activity. This model provides some degree of sustainability for the future business. There is a strategy of recruiting clinically-trained graduates to guide future anticipated clinical trials works; this appears sound and thoughtful planning. There was not a clear tradition or plan for supervision of graduate and doctoral students. Succession planning for the board members and lead positions was unclear. There appears to be an assumption that future leadership will be provided from promotion within. Although this strategy matches the current ethos of the company it is unclear whether this will provide the external assurance that clients might expect. In conclusion, we saw evidence of a strong pipeline of ideas and technologies, suggestive of a bright future.</p>

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Societal importance of research	Very good	<p>The potential of the research and commercial direction for societal impact is clearly high. Icosagen appears to be well respected within Estonia and a highly desirable employer. Icosagen is important by its size as an attractive employer for highly qualified scientist in biochemistry, molecular biology, immunology and clinical science. The commercial potential in terms of company growth is impressive. Icosagen may have further impact on society by creating a highly specialized biotechnology job platform within Estonian Society.</p> <p>Employees rated their company very highly and appeared committed to the longer-term goals of the company. It was noted that there are relatively few successful biotech companies in Estonia and Icosagen seems well-known nationally which helps with recruitment. It is also valued by graduates as there are limited longer-term options within universities. Through providing opportunities for highly trained graduates to remain working in Estonia, Icosagen most certainly contributes beneficially to the national economy. This national pre-eminence is supported by much of the Icosagen research focus, where this is not determined by clients in contractual arrangements. With foci on oncology, cardiology and pain, and more recently Covid-19, the Icosagen-directed research provides a close match with societal needs. The business model relies on pharmaceutical antibody development, comprising discovery, production, and clinical testing. The aim is to develop mAb with pharma companies with therapeutic potential. The R&D performed is highly medically relevant (production of AB, ELISA kits, diagnostic tools), just one recent example is their very recent work on SARS-CoV-2 antibody isolation. Icosagen has an existing portfolio with kits and custom-made antibodies and expression systems with semi-large-scale protein production and manufactures. These are appropriate areas to deploy their high-tech resources and expertise with longer-term potential benefits for people and their health, in addition to the national and international communities.</p> <p>In some respects, Icosagen management appears to have inculcated an almost ‘foundation’ not-for-profit culture in operating the company, ensuring substantial portions of profits are re-invested in research and avoiding divestment of stock and ownership. A stated priority is ensuring ongoing employment for highly trained nationals. If maintained, this approach provides a substantial societal benefit.</p> <p>Split affiliation of certain members between University and ICOSAGEN offers easy possibilities for intersectoral (academic and private) collaborations. The generation of commercial business, patents, teaching of students, generation of work places through spin-offs and hopefully a widespread use of diagnostic and therapeutic agents that improves health for patients, all in all prove the importance of Icosagen for the Estonian knowledge society.</p>

<p>Scientific basis in the field is sufficient to conduct doctoral studies. (This question should be answered only if: a) institution being evaluated is conducting doctoral studies and; b) The field being evaluated is proposed to grant positive evaluation. If these conditions are met then: a) If the level of scientific basis is sufficient for conducting doctoral studies in every structural unit being evaluated, then the answer should be „yes“; b) If the scientific basis is not sufficient in some structural units, then those units should be listed.)</p>		<p>The company is built on a sound scientific base, with one foot in industry and the commercial exploitation of ideas and the other in research and early-stage product development. There was no formalized program presented for a pipeline of projects for doctoral studies. This was not integrated into the present application and considered in detail. On the other hand, scientific employees are Natural and Medical Science candidates and clinically working MDs, mostly from Tartu with a minor contribution from foreign researchers. Daily language is English. Split positions with clinical employment are used at Icosagen. With 25% of employees having PhD level education and experience with supervision, there is a good basis for conducting PhD thesis projects. It is allowed to publish and MDs often publish studies from Icosagen assuring academic performance. Thus, the science and discovery approaches at Icosagen represent theoretically a top-class environment for Ph.D. studies due to the presence of excellent supervisors, flat structure, free flow of ideas, access to good scientific equipment, sound budgets and a fruitful research environment. Thus, the basis is regarded as very good. Doctoral studies need a systematic approach and planning and can easily be integrated if Icosagen would conduct doctoral studies.</p>
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Summary assessment

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<p>Areas of special note as appropriate (Where necessary indicate sub-fields, assessment criteria, and/or structural units which, in the committee's opinion, were of a notably high level.)</p>		<p>Reagent production especially protein production and monoclonal antibody production, including specialised advanced technologies.</p> <p>Highly motivated and enthusiastic workforce and a good gender balance with flat structure and permanent positions together with split positions with clinical medicine. Relatively flat organisational structure providing opportunities for all employees to contribute to direction. Commitment to national economy and society. High focus on unmet societal health issues in the portfolio. The short distance from basic science to applied science and further to commercialisation.</p> <p>It is a showcase for university people how to generate business and work places.</p>
<p>Areas in need of improvement as appropriate (Where necessary indicate sub-fields of the field being evaluated, assessment criteria, and/or structural units which, in the committee's opinion, revealed significant shortcomings.)</p>		<p>Bioinformatics, structural input – consider for future consolidation.</p> <p>Streamlined process for recruitment and supervision of doctoral students.</p> <p>Better communication of overall company strategy. Focus on strategic decisions – e.g. enter small molecule drugs? Enter clinical testing? Focus on fewer areas? More focus on leadership and transfer of responsibility of top management.</p> <p>Focus on values that constitute the basis of the company. Strategy for more international recruitment of scientific staff.</p>
<p>Assessment proposal to the Minister of Education and Research</p>	<p>To grant positive evaluation</p>	<p>Innovative research programme, largely sustainable funding, strong links with academia (national and international), potential for future expansion. Significant contributors to local and national economy including retention of highly skilled staff.</p>

Feedback

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<p>Feedback for institution (This question should be answered only if the institution asked for feedback from the evaluation committee in the self-report (about up to three specific areas of R&D which it finds to be currently important, e.g., related to its development plan).)</p>	<p>For comments, see below under suggestions for unit. Also covered above under "Areas that need improvement"</p>
<p>Suggestions for unit, institution, state etc (As appropriate, committee can give additional feedback for the structural unit, the institution, or the State (please specify whom feedback is directed to) according to the directive assessment criteria for regular evaluation (article 7).</p>	<p>Areas for consideration:</p> <p>Succession planning for future Is it realistic to be planning to expand to small molecule drug discovery? Expertise for this not currently in the company, would require substantial investment and expansion.</p> <p>Suggest you consider consolidating expertise for bioinformatics and molecular modelling (for both humanisation and docking/epitope analysis studies). Could this be brought in house to maximise effectiveness?</p> <p>Pleased to see recruitment of clinically trained researchers – focus on early stage clinical trials capability could be advantageous.</p> <p>Enthusiastic and motivated workforce are a strength – keep involved in decision making where possible and continue to provide opportunities for internal promotion</p>