PowerUP Games Industry

A Report on the Swedish Games Industry

RI.SE

This report has been compiled by RISE in collaboration with the Swedish Games Industry on behalf of Vinnova as part of the government assignment N2021/01920 to develop working methods and processes for increased synergies between regional, national and international innovation efforts.

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Summary

Video games are not just entertainment but also a successful and robust industry with a total export of €2.7 billion in Swedish companies (2021).

The figure rises to €5.8 billion when including Swedish-owned subsidiaries in the 45 countries where Swedish games companies have established themselves. The Swedish games industry is strong, prosperous and has a good reputation internationally. Sweden is usually considered one of the world's top ten countries in video game development but the industry has grown up like a dandelion through the asphalt without any national strategy or major public ventures.

In the project *PowerUp Games Industry*, national innovation agency Vinnova commissioned RISE to investigate the structures permeating regional, national and international levels as well as existing ventures in an effort to strengthen and develop processes to enhance these. This report identifies a total of eight areas with challenges for the games industry. The common denominator is a need for increased collaboration and a need for the public ecosystem to establish a national strategy and invest in the growth of the industry. The games industry is a creative industry with highly trained staff, containing top-tier Swedish innovation, technical know-how and creativity. But a solid innovation infrastructure must be put in place to create long-term sustainability and growth, which is lacking at present and risks causing Sweden to lose ground against other countries.

The industry's biggest challenge is access to qualified workers, both in the form of more future employees, the need for continuing education, and access to more teachers. In Sweden, there are currently almost 8.000 employees in the industry – a number that needs to grow to 41.000 by 2031 if the industry continues to develop at the same pace as before. Education programs need to increase dramatically, and the rules for labor immigration, as they currently stand, are a direct obstacle to international recruitment.

Higher education institutions are challenged by a lack of influx of new teachers due to few doctoral students. There is also an outflow of existing teachers who go to jobs in the industry. Games research is a clearly underfunded field of research. The decades-long active games research that is ongoing has instead had to seek funding in other areas and associate games research in relation to the benefit games have for other purposes. While it's true that the games industry can also be of great benefit to other industries, by virtue of its size and growth, it stands on its own merits.

Other challenges relate to the availability of export subsidies, which are designed for traditional industries and not adapted for ”born global” companies. The work being done to improve the value chain and other business development must be given the right conditions, and areas such as sustainability, gender equality, and the development of smaller companies all need to be strengthened.

Almost all development via public funds takes place at the regional and local level through incubators, game hubs and industrial clusters. Here, sites such as Skövde, Skellefteå and Malmö have taken the lead and created vibrant and dynamic ecosystems, despite the lack of a solid national investment. Instead, the regional players often need to search for project funds to strengthen the ecosystem around the growing industry. In neighboring Finland, state public actors last year invested €13 million in developing the Finnish games industry.

Games are not only a business but also a central part of Swedish culture. In most age categories, more than 50% play some form of game, and in the age group 18-30, it is over 70%. Games are a form of culture that is not only consumed but in which the user also becomes a co-creator, precisely the participatory culture that the Swedish 1974 cultural reform sought to achieve. At the same time, games are still not included in the Swedish Arts Council's governing documents as a pronounced form of culture. In November 2022, the European Parliament adopted a resolution that the whole of Europe needs to implement a strategic investment in the games industry from both a business and a cultural perspective, and the report *SOU 2022:44* on creative industries confirms the same.

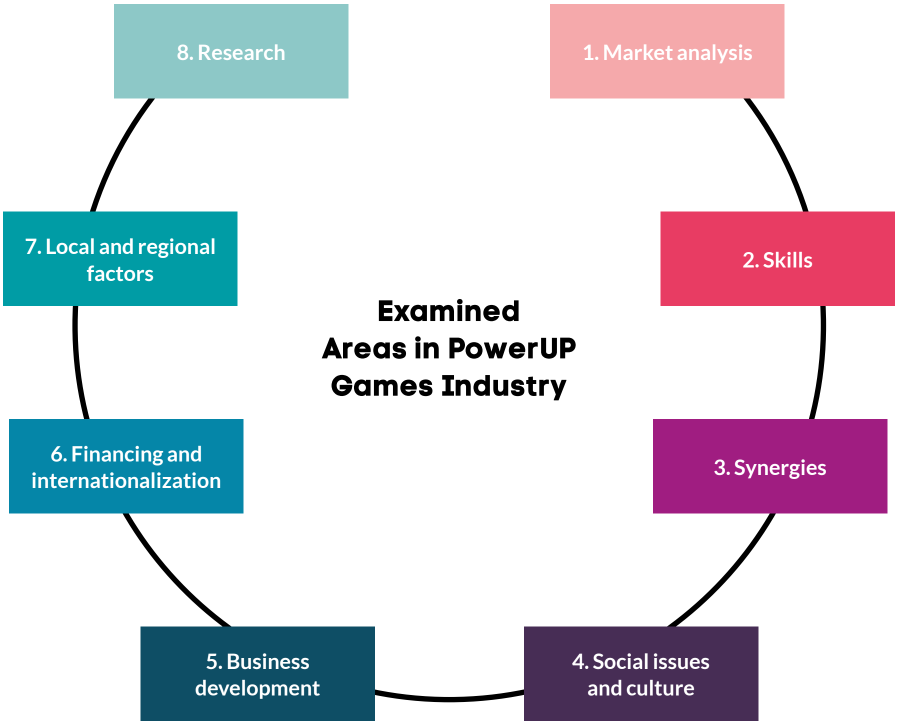
The Swedish games industry has great potential both in its own right and through contributions to the transformation of other industries. Game technologies are at the forefront of the use of both XR and AI, and the skills and technology transfer potential is excellent. But the infrastructural challenges must be addressed, and the near-negligent national approach to the game industry must be changed.

RISE's analysis of the games industry is that Sweden is sitting on a creative gold reserve, which is still mined by hand and is not taken seriously enough. It is necessary and urgent that the right tools and structural support are provided at the national level through the public support structures for research, growth and innovation, just as for other thriving industries. The games industry has growth pains, and the components needed for a long-term sustainable innovation infrastructure are missing. Training places, research funding and industry development support are all central components of this.

A Swedish national investment is essential and necessary if Sweden is to hold a position as a world-class games nation.

Björn Flintberg
Researcher and strategist, RISE Prototyping Societies

Introduction



Mission

The project *PowerUP Games Industry* (*Kraftsamling Dataspelsbranschen*) sprung from the government assignment N2021/01920 to Vinnova to develop working methods and processes for increased synergies between regional, national and international innovation efforts. The project is of a vertical nature and focuses on an entire industry, the games industry.

The assignment from the Ministry of Enterprise and Innovation includes, "in particular, analyzing and taking any measures to ensure that funds for innovation efforts and regional development shall be used more efficiently."

The project has been carried out under the leadership of *RISE* (Research Institutes of Sweden), a national research institute owned by the Ministry. RISE has worked closely with the *Swedish Games Industry*, the interest group and association for the games industry actors, and been in dialogue with over 90 individual actors, including education providers, higher education institutions, authorities, as well as private and public regional and local stakeholders. The assignment has included the collection of data for this report, as well as establishment of new forms of cooperation, stimulation of existing local and regional activities for increased collaboration and dissemination and sharing of successful concepts between regions. The main goals of the project, in addition to mapping the current situation, have been to support increased collaboration and strengthen the surrounding ecosystem of actors and processes, as well as to initiate new ones.

This report looks at a total of eight areas, one of which is a market analysis. The others have been included as a result of the dialogue with the involved parties and identified as key areas for the industry's continued growth. The report has aimed to map, identify and determine the current situation, opportunities and challenges for the industry and its industrial ecosystem, with recommendations on possible future measures for long-term sustainable growth.

In addition to the report, the project has also conducted meetings with individual actors and participated in events related to the for the industry. The joint collaboration has taken place through monthly digital engagements with the entire network, including over 90 people representing about forty organizations. Each of the eight areas has been discussed and processed in action groups, followed by joint discussions in larger groups. The experience gained from this has also been valuable as an input for this report.

Analysis and compilation have taken place in collaboration between RISE and the Swedish Games Industry with input and feedback from the network above. The report shows the present, the potential and the challenges. The analysis resulted in several potential pathways to aid development of the industry as well as recommendations for measures of particular interest to local, regional and national decision-makers.

Organizations represented in the work with this project through interviews, workshops and individual conversations:

RISE

Swedish Public Employment Agency

Business Sweden

Agency for Higher Vocational Education

Region Dalarna

Skellefteå Municipality

Vinnova, Swedish Innovation Agency

Swedish Agency for Economic and Regional Growth

Blekinge Institute of Technology

University of Gothenburg

Skövde University

Jönköping University

KTH Royal Institute of Technology

Luleå University of Technology

Science Park Skövde

Arctic Game

Science Park Gotland

Mid Sweden Games

Kvinnofolkhögskolan

Umeå University

Swedish Games Industry

Invest Stockholm

Sting

Tension

The Great Journey

Game Habitat

East Sweden Game

Creative Crowd

Embracer Group

Ubisoft Massive

Resolution Games

Malmö University

Södertörn University

Uppsala University

Mind Detonator

SISP, Swedish Incubators & Science Parks

Blekinge Business Incubator

Changemaker Educations

Stockholm University

Sweden's New Industry

The Swedish games industry is an industry with solid growth. Swedish companies in the industry have a domestic revenue of more than €2.7 billion, and a global revenue of over €5.8 billion including Swedish-owned subsidiaries abroad. In total, exports of video games account for 4.1% of Sweden's service exports[1].

In addition to the pure economic gain directly for the companies operating in the industry, the industry is also a part of the broader creative industries, the conditions of which have been investigated recently in government report *SOU 2022: 44*. The creativity of Swedish companies is mentioned by international players as an essential Swedish advantage. This is in addition to the high quality of the games, well-trained staff and outstanding levels of innovation. Swedish games companies have cross-functional teams, flat leadership hierarchies and a high level of creativity, which renders unique attraction internationally. In addition, there are also several examples of how cutting-edge expertise in digitalization technologies, such as VR and AI, is increasingly used in games, as well as inspiring the traditional industry in its digital transformation. The local regions that have strong games clusters also provide an exchange of knowledge and technology between industries and can contribute to Swedish industry in general.

Yet the games industry, like many other mainly digital industries, is not as well established in the public ecosystem as traditional industries, such as the automotive, mining and agricultural industries.

[1]https://dataspelsbranschen.se/game-developer-index

Market Analysis

The Global Market

Sweden's position in the global video games market is strong. The country is among the five largest in Europe in terms of the number of employees, number of companies and turnover, even though the country itself is relatively small. Nasdaq Nordic has become a hub for investments in the industry, and several companies based outside the country are listed in the Nasdaq Stockholm Exchange. Globally, Sweden is often considered a top 10 nation for game development.

Sweden's Position

Game development in Sweden is a growing industry with new records in turnover and employees every year since 2008. Over the past decade, sales have increased from just over €0.4 billion to €2.7 billion in Sweden-based companies alone. Fourteen of the companies that exist today have existed since the nineties, but just over half of all companies have been registered in the last five years. In 2021, 93 new companies were registered. The games are launched directly on an international market with strong growth and the work market is also largely international with many employees coming from other countries. Factors pointing to continued growth are increased investments in regional hubs with incubators, accelerators and training, as well as more veteran entrepreneurs starting new companies, and the fact that we have not yet seen the effects of the multiple and significant investments and acquisitions of recent years.

Counting foreign-based subsidiaries, Swedish games companies have a global turnover of €5.8 billion. This development has accelerated over the past five years, and in 2021, sales were for the first time higher for the Swedish-owned foreign based companies than domestically, an effect of the many significant acquisitions that took place during the year outside Sweden. Swedish owned game studios are widely distributed around the world and are present in 45 countries on all inhabited continents. The number of "second generation companies," where experienced game developers have moved on with new projects of their own, also continues to increase.

Swedish game companies are also characterized by amplitude and quality. Sweden has world-leading developers in AAA titles as well as in niche indie games, console, PC, mobile games, VR / AR, digital distribution and specialized subcontractors.

The industry's biggest challenges are the access to skills and capital, the latter especially for early stages, as well a need for updated laws and regulations regarding digital markets. The most crucial issue for the future is diversity, both among the game creators and the players. Although the growth has been rapid in recent years, much work remains to be done. In the longer term, games have all the prerequisites for diversity and inclusion. Games offer an opportunity to leave everyday life and step into worlds where only the imagination sets the limits.

The Case of Finland

Finland is of particular interest for comparisons. The country has a vibrant and active games industry and, like Sweden, has an outstanding reputation and has grown rapidly over the years.

The Finnish games industry in 2021 consisted of around 4.000 employees in 210 companies with a turnover of over three billion euros, according to estimates from the Finnish games industry's trade association Neogames. In terms of turnover, that means Finland is a larger video game nation than Sweden.

One of the reasons for the Finnish success is the organization Business Finland (formerly called Tekes). It consists of an authority, the Financial Supervisory Agency Business Finland and a service company, Business Finland AB. Its task is to strengthen and finance the growth of Finnish companies and strengthen Finnish exports.

Unlike Sweden, Finland has made significant national investments in the video games industry for many years. Over time, Business Finland has invested over EUR 180 million in the industry, which has been a significant contributing factor to the rapid growth of the Finnish games industry.

The support and loans that Business Finland provides to game companies are of similar design as those provided to companies in other industries. The organization has dedicated, knowledgeable staff who work closely with the games industry. They provide support for the development of new concepts, platforms and tools, new business models, and the use of games technology in new products and services.

There are three types of support: one for testing new business concepts, one for developing new products, services and business models, and one for rapidly scaling up operations in international markets.

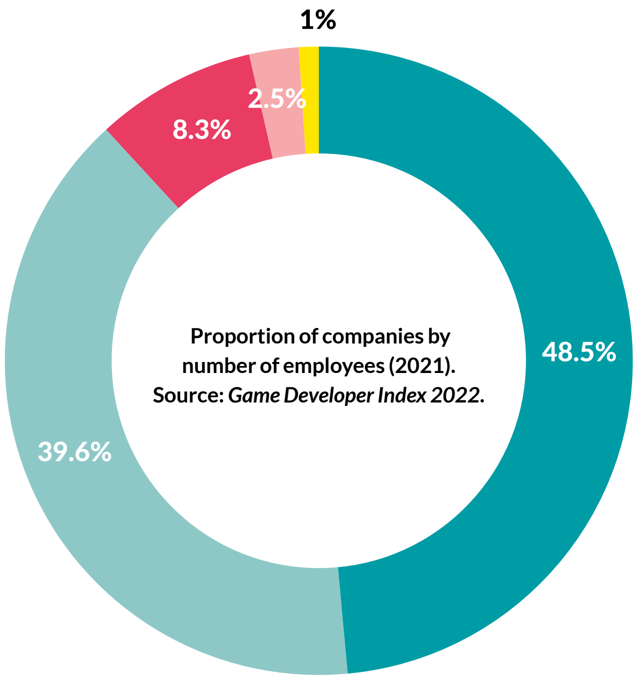
With continued investments, the Finnish games industry will have the conditions to continue to grow and develop in a way that lacks an equivalent in Sweden.

The Swedish Market

A Wide Range of Companies

Every year, the Swedish Games Industry association collects data on all companies with games-related operations in Sweden. The selection consists of limited companies registered under NACE code 58.210: Publishing of computer games, as well as other game companies that the industry organization has become aware of, but registered under other NACE codes. All companies in the selection are manually verified, and companies with entirely different activities, such as non-game-related software development or gambling, are not included in the data. 96 of the 785 companies in the *Game Developer Index 2022* reported neither employees nor any turnover in 2021, and only 3.5% of the companies had 50 or more employees.

The ten most prominent companies in 2021 account for over 70% of total sales. Only seven of the Swedish companies have had a turnover of over €100 million in recent years, and an additional 31 companies had a turnover of more than €10 million. The Swedish companies are profitable overall. In 2021, the ten most profitable companies paid almost €120 million in corporate tax, and the largest employers paid around €200 million in employer tax contributions based on their employees' salaries during the year.



Number of Companies by Size

- Solo companies: 48.5%
- Micro companies: 39.6%
- Small enterprises: 8.3%
- Medium enterprises: 2.5%
- Large enterprises: 1%

Regional Clusters

Game studios are spread around the nation. A majority of the employees are located in the capital, but significantly more companies are based outside Stockholm. While companies exist all over Sweden, data clearly shows that more companies and employees are concentrated in places with an active regional hub or cluster organization that works actively to promote the industry.

In an industry that is growing, the need for regional support functions, commitment and collaboration with education and local businesses is born. In recent years, several regions, often thanks to local support, have invested in game development and local entrepreneurship. These investments provide more startups and jobs throughout the country. The regional clusters represent a significant part of the industry's growth due to the existing support structure for business development, innovation and cooperation. Without the regional clusters, the Swedish games industry would not be where it is today.

Market Potential

Analytics company Newzoo valued the global games industry at $196.8 billion (2022). Video games, particularly mobile games, are growing. Many creative industries have business models based on the purchase of a specific experience at a specific point in time, such as concerts and theatre visits. A consumer's investment in a game, however, can result in hundreds of hours of gameplay. Many games also have the character of engaging players and creating relationships between the game developers and the players that span many years, not least when it comes to, complex strategy games and the wide flora of MMOs. Through this, games companies build strong brands, and in addition to direct revenue, immaterial value growth is also an important component of the industry. The customers, the players, become not only consumers but also active participants and value-creating actors who strengthen the companies they associate themselves, far beyond mere consumers of a product.

Vinnova's report, *Tillväxtgenen*, describes the value constellations model based on researcher Richard Normann's research.

Normann's theory of value constellations is based on value being co-created by the customers through collaborations that arise from its creation in a networked fashion rather than through a linear value chain. Players build their own modifications into games, write stories and create organizations to better manage complex challenges in different games. New technologies are being developed in entirely different industries based on game technologies and the use of game mechanics. Esports is just one example of such a value-creating sub-industry.

Value constellation companies are often run by entrepreneurs and challenge traditional business models. As the freemium model emerged, a business opportunity was created that became incredibly successful. Games like *Fortnite*, *Roblox*, and *Candy Crush* generate huge recurring revenues from the same customer base.

The Industry's Position in the Swedish Exports Mix

Swedish exports of video games can be classified as different types of services in the statistical data. One thing worth noting is that the classification of goods and services according to the Tax Agency's guide can create confusion. For creative industries, exports of theatre, dance and other art forms are counted as products because tickets are sold. Video games are counted as a service for tax purposes as distribution takes place online[2].

Swedish service exports amounted to roughly €66 billion in 2021, which gives the turnover of Swedish companies a clear impact on Swedish export with 4.1% of the total services export. In the table, according to information from *Statistics Sweden*, games are in category 9 or 11, depending on the type of game.

[2]https://www4.skatteverket.se/rattsligvagledning/edition/2021.18/329314.html

Swedish Service Exports 2021

1.	Goods production services	12,057	7.	Financial services	37,448
2.	Maintenance and repair services	2,427	8.	Fees for immaterial rights	74,383
3.	Transportation services	81,086	9.	Telecom, data and information services	149,866
4.	Travel services	52,108	10.	Other business services	184,036
5.	Construction services	4,723	11.	Personal services, culture, etc.	58,191
6.	Insurances	9,766	12.	Other public products and services	4,687

Swedish service exports 2021 (msek). Source: SCB

Sustainability and Climate Issues

For the most part, digital-based industries have a low climate impact, as no raw materials are consumed or transported in manufacturing or distribution. The single most significant climate impact for games is the consumption of electricity in development and use of the product.

The actual climate footprint of the industry as a whole in relation to other export industries has not been nationally examined. Within the games industry, there are projects such as the *Play Create Green* initiative, and there are also a number of guides and projects for more sustainable game development, but much more could be done. Many companies in the industry are committed to the climate issue. The Finnish trade association Neogames has produced a manual for how individual game studios can calculate their emissions. Similar work for the Swedish industry would be an asset to evaluate the industry's potential in the Swedish export mix compared to other types of service and to strengthen sustainability work going forward.

However, to make these calculations, more knowledge is needed about the entire production chain and player patterns, as well as established methods that make the industry comparable to others.

Overall, there is a long tradition in Sweden of exporting raw materials and manufactured products. Goods exports are still more than twice as large as service exports, but with the digitalization and technology expertise that exists in Sweden, service exports have a central role to play, not least from a sustainability perspective. Digital service exports also have a great opportunity to reach out globally directly, which is visible in companies that are born and live on the global market, a category the entire game industry today belongs to.

The need for infrastructural public support for the games industry that this report highlights, is relevant to other industries operating in the digital market as well. Due to their global consumer-oriented function, companies in the games industry often face challenges and regulatory changes at a very early stage.

Equality

The proportion of women in the industry has increased from 15% to 22% in ten years. But there is still much to be desired when it comes to gender equality. The gender distribution varies between different company types, size and game genres. The company Star Stable has the most even gender distribution among the larger companies, with a 50/50 gender split. There are several challenges to tackle in this arena, not least linked to skills provision and work environment. There is also a cultural issue in that young girls, to a greater extent, quit or scale down their gaming in their teens, partly because of a lack of range of games created for the target audience, making games less of an active interest when it comes time to choose a career path in the future. There are also reports in the industry of sexism and harassment, and several companies that have grown a lot in a short period of time have experienced challenges in leadership, work environment and workplace culture.

Among the students in the country's game education, the gender distribution is slightly higher than in the industry, with approximately 27% of women admitted to game education programs in the fall of 2022.

Another challenge is that relatively few women start companies or are involved in the early phases of new companies, which means that the gender distribution is lagging behind right from the start. There are exceptions. In Skövde, the number of women in the industry doubled between 2020-2021, largely thanks to female co-founders in companies formed through the local game incubator.

Skills

Current Situation

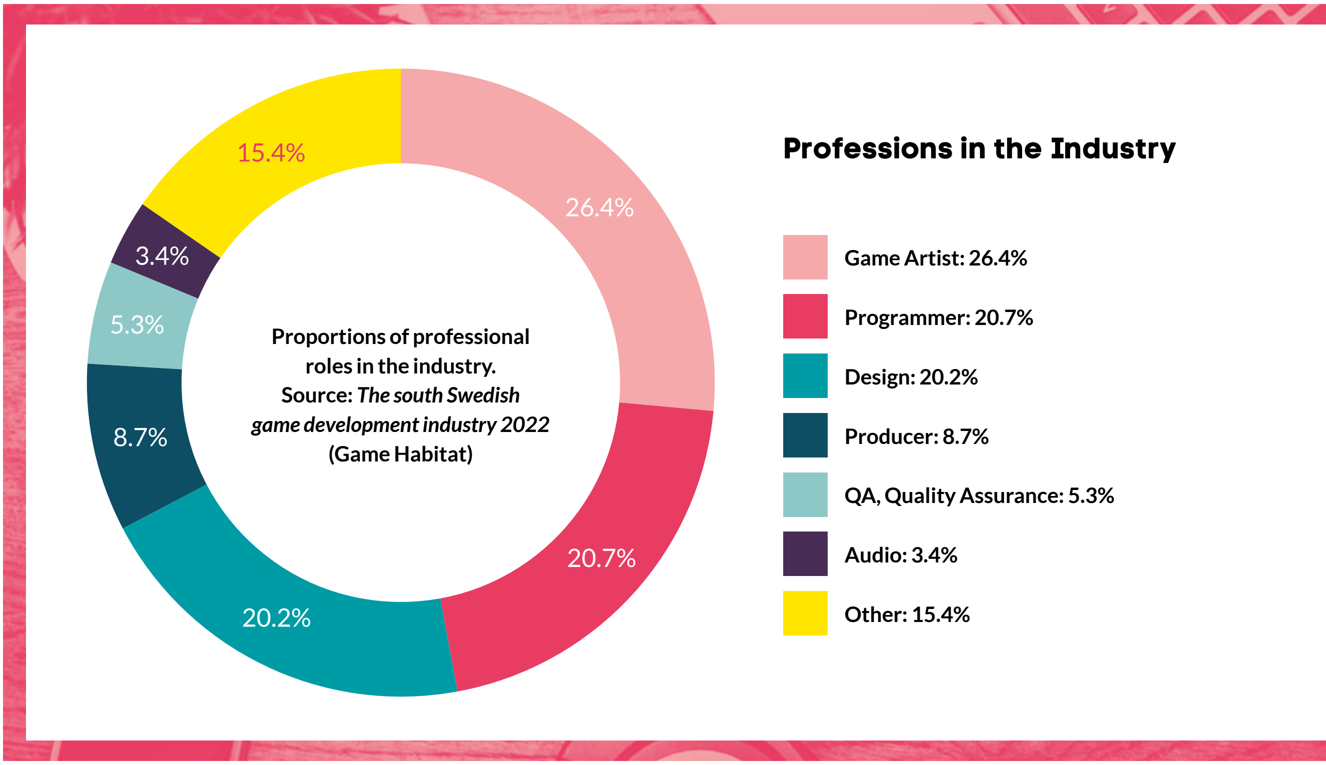
In 2021, the Swedish games industry had a total of 19,055 employees around the world, of which 7,944 were in Sweden[3]. In 2020, for the first time, the number of employees abroad overtook the number of employees in Sweden, a trend that increased sharply in 2021. The reason behind lies partly in the acquisition of foreign studios, but also in one of the industry's most urgent challenges – there is not enough trained and experienced staff to hire in Sweden. The Swedish games industry association estimates that by 2031 there will need to be about 41,000 employees in the industry in Sweden to keep the current growth.

The strong growth thus creates the conditions for being able to employ far more people than currently work in the industry. In 2021, 616 people graduated from game education at universities of applied sciences and higher education institutions. At the same time, a total of 1,348 new positions were added to the industry, which testifies to the fact that there is already an alarming deficit.

Without action, there is a risk that these employment opportunities will not end up in Sweden or that the industry can no longer grow, leading to the risk of stagnation or relocation. The gap between the number of people trained and the need is large, and the statistics of the Swedish Public Employment Service, on the number of unemployed also testify to a shortage of skills. The skills shortage is expressed by many different industry partners to be the single biggest issue for continued growth and long-term sustainability of the games industry. Within this framework, more enrollment slots for students in universities and HVE programs are needed.

At present, there is a shortage in almost all professional categories, but some are mentioned as particularly difficult to get hold of, such as animators, programmers and artists with advanced technical skills. The need can only be partially covered by international recruitment. At the same time education providers report that it is difficult to design and gain traction for very narrow specializations. The teacher shortage is real as people with relevant experience are often recruited into the industry, which further challenges upskilling and continuing education. Since the industry is at the forefront with regards to new technologies, there is also a general challenge in maintaining current and contemporary training. This is an issue that affects both higher education institutions and higher vocational education actors and which needs continuous focus and active research by the education providers. Some technologies, mainly AI, will very likely have a noticeable impact on what education and professional

[3] https://dataspelsbranschen.se/s/GameDeveloperIndex2022WEBB.pdf



practice looks like in the coming years, and the industry is already trying out different methods for implementing AI solutions both in the games themselves and in production processes.

Increased collaboration between higher education institutions and corporate actors in the industry is another issue that relates both to the ability to graduate more people, but also to be able to create more practical elements in the education by having access to the industry's existing competence in specific technical areas. It is important to keep in mind that games industry professions are specialized, and general programming or design skills are not enough to become directly employable in the games industry. Game programming, game art and game design are disciplines with their own set of skills, where the demand is also increasing for further specialized skills such as animation. This means that the number of student positions in various educational programs may appear greater than they really are.

Professions in the Industry

Arbetsförmedlingen Kultur is the national employment agency for the professions in media and culture, including the games industry. In their database, there are currently (January 2023) only about 200 people nationally who do not have a job. All registered individuals are verified as either being recent graduates from a game education or by having worked in the industry for the past three years. In addition, there are a few hundred people who do not qualify for any of these criteria but, in theory, could be employable. The causes of this unemployment have not yet been analyzed.

There is a wide variety of professional roles in the video games industry. Game artists and game programmers appear most often in the media, but many other roles are required for game production. In southern Sweden, the distribution of professional roles in the industry has been part of a report from 2022, represented in the figure above.

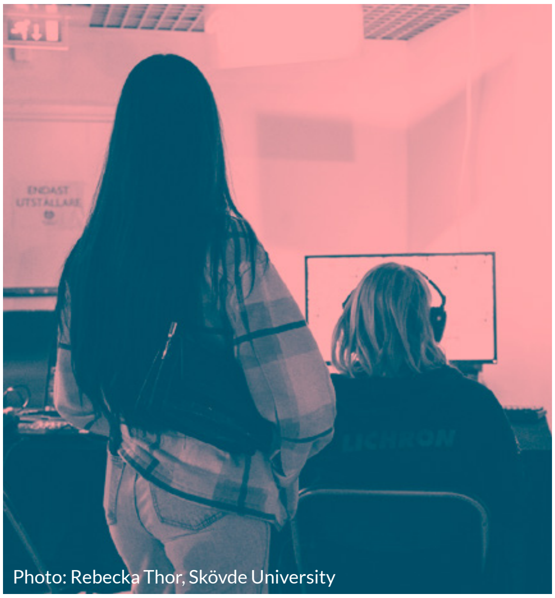


Photo: Rebecka Thor, Skövde University

Arbetsförmedlingen Kultur categorizes the following professions in its data for the games industry:

- **Programmers, console games/ mobile games/PC games/web games**
- **Artist, game concept artist**
- **Game designer**
- **Level designer**

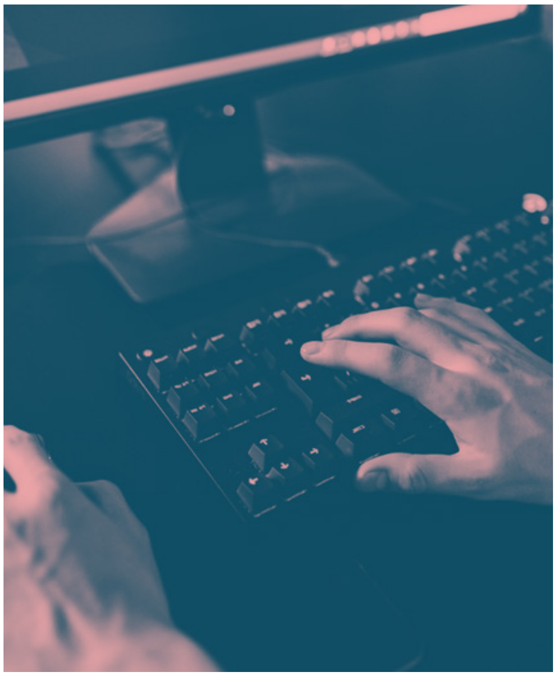
Interviews and surveys in the industry show that the system used to classify the industry's professions does not fully meet the needs that exist in the industry, which creates challenges. Slots available for education providers are limited and may not support specialist roles. Furthermore, the difference in skills between regular programmers and game programmers can be hard to pinpoint specifically where some types of specializations have a greater overlap than others. For some specializations, there is no code at all. This also connects to the large group of international employees whose work permits are linked to the ISCO-code which can cause problems if you change positions inside or outside the organization, rendering your work permit to be challenged.

The following SUN codes (ISCED) are included in the professions of the games industry:

- **481ab, Training for programmers, games**
- **213de, Training for game artists**
- **213df, Training for game designers**

A complicating factor is that game developers such as game programmers and game artists possess the skills for working in professions and industries other than video games, particularly as expertise in visualization and game technology tools is becoming more prominent in traditional industries and other software development. At the same time, the specialized expertise required to work with games makes it more difficult for people with education and experience from other industries to directly take a job at a game company.

Shorter courses in the vocational arena or via the Swedish legislation on reskilling may be able to become a source for finding more staff more easily to meet the industry's skills shortage. However, this is still a relatively unexplored area.



Vocational Education

Higher Vocational Education (HVE) is the post-secondary form of education that trains the most individuals in the industry, but the number of funded students is limited. Only a total of 281 people graduated from HVE programs and went into jobs in the games industry in 2021, but since then, the total number of available admission slots has increased. On average, 82% graduated from the country's game educations within HVE programs, and the match with the industry's needs is strong. The Agency for Higher Vocational Education, Myndigheten för Yrkeshögskolan (MYH) also indicate that the educational programs need to be flexible and able to adapt to changing needs as the industry develops, for instance with the need for animation programs and narrative writers, but to do so, one requirement for education providers is to be able to provide internship training at games companies. This phenomenon is in many ways similar to other highly specialized professions in other industries.

Education providers in several locations testify to very high demand of applicants and that they need more funding to increase the number of slots for admissions. Statistics from MYH show a admission stats of 2.7 applicants per slot for game programmers, 3.1 applicants per slot for game designers and 4.8 applicants per slot for game designers. However, the number of applicants varies greatly between different locations in the country. Major education providers include The Game Assembly and Futuregames (Changemaker Educations), both owned by Academedia. The organization Tension with Playgroundsquad is another major actor based in Dalarna. In addition to these, Visual Magic in Skellefteå and Xenter Botkyrka each organize a VFX training, and Forsbergs, a game program training in Stockholm.

A survey in southern Sweden, *The south Swedish game development industry 2022*[4], showed that just over 50% of people working at companies in the industry who also were educated in Sweden had attended a HVE program, compared to just over a third who had their education through one of the country's higher education institutions.

HVE Providers With the Most Students

Education provider	Location	Accepted students, fall 2022
Futuregames (Changemaker)	Stockholm, Karlstad, Boden, Skellefteå	297
The Game Assembly	Malmö, Stockholm	184
PlaygroundSquad (Tension)	Falun	50
Yrgo (City of Gothenburg)	Gothenburg	55
Other	Skellefteå, Boden, Stockholm	72
	Total	658

Source: Talent, Education, and the Art of making Games, Swedish Games Industry, 2023

[4]http://www.gamehabitat.se/wp-content/uploads/2022/10/industry-report.pdf

Higher Education Institutions

Higher education programs aimed specifically towards games are spread among many different academic disciplines, such as Computer Science, Information Technology, Media and communication, Innovation and Entrepreneurship, and several others.

In addition to these programs and courses, there are other programs that train for skills used in the game industry, as well as elective courses and specializations within traditional programs where game creation can be part of the course program. In particular, two engineering programs at Linköping University have game development as an elective focus. These have an active collaboration with the game hub East Sweden Game, as well as the with the local annual game conference.

The education programs have varying degrees of applicants and admission rates around the country, and feedback from universities reveal a desire for a closer collaboration with industry actors to be able to create better education programs with more practical applications. Vocational programs are by nature imbued with a high degree of practical work in game development, while education programs at different universities have a varying mix of theory and practice. Several educational institution representatives have also expressed a desire for increased collaboration between universities to be able to specialize in fields where a single actor cannot admit enough students for a narrow subject but where several higher education institutions could collaborate to enable better education programs.

There are also several higher education institutions that report difficulties in recruiting teachers who can train students because the skills shortage in the industry is so great that many competent and conceivable candidates instead start working for game companies. Increased interaction with the industry is desirable here too.

The issue of continuing education is also central to the area of competence. The industry finds it difficult to allow staff enough time to deepen knowledge or get more advanced degrees. Even when such attempts are funded by third parties, the skills shortage is so great that companies feel they cannot afford having staff become part-time industrial doctoral students, as they'd lose valuable time needed in production. This in turn leads to a shortage of doctoral students, and in extension, in research, which is discussed in its own chapter.

Students Starting Games Education, Fall 2022

University	Location	Accepted students
Blekinge Institute of Technology	Karlshamn/Karlskrona	62
Chalmers University of Technology	Gothenburg	40
University of Gothenburg	Gothenburg	2
Skövde University	Skövde	262
Luleå University of Technology	Luleå/Skellefteå	65
Malmö University	Malmö	77
Stockholm University	Stockholm	82
Södertörn University	Huddinge	86
Uppsala University	Visby	167
	Total	843

Source: Swedish Games Industry/each university

Folk High Schools

Folk high schools has a long tradition in Sweden, and some schools have extensive and growing programs for games. Although most employees in the game industry have an education from HVE or universities, Folk high schools in fourteen locations provides education programs for adults in game design, game music and game development. Some work closely with local game clusters and hubs.

Talent Attraction

The games industry is an attractive industry for young people. There is still a substantial majority of men in the industry, although the number of women is increasing year by year, albeit at a slow rate. In 2021, a total of 22% of the employees in Swedish-owned companies were women[5], compared, for example, with the professional group of engineers (29%)[6] and in the IT industry in general (30%)[7]. The problem is similar to that of other technology-heavy professions. Getting more women to choose the industry is therefore a central and important issue to combat skills shortage as well as from a national gender equality perspective.

Migration Challenges

In terms of international talent acquisition, some is obtained via acquisition of successful studios in other countries, but a substantial amount comes from international recruitment. In this area, Sweden's regulations for immigration have affected the industry in a negative way.

According to the survey of *The South Swedish game development industry 2022*, just over half of all those working in the industry in southern Sweden are citizens of another country. Just over half of this group come from a non-EU country. The United Kingdom, France, Germany and the US are the most common countries that provide staff for the Swedish-based games industry. There are mainly three different problems with migration: administrative processing delays, short probationary periods and work bans during the application for an extension of permits.

As far as the administration process is concerned, it is too slow, especially when applying for permits. There are several consequential problems around this when the employee ends up in limbo. One example is a legislative change that facilitates visas for business travel while applying for an extended work permit. However, it is not possible to make travel privately, and the family of the person requesting an extension is not allowed to leave Sweden while the person has an active application for an extension.

The problem of probationary periods arose after June 1, 2022, when the rules sharpened for temporary work permits for probationary periods, down to only six months from two years previously. Probationary employment is common in the Swedish work market and was previously considered part your permanent position unless it was prematurely ended. It is now legally instead a temporary, fixed-term contract. This creates vast amounts of administrative work for both the Migration Agency and for the employers and makes it difficult for employees who are not allowed to register residency in Sweden when the permit is shorter than a year.

The work ban during the application for an extension of permits creates other effects as well. The long processing times for extensions can make it impossible for some employees to get an extension. To actually get approval on an extension, the employee must have worked for the full six months to get approval on their application for extension, but may not work after the six months have passed, if the extension is not fully processed.

The situation leaves employers and employees in a large catch-22. The average processing time is six months today and is, therefore, sometimes longer than the permits that are distributed. The rules must be simplified and auto-

[5] https://dataspelsbranschen.se/s/GameDeveloperIndex2022WEBB.pdf
[6] https://www.sverigesingenjorer.se/globalassets/dokument/remisser-och-rapporter/ron-om-lon-och-kon-2021.pdf
[7] https://www.techsverige.se/om-oss/statistik/statistik-kvinnor-och-man/

mated, both to keep up the rule of law for those who come here to work and so that Sweden does not lose growth to the outside world.

For smaller companies, in addition to all the administration that comes with migration practices, contracts and long lead times, it can be a challenge with regards to onboarding and introduction to Sweden. Finding housing, being guided through the process of all the authorities involved and getting into the social system are all things especially smaller companies need better support for in order to help their new employees.

Once an employee has moved to Sweden, employers must also try to retain both the person employed, and any accompanying partner and family who want to gain employment and find meaningful social context in the country. Oftentimes, partners are well-educated people from other industries. Shortcomings in the general integration system, challenged with Swedish language training, and the difficulty of getting slot in English-speaking schools and preschools for accompanying children are all major obstacles for immigrant workers.

Talent Attraction Aimed at Younger People

Interest in gaming is high in younger target groups, according to the annual *The Swedes and The Internet* report. However, games have not yet made a similar impact on cultural activities for young people, although some municipal School of the Arts (Kulturskolor) have initiated games-related activities and courses. There is no particular investment in talent development among young people targeting the games industry. Several stakeholders express a desire to find a clear strategy for career building from an early age, from high school age and onwards. Data shows that many women who played games when they were younger, lose interest in games in their later teens. Efforts to bolster interest in a career in the video game industry are a topical issue that could be further developed both in schools and among the public at large, which would improve reskilling potential as well.

Other Forms of Employment

Most game developers still work on-site, especially at larger companies where a large part of the development process takes place in large teams. Some game developers work as consultants or freelance, and among them, distance-based work is an increasing trend, both in Sweden and internationally. Several countries have introduced special visas for remotely working travelers. This creates an opportunity to have employees who do not live on-site, but the regulations are challenging with regards insurance, pensions and sick leave, which cannot be handled in the same way for employees abroad.

These new forms of employment are likely to increase and are not unique to the games industry. The question is how and when a possible adaptation of the regulations can take place without the individual risking to have to give up their employment due to national legislation in order to become a consultant.

Photo: Rebecka Thor, Skövde University

Photo: Rebecka Thor, Skövde University


Photo: Rebecka Thor, Skövde University

Synergies

The main focus of the games industry is not to create opportunities for other industries, but it is nevertheless something that could strengthen Sweden's competitiveness. The benefits are achieved both through a transfer of technologies and knowledge. Technology such as AI and VR are used early in the game industry, and the special skills in game development and game design that workers in the industry possess also have a great opportunity to influence the general Swedish industry's digital transformation.

Some companies have already seen this opportunity today and are strengthened by the potential. In interviews for this report, several participants in the network testify about collaborations and projects with companies such as H&M, Boliden, Northvolt and Volvo Cars. The Swedish industry is undergoing an extensive transformation and digitalization process which includes automation, new processes and new forms of models for management, training and product development. The game industry also creates highly specialized talent and skills that can contribute to other industrial development and a transfer of technologies and abilities to other industries, which has the potential for growth and profit for other Swedish industries through a national public investment in the game industry. It is also one of the key factors RISE is considering in its own commission to strengthen Sweden's competitiveness.

At the same time, it is important to note that many actors testify that its legitimacy has historically not been on par with either industry growth or size.

The value of the games industry for Sweden has often been described in terms of its ability to grow other industries. Some stakeholders believe that this view still persists to some extent. And again, while it is clear that the game industry can be an interesting catalyst for other industries such as manufacturing, health, and education, it is not its main purpose any more than the automotive industry's main purpose is to provide the manufacturing industry with commuting abilities. The games industry has its own clear position as an industry in Sweden with an important role to play.

Note: the term "synergies" was initially used in the project but has been replaced during the course of the work with the report with terms such as "added value", "catalyst", and "spill-over effects" to represent that the benefit for other industries is a secondary effect for the games industry.

Game Technology and Technological Development

The most visible added value in other industries from the entertainment-based games industry is in the technological arena. Game engines used in other industries to visualize is one such example, such Volvo's use of Unreal Engine for their cars. Development and test environments in VR have also become an important tool in other industries and has led to collaboration with game studios such as that between Tarvalley and Boliden metal company. Virtual environments developed for game production have also been used in collaboration with other industries and contributed to faster technological development in the field.

Games for Other Industries

In addition, games can generate added value for a variety of manufacturing and raw material industries in the field of visualization, but also in production, product development and testing methods. Several industries have already seen the possibilities. Life Sciences, space, mining and textiles are all industries that have interacted with the game industry in various forms.

For creative industries such as film, television and theatre, digitalization and game development have already begun to generate new opportunities and are likely to be an important component in the future. Not least in the film industry, there is much potential. In other forms of culture, such as in museums and in libraries, games also have a natural part of being able to bring to life and recreate historical and cultural environments and objects. The hospitality industry also has great opportunities for synergies with the game industry to make visible local experiences and visualize visitor destinations.

Another great opportunity for added value lies in another field entirely, the cross-skills organizational working structure of the game industry's production teams. Game development often means that people with different skills work together and contribute with several different perspectives for a high-quality result. This has also been pointed out by foreign actors as a special success factor. The potential of interdisciplinary thinking is of great importance for the growth and competitiveness of the industry and can be an interesting aspect for other industries as well.

Communication With End Users

Another strength of the game industry is its unique method of interaction with end consumers, the players. Already in the development phase, potential players are involved with community feedback and alpha and beta versions, and both provide relationships and deliver important and qualitative feedback on the products. When the games are released on the market, these early players often have in-game perks and the ability to act as brand ambassadors. Many games also have opportunities to be developed by the players, either through addition of various features or content, or by modifications to the original game. Some games. Such as *Minecraft*, are built around the concept that it is the players who create and build the games' content to a large extent. User-oriented services such as Twitch and Discord are

also playing an increasing role in games and gaming culture and have begun to be used by other companies for more close communication and dialogue with end users. The model of collaborative product development and creation, developed in dialogue with the end users, is a method that can create added value in several other industries.

Games and Learning

Games have been used in teaching for a long time, both in the form of simpler games in the formal school system for learning mathematics and languages and also through more advanced games such as *Minecraft's* education edition. For learning purposes, serious games are also common, games that are developed for the purpose of being used in contexts other than entertainment. The University in Skövde has conducted extensive research in the field for several decades[8]. Games have great potential to be used in different contexts, both in formal learning but also in a number of fields linked to adult learning. Here you will find solutions that span everything from stroke rehabilitation to training in orthopedics and surgery, for training workers on new machinery, for safety management and within the Armed Forces for training and simulations of conflict situations. In recent years, VR has developed into a new field for serious games. All in all, the games industry can contribute to strengthen Sweden's skills supply challenge and the ambition to create better and more cohesive lifelong learning.

Games for Complex Decision Systems

In advanced decision-making systems that often include work with values, sustainability, democracy or management systems, games can also serve a great purpose with their ability to visualize and structure complex processes through game systematics. Games can therefore have an important role to play for work in democratization processes, management issues, urban development and work with sustainability and climate.

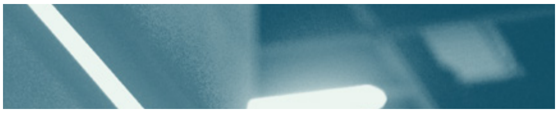
Games and Digital Twins

Game technology and game engines are already successfully used today for various forms of simulations and in digital twins, for example, for urban development. Unreal and Unity are both engines that can be used in this way to create virtual viewing and test environments for development.

Games for Inclusion and Accesibility

Games can contribute to a greater degree of inclusion. Video games enable people with different forms of physical and neurodevelopmental disorders to participate on more equal terms in social interaction and can be an opportunity for individuals with physical disabilities, autism, ADHD and other challenges to develop and grow. The issue of children and young people's exclusion is an area that generates great interest and where there is room for further development. There are examples where games have also been used for children and young people before treatments in healthcare to de-dramatize the otherwise frightening situations that complex treatments can entail.

For the elderly and self-isolated, games and interactive solutions with game elements have the potential to be used in health contexts. RISE has conducted interactive art walks and game projects for increased movement and exercise for rehabilitation in healthcare. Nintendo's Wii and the development of VR technologies are other examples, as is the development of games like *Pokemon Go*, which builds on GPS and "treasure hunting" methodology where players must physically move around to play the game.



[8]https://www.diva-portal.org/smash/get/diva2:1558159/FULLTEXT01.pdf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Social Issues and Culture

Games are both a business with great potential and an important carrier and component of Swedish culture. If the sports movement is a hub for physical development and the construction of social structures for young people, the game movement is likewise a hub for mental development and the construction of social structures. Games also have a great opportunity to contribute to the development of new artistic and creative formats, both in the field of art and music and in the performing arts.

The games industry is basically both a technology industry and a creative industry. Games are both culture and technology. The dual nature of this also puts the industry in a special position in relation to the public infrastructure in Sweden, which has different models and support for cultural, tech and business issues. This is not unique only to the game industry but a challenge that affects all creative industries and is largely highlighted in the state investigation *Creative Sweden! National strategy for the promotion of sustainable development for companies in cultural and creative industries*, formal name *SOU 2022:449*[9].

As a cultural phenomenon, games and gaming have been a part of human history since the first archaeological traces of early river cultures. Games like *The Royal Game of Ur* and *Kalaha* have long been known. Before the wide availability of computers and the internet, games were analog, and the borderline between games and gambling was more indistinct, but this changed in conjunction with the Industrial Revolution and urbanization.

In the late 1800s, board games took on a clearer profile. In Sweden, board games have previously been a pastime for holidays and weekends, but in many countries in Europe, board games are a more everyday form of entertainment and social interaction. Germany is Europe's leading country for analog board games, but many other countries also have a lively production.

With the availability of computers and the internet, early games such as *Pac-Man*, *Donkey Kong* and others came to Sweden, where the Swedish license for the release of Nintendo's games contributed to a boom in Sweden. During the 1980s, role-playing games also emerged in Sweden and a whole new hobby formed, which became the basis for a strong youth culture and the formation of a national organization for young people with interest in the gaming hobby, Sverok.

The culture around games is closely related to fantasy, science fiction and other gaming hobbies phenomena such as Japanese manga and anime. In the past 10-15 years this genre has made its way to both film productions

[9] https://www.regeringen.se/4a1ea6/contentassets/5362b817cbfb4966aa2be1158f946c67/sou-2022_44-webb_.pdf

and TV series with themes from environments in the above cultural areas.

Today, analog and digital games live side by side and in symbiosis. In recent years, crossovers between the two has also become increasingly common, where board games become digitalized or get video game variants, and in some cases, video games are turned into board games.

In 2022, the Swedish games company Embracer bought Europe's largest producer of analog board games, French Asmodee, for €2.7 billion. The role-playing game *Dungeons & Dragons*, published by US games and toy giant Hasbro, has contributed to their hobby game division to the extent that it is now the most profitable branch of the entire business. At the same time, the gaming hobby's more niche audience is small in comparison to the wider public's access to both board games and, above all, mobile games, where Swedish-originated company King has become a giant with his great success *Candy Crush*, a game series that has been downloaded over four billion times. In total, the industry estimates that at least one in four people in the world has played a game created in Sweden.

Games as Culture and the Versatility of Games

Within the framework of this report, the starting point has been the development of the industry itself, but the cultural aspect of games is absolutely central to the existence of the industry. Games are, in addition to commercial ventures, cultural expressions that can be created for completely different reasons than just the purely commercial ones.

Similar to Beatles music and hard rock, both role-playing and video games in their childhood endured a certain media moral panic about the "depraved youth", and for some years, there was an active anti-games lobby that pushed to restrict or ban games. As games have become an increasingly natural part of everyday life for many people, this type of criticism has increasingly died out, although interviews during the work with the report testify that prejudices and preconceived notions about games still live on to some extent, based on a lack of understanding of games as a cultural phenomenon.

The development of the games industry can be compared to that of the Swedish film industry, where Sweden has also enjoyed success. Games are, in many cases, a collaborative medium for communal entertainment where the participant, to a greater extent than in other cultural forms, becomes an active participant. The Game ON 2.0 exhibition was the most visited in the history of the Tekniska museum, and there are several initiatives where games as a culture have formed. Liberal arts through Kulturskolan have hosted a number Game Jams and non-profit and civil society activities use games as part of their work.

Games are also a central form of entertainment for many Swedes. According to the Swedish Internet Foundation, 58% of all Swedes over the age of eight play some form of game on a console, tablet, mobile or computer[10]. For the age category 8-19 years, 86% play games.

Based in Malmö, *Dataspelscentrum* has recently been formed, an association with the goal of becoming a national central organization for professional game creators focusing on games as an art form and free cultural expression. Dataspelscentrum wants to work for a wider range, greater diversity and better conditions for game creation at all ages through public forms of support, promotion efforts, talent development and collaboration with other forms of culture.

The Nordic Game Program

Between 2006 and 2015, the Nordic Game Program distributed some €6.5 million to 112 Nordic game projects. The program was funded by the Nordic Council of Ministers and was a first step towards a Nordic cultural policy for games. In addition to the support program itself, it aimed, among other things, to promote the cultural value of games, contribute to industry knowledge and work for increased exports. Among the Swedish companies supported by the program were several critically acclaimed games, such as Tarsier's *Little Nightmares* and Starbreeze's

[10]https://svenskarnaochinternet.se/app/uploads/2022/10/internetstiftelsen-svenskarna-och-internet-2022.pdf

game *Brothers*. Over the years, 31 Swedish game projects shared more than €1.7 million, a relatively small amount of money for each individual project, but very impactful for the recipients.

On average, there were twelve applications per approved project, and from these, expert experts then assessed who should receive support. To be fully qualified, the game had to have a playable prototype of the project that could be tested.

The combination of a relatively simple application process and support from extensive industry knowledge made the initiative a good example of how a comparatively small amount of money could still make a difference in the Swedish games industry. The program was also very appreciated by industry actors and filled a void in the ecosystem for investments and financing in terms of providing support for the development of early prototypes of games, something that is lacking now that the program has ended.

LAN and Esports

Large festivals have also emerged from video games, where the largest, Swedish Dreamhack, is held annually in Jönköping. It was also largely contributing to the emergence of the Swedish esports scene. Dreamhack originated in Dalarna and was owned by the founders up until 2009 when it was sold to Swedish media conglomerate MTG. In 2022, MTG sold the business along with the rest of its esports venture to Savvy Gaming Group, which is owned by Saudi Arabia's investment fund, for nearly €1 billion. There are several other game festivals and smaller networking events (LANs) that take place both at the hobby level and at the commercial level.

Game festivals have been important for the emergence of esports, where players train and compete in certain video games. There are two national associations for esports that, in 2022, decided to merge. There are esports high schools in several places in the country, structured in the same way as sports high schools for soccer, hockey and other sports. Esports is an area that has grown in recent years has its own research field, among others at Jönköping University.

Challenges Related to Games and Young People

There is an active debate around problematic gaming among young people, where young people are reported not to be able to stop playing or start failing at commitments in school and everyday life. However, it is difficult to distinguish to what extent this is unique and how much is part of the common fears that have been common around youth phenomena at all times. Both the Beatles, hard rock and analog role-playing games were in their day seen as so dangerous that they would be banned or restricted.

Among the criticisms is often the fear that problematic playing can have young people not want to go to school. Research on young people who are neither working nor studying, UVAS, conducted at the University of Skövde, shows, on the contrary, that many times it is not the games that create the exclusion, but instead, provide social context and meaning to a group of youth that have been exposed to bullying, had difficulties in the school environment and/or has neuropsychiatric functional variations. The research project created opportunities and methods that helped several participants to a better routine so that everyday life became more manageable[11].

In summary, it can be stated that problematic playing of entertainment games exists, but that the issue is more complex and may not be caused by games but often be a symptom of other problems, where the games at the same time can become a safe place for people who do not otherwise have the right conditions to be able to interact socially fully. In the project *Games – Problems or Opportunities*, game developers, academia social workers and other health professionals that come into contact with young people at risk for developing problems related to playing games. The European Council has also published a guide for parents and teachers that creates a picture of games culture[12].

Another issue related to this age group is the online toxic gaming culture, where elitism, misogyny and prejudice can be highly problematic in the same way as in some social media. Problems that generally apply to internet-based environments where people can be anonymous also affect

[11] https://www.his.se/globalassets/3.-forskning/informationsteknologi/studio-ludum/projekt_studioludum_slutrapport_april2021.pdf
[12] https://www.coe.int/en/web/education/-/new-publication-educating-for-a-video-game-culture-a-map-for-teachers-and-parents-

the game industry. Interviews during the project also show that the issue is an active priority in the industry and many companies have community managers specifically working to foster a healthy player culture. More education to create an understanding of gaming culture and the possibilities of games could certainly be deployed.

Gender Equality and Inclusion Initiatives

There are several initiatives for increased gender equality and diversity in Sweden that aim to increase inclusion of women and people with other gender identities in the industry. Below is a review of some of the more significant initiatives in the industry over the years.

The first Swedish publicly supported project aimed at game-creating women was *Super-Marit*. Based in Visby and financed by the island of Gotland and the EU, it was run between 2004-2009 with the aim of bringing in more women to the game industry and creating better and more fun games. Over the years, several events with female game students were held in Sweden.

Diversi is a project that started via the Swedish Games Industry association in 2013. It has a national and Nordic focus, and activities include scholarships for trips to GDC for female game students, networking events at Nordic Game and other activities. The industry organization has also conducted work fairs for women, *Introduction to the Games Industry*.

During 2018-2021, Science Park Skövde ran the project *The GIG 2020* to create a quality-assured gender integration of methods and processes for incubation purposes. In addition, the project worked to aid entrepreneurs to start and develop game studios, with a focus on gender, cultural background and life situation.

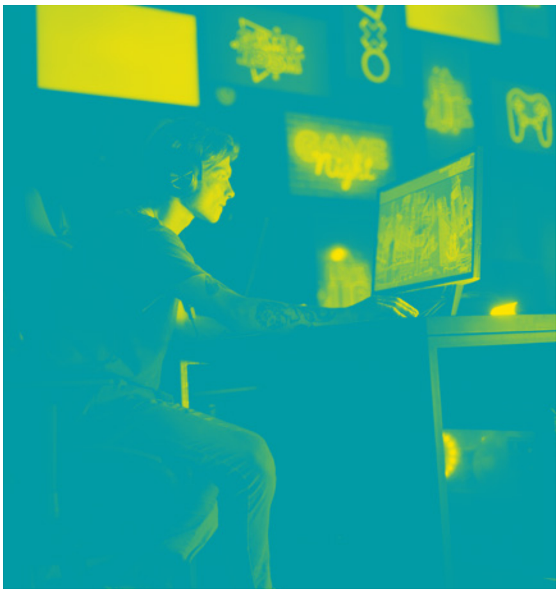
Since 2011, the University of Skövde has run *Donna*, a network for female and non-binary game students who, among other things, conducts the annual Donna Day conference in connection with the Sweden Game Conference.

Women in Games Sweden is a network mainly based in Stockholm for women and non-binary people that arranges network meetings. *GameDev Force* (GDF) is another Stockholm-based initiative that works for increased diversity and equality and creates safe spaces for minorities in the game industry. The project started in 2019 and arranges lunches in Stockholm as well as the mini-conference *The Thing*. In the city of Boden, *Valkyrie Jam*, a ten-day Game Jam is arranged annually.

There are also funding initiatives aimed at women. One of these is *Wings*, a private initiative that finances games created by women. *Levelling the Playing Field* is another initiative that offers to fund games created by studios with at least 50% women.

Games by Her is a twelve-week evening course in game development for women and non-binary people with the aim of increasing the number of non-cis men who create games. *GEM*, the Game Empowerment Movement, was created by Game Habitat in southern Sweden in 2021 as a local initiative to help create an equal and inclusive culture in the game industry. Paradox Interactive runs the project in Stockholm.

As can be seen, there are several initiatives, but they are working with small funds at the local level and are dependent on project funding. A national investment in the issue of gender equality in the game industry is called for by several different industry players.



Business Development

The Swedish games industry is growing and prosperous but heavily weighted towards games development. Interviews for the report show opportunities to develop several areas, including other positions in the value chain, collaboration between private and public actors, as well as support structures for innovation, business development, intellectual property and sustainability.

Industry Development

Ongoing business development in often done in collaboration with incubators and game hubs, mostly financed by local and regional funds or third-party funding from actors like Vinnova and the Swedish Agency for Economic and Regional Growth. Companies investing in business development have a natural focus on their own company and is found mainly in the larger companies that have the resources to conduct systematic business development. In the absence of a national strategy for the development of the innovation infrastructure, business development and industry development become a matter of sporadic efforts primarily based on the involvement of individual actors.

A national strategy and precise, targeted calls for projects and regional and national development investments are needed to strengthen sustainability and continuity.

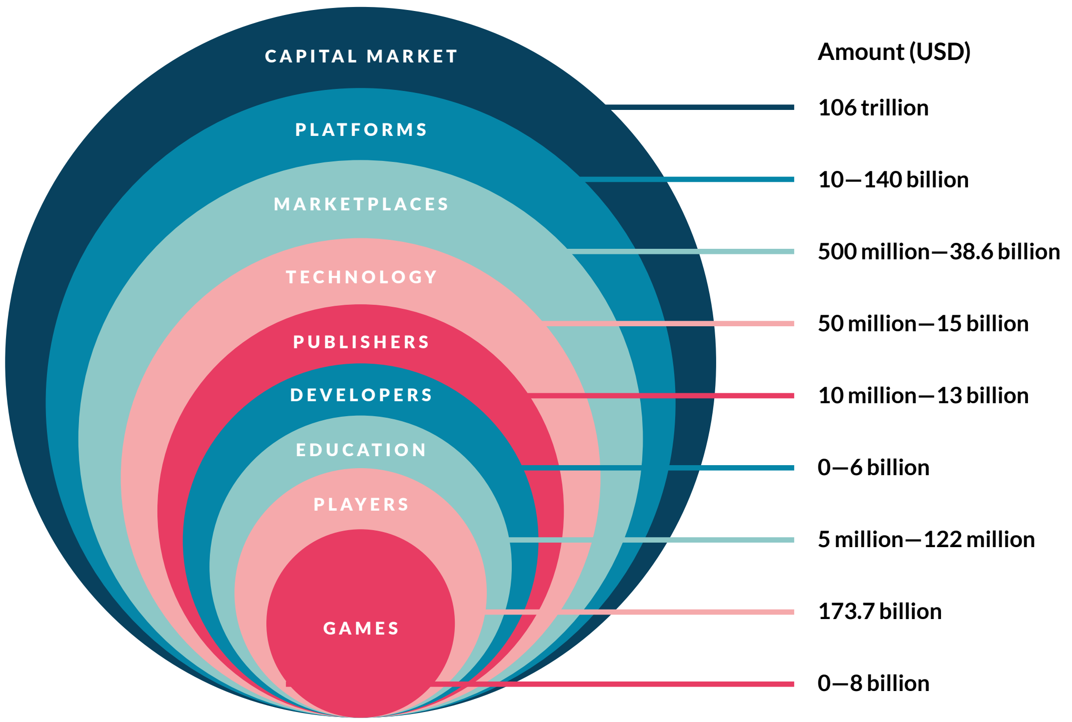
The project supporting this report has also had the ambition to strengthen the opportunity for development projects. In dialogue with the Swedish Agency for Economic and Regional Growth, it has been possible during the project period to identify several areas in which parties to the work have had the opportunity to apply for and receive development funds for three different projects.

The *Interlink* project was run by Science Park Skövde in collaboration with Science City Skellefteå, Karlstad Innovation Park and Game Habitat Southern Sweden and focused on issues of supporting work to improve cooperation for smaller game companies to improve international sales.

The *Vaultbreaker* project was run by Swedish Games Industry organization and focused on developing the availability of skills through, which led to the report *Talent, Education, and the Art of making Games*. The *GameXP* project was run by Science Park Skellefteå and compiled experiences of regional collaboration from international collaborations in the Baltic Sea region with the goal of developing a model that can be used in other regions to build small and medium-sized companies.

The opportunities to carry out these types of project is a prerequisite for continuing to develop the business of the game industry's external enablers in the form of incubators, game hubs and local organizations. Without project funds, this support is at risk. The availability of calls for proposals and projects that can implement specific investments in development is a central part of the opportunity for the innovation infrastructure.

An Illustration of the Value Chain



The Value Chain

Several actors highlight the need to develop the value chain to strengthen the robustness of the Swedish games industry. There is also great potential for synergies with other industries, not least in the development of technology platforms. To enable this, both more national collaboration and more parties highlight the need for lab environments for appropriate research for specific technologies. There is no shortage of examples – among other things, several of the incubator operations have investments in international collaborations. Arctic Game in northern Sweden has, for a long time, placed significant focus on building a global context.

Focus on intangible values around rights and create better conditions for Swedish games companies to find investment would significantly strengthen the industry. In general, national and international cooperation between private and public actors is emphasized as an essential component for being able to develop the Swedish games industry, but at the top of the wishlist is a national initiative to secure a long-term support infrastructure that will help the existing regional hubs build a solid and sustainable value chain and foster new regional hubs. This could be achieved, for example, with a national strategy for the games industry strategy and with specifically targeted calls for pilot projects and development of innovative business processes.

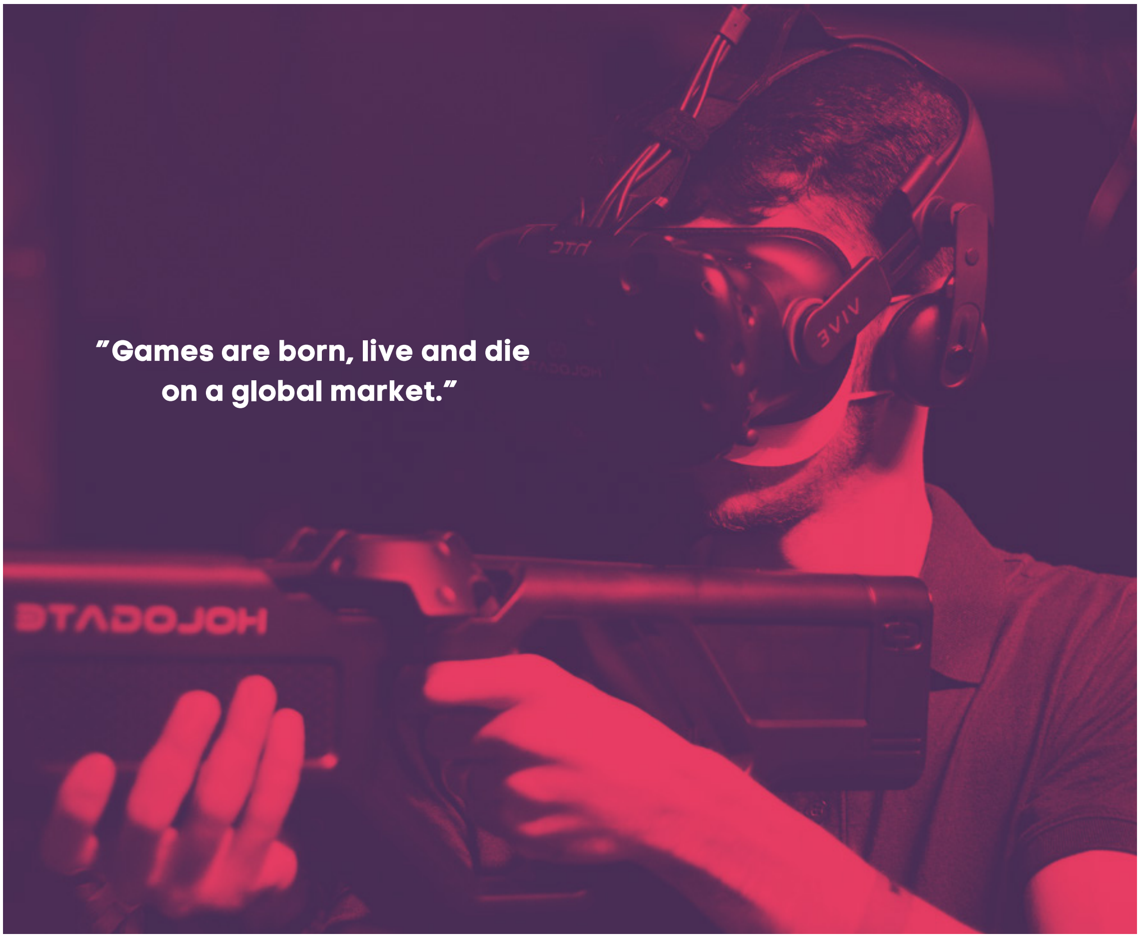
International Competitiveness

As has been noted, the Swedish games industry is characterized by a strong focus on game development. Just like in other sectors, there value chain contains other elements, and there are geographic regions where these are not as strong. Competition from nations with state-supported investments and subsidies for development, in combination with domestic skills shortages in Sweden, can also lead to Sweden losing ground in the long run.

Sweden has a developed market for investments, supported also by the success that Swedish companies have had, leading former founders of successful companies to form new investment groupings. In addition, much due to international actors, Nasdaq in Stockholm has become a base for listing games companies in northern Europe, and several foreign companies are listed on the Swedish stock exchange. Publishers have also grown since digital distribution became the norm. The area has benefited from the substantial investment climate in Sweden.

In the case of platforms and marketplaces, these are mainly international and based outside the EU. Hardware, such as game consoles, mobile devices and computers, are imported goods. In the same way, the trading platforms where the games are sold, such as the App Store, Steam and the console producers own digital stores, have their

Photo: Edvard Hansson CC-BY-SA 4.0



base outside Sweden. Some online games, such as *Star Stable*, sell their virtual products directly to customers, but these are few, and the regulations that have taken place in recent years have both made the rules more difficult for those who run their own sales channels and created more obstacles for new trading platforms to be added.

Swedish companies have not only succeeded in creating artistically successful games with gripping stories but are also at the forefront of technological innovation. Several game engines used internally in global game consoles are created in Sweden, such as EA DICE engine Frostbite, Ubisoft Massive's engine Snowprint and King's engine Defold. Swedish companies have been acquired by companies such as Microsoft, Epic, Reddit and Amazon and the technology from games is incorporated into their products. In these acquisitions, the companies with Swedish staff have remained in the country.

There is currently no reliable economic model that shows how much value or share of the global game market Swedish-created games hold. Millions of people play games created in Sweden every day, but intangible values are not visible in GDP calculations. Better data and measurement methods are needed to compare the industry in an international perspective.

Interaction with the players plays a defining role in game development. Services and tools like Twitch and Discord are likewise important, a trend that will grow with more user-generated content, more co-creating playersand increasingly accessible tools for game development.

Financing and Internationalization

Swedish initiatives for financing are entirely privately run today, unlike in several other European countries. When it comes to financing the innovation infrastructure itself, there are individual projects but on a very small scale, a shortcoming that is highlighted as pivotal to the industry's ability to develop. None of the investments listed in the 2022 *Game Development Index* had a publicly owned actor as an investor. Over the years, a few public actors have had interests in individual game companies, but structured initiatives have yet to take place.

A national platform for cooperation on internationalization is also lacking. There is currently no overall strategy for export cooperation, so industry has had to rely on various regional projects. Some national initiatives have been made historically, such as *The Swedish Affair* on E3 in 2012 and 2013, as well as cooperation through the Nordic Game Institute, which was funded by the Nordic Council of Ministers between 2006 and 2015.

The regional focus on hubs and clusters around the country have played an essential role in the ability of smaller companies to reach international marketplaces. However, there are several circumstances that affect the export capacity of the industry. Many regulations on export subsidies are designed around physical manufacturing and distribution and only partially useful for digital products and digital, globally oriented-distribution networks. Another factor is that the use of Technology Readiness Level (TRL), which is used to measure the maturity of a product, which often is used in the design of subsidies and public-funded support. It is not adapted for the production logistics of the games industry with its early releases and iterative development combined with end-user feedback. This means that certain types of funding such as the EU Horizon program, aren't always applicable for games companies.

Physical Meeting Arenas

Despite games being a digital industry, or perhaps precisely because of this, physical meeting places are essential for the industry. For smaller companies, the various fairs, conferences, and other international meeting places are vital components in finding publishers, partners and new staff. Among the more important are Gamescom in Cologne, GDC in Paris and the Game Developers Conference in San Francisco for the Western market. Tokyo Game Show, G Star in South Korea and Game Connection in Paris are other fairs that are important for contact creation and for bringing Swedish games to the world. Several regions regularly run projects to create more opportunities to both prepare and bring Swedish-based teams out into the world with relatively small funds, a potential that could grow with a coherent, clear national strategy.

The need for this was clearly noticeable during the pandemic when it became more difficult for companies to establish new contacts and publishers of their games.

As a global B2C industry with a relatively small amount of people employed, many collaborations are initiated in the meetings that take place during game conferences and other industry events around the world. The international marketplaces are also of high importance for reaching out to platform owners, gaining a chance for visibility and forming relationships with other global players.

Meeting places within the country are somewhat lacking, and have not yet reached an international appeal to compete with major international fairs. Nordic Game Conference in Malmö, Sweden Game Conference in Skövde, and Arctic Game Week in Skellefteå are the largest. In addition to the meeting places arranged for the industry, some of the larger companies also have their own national and global events for consumers that build a brand and are used for marketing at launches, for example, by Mojang and Paradox.

In interviews and dialogue with industry actors, it also became clear that the meeting places and game hubs that exist need to be strengthened and that more people would also be needed. Stockholm, in particular, is singled out as a place where several of the large companies are represented but where there needs to be a more prominent common meeting place and arena.

Financing, Innovation, Infrastructure and Development

There is an urgent need for more long-term and recurring funding for innovation infrastructure in the industry. The traditional incubators find it challenging to prioritize games, as they do always not qualify as "innovation" that they need to take into account when seeking finance through Vinnova's incubator program. This is a big reason why there is currently a lack of dedicated game incubation in big cities such as Stockholm and Malmö. The reason lies in using the OECD Frascati-model, which is based on research and development as a qualifier, instead of the OECD Oslo-model[13], and in several cases, service-driven and innovation-driven development has not been able to fully develop because many support programs in the public sector are designed according to the Frascati model[14]. However, there is much support in Frascati to consider even the development of processes, methods, organization and content as R&D, but in practice, this is rarely reflected, which disadvantages industries based on services.

Despite the fact that the industry itself is doing well, there is a need for long-term strategic funding for innovation and development, soft financing that can support newly started game studios, and a national platform for collaboration on internationalization. The scarce funding available for industry ventures is regional rather than national, which makes internationalization extra challenging. For residents in the "wrong" region, it is even harder to reach out, and the collaboration that exists between different regions is, in practice, based solely on the informal networks that exist in the industry, initiatives from enthusiasts, as well as from unfunded coordination of the trade association.

The industry's current strong growth is not a reason to avoid public investment in development. Other countries in Europe have a targeted and dedicated effort to build a long-term sustainable innovation infrastructure. A factory in a manufacturing industry needs infrastructure in the form of roads, electricity, and access to staff. In the same way, the games industry needs the support of the public sector in order for its potential to be fully realized and become a long-term part of Sweden's competitiveness.

Financing of Games Development

The industry has only seen a few initiatives over time in terms of development in critical areas: infrastructure itself, projects to improve understanding of the industry's conditions, the ability to accelerate work on sustainability

[13] https://www.oecd-ilibrary.org/science-and-technology/oslo-manual-2018_9789264304604-en

[14] https://read.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en#page1

and inclusion, better support for SMEs, and startup support. The games industry is competing here for the same public funds as the traditional manufacturing industry, and the understanding of the size and business model of the industry varies between regions. The regions where game hubs have existed for a long time clearly have greater opportunities here, but overall the lack of development funds is clear, and again, the view of the industry's relevance and legitimacy seems to be part of the challenge.

At the same time, financing games development itself is one of the most central factors to be able to create a good innovation climate where it will be possible to work long-term for development. In Skövde, the region where the investment in games has existed for the longest time, cooperation between different types of actors has also been able to mature and become a successful example of how a place can become a breeding ground for game development and innovation that takes place on the world market.

Early Prototype Funding

By far, the hardest thing to find funding for is to develop a game prototype, this first playable version of a game that showcases the vision of the game. At the same time, the game prototype is what a newly started company needs to obtain capital in later phases, conclude publisher agreements and secure the conditions for developing the finished game. Today, prototype development is self-financed in many cases, which requires time and resources from individual developers and is a significant threshold for startups. The consequence is that companies are either forced to close their projects prematurely or sell their company too early, which in turn risks shifting ownership and control outside Sweden.

The support that is used by some companies is the R&D deduction for concept development, especially in technical development. However, the guidelines are difficult to apply to games development, which limits the opportunities for companies in the games industry. One way forward would be to develop the R&D deduction to include a broader definition that includes the innovation of content, concepts and processes.

There are some initiatives in this area. For example, a map of potential early sources of funding can be found in an open database from the *Nanny* pilot project[15].

Financing for Investments

There is virtually no national public financing for investments in games companies in Sweden today. Investments from public sources are geared towards incubators and other organizations that help games companies develop and aid them in creating a long-term sustainable company. The Swedish games industry's *Faith* report from 2017[16] addressed the investment climate. An updated version of this would be useful, and could include also the intangible and technological values to gain a better picture of the current situation if there was an intent to discuss potential investments into financing at the national level. The industry is also calling for structured work for talent attraction as part of the long-term work on internationalization.

National Investments in Other Countries

Several other countries in the EU have national initiatives for financing and also direct and indirect funding opportunities. The *Games Funding Guide*[17] goes through the public support systems in Europe and should serve as a guide for Swedish initiatives. Germany, France and Poland, for example, have successfully benefited from the EU's cultural exemptions for targeted industry subsidies. In 2022, new support schemes have been announced in both Australia and Ireland. In the *Games Funding Guide*, twelve European countries are represented, including Denmark, Norway and Finland. The fact that Sweden has so little public funding that it doesn't appear in the report is remarkable, to say the least.

[15] https://docs.google.com/spreadsheets/d/1u805LkdCKhpScNIujr3gl3AA1N0uBk4DuBnqJA1zjIM/edit?usp=sharing
[16] https://dataspelsbranschen.se/faith
[17] https://spielfabrique.eu/european-game-funding-guide/

The case of Finland has already been discussed, but the Finnish model is a good starting point for building a solid infrastructure in Sweden. It is a neighboring country with a comparatively large games industry and similar corporate culture. It has been successful in offering various forms of support for companies in different phases, from small inputs to startups, via development support and, finally, soft loans for game development and to scale up the business. Finland has built up a high level of industry expertise in public administration and also supports games that are not only aimed at games for entertainment but can also be used for learning or in other industries.

Investment Work in Incubators

Games seeking funding through private or public incubators are evaluated in a process that reviews the game's core mechanics, concept, and team structure. Some incubators also use a competition format with external jury members. Once admitted to the incubator, the work begins to strengthen the business economy, team and management, marketing, sales and business modelling to prepare the companies to be able to handle the market when they leave the incubator, as well as get them ready for further investment. During this time, the goal on the product end is to develop an investable product, a so-called vertical slice. This is then often marketed by being demonstrated at various types of consumer fairs.

In the next phase, the focus is almost entirely on launch, product development and the search for a publisher. The work in the incubator has an emphasis on pitching, market verification and recruitment. This often means travels to national and international meeting places, as well as ongoing contact with various platform owners such as Nintendo, Sony and Microsoft, depending on the company's product strategy. If the company has secured a project partner, a publishing partner or an investment and has reached a sufficiently high level of financial security and business maturity, an exit phase then begins.

Notable Investments

No single deal in the Swedish market is larger than Activision Blizzard's acquisition of mobile game developer King for €5.5 billion in 2016, but since then, several deals have stood out over the SEK billion-mark (approx. €100 million). A recent trend is that more Swedish companies have started acquisitions, and in the cases where a foreign actor finances game development in Sweden, in recent years, it has more often for part-ownership rather than full acquisitions. Internationally, Microsoft has recently made a bid for Activision Blizzard, a bid that is now being reviewed by the Federal Trade Commission.

Embracer Group and Stillfront are the most prominent global actors based in Sweden with regards to acquisitions, where Embracer Group has acquired Gearbox Software in a deal worth over €1 billion in the past year, as well as the IP rights to, among other things, the *Lord of the Rings* world for an unknown amount, as well as board game giant Asmodee for €2.7 billion. Among the foreign game groups that have invested in Swedish companies over the past year Chinese Tencent should be noted, which in addition to Sharkmob and 10Chambers, has now fully acquired Stunlock Studios and is the majority owner of, among others, Fatshark.

In a third of all known significant transactions in 2021, both buyers and sellers were Swedish companies, and in even more cases, the buyer was Swedish and the seller from another country. Many of the Swedish investments are located in Europe, but investments in US companies increased compared to previous years.

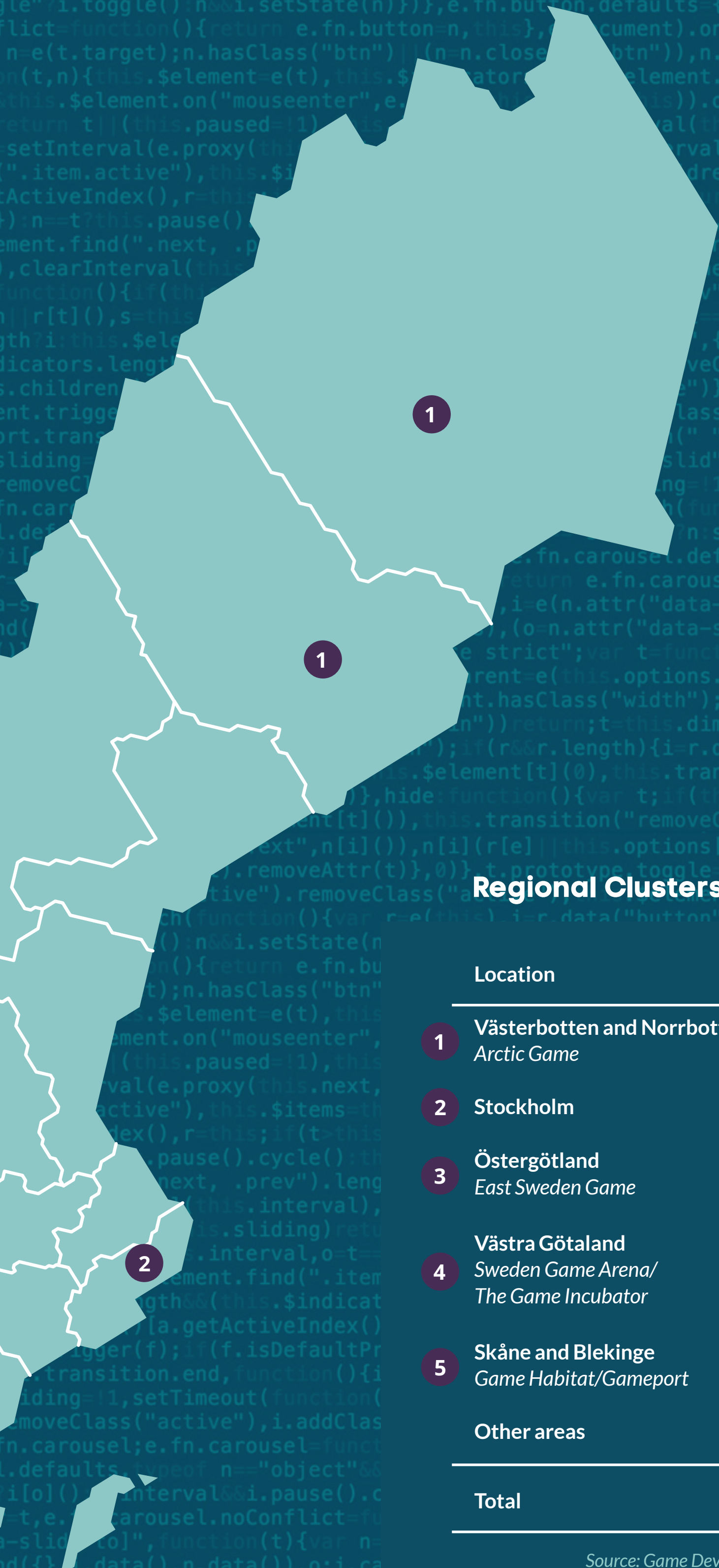
Many investments and acquisitions in the game industry are made through larger groups and large international companies. But there is also business through publishers, individual investors and smaller investment companies or funds such as Behold Ventures, which is Sweden's most recent pure venture capital fund that targets games. In 2021, Behold Ventures made eight investments in Nordic companies in the games industry.

Local and Regional Factors

By far, the most significant part of the industry's development work, especially for small and medium-sized companies, takes place through the regional and local game hubs and clusters that operate in a number of locations around Sweden. Here, they invest both in supporting newly started game companies and in strengthening competence, leadership, growth and innovation. They constitute the key supporters for external industry development and are a crucial component of the Swedish game wonder.

The country's games clusters and game hubs are all made up of different components. Some are more traditional clusters, while others are nonprofit associations that deal with industry issues at a local or regional level. In several locations an incubator is included as part of the business, but not everywhere. Below is a review of the country's major initiatives to strengthen game development in each locality and their key collaboration partners.

The distribution of the larger Swedish game clusters, the number of companies and employees, is based on the report *Game Developer Index 2022*. It is worth noting that only employees of limited liability companies are included in the statistics and the data is based on full-time positions presented in the companies' annual reports. The total number of people who work with game development in each locality is, therefore, significantly higher. Employees at local offices are reported at each place of work as far as possible. The numbers below include some game studios that started in 2022 and may thus differ from the key figures.



Regional Clusters and Game Hubs

	Location	Companies	Employees
1	**Västerbotten and Norrbotten** *Arctic Game*	75	322
2	**Stockholm**	333	4,745
3	**Östergötland** *East Sweden Game*	45	52
4	**Västra Götaland** *Sweden Game Arena/ The Game Incubator*	120	841
5	**Skåne and Blekinge** *Game Habitat/Gameport*	130	1,515
	Other areas	129	469
	Total	832	7,944

Source: Game Developer Index 2022, Swedish Games Industry.

Regional Clusters and Game Hubs

Arctic Game is a fast-growing game cluster based in the north of Sweden. With a common platform for establishment, development, meeting places and investments, the cluster has become a base for successful game creation. A sizeable educational effort in the region has occurred and there are now eighteen post-secondary education with a total of 800 students in the autumn of 2022, an increase of 30% from 2021.

In Västernorrland, south of Arctic Game, a completely new cluster has been built up – Mid Sweden Games – based in Sundsvall and Kramfors. It is based on a project funded by the European Fund for Regional Development together with Region Västernorrland, as well as the municipalities of Sundsvall and Kramfors. This includes, among other things, a program to train people who are interested in entering the industry. In the autumn of 2021, Hola folk high School in Kramfors started a new education in game development.

Since its inauguration in August 2017, East Sweden Game has built up a strong community in Östergötland, and in 2021 the third round of the ESG Accelerator was carried out with the goal that the participants will go from hobby developers to game entrepreneurs. In the autumn of 2020, a separate game education was started together with Valla folk high school. During the year, a collaboration was also initiated with the podcast *Spelskaparna*, and they have jointly released several interviews with people from the industry. In 2021, Linköping Game Week was held for the first time.

Visby has one of Sweden's oldest game educations, which is run by Uppsala University, Campus Gotland. The incubator Science Park Gotland has also run game-related projects over the years, including collaborations with Finland, Estonia and Latvia.

The Great Journey is Karlstad's hub for game development. With the support of Embracer Group, which also has its head office in Karlstad, the hub currently has several teams and studios under development with the possibility of financing nine months of game development with the help of the student financing authority CSN, some in the accelerator, as well as five studios in Fasttrack. The Great Journey supports several initiatives on inclusion and diversity where, for example, women in the game industry are highlighted, as well as mental health and LGBTQ+.

Falun has the renowned game education PlayGround Squad, which for over twenty years has graduated students in graphics, game programming and game design. Here, the games industry works closely with the more traditional Swedish industries such as paper, steel and the hospitality industry on how digitalization, gamification and knowledge from the games industry can be used to develop and become more attractive to the future work market. During the year, a new company was also started with a focus on the traditional sports world.

Stockholm got its first game incubator in 2017 when Sting Game opened with expert coaching, financing support, recruitment and market support. Programs like Sting Test Drive and Sting Incubate further the development for games studios at Sting.

Sweden Game Startup (formerly The Game Incubator) has since 2004 successfully led incubator operations for game companies at Skövde's Sweden Game Arena and, since 2016, is also located in Gothenburg. Over the years, the incubator has given birth to about a hundred companies and is a significant contributing factor to Västra Götaland being a solid breeding ground for games companies. Skövde is the base for Sweden Game Arena, which has made several export investments in game fairs and international conferences. In the city of Skövde, Sweden Game Conference (SGC) is also arranged annually in October with speakers from all over the world. The DONNA network for women/non-binary/trans game developers and students is also run from here, where, among other things, DONNA DAY is arranged in connection with the SGC. In southern Sweden, Gameport has long-run successful incubator operations in Karlshamn, part of Blekinge Business Incubator.

In Malmö, the organization Game Habitat works in collaboration with Region Skåne and the City of Malmö to grow the local game community, including the office hotel Game Habitat DevHub, the game accelerator GASS, (Game Accelerate South Sweden) with support from the European Regional Development Fund, and GEM, a network for women in the game industry.

Success Factors

There is no conclusive information on what makes regional cooperation successful, but RISE will conduct research in the area starting in 2023. Some conclusions can be drawn from existing data: the places that have seen significant growth in recent years are all places where there is well-functioning game education, as well as active participation from the municipality or region that supports the companies. A deeper analysis of conditions, challenges and success factors is needed not only to be able to copy success recipes to more locations but also to be able to develop existing clusters and hubs in the right direction.

Creating thriving ecosystems that include both larger and smaller companies with active talent acquisition is an integral part of creating fertile ground for industry growth. In addition, if it is possible to develop vibrant meeting places for networking and cooperation, it also benefits development in a transparent way.

One example is Skövde, which for several decades has systematically built up a viable and lasting ecosystem through collaboration between the university and the incubator Science Park Skövde, combined with a political vision from the municipality of games as an industrial policy priority area. Here, together with the Västra Götaland region, they are now investing in gearing up and strengthening both regional developments to broaden the work and reinforce interregional collaboration that will build a more long-term sustainable national context.

Given the need to build long-term ecosystems, it is therefore particularly challenging that there is a lack of national efforts to strengthen regional development, and it becomes an essentially regional issue to develop infrastructural support for the industry. A national strategy and organized and systematic support for regional development is a high priority.

During 2021-2022, SISP (Swedish Incubators and Science Parks) conducted a peer review of the incubators in regions with active game hubs and came up with a number of parameters that provide insight into the conditions of the regional clusters. The review included both regular incubators and local industry hubs without their own incubator operations, such as Game Habitat (Malmö), GamePort (Karlshamn), Sting (Stockholm), The Great Journey (Karlstad), Arctic Game (Väster/Norrbotten), Boden Game Camp (Boden), Uminova Innovation (Umeå), Expression Umeå (Umeå), East Sweden Game (Linköping) and The Game Incubator (Skövde).

Collaboration has been a fundamental key in this process and perhaps the most evident factor for success. When regions can learn from each other and implement methods that have proven successful, it can create added value in more regions. Collaboration between incubators has also benefited their own work and strengthened the conviction that national cooperation remains essential.

The analysis also shows that Swedish incubators maintain a high level of support towards innovation, even by international standards, but that continuous development is required to maintain this and increase the level of innovation. It also highlights the need for coordination of quality-assurance work so all incubators to reach a level that benefits development in the right way.

However, there is a lack of support in the public structure at the national level for this development as well as for targeted calls for both innovation and business growth. Incubators emphasize the importance of offering newly started companies expertise and development in sustainability work, the ability to evaluate and validate the potential of different games, and stronger matchmaking work with national and international networks to be able to


Photo: Toby Photography/Tobias Andersson

become attractive partners. A vital component is also that cultural plans can differ in several ways between regional authorities and provide different conditions in different regions. In the long run, the games industry would have benefited if the Swedish Arts Council's general regulations and subsequent guidelines had clearly included games as one of the Swedish cultural forms. The lack of this clarity is also reflected in how other public institutions handle games.

On the national level, incubators call for focused investment in technologies for games, the development of common measurable factors for measuring sustainability and funding of national collaborations between innovation environments and major public-private initiatives.

Company Development for Smaller Companies

Game developers can be supported both by strengthening the opportunities to start a company and getting the support that may be needed and developing the companies' abilities. It can be anything from enhancing the capacity for marketing, networking and business development, as well as talent attraction, product development and support when companies grow and begin to reach out internationally. In all this, mentorship from the incubators is a central part, both for the knowledge that can be conveyed to the small companies and also to be able to guide and shape a common culture in the region. Many actors testify that the Swedish games industry has a unique collaborative culture, where companies help each other and are happy to share contacts and knowledge. This type of collaboration is not common in other industries and should be given the right conditions to continue to develop.

Concrete proposals that have emerged in the work are to strengthen collaboration in various ways, both through development funds and export support, as well as support for the development of environments in small incubators in more rural towns, "game villages" where companies can gather and share common resources for support and learn from each other. This means that games industry has a lot of potential for smaller towns and rural areas.

Collaboration with the industry's more established players will also be an essential part of the growth ability of smaller companies as well as coaching and mentorship from experienced actors at incubators.

Education and Visibility

One component of enabling development and financing from the public structures is about making visible the potential and capacity of the games industry, both in itself and how it can contribute to technology development and skills enhancement in other industries as well. Awareness of the games industry varies among decision-makers at national, regional and local levels. In places where there are already established game hubs, understanding is greater, but perhaps it is one of the contributing reasons that smaller and medium-sized cities have succeeded better in building clusters, where decision-making paths and individual decision-makers can work closer and more directly with the actors.

There is still some ignorance of the potential and ability of the games industry's potential to contribute to Swedish competitiveness and innovation. Providing information and education to decision-makers is a component that can generate better conditions, primarily locally and regionally, but also nationally through the potential for more calls and funding.

Games are still surrounded by prejudice and misconceptions in some contexts. Some find it difficult to distinguish between gambling and entertainment games. Others see games as entertainment primarily for children and young people, despite the data clearly showing that games are a vital part of a large number of Swedes in a vast majority of age groups.

It is crucial to have the correct facts and an understanding of the industry's ability and potential. In 2023, RISE will launch the podcast *Spelfokus*, describing the games industry from different perspectives, as well as the virtual test and demo environment GameNode where RISE gathers its resources to focus on developing the infrastructure for the games industry and its potential for more value in other industries and in other areas such as skills supply.

The national network formed during the work on the project *PowerUp Games Industry* will be continued forward as a conversation arena and reference group for national work with collaboration and to be able to support the local and regional initiatives that are carried out.

Research

Games research is a multifaceted and multidisciplinary field. It is currently conducted at several Swedish higher education institutions in many different disciplines.

There is games research both within the framework of computer science, information technology, media, design, games development, business administration and many other specializations. Academic research plays a significant role both in being able to carry out the development of new cutting-edge technology and for its ability to explore the impact of games on players and society, as well as in training doctoral students. The breadth of the research is its strength but also its great challenge. Since there are so many disciplines involved, and since different higher education institutions also have different organizational structures, it is challenging to get an overall picture of the research in the field on a national level. Strengthening interdisciplinary cooperation between the different universities will be necessary.

More interdisciplinary collaboration can, with better access to research funds, also generate tremendous benefits for the development of both the industry and the research at Swedish universities.

Challenges for Research in the Games Industry

Overall, there are no good opportunities for dedicated games research, neither in basic research nor in games research for specific areas. Countries such as Denmark, Norway and Finland have long had a tradition of investing in games research. In the long run, this is a significant challenge for both research and the industry in Sweden.

Several higher education institutions testify that it is common for games research to need to be associated with other phenomena to be able to participate in calls and see a great need for dedicated research funding for games research to strengthen the Swedish position. For specific topics, there is an expressed need to also broaden the field towards areas such as games journalism, entrepreneurial research and research on the influence and potential of games for scientific methods. There is a particular need for research funding to support SMEs that do not have access to the resources of large game companies. Given that 96.5% of companies in the industry are classified as small businesses with fewer than fifty employees, this is a particularly pressing issue. Several actors have highlighted the need for a nationally open and accessible Swedish games research lab.

It would also strengthen research to gain higher visibility for research being carried out and bring it together in a way that makes it easier both to take part in, but also for universities to collaborate on everything from guest lecturers to the exchange of students within the different higher education institutions' specializations.

Relationship With the Industry

Another area where games research is focused, is to strengthen collaboration with the industry. The skills shortage reinforces the already high production pressure in the companies, which makes it challenging for many companies to participate in research collaboration and set aside time for this. Research projects have been carried out with industrial doctoral students, but feedback from the industry shows that as little as a 30-40% position set aside for academic work is something few companies can spare, as the people with skill sets that are suitable for a PhD, already are vital competencies in their current professional positions.

Another reason for this need is the availability of researchers in academia. Many research areas are very specialized, and the larger game companies already have specialists in place. Doctoral students who show great potential in such fields often receive offers of jobs in industry or other parts of the ecosystem. Even for universities themselves, there is a skills shortage in doctoral students, needed both to conduct more research, and to be able to educate students at the undergraduate programs that will then go into the industry to work.

Another factor that affects research is that the industry develops at a high pace with regards to technology and methods that are progressing very quickly. Trend spotting and continuous analysis of developments are necessary factors for all educating institutions as well as for researchers. The speed at which the industry moves forward is a challenge for academic research, which further suggests that increased collaboration between the industry and academia would be beneficial for both parties.

Research is vital for the industry's development both in technical areas and to meet issues that are important to the industry in areas outside the products themselves, such as organizational development, leadership, sustainability and inclusion.

The importance of Research

The lack of basic games research and research into theory and frameworks, means that game research also does not have the same access to theoretical, conceptual structures that are otherwise common in more established research disciplines that can contribute to contextualization and establishment of further in-depth research. There is therefore also a need for theory formation and method development for research in games.

Research on accessibility, functional differences and the importance of games for inclusion and the possibility of experiences also has a relatively narrow research basis.

Research also has the potential to be used to validate the development of technology and other areas in game and to be able to validate competencies and has a vital role to play in the skills development chain for the industry.

Research School

An essential component in strengthening research would be the establishment of a research school with government funds to carry out a targeted initiative that would provide funds to enhance Swedish games research. Work on this has been discussed for a long time in academia. With a growing industry and a closer collaboration between universities, a research school has excellent opportunities to strengthen the supply of skills and be able to contribute significantly to both research and the industry's development. The strong brand that the Swedish games industry represents, can also attract foreign industrial doctoral students to apply for such a research school.

Council of Swedish Games Researchers

As part of finding new processes for collaboration, a dialogue between games researchers at different universities led to the formation of the Council of Swedish Games Researchers, the purpose of which is to strengthen Swedish games research. Almost 50 researchers from different organizations are members:

- **Skövde University**
- **RISE**
- **Blekinge Institute of Technology**
- **Uppsala University**
- **Stockholm University**
- **KTH Royal Institute of Technology**
- **Södertörn University**
- **Luleå University of Technology**
- **Malmö University**
- **University of Gothenburg**
- **Science Park Skövde**
- **Umeå University**
- **Privatpsykolog.se**
- **Royal College of Music**

Analysis

The remarkable growth of the Swedish games industry has created an industry that accounts for 4.1% of Sweden's service exports, produced many jobs, and positioned Sweden as an innovative and leading game nation. Similar to successes that Sweden has had in the field of music and film, Swedish creativity also stands out in the games industry. The industry also interesting because of its position at the intersection of creativity and innovative technology. It can, properly used, bring great opportunities for technology and skills transfer to other parts of the business and Swedish industry.

The work with PowerUP Games Industry shows a tremendous and pent-up need for increased national collaboration, both between business-promoting actors with specific roles in the ecosystem around the games industry and with regards to the infrastructure as a whole.

While the industry itself has good growth, there are many challenges in several areas that are essential to address to maintain long-term sustainable innovation. Funding from the public support system is not anywhere near what the growth of the industry warrants. Even worse, other countries in Europe are investing significantly more, and Sweden risks losing its strong position.

The work going forward must strengthen collaboration between the industry and the ecosystem's actors: incubators, educational institutions, municipalities, regions and other parties. There also needs to be investments in the development of industry infrastructure.

In essence, Sweden has a booming and rapidly growing industry in the games industry. We are among the strongest nations in the world, have high growth and good profitability. At the same time, we have a flawed and questionable public support structure with gaps in support for development work, business development, sustainability and inclusion.

In the games industry, Swedish innovation, creativity and technical know-how converge in a very favorable mix containing large untapped added values both for the industry and for Sweden as a whole. The question is not why Sweden should invest more in the emergence of the video game industry; the question is instead why it hasn't been done already.

Major Challenges for the Industry

There are several different challenges for the long-term development of the industry. This analysis has focused on five main areas that are particularly prioritized:

- **Skills shortages**
- **Research**
- **Resources for industry development**
- **Systemic challenges**
- **Industry acceptance**

Skills Shortages

The Swedish games industry estimates that at the current growth rate, it will employ at least 41.000 people in Sweden by 2031, more than quadruple the current amount. If today's level of training places persists, and all graduates of game education take up employment in the industry, there is still a shortage of 25.000 people. Perhaps the industry's most urgent situation, then, is the lack skilled workers. These mainly come from three sources: Higher vocational education, universities, and labor immigration from all over the world. For higher vocational education, the problem is that the number of allocated places is not sufficient to meet neither an increased number of applicants nor the industry's need for personnel. Continued substantial expansion and further upskilling and reskilling efforts could be a part of the solution to meet the industry's skills needs. For both vocational and university education, there is also a challenge to find and retain staff who can conduct teaching, and another to make sure there are enough practical elements related to game creation to make students employable. For universities, there is also a challenge linked to the availability of games research. This means that few students go on to postgraduate education, which leads to a relatively small number of new university-trained teachers with degrees. The lack of skills in the industry also means that skilled, well-trained teachers can easily find employment in the game itself, which impairs training capacity.

In addition, there is an external challenge in that the rapid changes in the industry place high demands on education and training providers to constantly develop and update their skills, which requires closer collaboration with the industry, whose skills shortages, in turn, make it difficult to set aside the time that continuing education and further education requirements without negatively affecting production capacity.

Labor migration has gradually been made more complicated by stricter migration regulation and is a challenge for many industries, as noted by the Entrepreneurship Forum. For the games industry, this is a crucial challenge as too few students are coming into the work market.

The issue of competence is therefore in a vicious spiral that needs to be broken. Getting more game developers doesn't just benefit the games industry. It also creates highly specialized skills that are interesting and important for other industries. Employees who one day leave the games industry possess a solid and vital competence profile that is interesting for several other Swedish industries.

RISE believes that the skills shortage is the most acute and pressing issue for the games industry. It requires a range of measures that both significantly increase the amount of HVE education as well as a much stronger research position. Furthermore, work on long-term growth is required through active talent attraction measures that build new generations of game developers, game designers and other staff. A not unimportant factor is also the need for more teachers and trainers in the field, which will be a bottleneck if the number of enrollment slots are expanded. Similarly, support for companies to strengthen internships in the industry is needed so that students in training can gain practical experience.

Finally, the potential of shorter HVE courses and the new reskilling legislation is still relatively unexplored and may represent a potential new way to increase access to employable skills.

Research

Swedish games research is interdisciplinary but also underfunded. There is a lack of game-specific research funds. Funding for game research instead usually comes through calls in other areas, where creative researchers receive funding as a part of other types of research. The lack of dedicated games research funding also means that, for example, theoretical research on the field itself is underfunded and that conceptual structures and methods cannot be developed in a way that would create a more robust framework for theorizing.

According to some universities, there are also insufficient resources to develop sufficiently attractive and competitive doctoral courses, which means that the number of new researchers in the field is small. More graduate students would generate more research and, ultimately, more teachers, which would expand the capacity of universities in terms of contributing to education. Academic teaching should be based on research, and when research on the subject is not available, it is difficult to create relevant education for the industry. RISE sees that the formation of a research school would facilitate the opportunity to strengthen game research in Sweden in several ways. This would create the potential for more doctoral students and, at the same time, enhance collaboration between higher education institutions allowing for development better education at the research level.

Specific calls for research funding for games research need to be created to a much greater extent. The Swedish games industry has an advantageous and strong position with a good reputation internationally. With world-class research, the country could attract paid foreign doctoral students, something that would contribute to the industry's long-term development and strengthen Sweden's competitiveness internationally.

Resources for Industry Development

The absolute majority of development projects aimed at the games industry today take place via regional hubs and incubators. This usually takes place in areas with strong collaboration between games companies, business development actors and educational actors. The work done regionally is outstanding, and investments such as those based in Skövde, Malmö and under the Arctic Game umbrella show the potential of what can be achieved, something that is also reflected in regional growth figures. The Swedish games industry has become what it is through the help of these efforts.

However, the work is done almost exclusively locally and regionally and only to a minimal extent nationally. This means there is often a lack of resources for larger and long-term efforts. Instead, smaller and shorter projects dominate the picture. Regional-only investments also risk diminishing synergy effects on the national arena. Several of the more successful projects have succeeded through regional interaction or through national programs.

The risk with this type of short-time, project-based funding is that the operative work will be overshadowed by a need to constantly search for new funds to aid the large majority of very small companies that are the base of the industry. Benefits of individual projects cannot be fully exploited. Of course, some collaborations through industry organizations or very established regional activities will continue but there is a lack of resources to develop essential areas such as equality, inclusion, sustainability issues, growth and entrepreneurship. All industries need the proper infrastructural support through the public ecosystem, including the games industry. Interview respondents often highlighted the need for support to develop new and existing meeting places that form a link to the international arena. With an industry that is mainly global in its distribution, such events are necessary. Sweden, as a powerful games nation, should have more international events that attract companies from all over the world. The fact that Stockholm, as the capital and essential node for games companies, doesn't have such an arena has been highlighted by several actors who find it especially remarkable.

RISE believes that a clear national strategy is needed for the long-term development of the games industry. National resources should be made available to strengthen collaboration between the existing hubs, develop meeting places, and create a better infrastructure for the ecosystem around the game industry. This is one of least complex efforts, as there are already strong players at the regional level who can manage such funds in the best way in cooperation with the industry.

Systemic Challenges

In addition to the specific areas already described, there are a number of issues at the systemic and often political level that constitute obstacle for companies in the industry.

One of the most pressing is the difficulties surrounding labor force immigration. The various tightening measures implemented in the legislation since 2015 have made it more difficult to recruit talent internationally. Changes in the classification of different types of residence permits, long lead times for processing and difficult-to-navigate bureaucracy mean that both employees and employers face significant challenges to be able to recruit, especially from countries outside the EU. The Swedish Entrepreneurship Forum's report *Stärkt svensk talangattraktion*[18] testifies to the same challenges for companies in many other industries as well. Since the games industry

[18] https://entreprenorskapsforum.se/wp-content/uploads/2022/12/Rapport_Ageberg_Wiberg_Web.pdf

"The question is not why Sweden should invest more in the games industry. The question is why it hasn't happened already."

has a large group of international staff, it is a particularly hard hit.

There are also challenges linked to the lack of investment funds, as Sweden lacks national investments in games. *The European Games Funding Guide 2021*[19] goes through the various funding initiatives available in Europe. The list of countries includes Denmark, Norway and Finland, as well as Germany, the Netherlands, Belgium and France – but not Sweden. In some countries, there are tax breaks; in others, soft loans are based on the EU's cultural exemptions for industry subsidies. Many have different types of funds that support game development specifically. The fact that Sweden, as a leading games nation, completely lacks this type of support must be considered quite remarkable.

On the exports side, there are several different challenges linked to resources and support for internationalization and international expansion. The regulations are not designed for digitally driven service-based companies with global distribution. Game Studios rarely have the need to establish local production or sales offices to be able to sell, as platforms for distribution are digital and global. This means that games companies often fall outside the export subsidies that are otherwise created precisely to facilitate the expansion of Swedish industries abroad.

RISE believes that a review of existing export regulations with the intention of facilitating Swedish exports for digital service companies should be carried out. A national strategy for the development of the games industry should be established, modelled after Finland's work. RISE also shares the image that The Swedish Entrepreneurship Forum (Entreprenörskapsforum) presents regarding challenges in international talent attraction and advocates a clear review and simplification of labour immigration as it hits a wide range of companies, especially the game industry.

Industry Acceptance

There is no getting away from the fact that the root cause of many of the challenges discussed in this report is a lack of understanding of what the games industry is. It is both a thriving Swedish industry and an important cultural phenomenon, but in practice, games are often seen as neither, rather than both. Why this is the case is not known but may be related to the fact that entertainment is not a tangible product, and the benefit of it is not immediately apparent. It's easier to visualize the national importance of a car or pile of wooden logs ready to become wood products than to understand the vital importance of games. But the benefits are there, whether you measure growth, tax revenues, jobs, or potential knowledge and innovation transfer. All this, combined with the fact that the games industry is strongly associated with youth, means that it is easily dismissed or less prioritized in ventures and investments. The consequence is that the games industry has to fight for its legitimacy in a way that is not on par with its size and influence as a Swedish export industry.

But games are also culture. Here, too, games do not have a strong position compared to other forms of culture, at least not compared to the rest of Europe. The European Parliament recently adopted a resolution by a substantial majority (560-34) on the importance of strengthening games[20] and has also advised the Commission to act in this spirit.

Games are seen as a prominent and vital part of European culture, and at the European level, more is being invested in strengthening the creative industries.

In Sweden, games do not have the same position. Sweden hasn't fully embraced games in governing documents, which is spilling over into the public ecosystem for funding. In *SOU 2022:44*, it is established that the cultural and creative industries must be seen as part Swedish industry to a greater extent than they do today. The rapporteur also raises a warning to note that long-term success is not self-evident. Sweden, with its strong civil sector has all the prerequisites to let games take a more important place in the cultural space. Nevertheless, progress is slow. RISE believes that the answer is knowledge and education. Promotion efforts aimed at decision-makers to understand games both as a creative industry and as a form

[19] https://spielfabrique.eu/european-game-funding-guide/

[20] https://www.europarl.europa.eu/doceo/document/A-9-2022-0244_SV.html

of culture would aid this cause. With over 4% of service exports, strong growth and a good reputation, it should be a self-evident that the games industry has a place in Swedish business and as a cultural phenomenon.

Seven Propolsals for Action

For a year, this project has been conducting dialogues with more than ninety participants in the ecosystem for the games industry, interviewing key actors, studying the reports and data that already exists and held workshops and discussions. A number of measures would need to be taken to strengthen the long-term sustainability of the games industry and strengthen Swedish competitiveness in the field. Seven suggested key actions to support the game industry are presented here:

1. A National Strategy for the Games Industry

Sweden needs a strategy and a plan for a national innovation infrastructure that unlocks the industry's full potential for growth and identifies the added values for other industries. RISE recommends that a study on the area be funded by Vinnova to form the basis for such a strategy. It should be developed in conjunction with industry, public, and business promotion actors at the local, regional and national levels. National coordination for these actions would need to be allocated responsibilities and resources.

2. Reinforced Support for Improvement of Innovation and Systemic Measures

National funds need to be made available both through calls for specific issues but also for reinforced, long-term development of ecosystem infrastructure. Specific calls and funds should be made available through appropriate actors to strengthen Swedish game development, with a focus on small companies.

Five areas can be mentioned as particularly prioritized: the opportunity to develop a long-term sustainability approach for Swedish game development, the need for support for the smallest companies at startup and when scaling, the issue of gender equality and inclusion in the game industry, strengthened collaboration for the development of interregional partnerships and meeting places, and strengthen Sweden's industry positioning internationally. Funds would be most useful if coordinated through existing regional game clusters and with new clusters in the process of starting up.

3. Active Measures to Reduce Skills Shortages

The most pressing problem for the industry needs to be addressed urgently. The number of enrollment slots on the vocational programs needs to be significantly expanded and given the conditions necessary for this to be possible. An information and talent attraction initiative to attract more people to the profession should be carried out. Through temporary additional funding, universities could be commissioned to develop and strengthen games education with the goal of increasing the number of doctoral students and collaboration between universities. The opportunities with upskilling and shorter HVE programs should be researched through a pilot and linked to other national investments in lifelong learning and skills supply efforts that take place through government cooperation.

4. Strengthening Resources for Game Research

The underfunded research in games means that Sweden is losing ground both in the field itself, but also with regards to the access to educators that can reduce the skills shortage. Here, funds could lead to increased research, both through research projects and through the establishment of a research school. This also benefits the previous point about skills shortages above.

5. Regulatory Changes

The current regulations highlighted in the report should undergo a review in collaboration with the industry organization the Swedish Games Industry in order to identify issues that today constitute obstacles to growth. Obstacles that are common also in other industries should be given special priority for action and processed and implemented by the authorities concerned, or where so needed, at the political level. The issue should be coordinated with the needs of other industries in the areas where needed.

6. Establishment of a National Model for Investments

Finland, another country with great success, not least in the mobile games segment, has a prosperous and successful model for investments. A similar model in Sweden would benefit the opportunities for Swedish game companies. A special fund focusing on small businesses would also allow for the smaller companies that are in the early stages. A program similar to the previous Nordic Game Program should be restarted, as it has shown powerful results with small investments.

7. Strengthening the Position of the Industry

Games are both commerce and culture but do not have the level of legitimacy and prioritization that the size of the industry warrants. Investment is needed to develop an understanding and competence about the industry's potential for itself and for other Swedish industries. Games as a cultural expression should be strengthened and made visible and accepted, like it is in most other European countries. Education about the games industry and professions in the games industry should be developed, both for decision-makers and for talent attraction purposes.