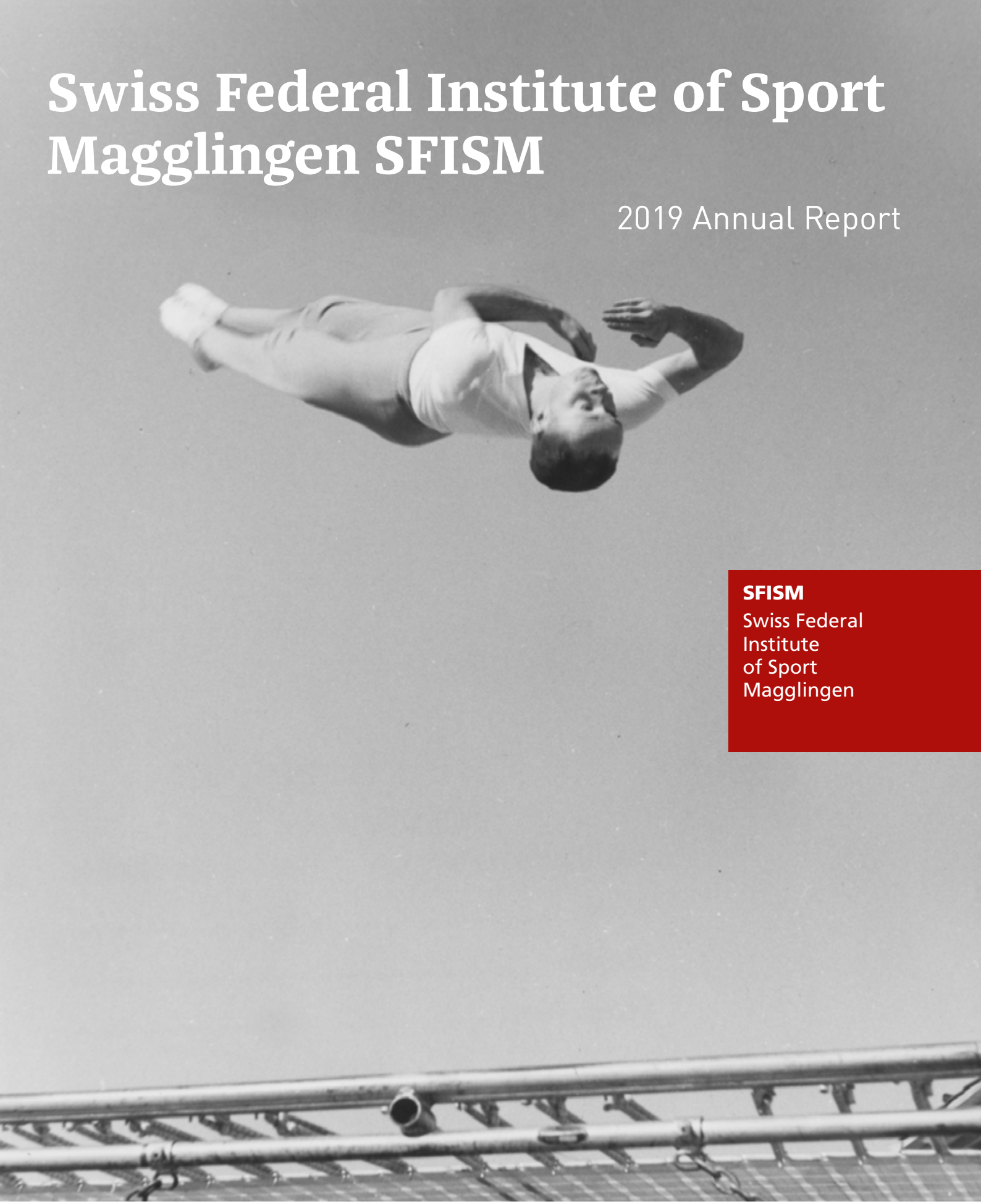
# Swiss Federal Institute of Sport Magglingen SFISM

2019 Annual Report



**SFISM**
Swiss Federal
Institute
of Sport
Magglingen

FOSPO
2532 Magglingen

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

**Federal Office of Sport FOSPO**

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# Preface

In the year under review, the institution known as "Magglingen" celebrated its 75th anniversary. The path followed by the Swiss Federal Sports School Magglingen led from instruction for preliminary army training course leaders to sports teachers, then Y+S instructors and experts, all the way to coach education. Out of one single degree course at university of applied sciences level (1998), the Swiss Federal Institute of Sport Magglingen (SFISM) emerged in 2005, offering all the activities associated with a traditional university (teaching/research/services). Sports training was and still is the central component of these activities. The Institute delivers the scientific fundamentals and undertakes, with the aid of application-led research, to help sport in its many facets to evolve in a way that reflects actual practice as closely as possible. Being firmly grounded in the Swiss sports system allows us to bring our findings directly to the grassroots.

During the anniversary year, we focused on the past as well as the future. Driven by its legacy and the challenges ahead, the entire Federal Office of Sport (FOSPO) drew up overarching as well as discipline-specific strategies. The analyses and subsequent discussions gave rise to the thematic focuses that will influence our work going forward. These include the accreditation, digitalisation and concretisation of the training model (see p. 7). In addition to these focuses, we also continue to develop research, teaching and service capabilities that are fit for the future. Implementing the planned measures will contribute to positioning SFISM as a competent and effective institution within FOSPO, both at national and international level.

We invite you to immerse yourself in the 2019 Annual Report.

Dr. Urs Mäder
Rector

Prof. Walter Mengisen
Co-rector

# 75 years of promoting sport in Magglingen

2019 marked a special anniversary: Established in 1944 as the Swiss Federal Sports School Magglingen (ESSM), its original remit was to make Switzerland's men fitter for military service. Today the Swiss Federal Institute of Sport Magglingen (SFISM) is part of the Federal Office of Sport FOSPO, which is responsible for the federal government's sports promotion activities.

**98** full-time positions

**121** employees

**Social Media SFISM**

Celebrations to mark the institution's 75th anniversary kicked off on 11 January 2019 with an in-house event for all FOSPO staff. They continued with an open day on 14 September that attracted over 3,000 visitors to Magglingen, giving a broad interested public a general insight into current federal sport promotion in practice. Anniversary activities culminated on 6 November in a unique rendezvous between two former and three current Federal Councillors – under the aegis of the Head of the DDPS, Federal Councillor Viola Amherd. A forum for policy networking, this third event was a tribute to Magglingen's history and development over these 75 years. The dignified festivities all did justice to the importance of Magglingen in Switzerland's sporting world.

**Swiss art guide**

The anniversary year also provided a good reason to produce a special publication: Co-rector Walter Mengisen and Martin Schwendimann, former Head of the Sports Facilities unit, pooled their knowledge of (architectural) history to co-author a book on the Swiss Federal Office of Sport in Magglingen in the Swiss Art Guides series. It is available at the shop of the Society for the History of Swiss Art (SHSA), which sees its role as documenting, researching and imparting Switzerland's architectural cultural heritage and so help to preserve it for posterity.

**Strategy process**
SFISM was not only celebrating, it was hard at work as well. Through its teaching, R&D and service activities, SFISM makes a substantial contribution to achieving the focus and objectives of the federal government's sports promotion policy. The strategy process initiated by FOSPO led to a vigorous examination of SFISM's own strategy. Various working groups and workshops played their part in consolidating this strategy.

Two of SFISM's three retreats were devoted to the development of SFISM strategy. The third explored in context SFISM's concrete efforts in the area of sustainability.

**Institutional accreditation set in motion**
Institutional accreditation is one of the nine strategic focuses that FOSPO defined for the period from 2020 to 2023. Accreditation will confirm SFISM's place in the international higher education space and help the school to raise its profile in the areas of teaching, R&D and services. Accreditation of SFISM is also significant in terms of national sports promotion and the Magglingen umbrella solution. Since all of FOSPO is therefore affected, various units will be involved.

In September 2019, the Swiss Accreditation Council admitted SFISM to the process. Overseen by the Swiss Agency of Accreditation and Quality Assurance, SFISM will begin the approximately two-year process in 2021. Until then, SFISM will use the time to push ahead with groundwork, test new structures and processes and make quality assurance at SFISM more visible in the areas of teaching, R&D and services.

**Collaboration on the Magglingen training model**
The Magglingen training model is also a firm component of FOSPO strategy. It was developed by a core group which includes SFISM experts. Launched internally, the didactic model is regarded as the fulcrum of the FOSPO training programme.

**R&D projects** 44

**Cooperations with sports federations**

- Swiss Olympic
- Swiss Ice Hockey Federation
- Swiss Football Association
- Swiss Swimming
- Swiss Cycling
- Swiss Ski
- Swiss Triathlon
- Swiss Gymnastics Association
- Swiss Athletics
- Swiss Shooting
- Swiss Handball Association
- Swiss Volley
- Swiss Tennis
- International Ice Hockey Federation

**Partner universities**

International mobility
- 20 in Europe
- 2 outside Europe
- 6 linked to th BFH

**Magglingen** 875 m above sea level

**High School main building** 880 m above sea level

**Lärchenplatz** 933 m above sea level

**End der Welt Hall** 961 m above sea level

**Close ties with the Bern University of Applied Sciences BFH**

The BFH Centre for Technologies in Sports and Medicine and the newly developed minor in sports and event management offered under the Bachelor's course in business economics embody the continuing close ties between the BFH and SFISM. University sport courses run by the Bern University of Applied Sciences are also coordinated out of Magglingen. Once again, the annual BFH Games held at SFISM marked a highlight on the calendar. Magglingen's sports students made the event a day to remember for the 600 BFH students. The motto was "Old School" as a nod to Magglingen's 75th anniversary.

**Sports media library**

Magglingen's sports media library acquires, provides and circulates media on sports scientific topics and sports disciplines. In the year under review, it conducted a survey among user groups on ways to optimise its services. Media library staff assisted with the Anniversary Box, which was created especially to provide information on the eventful and moving 75-year history of sports promotion. It was installed in the entrance area of the school's main building.

The media library team also collaborated on the GENOVA project for the roll-out of the Federal Administration's electronic records and process management system at FOSPO in spring 2020 and on setting up the BFH open access repository. In addition, the team assisted the BFH information literacy working group with establishing an e-learning course for literature searches and with training courses on literature management programs. Preparatory work has begun on migration to the Swiss Library Service Platform (SLSP), which is currently being set up. On open day, the sports media library exhibited some special treasures from its collection.

Scouring the archives for the purpose of processing its own history brought some interesting pictorial material to light. The one or other find illustrates the pages of the present annual report.


Vergessen
Isolation:

# Sports studies organisation

In addition to their regular tasks of sports studies management and maintaining the quality of service provided to students and lecturers, the Sports studies organisation team faced several challenges in the year under review: replacement recruitment, maternity leave, further development work on the "Daylight" admin tool in the areas of aptitude assessment, the Masters in elite sport, and the Magglingen university weeks.

**Bachelor of Science**
119 students

| | |
|---|---|
| Women | 28 |
| Men | 91 |
| German-speaking | 86 |
| French-speaking | 28 |
| Italian-speaking | 5 |

## Bachelor of Science in Sports

The aptitude assessment was successfully introduced in June. Of the 108 candidates who registered to take the assessment, including 24 women and 84 men, 98 completed it. In September, 40 qualifying students commenced their studies (including 2 female elite athletes and 2 male elite athletes with a Swiss Olympic Card).

On the opening day to mark the 75th anniversary, sports students demonstrated their coordination skills to visitors with a display of balancing and juggling exercises. Also on the bill, student show troop "Art Performance" vigorously rehearsed and worked on their new choreography. Sports studies staff provided prospective students with information about the courses and admission requirements.

26 Bachelor's students were presented with their degree certificates at an imposing ceremony held in November. Guest speaker ETH Zurich rector Prof. Sarah Springman won over the audience with her personality and impressive track record. "Art Performance" crowned the occasion with another brilliant show.

## Master of Science in Sports with Specialisation in Elite Sport

Elite sport today are at a highly challenging level: The development of disciplines is evidence-based, elite sport training is grounded in the concrete implementation of scientific findings, and staging sports events today calls for management skills. The selection of athletes for international title competitions is a demanding project that requires minute planning. The skills profile for people already in, or aspiring to be in, elite sport is much more expansive and diverse today.

The Master's programme provides an academic track to acquiring the necessary skills in training science and sports management. While job market penetration is still in the early stages, there are tangible signs of a growing resonance in the media – as borne out by two concrete examples:

- The release announcing the appointment of the Director of Swiss Orienteering stated: "received an MSc in Elite Sport from Magglingen".
- The personal profile of the volunteer-in-chief for the 2020 Ice Hockey World Championship contains a quote referring explicitly to his Master's studies: "It's a cool course".

There is a growing awareness that graduates of the SFISM Master's programme represent a pool of competent and committed people able to rise to the challenging tasks of elite sport. This encouraging development is a "through ball" for the next course cycle in autumn 2020 – added value in the form of acceptance and professional prospects.

**Master of Science in Elite Sport**
63 students

| | |
|---|---|
| Women | 23 |
| Men | 40 |
| German-speaking | 58 |
| French-speaking | 4 |
| Italian-speaking | 1 |

## Master of Science in Sports Sciences

The number of students in the Master's course conducted jointly with the University of Fribourg rose slightly compared with the past few years. Accounting for 59 Master's students, SFISM graduates are strongly represented. This study programme is very attractive for them: It not only allows them to teach at secondary level II (baccalaureate schools and vocational schools), it also provides access to a PhD. The Master's programme is at the crossroads between the systematic consolidation of sports scientific knowledge following on from a Bachelor's degree and the methodical and didactic expectations of the majority of students, who intend to work as sports teachers. The Master's degree enables students to complete their sports teacher studies at various teacher training institutions to obtain the qualification required to teach sport in baccalaureate schools and vocational schools.

**Master of Science in Sports Sciences**
136 students

| | |
|---|---|
| Women | 42 |
| Men | 94 |
| German-speaking | 82 |
| French-speaking | 53 |
| Italian-speaking | 1 |

**457 external students**
**111 SFISM students**
568 students

| | |
|---|---|
| Women | 205 |
| Men | 363 |
| German-speaking | 407 |
| French-speaking | 144 |
| Italian-speaking | 17 |

## Magglingen university weeks (MHW)

**Students from other universities attending SFISM modules**
Six universities, two teacher training institutions and SFISM benefited from the programme on offer during the 2019 Magglingen university weeks (MHW). 568 students in all were given an opportunity to get to know the Federal Office of Sport (FOSPO) and Magglingen.

Students could follow one of eight course weeks "MHW School Sports", in which they were given theoretical and practical contents around the voluntary school sports and they could receive the recognition as Y+S leaders School Sports. Or they could take part in a "MHW Sports" week, in which they could choose from a wide range of water sports such as sailing yacht or dinghy, windsurfing or canoe in white water.

## Students and lecturers on (inter)national exchanges

In autumn 2019, eight SFISM students spent their immersion semester outside Switzerland, with four completing an internship abroad.

In January, SFISM welcomed 14 students from the Beijing Sport University to a winter school. The first week in Andermatt featured snowshoeing and skiing (including cross-country). Students spent the second week in Magglingen learning the disciplines ice-skating, ice hockey and curling. They also engaged in an intercultural exchange with SFISM students and visited the Olympic Museum in Lausanne as well as the cities of Lucerne and Bern.

In return, 14 SFISM students attended a summer school in Beijing. They received instruction in tai chi, qigong, table tennis, the Chinese language and much much more, learning a lot about the country and Chinese culture.

SFISM organised a three-week field school for 12 students from our partner school, Douglas College in Vancouver: They spent the first week in Tenero familiarising themselves with climbing, in the second week they learned to sail on Lake Biel, and in the third they discovered the Jura region on mountain bikes together with their SFISM counterparts. The programme was rounded out with theory inputs and sports practice, reflections on similarities and differences in teaching and learning at SFISM, and an intercultural exchange.

20 students from DIT Deggendorf took part in the one-week SFISM summer school exploring the topic "IT-based stress monitoring – applied performance diagnostics". The two accompanying DIT lecturers exchanged ideas with SFISM staff.
Two SFISM students took part in the DIT "block week" at Attersee, examining questions of high-performance and elite sport.

The second BFH-wide Global Days on the theme "Global Challenges meet Global Competence" took place in March. The SFISM ran the workshop "Is sport universal?".

## Inspiring further education courses

Along with teaching the foundations of sports sciences, SFISM also offers further education courses. All the individual courses on offer and the latest information can be found on SFISM's website (www.ehsm.admin.ch/en/home.html) and in the course finder on the Continuing Education web page of the Bern University of Applied Sciences BFH (www.bfh.ch/en/continuing-education/all-continuing-education-courses).

SFISM has been positioning itself over many years with tried-and-tested further education offerings ranging from sports management, sports facilities construction and sports nutrition through to sports teaching at vocational schools.

As well as its own courses and teaching programmes, SFISM also took the opportunity to cooperate in a number of joint ventures, either through commissioning activities (e.g. swissuniversities, Bern University of Applied Sciences BFH) or by helping to design further education courses, e.g. within the remit of the Swiss Sport Management Centre (SSMC).

**CAS Sports Facilities**

Over four one-week modules, the CAS Sports Facilities course teaches the fundamentals and specialist knowledge required for planning, building and operating sports facilities.

The CAS course is offered by SFISM together with the University of Bern's Institute of Sport Science (ISPW) and the University of Applied Sciences in Rapperswil.

Participants acquire the skills
- to initiate the necessary steps prior to actual facility planning,
- to provide expert support for the planning and realization of sports halls, outdoor facilities, swimming pools, ice rinks as well as sports centres, trend and leisure facilities.

The CAS course started in November 2018 with 30 participants and ran until June 2019. The deadline for submitting dissertations was end 2019.

**Further education courses**

- CAS Sports Facilities
- Quality and competency in vocational school sports

# Sports Coach Education Switzerland

The year under review marked the 50th anniversary of Sports Coach Education Switzerland. The historic shame suffered in Innsbruck in 1964 – when Switzerland failed to win a single medal at a Winter Olympic Games – led to a reorganisation of Swiss sports. What began in 1969 with the first coaching programme for coaches developed into a nationally recognised competence centre for the education and training of Swiss performance and elite sport coaches.

**Professional coach training**
84 students

| | |
|---|---|
| Women | 11 |
| Men | 73 |
| German-speaking | 67 |
| French-speaking | 13 |
| Italian-speaking | 4 |

**50 years of Sports Coach Education Switzerland**
50 years of coach education were reason enough to pause and say thank you – to everyone who during this time played their part in the development of coach education in Switzerland. The values stressed under today's coach education are competence, inspiration, commitment and innovation – in 1969 the values were discipline, results, role model and physical exercise. In 2019, looking back on this moving period through the media of pictures, stories, occurrences and interviews, Sports Coach Education Switzerland clinked glasses with protagonists, past and present, at a gala evening to celebrate the 50 years.

**Second implementation phase kicked off**
Following the introduction of the new education and training structure at performance sport level in 2018, the year under review marked the start of courses at elite sport level. It was in this context that the first "new" certified coach training (CCT) took place in 2019. With 108 courses on offer in 2019, the introductory phase of the new training concept was brought to a successful conclusion at the end of the year.

In 2019, Coach Education Switzerland provided a total of 126 course days in the areas of sports psychology, coaching theory for conditioning, technique/tactics, sports coaching, sports medicine and leadership, plus advanced options – attended by 507 participants in all. In addition, 14 assessment days, three professional coach courses with 84 coaches overall and one certified coach training with 11 participants took place. In May and November, 50 candidates sat the Federal PET Diploma examination. In 2019, Sports Coach Education Switzerland also certified 37 coach developers, 17 barbell coaches and 7 conditioning coaches.

In addition, the Master Coach Programme "Tokyo 2020" was launched in 2019. It is designed to assist coaches as they prepare for the 2020 Summer Olympic Games in Tokyo and to promote the development of common strategies, self-reflection and experience sharing.

**Coach in Competitive Sports, Federal Diploma of Higher Education**
Participants: 50 passed: 32

**Coaches counseling**
· 30 (without case supervision)
· 376 (with case supervision)

**Master Coach Programme**
Participants: 25

**Coach Developer**
Participants: 37

**Professional Development Courses**
Participants: 507

**Record participation at 2019 coaches conference in Magglingen**
On 4 and 5 November 2019, Sports Coach Education Switzerland took 386 coaches to the world of Generation Z. Never in the history of Sports Coach Education Switzerland have more people taken part in a Magglingen coaches conference. With discussions broken down into four topics, participants addressed the opportunities and challenges presented by interacting with Generation Z. The two days of the conference were under the motto "Learning, Sharing, Networking" – activities which the almost 400 participants pursued to the full in the various settings comprising presentations, workshops and discussion platforms.

**Focus on modern forms of teaching and learning**
After completion of the introductory phase of the new education and training structure, at the end of the year the focus shifted increasingly to the topic of digitalisation in teaching. The development of modern teaching and learning settings will be high on the agenda at educational establishments over the next few years. Sports Coach Education Switzerland views the integration of new technologies and the principal of location-independent learning as an opportunity. Employing a meaningful mix of analogous and digital learning settings, Sports Coach Education Switzerland strives to achieve the best possible learning results. This also includes the development of communities as a basis for social learning. At the same time, the courses offered by Sports Coach Education Switzerland should always be in a respectful, stimulating environment that is conducive to learning.

# Units

The units can look back on the second year since the department was created at SFISM. They have successfully developed and disseminated nationally and internationally recognised knowledge and methodologies in the fields of monitoring, evaluation, sports technology, integration and prevention in sports as well as sports facilities. Completed in the year under review, the process of formulating a mission statement for the units helped to build their identity, hone focus topics and formulate eight jointly developed guiding principles of employee work ethos.

## Evaluation

In 2019, the Evaluation unit processed a large number of scientific research and development projects with the focus on optimising the investigated sports promotion programmes and projects. The unit's activities comprised further development work on the Youth+Sport (Y+S) impact evaluation system entailing groundwork on measuring the quality of Y+S activities and a publication on the theoretical context as well as collaboration on a study by the Swiss Institute of Tropical and Public Health of the University of Basel (Swiss TPH) on access to Y+S. Other key work included preparing for the evaluation of the sports motricity inventory made by the Sports Department of the City of Zurich, the accompanying evaluation of the "Power to Win" project of the Performance sport section, planning the evaluation of the Kids' Tennis programme, developing a sports motricity fitness test for paramedics in the Canton of Bern, as well as evaluating mobilesport.ch and the Magglingen university weeks. The unit also provided advice on further evaluation projects. In addition, unit staff were involved in various teaching events and supervised master's theses in the fields indicated.

## Monitoring

In 2019, the Monitoring unit focused largely on the topic of the physical fitness of soldiers. The unit enjoys global recognition in this field of research and can generate added social value. Jointly with the Swiss Army, the unit launched the training app "ready" on the market on 4 March 2019. This training app is a digital personal trainer that provides and directs individually adapted training units. It is designed in particular to enable recruits to prepare for military service. Downloaded some 50,000 times in the first ten months, the app is a success. A widescale study was also launched in 2019 to assess the training app's impact on soldiers' fitness levels and risk of injury. As part of the Swiss Army's recruitment activities, training videos were made on the correct conduct of military fitness tests. The unit was also actively involved on international bodies addressing soldiers' physical fitness (CISM Sport Science Commission and NATO Human Factors and Medicine Panel). Unit staff also supervised numerous student dissertations on the topics cited.

## Sports technology

The Sports technology unit supports technological innovations in sport. It does so working at various levels: It promotes an exchange between the sports community and the sport tech industry. It was in this spirit that the second symposium of the Swiss Association of Computer Science in Sport was held. Participants included 50 representatives of sports organisations, sports science and the sport tech industry. The unit represents SFISM in the BFH Centre for Technologies in Medicine, Health and Sports. Working with sports experts, scientists and engineers, it conducts concrete development projects. Rahel Gilgen was elected to the management board of the BFH Centre in 2019. Her remit is to represent the interests of sport.

The unit is called on for technological advice in the area of digitalisation. Data handling is another focal area. In collaboration with the Institute of Public Sector Transformation at the BFH, the unit has initiated a study entitled "Data Governance in Sport" in order to build up its know-how in this field. This will also help the unit to refine the advice it provides to governing bodies and sport tech firms going forward.

Working with the University of Basel, the unit also published the source code from a football analysis project, making it available to the scientific community under an open source licence. In addition to existing teaching events under the "Scientific theses" module, the lecture series "Measurement technologies and data analysis in performance sport" was added for the first time to the SFISM Master's programme in performance sport in the year under review.

## Integration and prevention

2019 was a year of expansion and consolidation at the Integration and prevention unit. Following the return of three staff members from maternity leave, two new female employees were also taken on. The unit formulated a uniform understanding of the concept "Integration" within the Federal Office of Sport (FOSPO). It also drew up a broad-based report on the topic "People with disabilities in the area of federal sports promotion". This led to the launch of a project aimed at doing more to promote people with disabilities in the context of Swiss sport. Cooperation with the Laureus Foundation Switzerland permits the unit to place particular emphasis on the topic "Promoting girls and young women in sport" over a period of three years. The primary task here in 2019 was to process the topic and produce a general report.

The unit played a key role in two scientific publications analysing the extent of the social integration of immigrant members in sports associations as well as influencing factors.

New teaching units added to the existing curriculum sensitised SFISM students to various topics, including proximity and distance, and the prevention of violence. In collaboration with experts in the field, the unit refined its content on the topics of addiction and the prevention of violence. The unit also worked closely with Youth+Sport to prepare content for the 2021/2022 in-service training period.

**Series of publications for planning, building and operating sports facilities**

· 25 (German/French)
· 3 (German/French/Italian)
Total: 28

The documents can be ordered in print or downloaded in PDF-format for free on www.basposhop.ch.

## Sports facilities

Each attracting over 100 participants, the unit's annual visits to selected sports infrastructures and the professional conference in Magglingen met with huge interest in the year under review too. The construction site of the Centre Sportif de Malley ("Vaudoise aréna") was visited in spring. Equipped with ice and water facilities and an infrastructure for fencing and table tennis, the centre was partially opened in autumn 2019. In 2020, the venue will host the Youth Olympic Games and the Ice Hockey World Championships. The autumn conference on the topic "Sports and exercise areas for everyone" demonstrated how open spaces and path networks in residential developments and rural areas can be transformed into a variety of sports opportunities and exercise zones.

Specialist knowledge and the fundamentals of sports facility planning, construction and operations were imparted through various formats of education and training in 2019: All modules of the 6th CAS Sports Facility courses took place. Bachelor's students at SFISM received instruction on sports facility construction. Over three days, trainee sports coordinators were introduced to the topic of sports facilities. Lively discussions with and among participants testify to the fact that key specialist know-how, solid inputs and thought-provoking pointers were passed on via all training formats. What is more, over 200 telephone and e-mail inquiries received by the unit underscore that concrete project advisory services are in demand and play a major part in the excellent standard of Switzerland's sports infrastructures.

The unit began an R&D collaboration with the Department of Architecture, Wood and Civil Engineering (AHB) of Bern University of Applied Sciences (BFH) to gather data on the construction and life-cycle costs of sports halls and develop key forecast data.

## Publications

Adler Zwahlen, J., Nagel, S. & Schlesinger, T. (2019).

**The role of socio-demographic, sports-related, and sociocultural factors for the social integration of young migrants in Swiss sports clubs**
Sport und Gesellschaft, 17(2), 125-154.

Summary: This paper analyses the extent of social integration of native and immigrant members of sport clubs, using Esser's (2009) four-dimensional integration concept (n = 780; MAge = 20.62; 38.5 % with migration background). Of particular interest was the influence of socio-demographic, sports-related, and socio-cultural characteristics. Members of the clubs who were first generation migrants were less integrated along three integration dimensions than the native and second- and third-generation immigrant members. Multiple regression analyses demonstrated that some characteristics are significantly related to integration dimensions (membership duration, parental sports club activity, value orientation, bicultural integration attitude) and thus more relevant to social integration than others (identity, nationality).

Gilgen-Ammann, R., Schweizer, T., Wyss, T. (2019).

**RR interval signal quality of a heart rate monitor and an ECG Holter at rest and during exercise.**
European Journal of Applied Physiology; 119(7): 1525-1532.

Abstract: This study was designed to examine the RR interval signal qualities of a Holter device and a heart rate chest belt monitor at rest and during exercise. Ten healthy individuals completed five low- to high-intensity activities while simultaneously using the medilog® AR12plus Holter monitor and the Polar H10 heart rate monitor. The RR interval signal quality was based on the quantification of the missing RR intervals and RR interval detection errors. Therefore, both measurement systems were compared against visual inspection of the raw electrocardiography signal. The missing and wrong R-wave peak detections were counted manually for both measurement systems. RR interval signal quality was defined as the relative number of correctly detected RR intervals. Overall, RR interval signal qualities of 94.6 % and 99.6 % were demonstrated for the medilog® AR12plus and the Polar H10. During the high-intensity activities, the RR interval signal quality of the medilog® AR12plus dropped to 89.8 %, whereas the Polar H10 maintained a signal quality of 99.4 %. The correlation between both systems was high ($r$ = 0.997, $p$ > 0.001). The excellent RR interval signal quality during low- to moderate-intensity activities in the medilog® AR12plus and during low- to high-intensity activities in the Polar H10 demonstrates both measurement systems' validity for the detection of RR intervals throughout a wide range of activities. A simple chest strap such as the Polar H10 might be recommended as the gold standard for RR interval assessments if intense activities with strong body movements are investigated.

# Performance sport

Addressing questions and issues raised by the governing bodies, sector staff work increasingly across multiple disciplines. Day-to-day work topics such as ethics, data archiving, data merging and digitalisation keep the sector very busy and will continue to make demands on resources. In the course of the past few years, the sector succeeded in merging various performance and test parameters for endurance, strength and game sports and in investigating athletes' development. The close collaboration with Swiss Olympic, the governing bodies and university partners brings everyone forward together. Plans for the Lärchenplatz newbuild are taking on a concrete form, and the move into the provisional premises is imminent.

**Consultations:** 857

## Sports medicine

Sports medicine staff at Magglingen are tasked with treating injuries and illnesses suffered by elite athletes visiting our infrastructures as well as attending to outside athletes. Our presently well-established network permits us to meet what are always the justifiably exacting demands of our athletes.

However, our main preoccupation remains preventive and educational work with young athletes to give each one individually the necessary tools to optimally manage their health when engaging in performance sport. To this end, we conducted more than 150 sports medical assessments in over 20 disciplines in the year under review.

We also provided medical supervision to various national teams at international sports competitions.

During the year under review too, we were involved in the training of sports doctors in Switzerland and also provided training for coaches as well as students on Bachelor's and Master's programmes in sports. The topics addressed were sports emergencies, sport-related injuries, the specific characteristics of injuries sustained by young athletes and their prevention, overtraining and extreme sports.

We collaborated in research on the epidemiology of sports injuries, body composition and how the body adapts to extreme conditions.

## Sports physiology (strength)

The Sports physiology (strength) team was also active in all three realms of services, R&D and teaching in the year under review.

The services team supervised athletes from 13(!) different disciplines (always national teams). In the case of the most complex of the tests carried out – the muscular performance diagnostic test – the team achieved a new record, conducting it 318 times. It was also deployed twice to support youth athletes at the Swiss Olympic talent meet in Tenero (3T).

The interdisciplinary test conducted together with physiotherapists during rehabilitation established itself fully. Marking a first, the appointment of a strength training expert in the year under review allowed the service to be built up directly as athletes trained. The team also provided its know-how for the planning and construction of new weights rooms in the End of the World Hall as well as in Tenero and Andermatt.

Moreover, the R&D team established a new record with the publication of five original articles.

Sports physiology (strength) staff organised teaching events equivalent to nine ECTS credits and were actively involved in various coach education courses offered by Youth+Sport and sports governing bodies. They also supervised five doctoral theses.

**Number of athletes:** 420

**Number of tests:** 725

## Sports physiology (endurance)

In the year under review, the Sports physiology (endurance) team provided extensive sports scientific support to the national teams of the governing bodies Swiss Ski (cross-country skiing, biathlon), Swiss Cycling (mountain biking, track cycling), Swiss Triathlon and Swiss Athletics (middle-distance and marathon). In addition to conducting traditional performance tests, the team also developed new test formats (MTB and XC skiing). It also ran various sports scientific projects to prepare the different athletes for their competitions. In readiness for the 2020 Summer Olympics, the team assisted Swiss Olympic and the sports governing bodies with the "Beat the Tokyo Heat" project. Work was also under way for the the task force set up by Swiss Olympic in preparation for the 2022 Olympic Games in Beijing. Two research papers were published in renowned peer-reviewed journals. Besides teaching at SFISM and other institutions in Switzerland, experts from the team also travelled by invitation to China, Russia and Finland to deliver keynote lectures.

**Number of athletes:** 359

**Number of tests:** 1386


**Number of athletes:** 516

**Number of tests:** 3722

## Sports physiology (game sports)

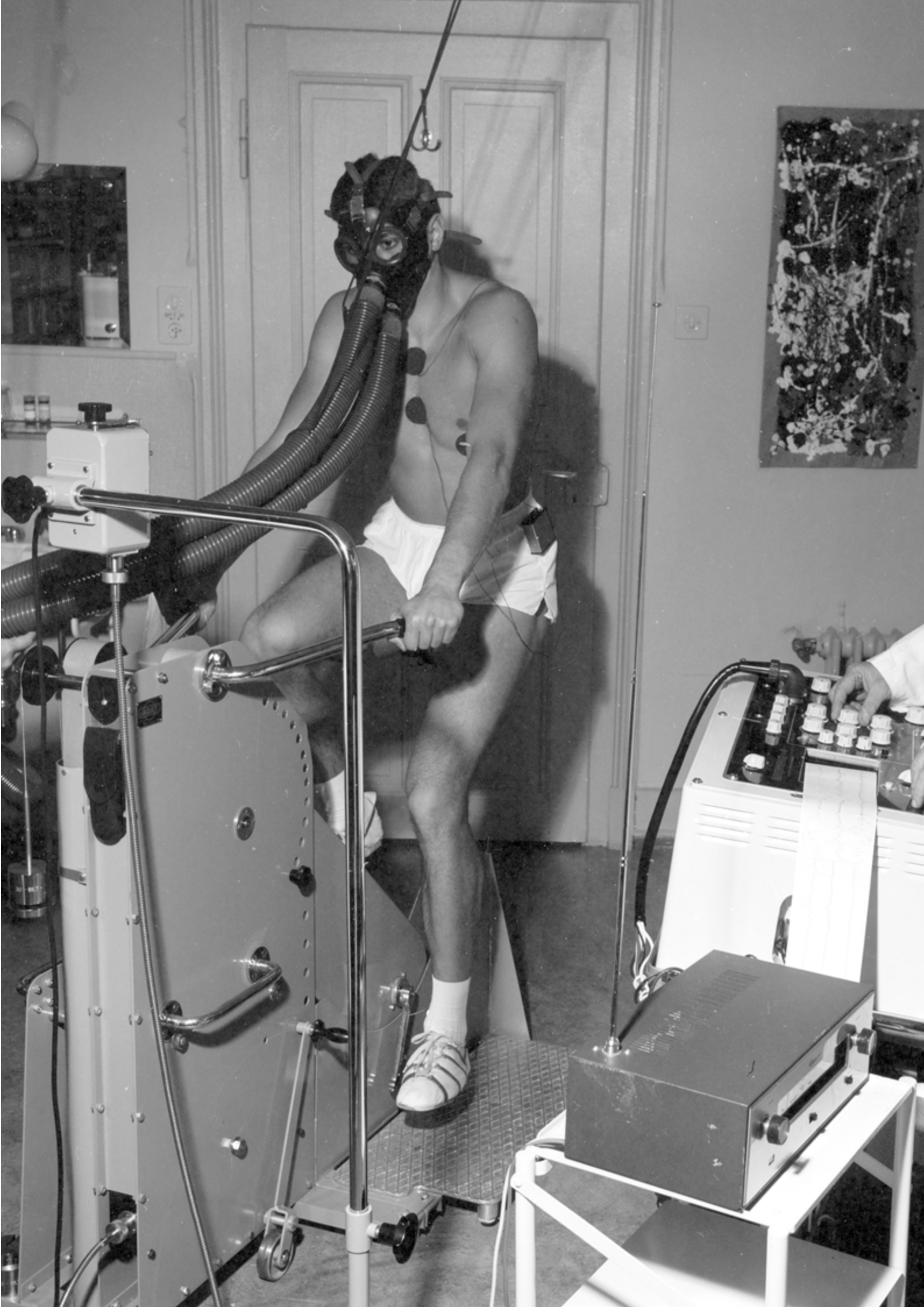
The year under review saw the launch of the "Power to Win" project. Its aim is to ensure that at the end of the talent development programme a higher proportion of young athletes in the disciplines football, ice hockey, handball and unihockey display a level of neuromuscular fitness high enough to support an international career. The project is being conducted over four years as a collaborative venture between the national governing bodies of the four disciplines, their clubs, Sports Coach Education Switzerland and the game sports team. It is receiving financial support from Swiss Olympic. Current scientific findings and practices regarding optimum neuromuscular training in game sports are integrated into the coach training programme. The effectiveness of the training and its impact on performance development are also being scientifically evaluated in a dissertation.

As part of the close cooperation between the three national governing bodies for football, ice hockey and handball, this year too, as customary, numerous performance tests were conducted with the different national teams and athletes on funding programmes (including beach soccer and ice hockey prospects), scientific projects were continued (validation of positional data in ice hockey and football) and governing bodies were supported in their training efforts (including football training philosophy).

## Coaching science

The Coaching science team has two principal remits: a) to identify and scout talent and b) to provide scientific support to the governing bodies and Swiss Olympic.

In the year under review, the team provided support to the governing bodies Swiss Ski, Swiss Athletics, Swiss Swimming and the Swiss Football Association. It implemented applied research projects and offered scientific assistance to coaches working in youth performance and elite sport. In addition, two innovative pioneer projects ("Play more football" and "Bio-banding") were continued in collaboration with the Swiss Football Association and the Technique and tactics group. Together with Swiss Olympic, the team made a great deal of headway, including providing governing bodies with scientifically validated practical tools for an improved, more reliable selection of emerging talents (PISTE 2.0). The "Bio-banding" project, which investigates the effects of categorising U13-U14 players according to biological rather than chronological age, was successfully continued. Running parallel to this, the "Play more football" project is exploring the impact of a new game variant (4 against 4 in addition to the usual 7 against 7 format) in children's football (9-10 years). The project clearly demonstrates that children engage in a significantly higher number of game actions and so gain more learning opportunities. It won the 2019 Swiss Olympic Science Award. Five publications appeared in international professional journals. The empirical evidence and know-how acquired are passed on to participants of the coaching courses under the Bachelor's and Master's programmes.



**Physiotherapy treatments:** 2123

**Massages:** 2043

## Sports physiotherapy

The Sports physiotherapy team's remit is to support athletes in the areas of rehabilitation, prevention and regeneration. Close interdisciplinary teamwork between all sports science disciplines is what ensures the success of rehabilitative measures in performance sport.

The prime objective is a fit and healthy return to sport. Stepping up cross-discipline support further optimised the athletes' rehabilitation process. This prompted several sports governing bodies to increase collaboration with sports physiotherapists. A large number of athletes relied on army programmes (elite sport for recruits school and refresher training) to build up their strength at Magglingen after an injury.

Injury prevention is becoming increasingly important in performance sport. An injury always leads to a decrease in athletes' health and fitness levels. Preventive, functional examinations of the musculoskeletal system are carried out to identify deficits and forestall injuries with the aid of specific training programmes.

The physiotherapeutic support provided to young women athletes at the Swiss Women's Football Academy in nearby Biel/Bienne is a firm component of the work done. While both demanding and challenging, it produces significant findings for application in everyday activities.

## Sports psychology

Despite staff bottlenecks, the Sports psychology group firmed up its activities. The number of individual or group counselling sessions (including sports psychological screenings) saw a further increase, up to over 500. On the other hand, the number of support days provided for governing bodies decreased. Demand remained heavy for recovery-stress monitoring via smartphone. Teaching provided by Coach Training Switzerland totalled some 30 course days. In addition to book chapters in peer-reviewed journals, articles also appeared in professional publications.

Staff worked on two larger research projects: The first of a total of three studies into self-compassion in coaches and athletes – funded by the Swiss National Science Foundation – was launched. Work continued on the research project into career-impairing conflicts between different spheres of life for the Swiss Football Association (SFV-ASF). Likewise commissioned by the SFV-ASF, the group drew up a compilation of the mental aspects to be included in the teaching philosophy currently being developed.

The team also again organised an international summit on mindfulness- and acceptance-based interventions in elite sport. 21 sports psychologists from ten different nations were welcomed at the invitation-only event.

## Publications

Steiner T, Maier T, Wehrlin JP. Med Sci Sports Exerc. 2019 May; 51(5): 912-919.

**Effect of Endurance Training on Hemoglobin Mass and $\dot{V}O_2$max in Male Adolescent Athletes.**

Abstract
Purpose: It is unknown, whether endurance training stimulates hemoglobin mass (Hbmass) and maximal oxygen uptake ($\dot{V}O_2$max) increases during late adolescence. This study assessed the influence of endurance training on Hbmass, blood volume parameters, and $\dot{V}O_2$max in endurance athletes and control subjects from age 16 to 19 yr. Methods: Hemoglobin mass, blood volume parameters, $\dot{V}O_2$max and anthropometric parameters were measured in male elite endurance athletes from age 16 to 19 yr in 6-month intervals (n=10), as well as in age-matched male controls (n=12). Results: Neither the level of Hbmass per lean body mass (LBM) (P = 0.80) nor the development of Hbmass during the 3 yr (P = 0.97) differed between athletes and controls. Hbmass at age 16 yr was 13.24 ± 0.89 g·kg LBM and increased by 0.74 ± 0.58 g·kg LBM (P < 0.01) from age 16 to 19 yr. There was a high correlation between Hbmass at age 16 and 19 yr (r = 0.77; P < 0.001). Plasma volume, blood volume, and $\dot{V}O_2$max were higher in athletes compared to controls (P < 0.05). Blood volume and $\dot{V}O_2$max increased with age (P < 0.01, similarly in both groups). Conclusions: Endurance training volumes do not explain individual differences in Hbmass levels nor Hbmass and $\dot{V}O_2$max development in the age period from 16 to 19 yr. The higher $\dot{V}O_2$max levels of athletes may be partially explained by training-induced higher plasma and blood volumes, as well as other training adaptations. Since Hbmass at age 16 yr varies substantially and the development of Hbmass in late adolescence is comparably small and not influenced by endurance training, Hbmass at age 16 yr is an important predictor for Hbmass at adult age and possibly for the aptitude for high-level endurance performance.

International Journal of Environmental Research and Public Health

**Specific Eccentric–Isokinetic Cluster Training Improves Static Strength Elements on Rings for Elite Gymnasts**

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Abstract: In gymnastics, coaches are constantly searching for efficient training methods in order to improve the athletes' performance. Therefore, in this study we aimed to investigate the effects of a novel, four-week, gymnastic-specific, eccentric–isokinetic (0.1 m/s) cluster training on a computer-controlled training device on the improvement of two static strength elements on rings (swallow and support scale). Nine elite male gymnasts participated in this study. Outcome parameters were maximum strength and strength endurance in maintaining the static position of both elements. After four weeks of training, specific maximum strength increased significantly (swallow: +4.1%; d = 0.85; p = 0.01; support scale: +3.6%; d = 2.47; p = 0.0002) and strength endurance tended to improve (swallow: +104.8%; d = 0.60; p = 0.07; support scale: +26.8%; d = 0.27; p = 0.19). Our results demonstrate that top athletes can considerably improve ring-specific strength and strength endurance in only four weeks. We assumed that the high specificity but also the unfamiliar stimulus of slow eccentric movements with very long times under maximal muscle tension led to these improvements. We suggest to use this type of training periodically and during phases in which the technical training load is low.
Keywords: strength training; eccentric; isokinetic; upper limbs; artistic gymnastics; rings; males

# Sports teaching

The Sports teaching section's R&D activities are aimed at developing scientifically founded, empirically robust tools to promote the quality of physical education. The section also conducts research into fundamental principles and promotional tools to improve the quality of physical education. Since the beginning of 2019, it has also been focusing on sport-pedagogical research and development in the area of national elite and youth elite sports.

## Research and development

Research into improving the quality of physical education is directed primarily at the development and impact of sports teachers' professional skills. The section is also participating in the Swiss National Science Foundation project "Professional skills required of physical education teachers and their impact on teaching and student performance". The project is a joint venture between the teacher training institutions of the University of Applied Sciences and Arts Northwestern Switzerland and FHS St. Gallen as well as SFISM. The section has project-wide re-sponsibility for the development of a Rasch-scaled student performance test. Work on this began during the year under review. A competency model was prepared, enabling the model-based development of test items. The test consists of a practical sports performance test and a knowledge-based test to measure the analytical abilities of lower-secondary level students in technical-tactical and technical-creative disciplines. An initial pre-pilot phase was concluded. Test piloting and standardisation is scheduled for 2020.

A dissertation project also began on the development and validation of a test instrument to measure the professional skills of coaches in the planning and design of effective and learnable coaching content. Based on a widescale analysis of coaching science literature and research on pedagogic professionalisation as well as on sports instructors – while also drawing on discussions with sport pedagogy and coach education experts – it was possible to create an initial theoretical model for the operationalisation of coaches' effective and relevant professional and didactic know-how and skills. It is planned to hold a workshop in 2020 to discuss this model with a working group from Germany that is devising similar questionnaires. Subsequently, work will begin on the model-based development of test items to measure professional skills.

Some section staff members received special recognition: they were invited invited on numerous occasions to present their work on teaching disruptions, including at the "Kinder bewegen" (Moving children) congress organised by the Karlsruhe Institute of Technology (KIT), as well as during teacher training and development courses provided by the city of Zurich. They were also able to present their work on the multimedia design of teaching and learning situations in physical education at the DOBS Conference in Magglingen.

## Teaching

In terms of teaching, the sector provided much fresh momentum in the transfer of sports teaching knowledge to enhance the pedagogical quality of sports courses:

**Bachelor's course**

For the third time, the sector conducted required elective specialisation courses in sports teaching in the Bachelor's degree programme in place since 2016. They serve the twofold objective of providing a practice-based consolidation of previously acquired theoretical application know-how and expanding the scope of application to non-school contexts.

The integration of the new learning and teaching units on "prevention and rehabilitation in gymnastics" and "biomechanical aspects of gymnastic sports" into apparatus gymnastics courses 1 + 2 has reinforced the sports science perspective on gymnastics. This underpins the Institute's aspirations to provide teaching which is solidly founded in sports science and satisfies the criteria of university-level didactics in all areas of training (including "practical" sports courses).

**Master's courses**

Changes were made to the sports teaching course "Applications of sport science theories and models" offered in the Master's course in sports science conducted jointly with the Uni-versity of Fribourg. Increasingly discredited in scientific debate, the learning and teaching module "Differential learning" was replaced by the two newly developed (as yet unpublished) learning and teaching models "Cooperative learning" and "Tutorial learning". On an encouraging note, students also succeeded in using these models to design sports lessons which meet the deep-structure learning demands in sport.

The degree course leading to a "Master of Arts in Educational Sciences with Specialisation in Sports Teaching Methodology" was launched at the Institute for Educational Sciences of the University of Basel; a course offered by the Sports Teaching Methodology competence centre in which SFISM is participating and which is funded by project-linked grants from the Swiss federal government under the P-9 programme "Development of subject-specific didactics". The Sports teaching section is running three courses.

## Publication

Krieger, C., Heemsoth, T., Gogoll, A., Jeisy, E., Kleinknecht, M. & Neumann, A. (2019).

**Zum Zusammenhang von sportunterrichtsbezogenem Wissen, sportunterrichtlicher Leistung und sprachlichen Fähigkeiten von Schülerinnen und Schülern. Zeitschrift für sportpädagogische Forschung, 7, 67–83.**

Die Bedeutung von (Schrift-)Sprache für den Sportunterricht ist bislang weitestgehend unerforscht. Ähnlich wie in anderen Fächern erscheint jedoch auch für den Sportunterricht bedeutsam, ob und wie beispielsweise schriftliche Aufgabenstellungen, Stationskarten oder Feedbackbögen von den Schülerinnen und Schülern überhaupt verstanden werden. Der vorliegende Beitrag stellt eine explorative Studie vor, in der mit 1346 Schülerinnen und Schülern der Klassenstufen 7 und 8 untersucht wurde, wie sich die Zusammenhänge zwischen den sprachlichen Fähigkeiten, der sportunterrichtlichen Leistung sowie dem sportunterrichtbezogenen Wissen darstellen. Darüber hinaus wurde untersucht, inwieweit das sportunterrichtsbezogene Schülerwissen davon abhängt, welches sprachliche Schwierigkeitsniveau die Testaufgaben zur Erfassung dieses Wissens aufweisen. Die Ergebnisse zeigen, dass auch im Fach Sport die sprachlichen Fähigkeiten der Schülerinnen und Schüler für die sportunterrichtliche Leistung bedeutsam sind. Die Variation der sprachlichen Schwierigkeit in einfach, mittel und schwer führt jedoch nicht durchgängig zu einer entsprechend abnehmenden Lösungswahrscheinlichkeit.

# Sports economics

The section's day-to-day work in the year under review was dominated by surveys on the study "Performance sport in Switzerland 2019". Courses are becoming increasingly popular with students. The huge demand for the section's services bear witness to the high practical relevance of its activities. It appears as though the section is one step closer to its vision of being perceived as the centre of excellence for sports economics in sport and performance sport.

## Research and development

Switzerland's sports system has become more complex. The performance sport space is innovative and in motion. Exchanges between the various actors have grown more intensive. Decision-makers in the central organisations need to be thoroughly familiar with the system. This is the only way that they can optimise their support, and the only way that sporting success can be assured over the long term. The study entitled "Performance sport in Switzerland in 2011" marked the first time that the sector was able to deliver data-based support for decision-making. This study is now being repeated. Performance sport in Switzerland in 2019 is being analysed on the basis of qualitative (desk research and interviews) and quantitative data (questionnaires for athletes, coaches and sports chiefs). Data collection is at a very advanced stage. Three workshops were held with performance sports experts and officials. The results will be presented in 2020.

The sector's research activities were also reflected in a doctoral thesis entitled "Creating competitive advantage in the Winter Olympics: Strategic positioning in sports disciplines" under the joint supervision of the Vrije Universiteit Brussels and SFISM. A number of workshop reports on success factors in performance sport and on the operating concepts of performance sport centres were also drawn up. Research conducted by sector staff ultimately found its expression in presentations given at several international conferences – including the European Association for Sport Management (EASM) in Seville – and in the form of collaborative publications (Research Handbook on Sport Governance) or scientific journals (European Sport Management Quarterly).

Research activities flowed seamlessly into efforts to continually optimise the products used in teaching. A study on professions in sport management was initiated in 2019. This is a larger-scale project carried out jointly with partners at the Swiss Sport Management Center and Chur University of Applied Sciences. The objective of the study is to take a more nuanced look at sport management professions, describe the requirements of the various professions and use this as a basis for determining the skillsets in demand in these professions.

## Teaching

The sport management courses offered under the programmes for the SFISM Bachelor's in Sport, the Master's in Elite Sport and the BFH Minor in sports and event are very popular. Student numbers for these courses are increasing, with strong attendance levels for the specialisation modules. Our partners have shown an interest in diverse courses offered by the sector. The course blocks on offer in Magglingen and Tenero on the Swiss sports system and performance sport in Switzerland are a fixed component of the Bachelor in Sport Management programme of Chur University of Applied Sciences. In conjunction with the "Magglingen Thinkathlon", the section also developed a special teaching format which allows participants to solve concrete management problems under real work conditions in direct collaboration with sports organisers.

## Services

The sector makes its specialist know-how available to numerous actors in the Swiss sport system. A case in point is the support provided to FOSPO in drawing up studies on sport in Switzerland, the sports economy and sport event strategy. It also participated in partner projects. A topic that the sector devoted particular attention to in the year under review was "sustainable development thanks to sport" through mandates received from local authorities and sports organisers. This translated into the development of a strategy on the positioning of a region thanks to snow sports, a strategic audit of plans for a sport and congress centre in a mountain valley, and the drafting of a regional sustainability concept. The project for the preparation of standards for an Olympic centre proved extremely substantial.

## Publications

Chappelet, J.-L. and Mrkonjic, M. (2019).

**Assessing Sports Governance Principles and Indicators. In M. Winand and C. Agnostopoulos (Eds.), Research Handbook on Sport Governance. Cheltenham: Edward Elgar**

Corruption scandals involving major international sport organisations (ISOs) such as the Fédération Internationale de Football Association (FIFA) or the International Olympic Committee (IOC) have deeply affected the sport system. Consequently, since the early 2000s ISOs are being urged to follow good governance principles such as transparency, accountability, democracy, integrity and control (e.g., Council of Europe, 2005; Geeraert, 2015; Nordic Ministers of Sport, 2016; European Parliament, 2017) in order to restore public trust and preclude further unethical behaviour. Nevertheless, no group of major sport organisations and their stakeholders has yet accepted the sort of general and binding code or standard of governance comparable to the World Anti-Doping Code needed to give them conceptual and operational clarity and stability. Moreover, sport organisations are faced with a plethora of governance principles and indicators (Mrkonjic, 2013), contained in almost 50 different frameworks put forward by public and private bodies which might directly or indirectly impact their activities. This contribution describes a selection of these frameworks in order to provide a better understanding of sport governance frameworks and issues relating to their implementation. Building on democratic studies (e.g., Bühlmann et al., 2012) it also suggests an approach for assessing and comparing them, and proposes avenues for further research in the emerging field of sport governance assessment.

Weber, A. Ch., De Bosscher, V. & Kempf, H. (2019).

**Positioning at the Olympic Winter Games: Examining the targeting of Olympic winter sports by medal-winning nations. Sport, Business and Management: An International Journal. 9(5), 417-442.**

Purpose: Since the 1990s, the International Olympic Committee has offered nations more medal-winning opportunities at every Winter Games. Meanwhile, many countries are constrained by their limited financial resources to target sports strategically. The purpose of this paper is to examine the targeting approaches to Olympic Winter Sports of National Sports Agencies (NSAs), and to identify the factors they assess in the decision-making process.
Design/methodology/approach: The data were collected through semi-structured interviews with 11 decision makers of medal-winning NSAs at the 2014 Sochi Games. The data were then analysed with reference to strategic management in an approach, which combines a resource-based view (RBV) with a market-based view (MBV) to build a competitive advantage.
Findings: The results show that NSAs, like firms, combine an internal analysis that reflects the RBV on resources and capabilities (e.g. athletes' performance per sport and sport-specific elite sport system), with an external analysis of the competitive environment that reflects an MBV (e.g. sport's medal market size and intensity of competition at Games) to target sports. Using this information, two phases were distinguished: first, the target sports are identified and finance is prioritised accordingly; second, the allocation of the nation's resources is constantly reviewed in order to optimise it.
Research limitations/implications: Even though social desirability bias in the responses could not be fully excluded, the findings can help policy-makers to distinguish between the internal and external factors identified in this study, and to make more strategic decisions by combining RBV and MBV approaches to build-up their nation's competitive advantage.
Originality/value: This paper models the targeting strategies of NSAs during an Olympic cycle by introducing the competitive positioning of firms to sports management.
Keywords: Competitive advantage, Resource-based view, Competitive positioning, Market-based view, Olympic Winter Games, Strategic targeting of sports

All SFISM's publications are listed on www.ehsm.admin.ch

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