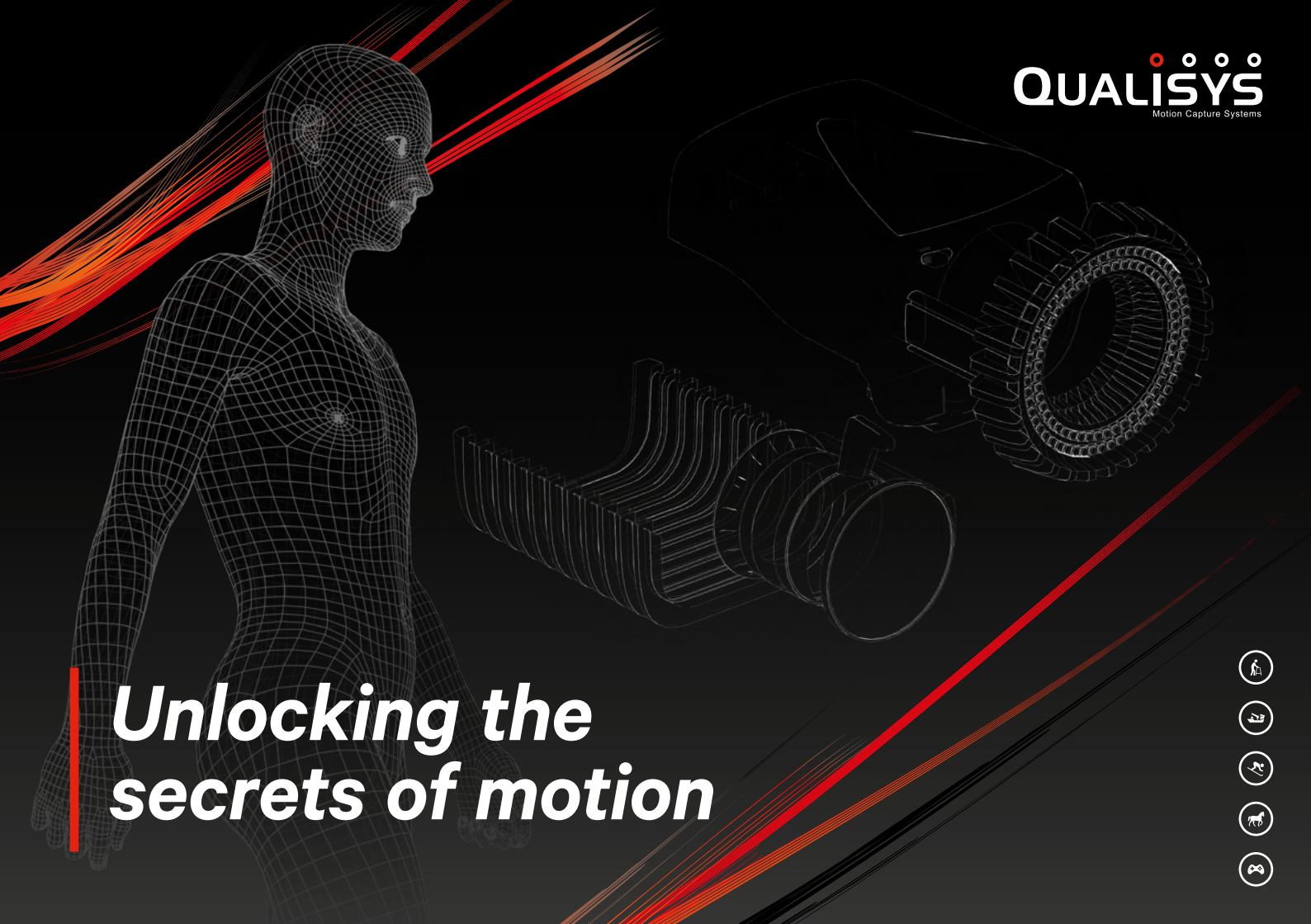
QUALISYS
Motion Capture Systems



Unlocking the secrets of motion

Everything moves

However, the movements of humans and the technology we use are often too quick and complex to be easily detected and understood with the eye of simple/basic technology.

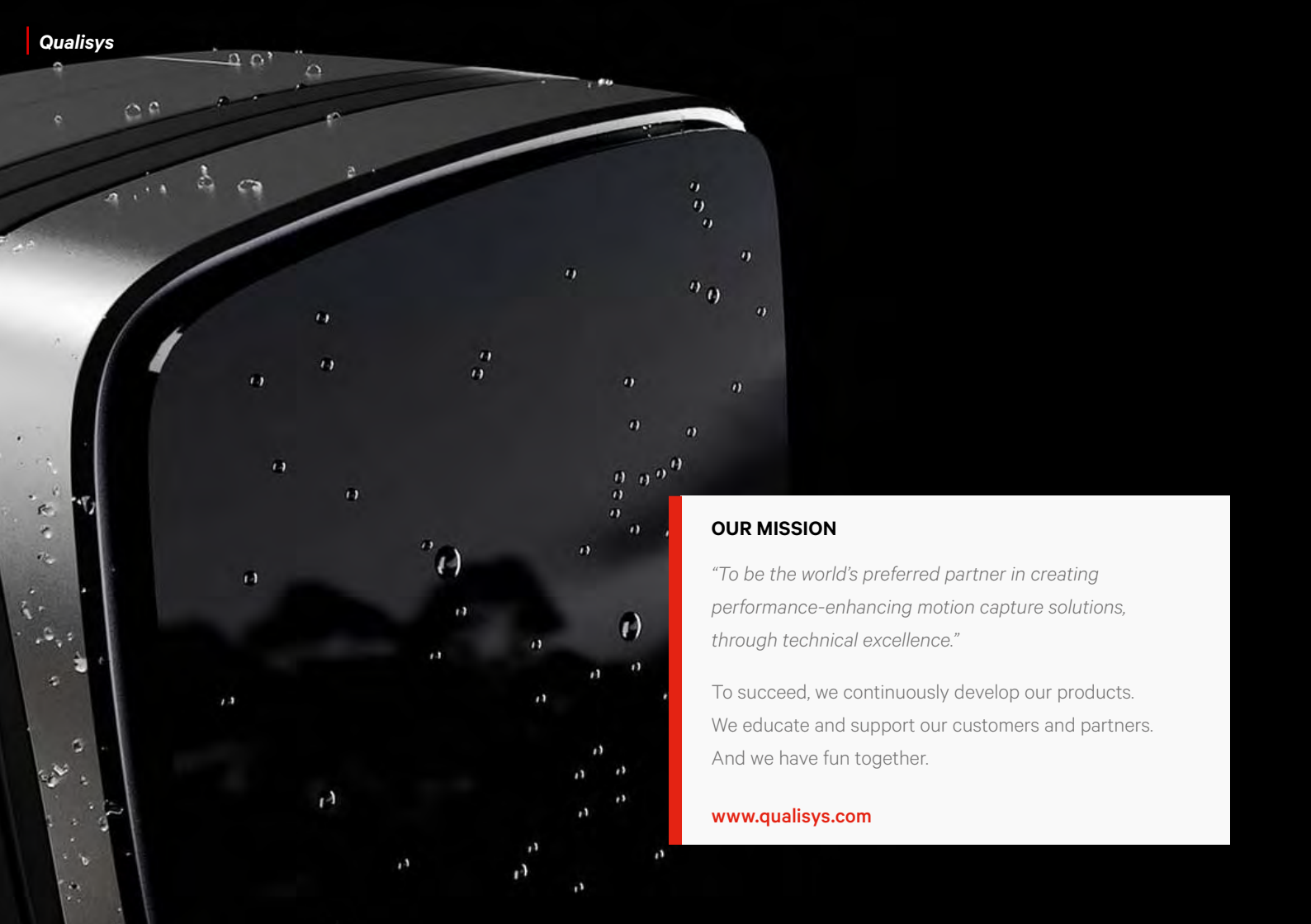
Qualisys provides tools that reveal the secrets of motion in minute detail. The resulting data can be analyzed and used by professionals in human and animal biomechanics, engineering, sports, entertainment and other fields. The end result is deeper knowledge, improved quality of life, better performance, higher profits or more efficient technology, depending on the application.

Our core technology is marker-based motion capture, a method of recording fast and subtle motion with high accuracy. It utilizes specialized cameras that record the three-dimensional movements of optical markers placed on the person, animal or machine being analyzed. The data is then processed to provide the results, analysis and information display required by the user.

Since our technology can provide objective information about anything that moves, it is constantly finding new uses. We are continuously developing specialized products and systems for new customers and business segments.

Qualisys is driven by innovation. Since we began creating our core technology in 1989, we have consistently worked to achieve new levels of excellence, while working closely with global academia and other professionals. This ensures that our innovations translate into useful tools, able to solve real-world problems. Initially focused on per-client custom solutions, we're increasingly offering scalable off-the-shelf systems for specific uses.

As a global company, Qualisys has its headquarters in Gothenburg, Sweden with additional offices in the USA and Asia overseeing a network of global distribution partners.



OUR MISSION

"To be the world's preferred partner in creating performance-enhancing motion capture solutions, through technical excellence."

To succeed, we continuously develop our products. We educate and support our customers and partners. And we have fun together.

www.qualisys.com

HUMAN BIOMECHANICS

Biomechanics is the study of the movements of biological entities, such as humans and animals. In human biomechanics, Qualisys systems are used in several different contexts, from basic research to clinical applications.

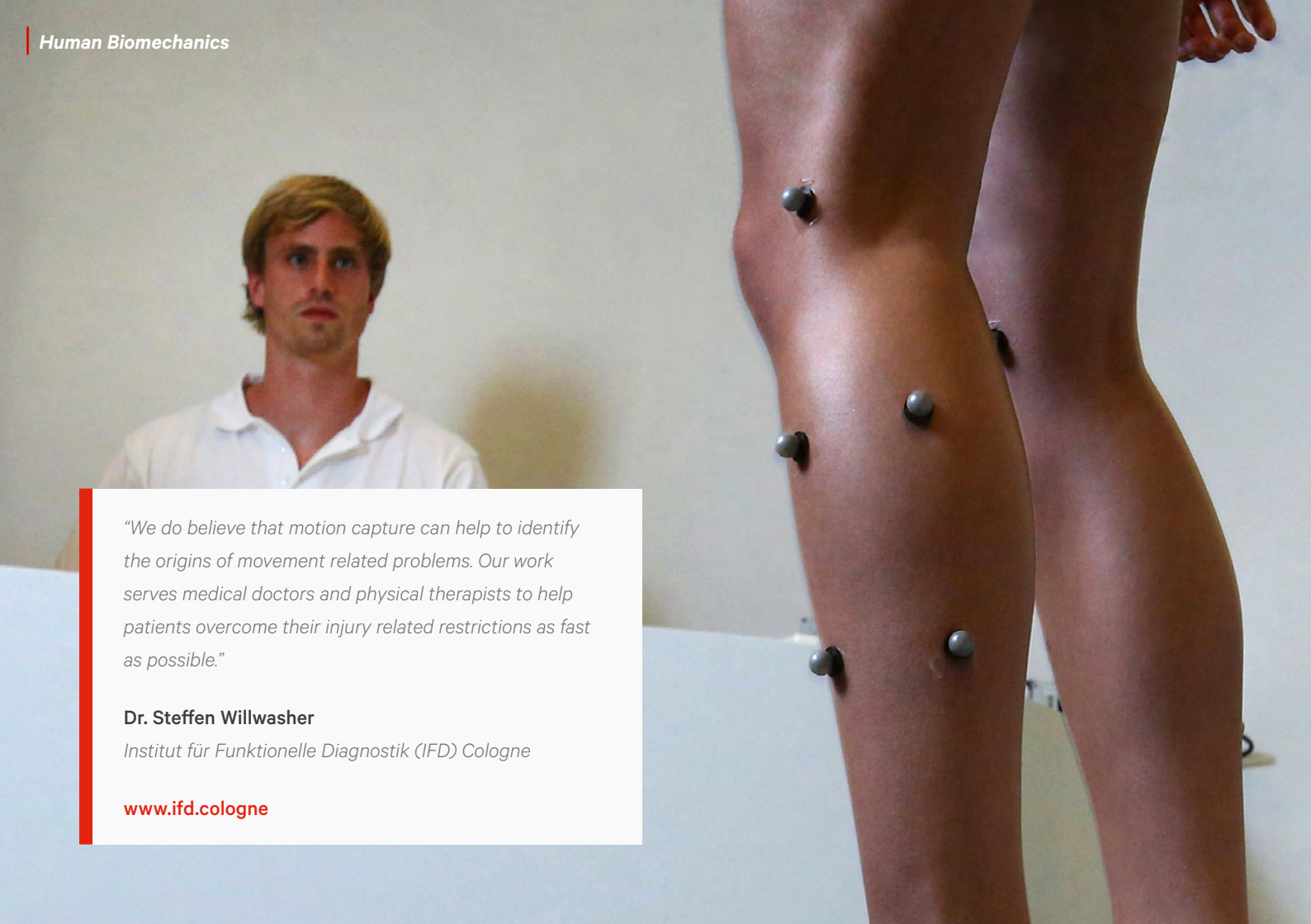
Gait research is our original area of expertise. More than 30 years of experience have resulted in finely tuned systems and a deeper understanding of the needs of the global scientific community. Since no two projects are alike, our solutions are highly customizable. Used all over the world, they continue to contribute to our understanding of human motion.

Clinical use of our biomechanics systems generally takes place in a rehabilitation context, with software tailored to deliver information used to provide individual patients with the relevant therapy, or as diagnostics aids.

In the *neuroscience* field, our technology provides biomechanical data for neurophysiological studies of human motor control.

In *ergonomics*, Qualisys systems are used to study the posture and movements involved in specific occupational activities.

In the related *usability* context, they analyze the interaction between a commercial product and the user.



"We do believe that motion capture can help to identify the origins of movement related problems. Our work serves medical doctors and physical therapists to help patients overcome their injury related restrictions as fast as possible."

Dr. Steffen Willwasher

Institut für Funktionelle Diagnostik (IFD) Cologne

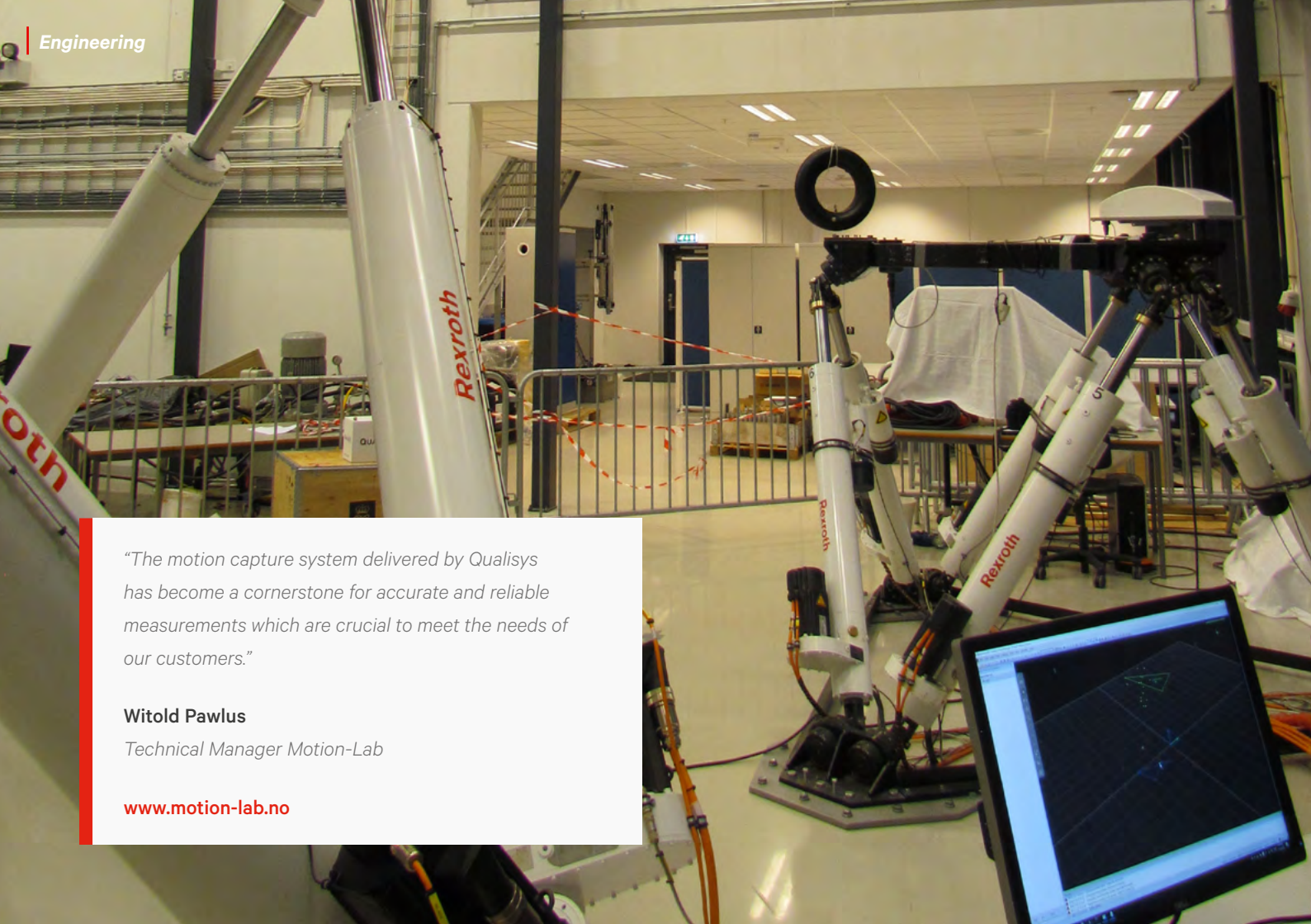
www.ifd.cologne

ENGINEERING

Superior pixel rate, low latency, sub-millimeter accuracy in smaller volumes and measurement distances up to 100 meters have made Qualisys the golden standard within the field of engineering. Our products are used in marine, robotics, and UAV applications, and are also active as an OEM supplier.

Marine applications provide ground-truth data in towing tanks, test basins and other marine research and test facilities, both academic and commercial. We also support a sustainable maritime industry by providing ocean labs with up-to-date motion capture technology.

Cybernetics is concerned with control and communication systems in machinery, and motion capture is used to precisely assess the resultant movement. We design systems for operation in any situation, including marine environments. As an OEM-supplier, we enjoy long-term relationships with companies that use our products in their own applications.



"The motion capture system delivered by Qualisys has become a cornerstone for accurate and reliable measurements which are crucial to meet the needs of our customers."

Witold Pawlus

Technical Manager Motion-Lab

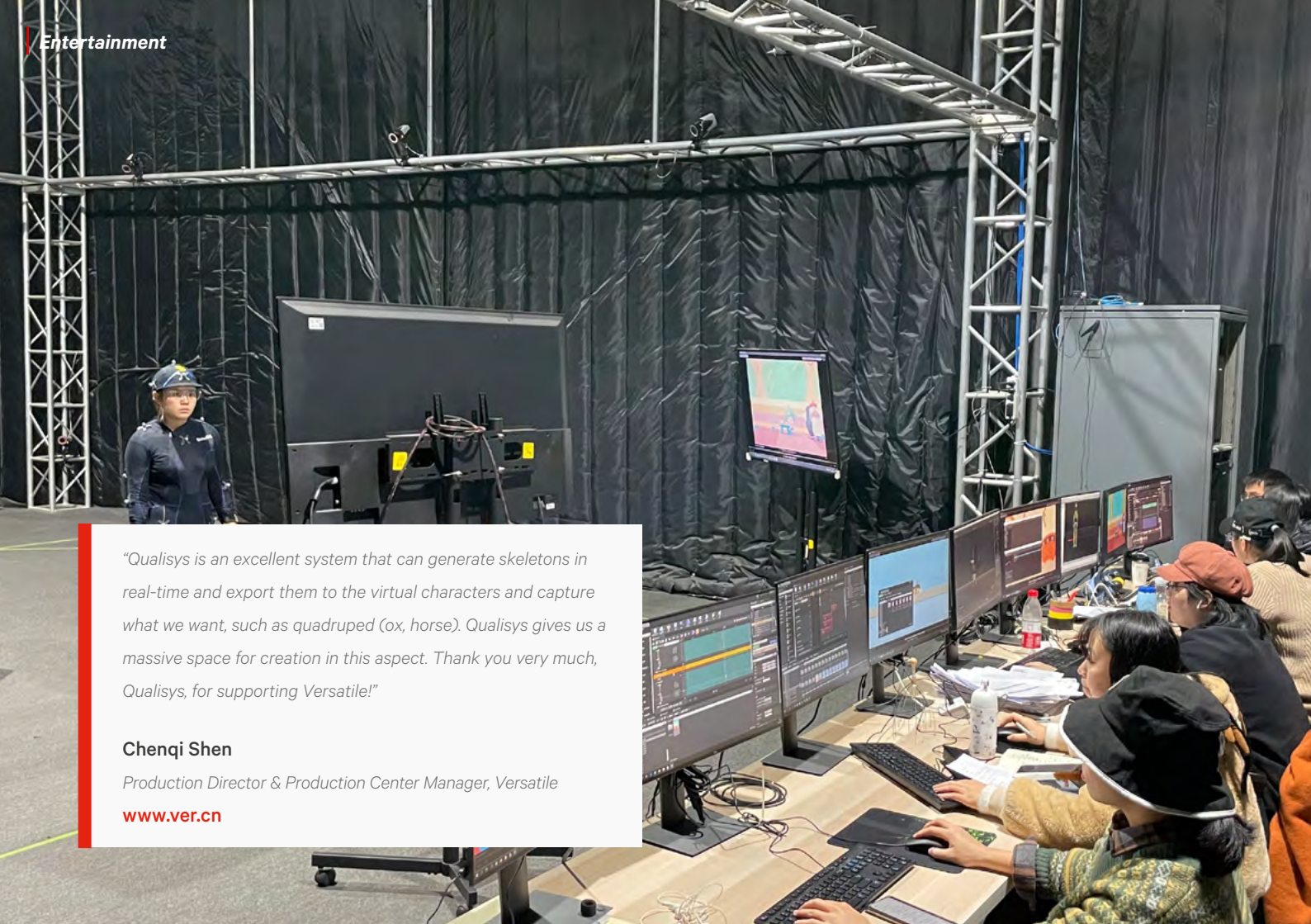
www.motion-lab.no

ENTERTAINMENT

With the emergence of usable and useful virtual reality (VR) and animation technology, our motion capture systems are finding new uses in the entertainment industry.

Track a player or actor's movements within a VR environment or animation studio. High accuracy and low latency are crucial in order to maintain the illusion, and Qualisys technology delivers on both counts. Large volume coverage enabiles the tracking of many players or actors at once, especially with our Active Traqr for Location-based Virtual Reality (LBVR).

Qualisys provides accurate mocap data in the form of optical markers or as solved characters. Skeletal data can be exported or streamed in real-time directly into the game engine or animation software of your liking, such as Unity, Unreal Engine, Maya, MotionBuilder, and iClone Motion LIVE.



"Qualisys is an excellent system that can generate skeletons in real-time and export them to the virtual characters and capture what we want, such as quadruped (ox, horse). Qualisys gives us a massive space for creation in this aspect. Thank you very much, Qualisys, for supporting Versatile!"

Chenqi Shen

Production Director & Production Center Manager, Versatile

www.ver.cn

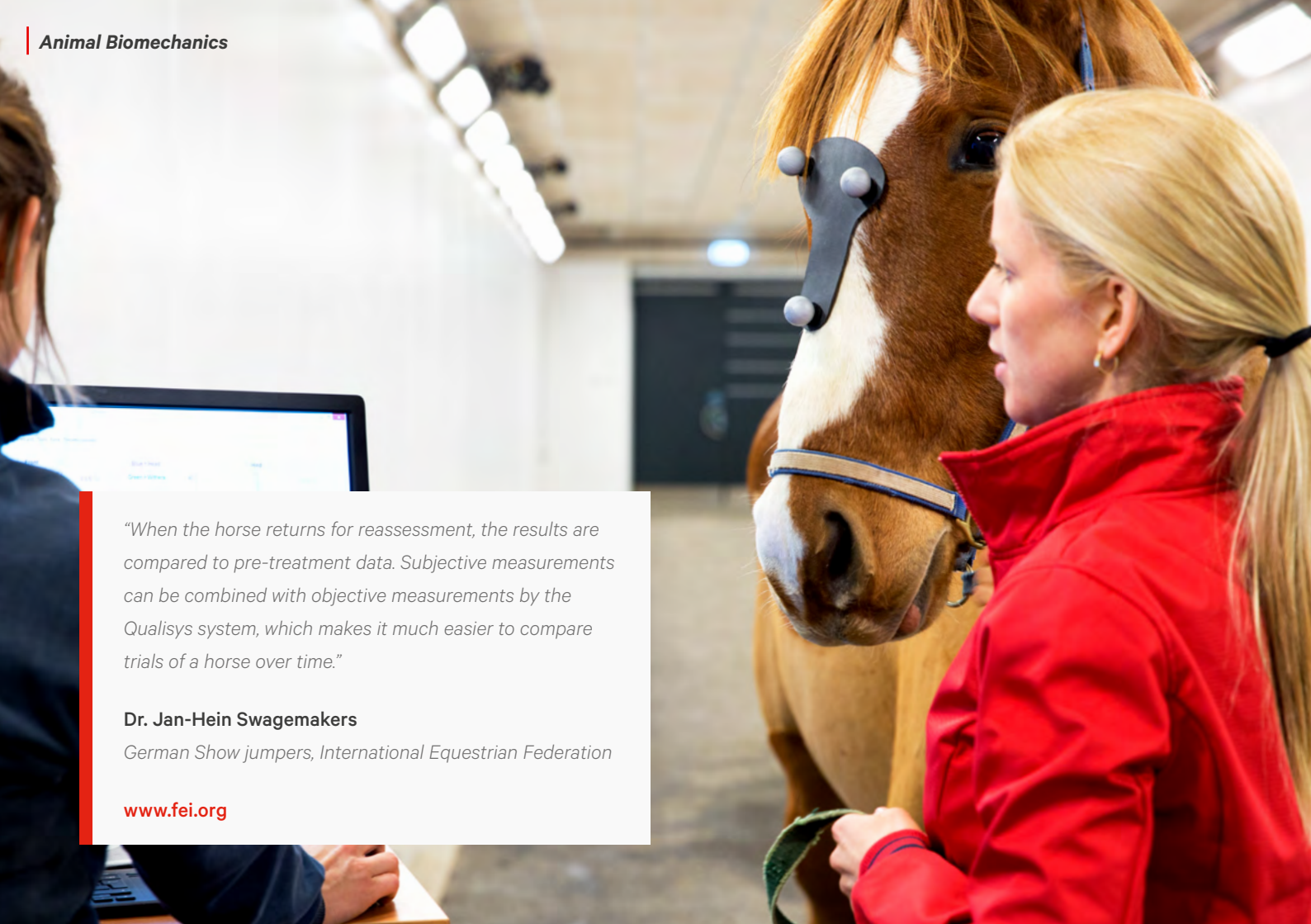
ANIMAL BIOMECHANICS

Our animal biomechanics systems also fall into two categories: research and performance enhancement. Veterinary clinicians are a third user ground within the segment.

In *research*, our systems are used primarily in academic settings, public or private.

They are also used to enhance *performance* in individual animals, in horse racing and other competitive activities. These systems are typically employed in equestrian sports centres, race courses, kennel clubs, and other facilities.

As with humans, Qualisys motion capture systems are also used in *clinical* environments, to provide veterinarians with accurate information for rehabilitation and diagnostics of animals.



"When the horse returns for reassessment, the results are compared to pre-treatment data. Subjective measurements can be combined with objective measurements by the Qualisys system, which makes it much easier to compare trials of a horse over time."

Dr. Jan-Hein Swagemakers

German Show jumpers, International Equestrian Federation

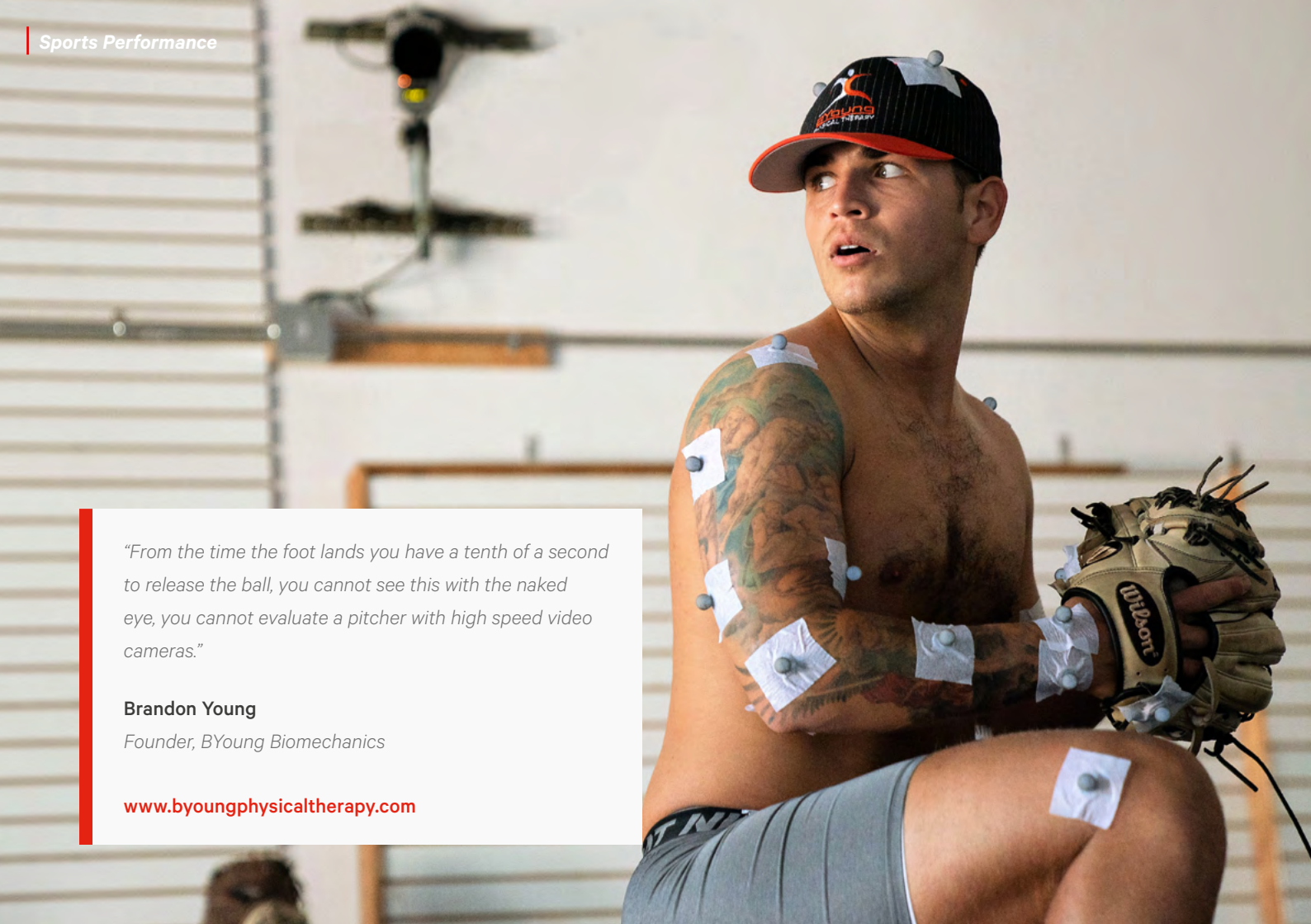
www.fei.org

SPORTS

In sports, Qualisys motion capture technology is used within two main areas: biomechanical sports research and performance enhancement for individual athletes. The technology used is basically the same as in the human biomechanics segment.

Sports Research is conducted in research centers and academic institutions globally. Since research objectives and methods vary, we generally tailor our systems to suit each project.

The *Performance* segment uses the same hardware, but with software adapted to provide readily accessible results to non-specialist, like trainers and athletes. Users include sport clubs, gym franchises and sports goods retailers, the objective being individual performance enhancement. We currently have modules for Running, Cycling, Golf, Baseball and Functional Assessment.



"From the time the foot lands you have a tenth of a second to release the ball, you cannot see this with the naked eye, you cannot evaluate a pitcher with high speed video cameras."

Brandon Young

Founder, BYoung Biomechanics

www.byoungphysicaltherapy.com

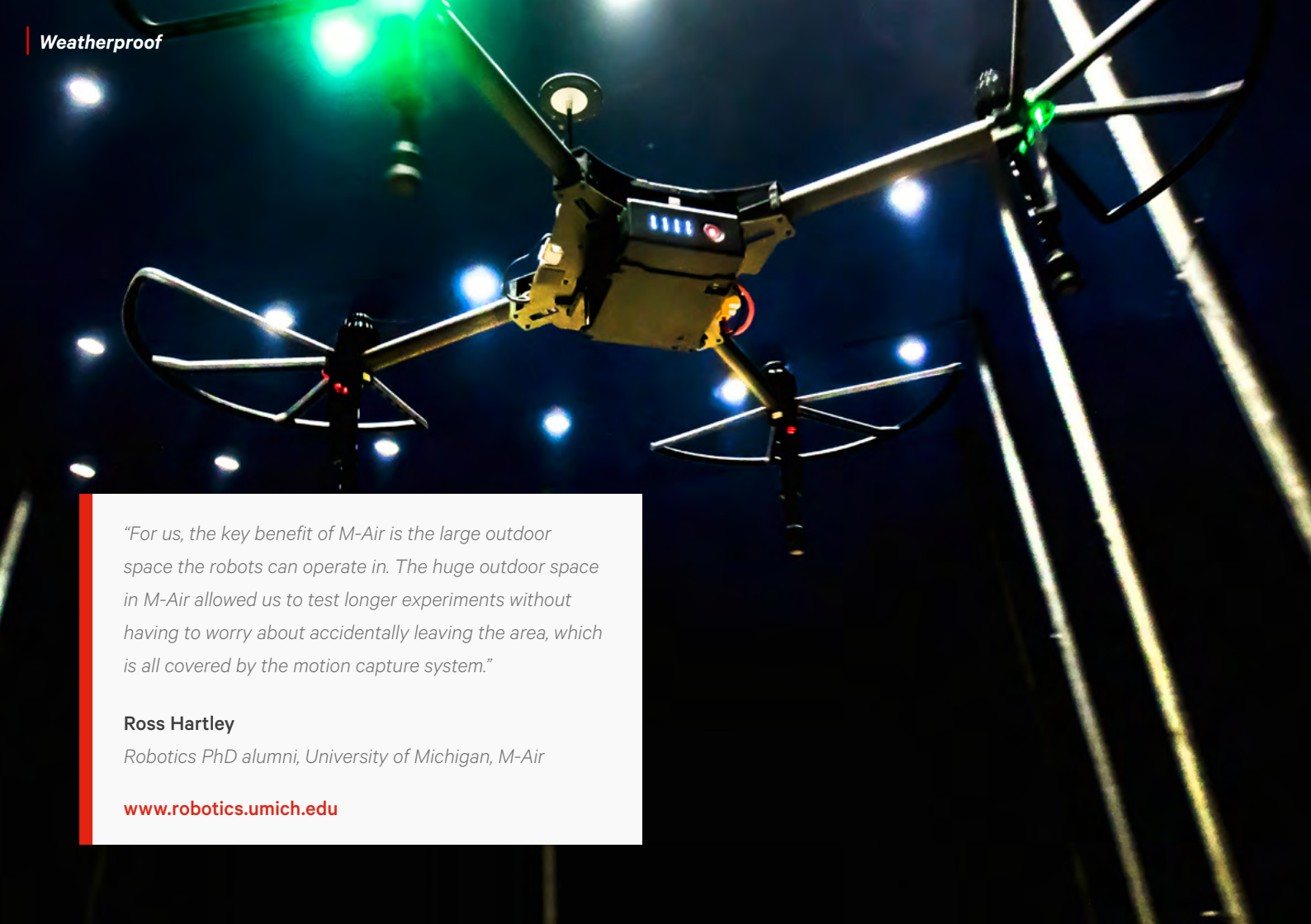
WEATHERPROOF

All Qualisys cameras can be brought outside and get good measuring results. But at extreme conditions or a permanent outdoor installation, we provide models with extra features resulting in excellent tracking in those challenging environments.

Our protected camera models provide extra features resulting in excellent tracking in challenging environments. Whether it's outdoor, underground, hot, or cold, our hardware has proven endurance.

The active filtering function is an in-camera hardware operation that dramatically increases the ability to capture passive markers in an outdoor setting.

Custom-made Sun Filters are available for a selection of cameras, which effectively blocks intense ambient light from interfering with outdoor captures.



"For us, the key benefit of M-Air is the large outdoor space the robots can operate in. The huge outdoor space in M-Air allowed us to test longer experiments without having to worry about accidentally leaving the area, which is all covered by the motion capture system."

Ross Hartley

Robotics PhD alumni, University of Michigan, M-Air

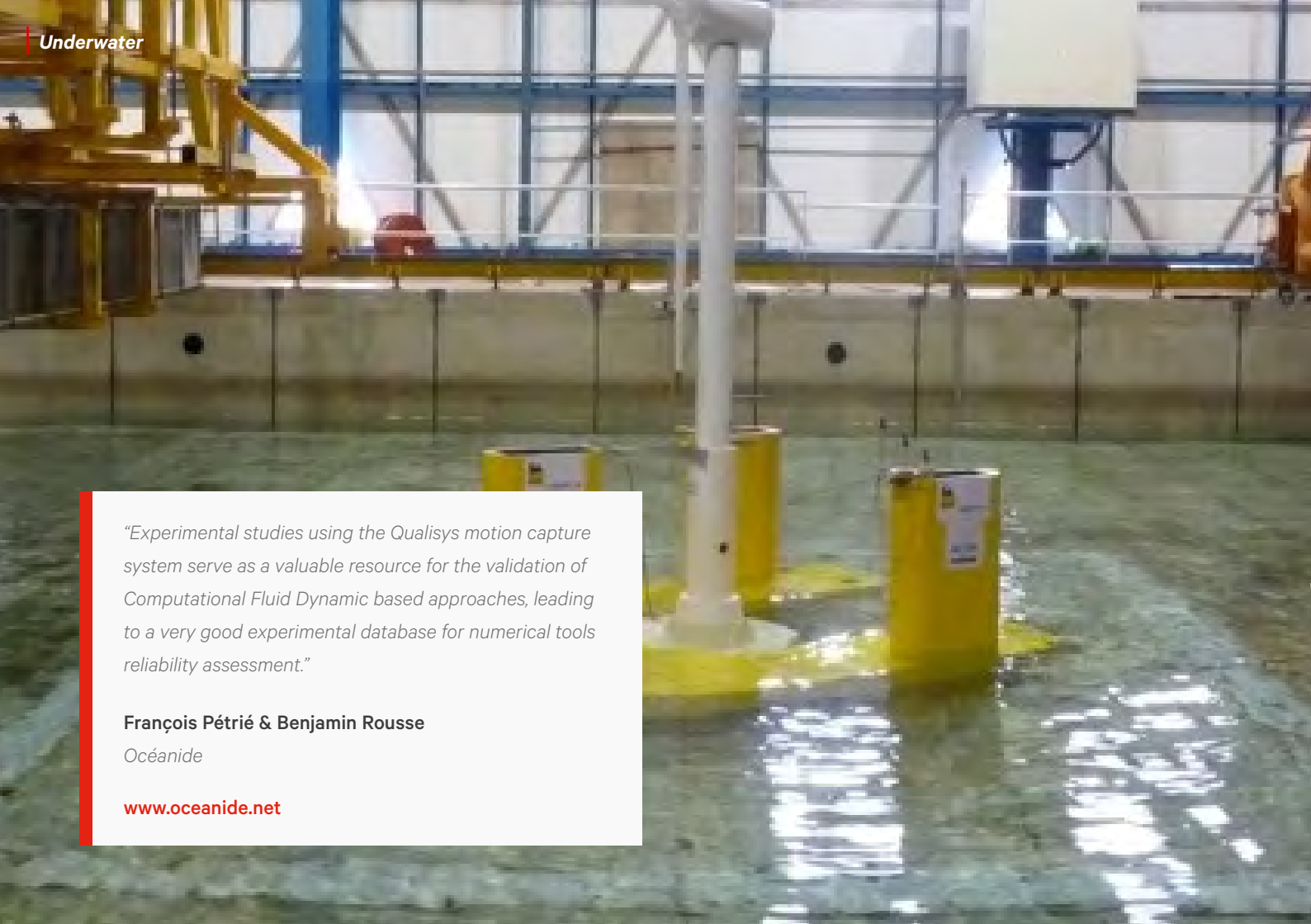
www.robotics.umich.edu

UNDERWATER

Qualisys' underwater cameras are the world's only commercially available optical motion capture cameras for underwater use. All cameras are pressure tested to a depth of 40m. Our motion capture technology allows you to capture motion above water, underwater, or in a combination of both.

Qualisys Underwater cameras include the 7+u - a high-resolution camera capable of covering large volumes while the Miqus M3u and M5u are smaller cameras with a wide field-of-view suitable for smaller volumes in tight

Adding synchronized and calibrated video cameras to both above water and underwater tracking systems is an efficient way to visualize movement by overlaying 3D and 6DOF data onto the image. Alternatively, you may use the video as a standalone reference to monitor applications.



"Experimental studies using the Qualisys motion capture system serve as a valuable resource for the validation of Computational Fluid Dynamic based approaches, leading to a very good experimental database for numerical tools reliability assessment."

François Pétrié & Benjamin Rousse
Océanide

www.oceanide.net

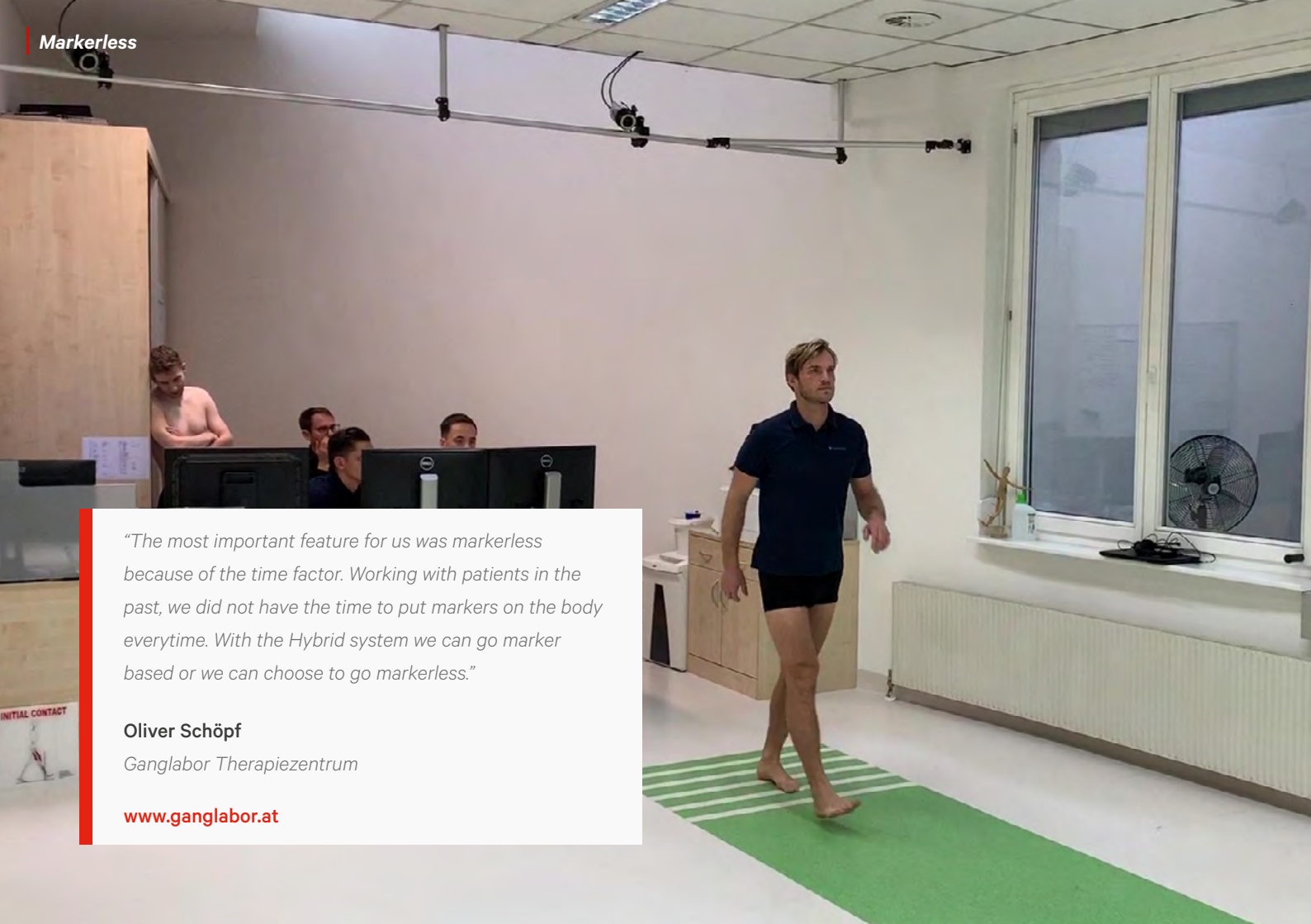
MARKERLESS

Optical marker-based tracking is the most accurate method today if you need a proven and robust tracking solution, but for specific applications, optical markerless tracking is the more suitable option.

A typical system consists of 8-10 Miqus Video or Hybrid cameras. Miqus Video cameras may be combined with any Qualisys marker-based camera system. Miqus Hybrid cameras are truly versatile and can run either in video mode or marker mode

Whether you run a pure Miqus Video or a Hybrid system, Qualisys provides the right platform to collect calibrated and synchronized video data. Calibrate and capture in Qualisys Track Manager while the Theia software tracks and post-processes the data.

The end result is exported as a Visual 3D or web report for select analysis modules, for further analysis and reporting.



"The most important feature for us was markerless because of the time factor. Working with patients in the past, we did not have the time to put markers on the body everytime. With the Hybrid system we can go marker based or we can choose to go markerless."

Oliver Schöpf

Ganglabor Therapiezentrum

www.ganglabor.at

MIQUS



		Miqus M1	Miqus M3	Miqus M5
Normal mode (full FOV)	Pixels	1 MP	2 MP	4 MP
	Resolution	1216 × 800	1824 × 1088	2048 × 2048
	Frame rate	250 fps	340 fps	180 fps
High-speed mode (full FOV)	Pixels	N/A	0.5 MP	0.5 MP
	Resolution		912 x 544	1024 x 1024
	Frame rate		650 fps	350 fps
Camera latency		2.9 ms	2.9 ms	5.5 ms
System latency		5 ms	5 ms	7 ms
Standard lens (FOV)		58 × 40°	64 × 41°	49 × 49°
Optional lens (FOV) wide		N/A	80 x 53°	N/A
Optional lens (FOV) narrow		41 × 27°	44 × 27°	25 x 25
Active filtering (improved outdoor support)		Yes	Yes	Yes
Sun filter		No	No	No
Max range with 16 mm marker		10	15	18
Lens mount		C	C	EF-M

ARQUS




		A5	A9	A12	A26
Normal mode (full FOV)	Pixels	5 MP	9 MP	12 MP	26MP
	Resolution	2560 × 1920	4224× 2160	4096 × 3072	120 × 5120
	Frame rate	700 fps	300 fps	300 fps	150 fps
High-speed mode (full FOV)	Pixels	1 MP	1.5 MP	3 MP	3 MP
	Resolution	1280 × 960	2112 × 1080	2048 × 1536	2560 × 2560
	Frame rate	1400 fps	590 fps	1 40 fps	290 fps
Camera latency		1.4 ms	3.3 ms	53.3 ms	6.7 ms
System latency		5 ms	5 ms	7 ms	31°, 54°, 70°
Standard lens (FOV)		56° × 44°	67° × 37°	54° × 42°	56° × 56°
Optional lens (FOV) wide		77° × 62°	82° × 48°	70° × 56°	77° × 77°
Optional lens (FOV) narrow		29° × 22°	47° × 25°	51° × 24°	29° × 29°
Active filtering (improved outdoor support)		Yes	Yes	Yes	Yes
Sun filter		Yes	Yes	Yes	Yes
Max range with 16 mm marker		26	28	40	32
Lens mount		C	C	EF-M	C

Where we are going

As an innovation-based company, continuing to develop and refine our technology is what drives our future.

Our mission is to be the preferred global partner for performance-enhancing motion capture solutions, based on both technical excellence and the right company culture. We believe in transparency and information sharing, close partnership with our customers and common sense in matters of cost and profit. And everything we do can always be improved.

A long and successful history of developing our hardware and software for specific customers is now resulting in solutions that can also be offered as off the shelf concepts for whole market segments. Our understanding of the developments in this technology now enable us to become a solutions provider in addition to being a tech supplier. As mocap technology finds new uses and users, the demand for concepts that are easy to use and purchase have increased, and with our past experience, Qualisys can help you move with the times.

Qualisys Europe (HQ)
Kvarnbergsgatan 2
411 05 Gothenburg
www.qualisys.com

Qualisys Americas
1603 Barclay Blvd
Buffalo Grove Illinois
60089 USA

Qualisys Asia Pacific
Suite 2611, 26F New Town Center Building
83 Lou Shan Guan Road
Shanghai PRC, 200336

QUALISYS
Motion Capture Systems

Capturing motion everywhere, for example at these fine companies & universities

new balance
MEYER INSTITUTE OF SPORT
OPTIMIZING ATHLETES
salomon
VIRGINIA TECH
VCU
Reebok
GOODBYE KANSAS
Queen's UNIVERSITY
sochi.ru 2014
UMassAmherst
The Commonwealth's Flagship Campus
CALIFORNIA STATE UNIVERSITY FULLERTON
Texas Health
Ben Hogan Sports Medicine
PENNSTATE 1855
ABB
ERICSSON
TOYOTA
1865 THE UNIVERSITY OF MAINE
MARINTEK
HARVARD UNIVERSITY