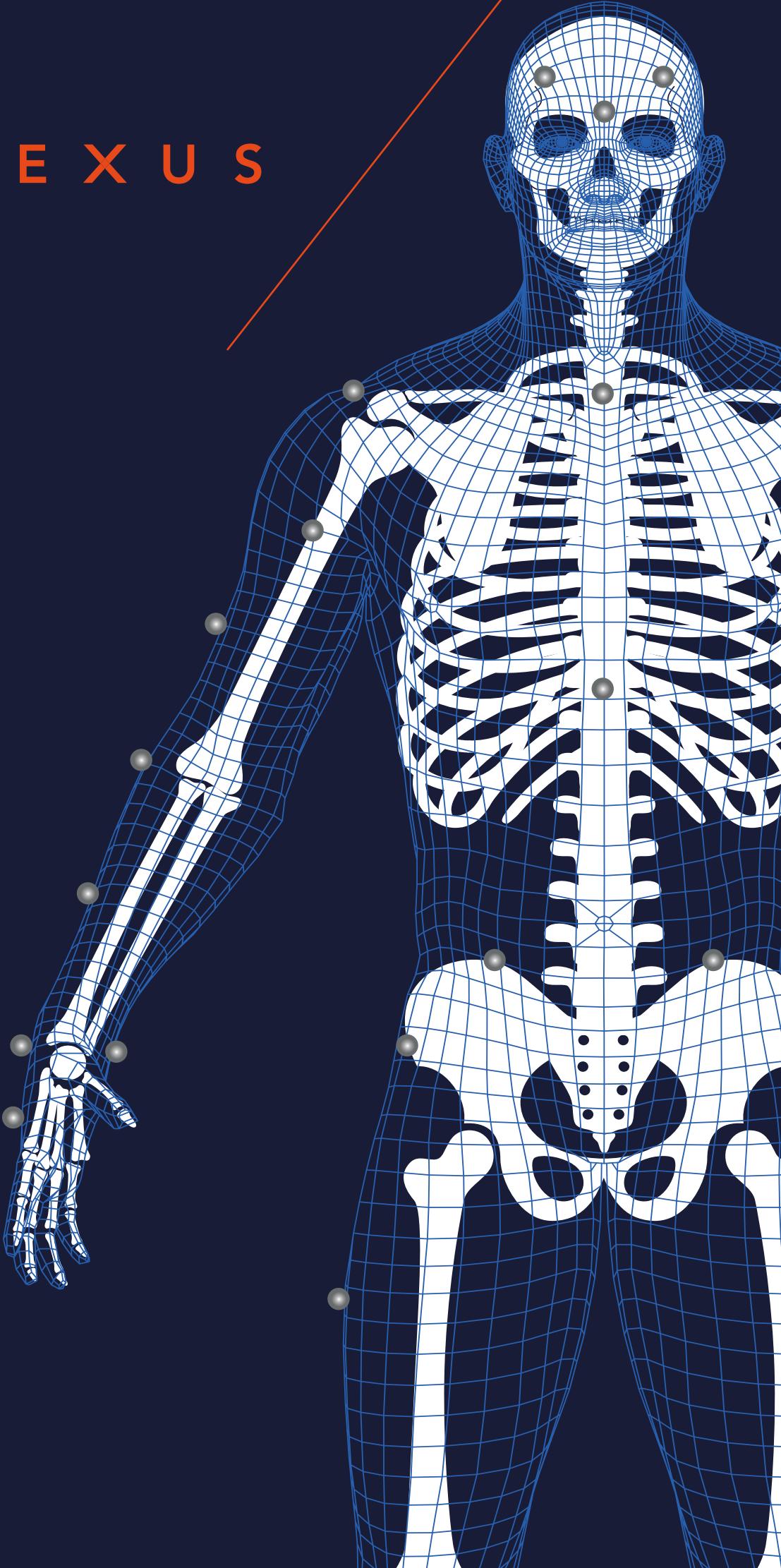


NICON

NEXUS

PART 1  
NATIVE VSTs

A TIP SHEET  
ON THE BASICS



## PART 1 NATIVE VSTS

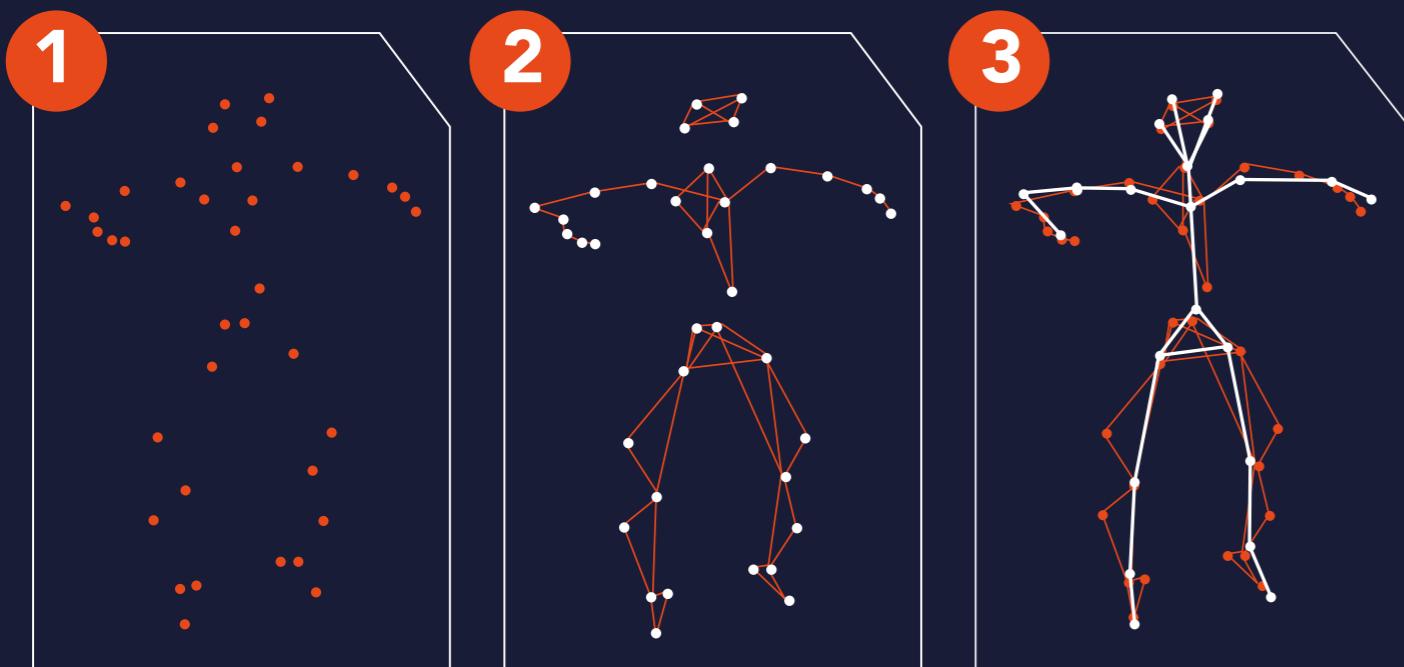
### CONTENTS

- 2 What are VST and VSK files?  
What is a VST used for in Nexus?
- 3 Benefits of Vicon VSTS  
Benefits of Vicon approach
- 6 What native VSTs are in Nexus?
- 7 How do I choose between the native VSTs?
- 8 How do the native VSTs differ?
- 10 Marker placement guidance

## WHAT ARE VST AND VSK FILES?

- A Vicon Skeleton Template (VST): a generic labeling skeleton template that can be applied to any subject and describes the relationship between the markers and the underlying skeleton to which they are attached
- A Vicon Skeleton (VSK): same as above, but calibrated to a specific subject

## WHAT IS A VST USED FOR IN NEXUS?



Individual 3D reconstructed markers generated from the cameras and Nexus platform.

The VST is applied to label the markers.

The subject file is calibrated and the native VST is turned into a VSK with subject-specific segment lengths.

## BENEFITS OF VICON VSTS

The native labeling templates in Nexus allow you to quickly and easily capture and process data from day one. VSTs make automatic labeling easier and more intuitive – without needing to train the model to improve.

These labeling templates are so robust you always get trustworthy data. All of this intelligence is built into Nexus.

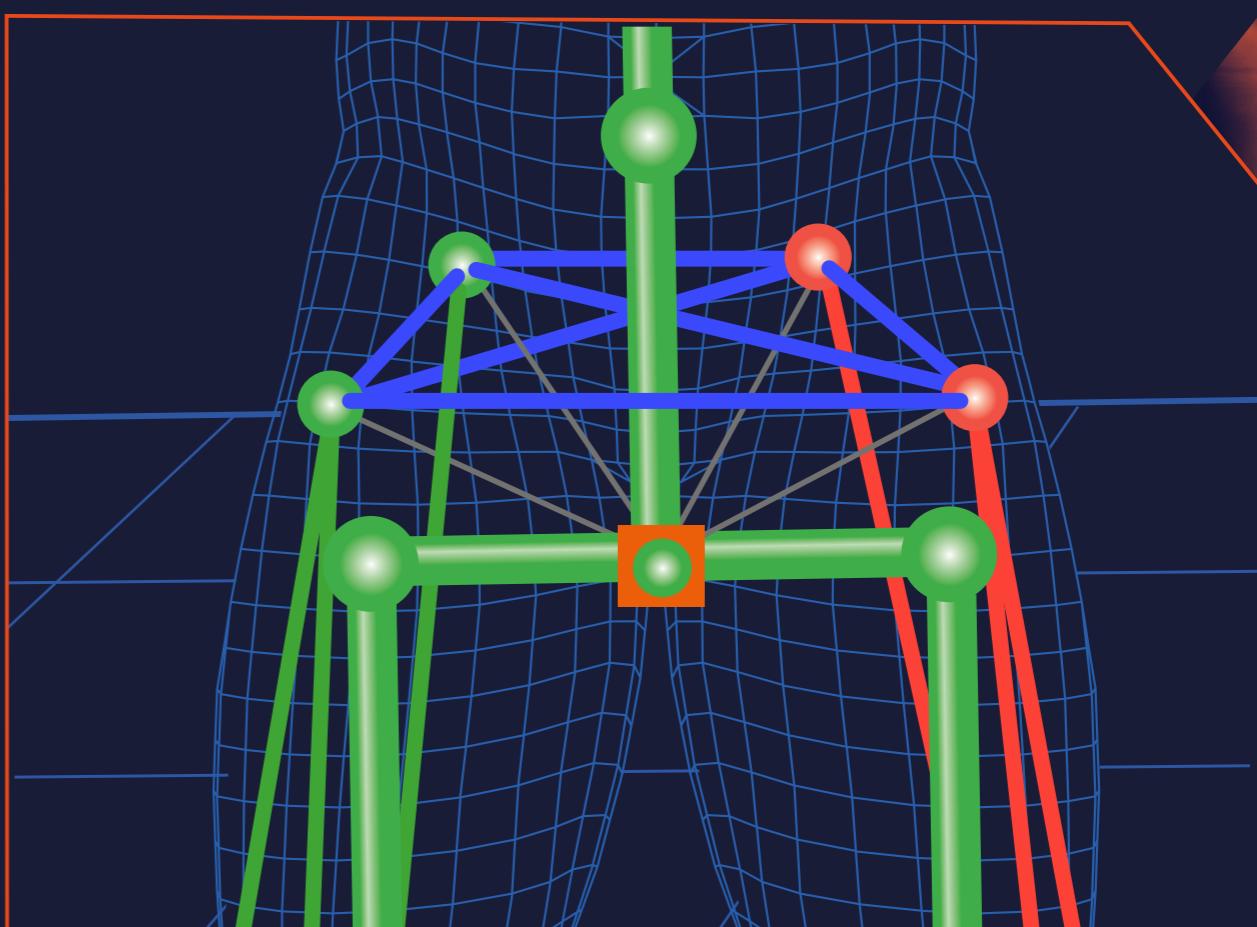
## BENEFITS OF VICON APPROACH

### 1. MARKER MOVEMENT CALCULATED IN RELATION TO THE HUMAN SKELETON

Vicon uses a kinematic skeleton for labeling – this is more accurate than using the distances between markers.

If one of the markers disappears, the labeling won't be affected for the rest of the chain.

The result – markers are consistently robust, and labeled correctly and accurately.



## BENEFITS OF VICON APPROACH

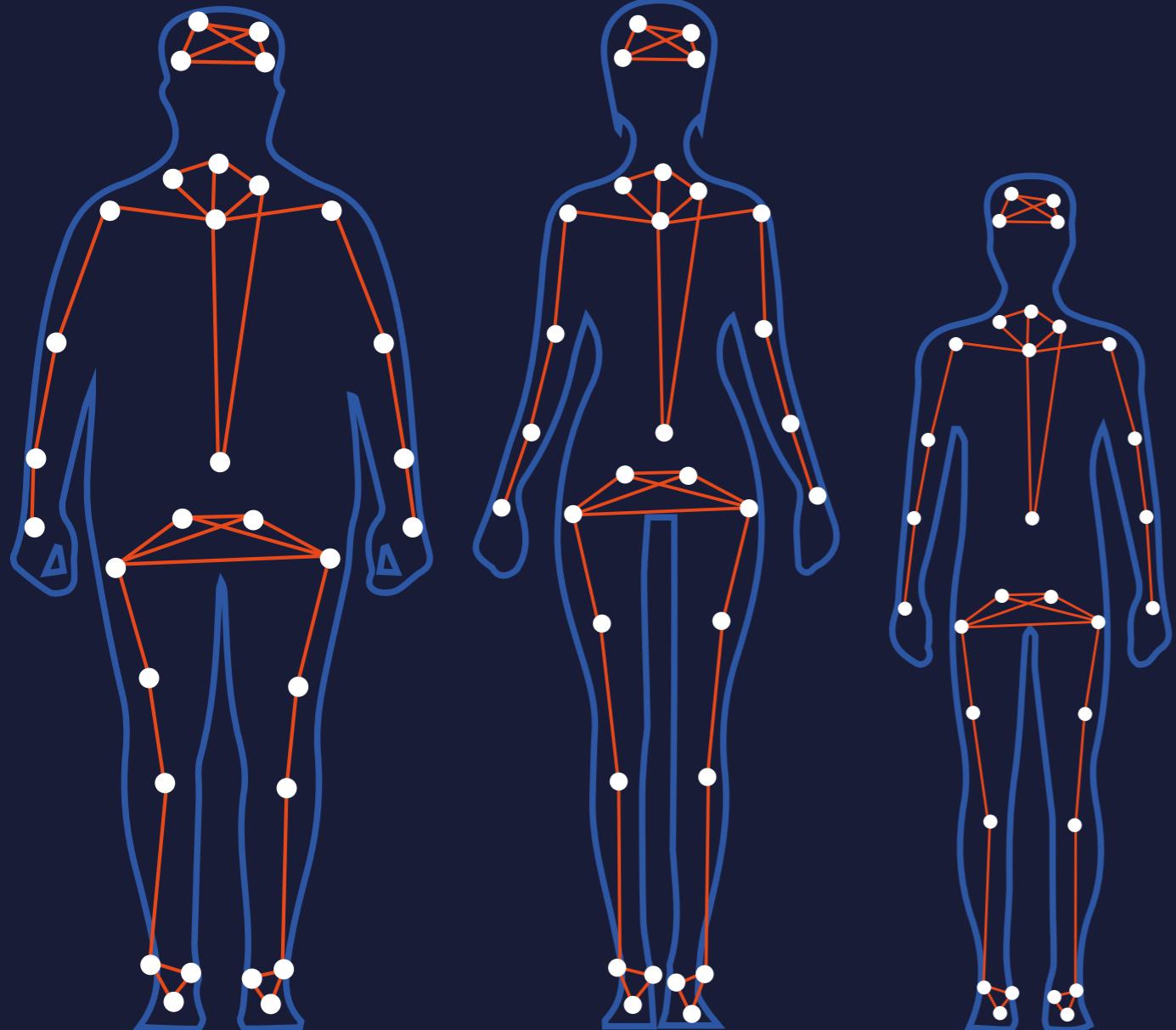
### 2. FIT YOUR SKELETON TEMPLATE PRECISELY TO YOUR SUBJECT

When the subject first enters the lab, they are unknown to the system so you need to calibrate the VST to the person.

The VST contains a neutral pose, allowing the markers to be automatically labeled and the VST to be scaled to the subject.

With a single click, subjects of all sizes can be labeled and calibrated, saving time and preventing users from having to manually label trials.

This approach is unique to Vicon.



### 3. SOFT TISSUE ARTIFACT

Markers aren't connected to the anatomical joint or joint axes unless placed on a bony part of the body e.g., the knee. Even then there's skin, muscle and fat between the marker and joint.

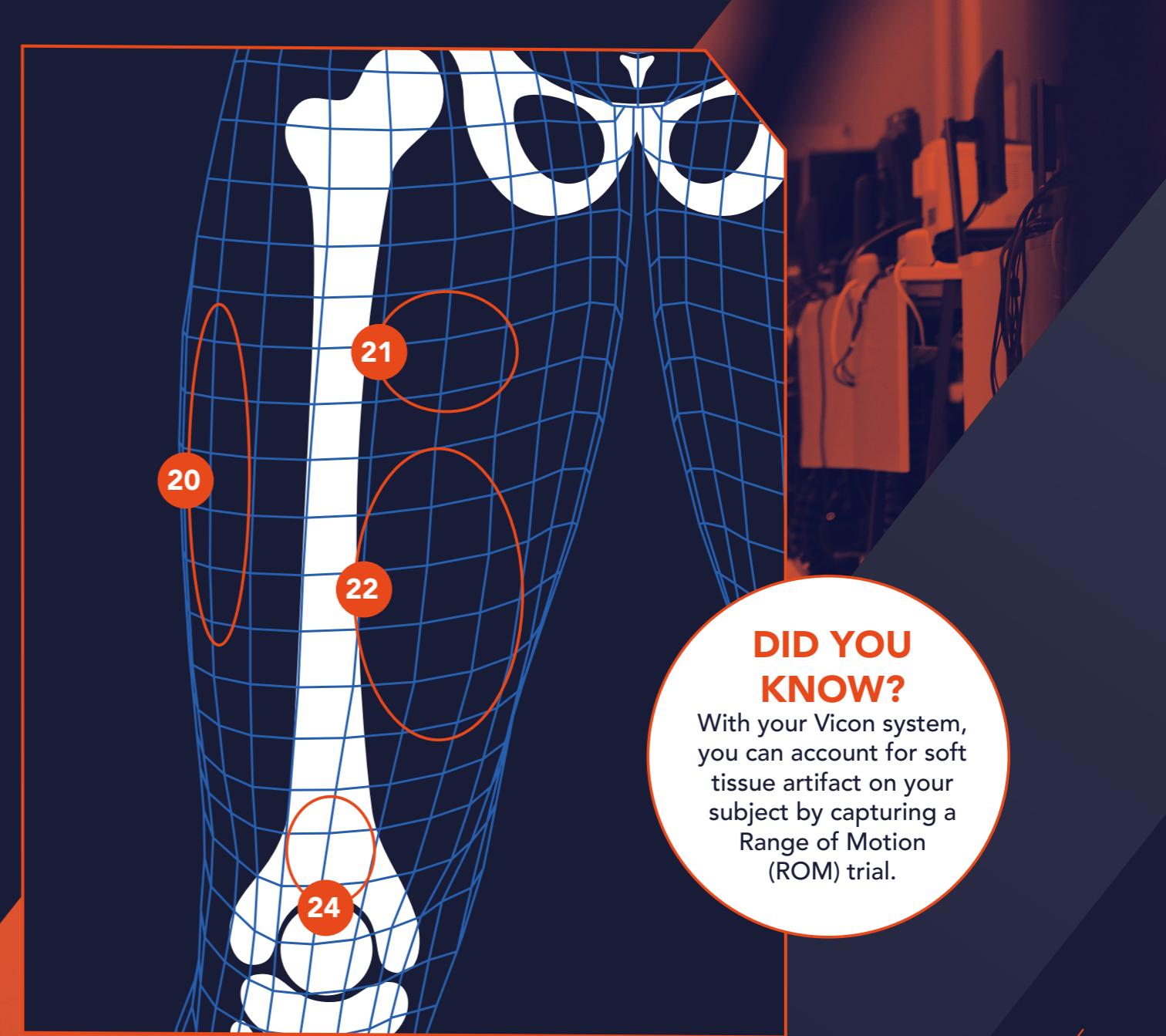
VSTs take the movement of this underlying tissue into account when using the anatomical skeleton to model marker movement.

Every marker is a highly complex 3D trajectory, moving in every plane.

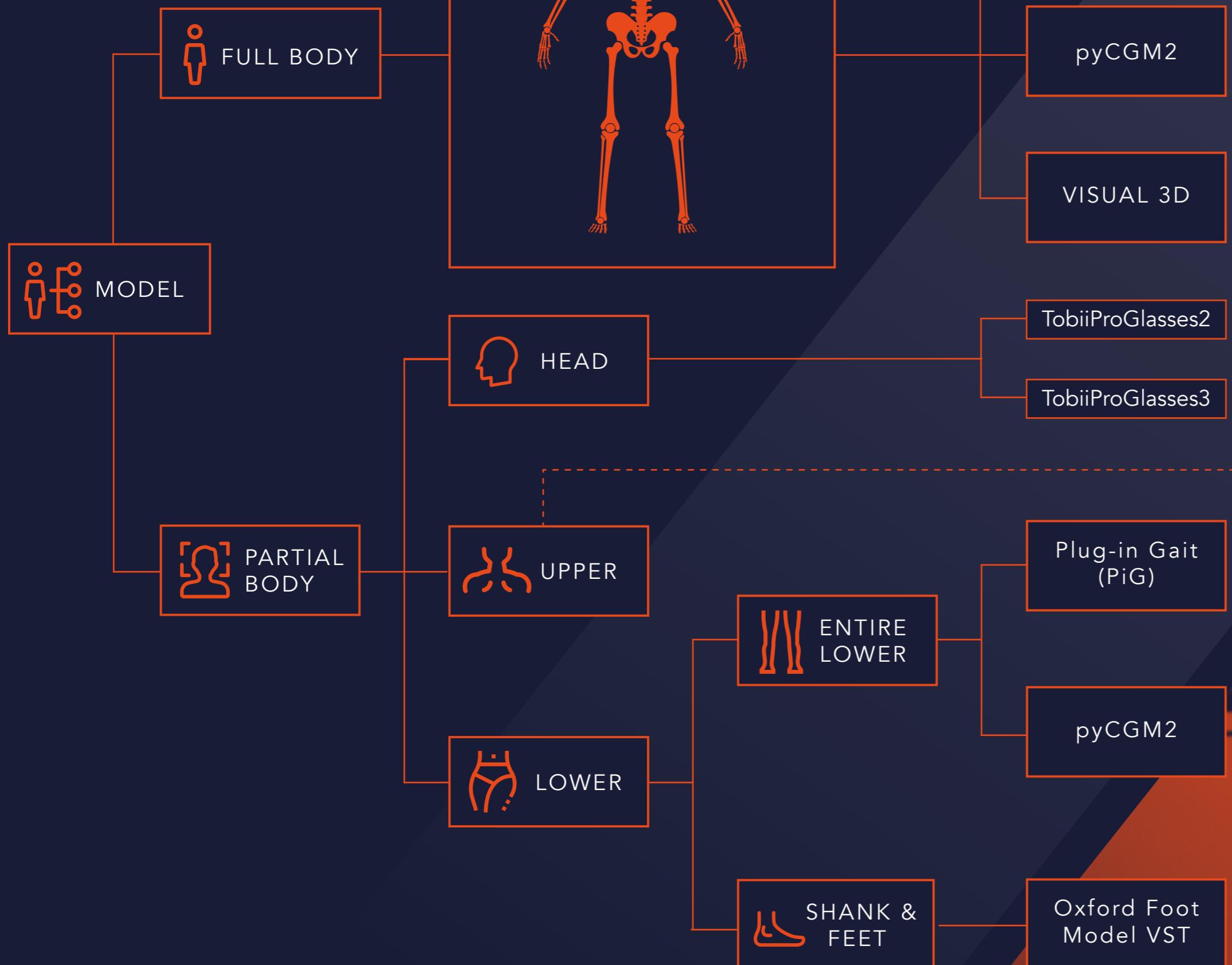
This is especially important when capturing complex sporting movements with multiple subjects, and ensures there are no swapped or mislabeled markers.

This deep biomechanical intelligence is programmed into Nexus.

The result is the most reliable auto-labeling and most consistent tracking available today.



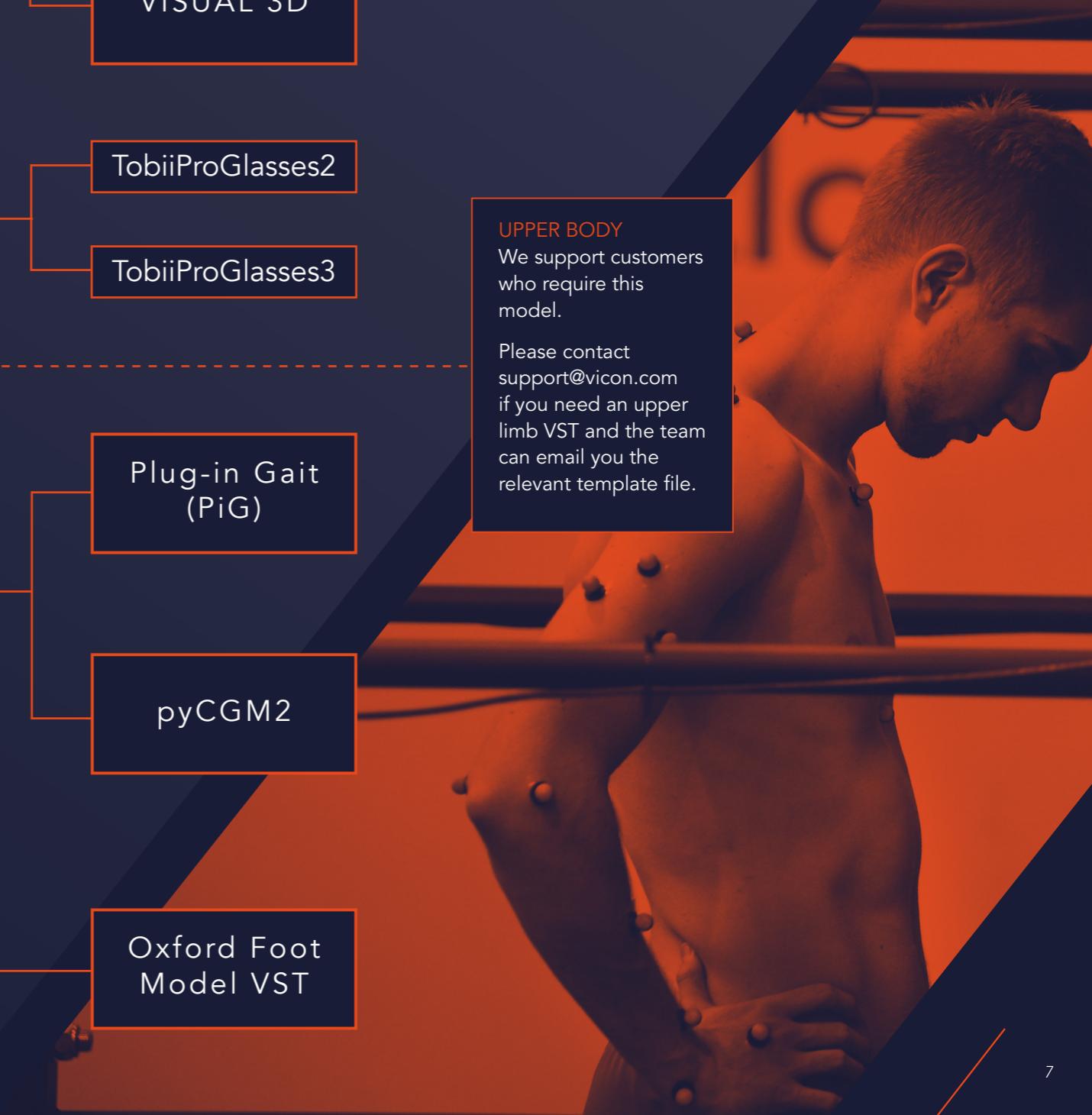
## WHAT NATIVE VSTS ARE IN NEXUS?



## HOW DO I CHOOSE THEM?

VSTs can be used to accurately track any marker layout, full body or partial, on any subject type. When choosing a VST it is important to understand the possible model outputs that the markerset can provide (when a corresponding biomechanical model is applied to the data), and if those outputs meet the clinical or research needs of the user.

**UPPER BODY**  
We support customers who require this model.  
  
Please contact [support@vicon.com](mailto:support@vicon.com) if you need an upper limb VST and the team can email you the relevant template file.



# HOW DO THE NATIVE VSTS DIFFER?

## PLUG-IN GAIT & CGM2 MARKER PLACEMENT, IMAGES & NOMENCLATURE

● = REQUIRED ○ = CALIBRATION ONLY  
◊ = OPTIONAL

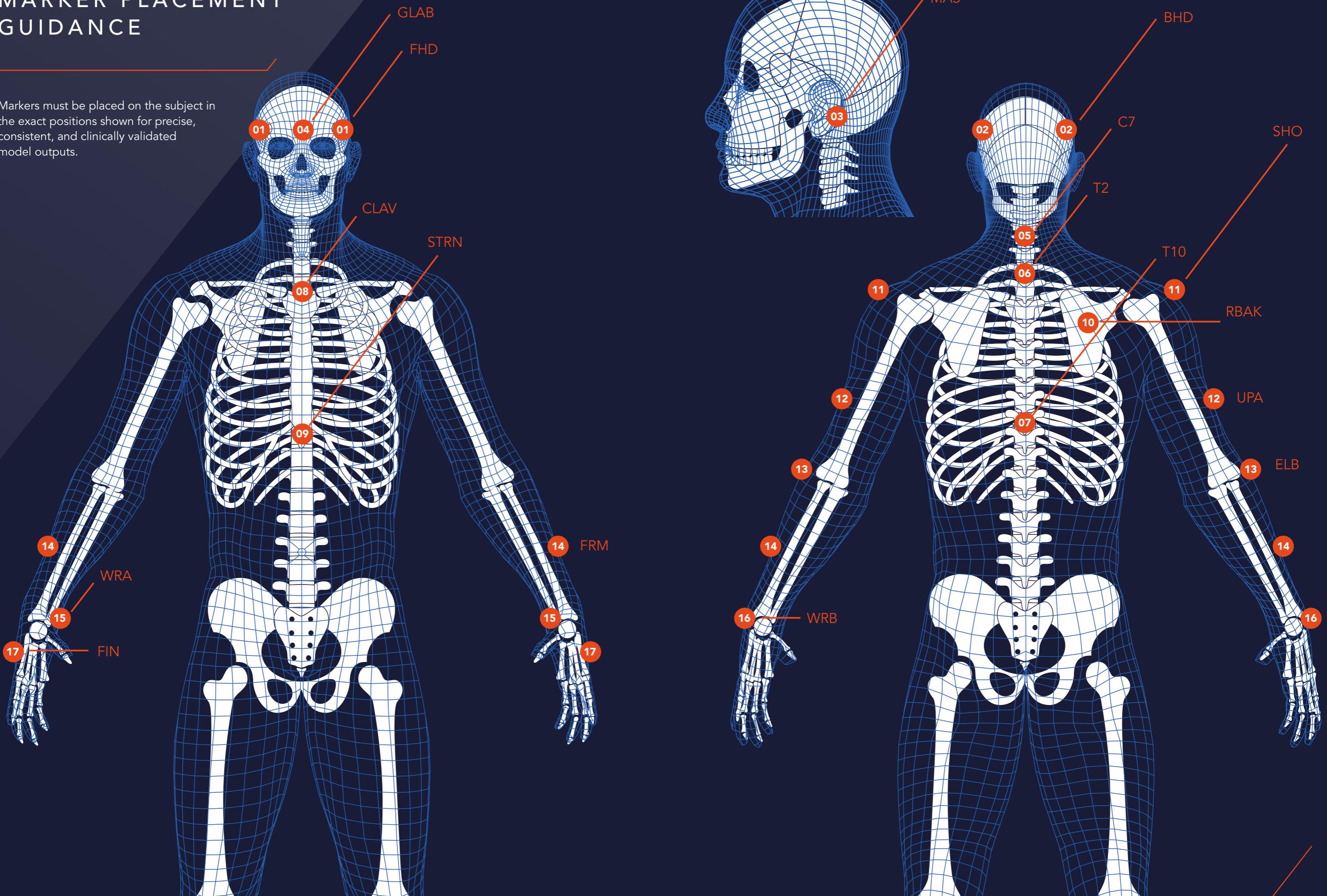
No		Plug in Gait	CGM 1.0	CGM 1.1	CGM 2.1 HJC	CGM 2.2 IK	CGM 2.3 Skin Clusters	CGM 2.4 Forefoot	CGM 2.5 Upper Limb	CGM 2.6 Knee Cal
UPPER BODY	01	LFHD	RFHD	●	●	●	●	●		◊
	02	LBHD	RBHD	●	●	●	●	●		◊
	03	LMAS	RMAS					●		◊
	04	GLAB						◊		◊
	05	C7	●	●	●	●	●	●		◊
	06	T2						◊		◊
	07	T10	●	●	●	●	●	●	●	◊
	08	CLAV	●	●	●	●	●	●	●	◊
	09	STRN	●	●	●	●	●	●		◊
	10	RBAK	●	◊	◊	◊	◊	◊	◊	◊
	11	LSHO	RSHO	●	●	●	●	●	●	◊
	12	LUPA	RUPA	◊	◊	◊	◊	◊	◊	◊
	13	LELB	RELB	●	●	●	●	●	●	◊
	14	LFRM	RFRM	◊	◊	◊	◊	◊	◊	◊
	15	LWRA	RWRA	●	●	●	●	●	●	◊
	16	LWRB	RWRB	●	●	●	●	●	●	◊
	17	LFIN	RFIN	●	●	●	●	●	●	◊
LOWER BODY	18	LASI	RASI	●	●	●	●	●	●	●
	19	LPSI	RPSI	●	●	●	●	●	●	●
	20	LTHI	RTHI	●	●	●	●	●	●	●
	21	LTHAP	RTHAP				●	●	◊	◊
	22	LTHAD	RTHAD				●	●	◊	◊
	23	LKNE	RKNE	●	●	●	●	●	●	●
	24	LKNM	RKNM	◊	○	○	○	○	○	○
	25	LTIB	RTIB	●	●	●	●	●	●	●
	26	LTIAP	RTIAP				●	●	◊	◊
	27	LTIAD	RTIAD				●	●	◊	◊
	28	LANK	RANK	●	●	●	●	●	●	●
	29	LHEE	RHEE	●	●	●	●	●	●	●
	30	LTOE	RTOE	●	●	●	●	●	●	●
	31	LMED	RMED	◊	○	○	○	○	○	○
	32	LFMH	RFMH				●	●	●	
	33	LSMH	RSMH				○	○	○	
	34	LVMH	RVMH				●	●	●	

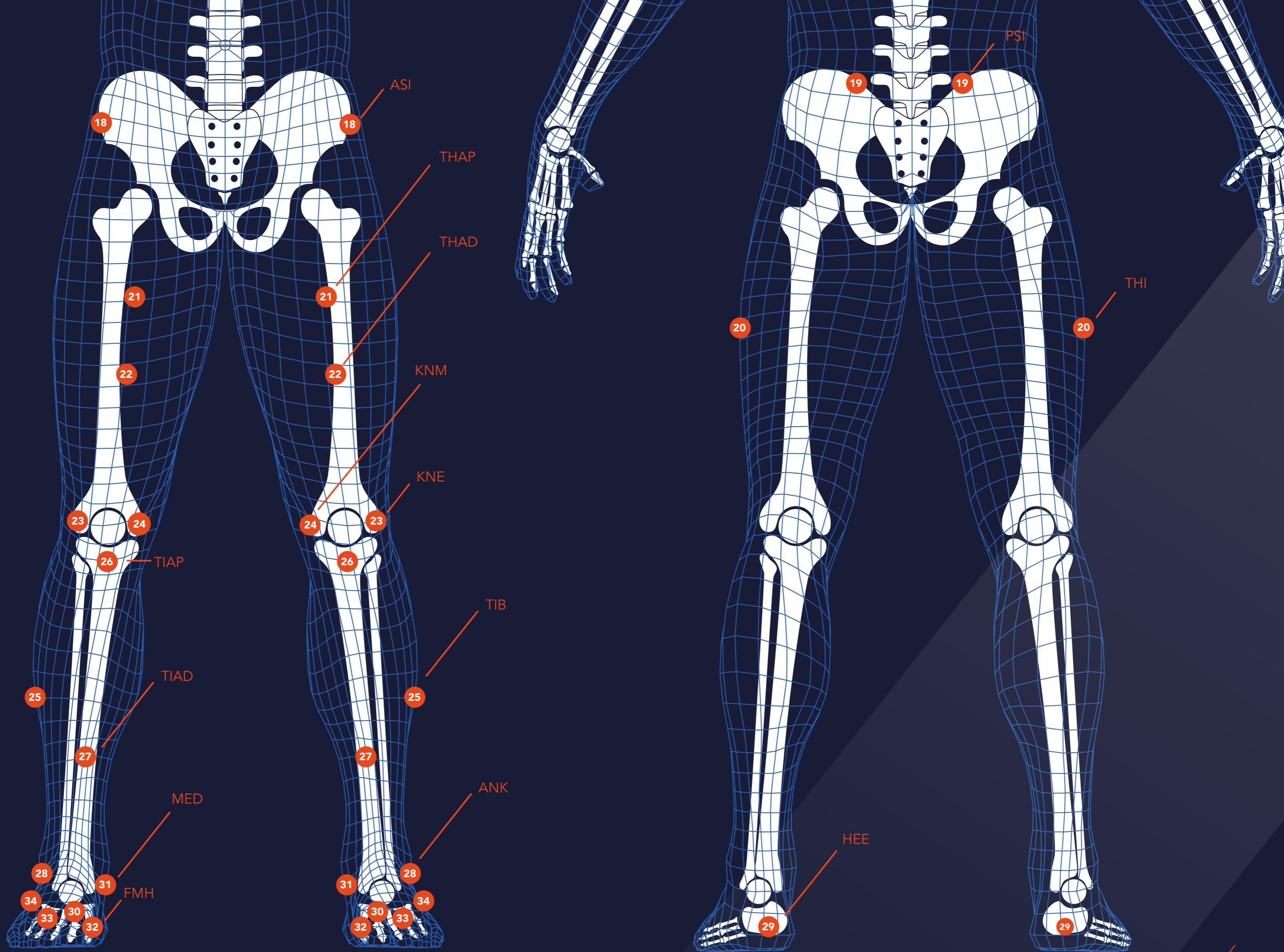
## MARKER PLACEMENT GUIDANCE

No			
01	LFHD	RFHD	Located approximately over the left/right temple
02	LBHD	RBHD	Placed on the back of the head, in a plane roughly horizontal to the front head markers
03	LMAS	RMAS	Placed on the left/right mastoid process
04	GLAB		Placed on the glabella
05	C7		Spinous process of the 7th cervical vertebrae
06	T2		Spinous process of the 2nd thoracic vertebrae
07	T10		Spinous process of the 10th thoracic vertebrae
08	CLAV		Jugular notch where the clavicles meet the sternum
09	STRN		Xiphoid process of the sternum
10	RBAK		Placed in the middle of the right scapula. This marker has no symmetrical marker on the left side. This asymmetry helps the auto-labeling routine determine right from left on the subject
11	LSHO	RSHO	Placed on the acromio-clavicular joint
12	LUPA	RUPA	Placed on the upper arm between the elbow and shoulder markers. Should be placed asymmetrically (left versus right)
13	LELB	RELB	Placed on lateral epicondyle approximating elbow joint axis
14	LFRM	RFRM	Placed on the lower arm between the wrist and elbow markers. Should be placed asymmetrically (left versus right)
15	LWRA	RWRA	Left/Right wrist bar radius side
16	LWRB	RWRB	Left/Right wrist bar ulna side
17	LFIN	RFIN	Placed on the dorsum of the hand just below the head of the second metacarpal
18	LASI	RASI	Placed directly over the left/right anterior superior iliac spine
19	LPSI	RPSI	Placed directly over the left/right posterior superior iliac spine
20	LTHI	RTHI	Place marker half way down the lateral lower leg in such a way that it and the hip and knee joint centers lie in the coronal plane of the femur. Position asymmetrically (in terms of height), left versus right
21	LTHAP	RTHAP	Place the marker one-third of the way down the center of the anterior thigh (use the ASIS marker and the epicondyle markers to define the length of the femur in this instance)
22	LTHAD	RTHAD	Place the marker two-thirds of the way down the center of the anterior thigh (use the ASIS marker and the epicondyle markers to define the length of the femur in this instance)
23	LKNE	RKNE	Placed on the lateral epicondyle of the knee
24	LKNM	RKNM	Placed on the medial femoral epicondyle
25	LTIB	RTIB	Place marker half way down the lateral lower leg in such a way that it and the knee and ankle joint centres lie in the coronal plane of the tibia. Position asymmetrically (in terms of height), left versus right
26	LTIAP	RTIAP	Place just below the tibial tuberosity
27	LTIAD	RTIAD	Place the marker half way down the lower leg on the crest (palpable 'shin') of the tibia
28	LANK	RANK	The lateral malleolus is the distal end of the fibula, located on the lateral ankle
29	LHEE	RHEE	Placed on the calcaneus at the same height above the plantar surface of the foot as the toe marker
30	LTOE	RTOE	Placed over the second metatarsal head, on the mid-foot side of the equinus break between fore-foot and mid-foot
31	LMED	RMED	The medial malleolus is the distal end of the tibia, located on the medial ankle
32	LFMH	RFMH	The 1st metatarsal is the hallux
33	LSMH	RSMH	Place the center of the marker on the line of the second metatarso-phalangeal joint so that the marker is in the center of the bone (from medial to lateral)
34	LVMH	RVMH	The 5th metatarsal is the most lateral of the metatarsal bones. The base of the metatarsal is the most prominent part of the bone

## MARKER PLACEMENT GUIDANCE

Markers must be placed on the subject in the exact positions shown for precise, consistent, and clinically validated model outputs.







**For more information visit our website or contact us.**

[www.vicon.com/life-sciences](http://www.vicon.com/life-sciences)

[www.vicon.com/nexus](http://www.vicon.com/nexus)

[support@vicon.com](mailto:support@vicon.com)

[www.youtube.com/c/ViconLifeSciences](http://www.youtube.com/c/ViconLifeSciences)



Copyright © 2020–2022 Vicon Motion Systems Ltd. All rights reserved.  
Vicon® is a registered trademark of Oxford Metrics plc. Vicon Nexus™ is a trademark of Oxford Metrics plc. Other product and company names herein may be the trademarks of their respective owners.

**VICON DENVER**  
7388 S. Revere Parkway  
Suite 901  
Centennial  
CO 80112 , USA  
T:+1.303.799.8686  
F:+1.303.799.8690

**VICON LA**  
9469 Jefferson Blvd  
Suite 114  
Culver City  
CA 90232 USA  
T:+1.310.437.4499  
F:+1.310.388.3200

**VICON OXFORD**  
6, Oxford Industrial Park  
Yarnton  
Oxford  
OX5 1QU  
T:+44.1865.261800