Nexus is the most powerful all-inclusive modeling and processing tool for movement analysis on the market. Created specifically for the whole life sciences community, Nexus delivers precise, repeatable and clinically validated data.

With more than 90% of our product enhancements driven by customer feedback, Nexus 2.13 is the latest version of our most trusted motion capture software.

Learn more about the new features and benefits of Nexus 2.13, together with some insights from Dr. Fabien LeBoeuf (Nantes Hospital, France and Research associate, University of Salford, UK) on the latest developments in Conventional Gait Modeling.
WHO IS NEXUS FOR?

GAIT ANALYSIS & REHABILITATION
- Doctors & surgeons
- Military
- Physiotherapists
- Clinical scientists
- Postgrad research
- Undergrad teaching

NEUROSCIENCE & MOTOR CONTROL
- Clinical scientists
- Doctors & surgeons
- Postgrad research
- Undergrad teaching
- Physiotherapists

ANIMAL SCIENCE
- Veterinary doctors
- Researchers
- Trainers
- Postgrad research
- Undergrad teaching

SPORTS PERFORMANCE & BIOMECHANICS
- Performance analysts
- Commercial research
- Strength & conditioning
- Physiotherapists
- Coaches or trainers
Nexus sets a standard for motion capture. With a host of new automated features, intelligent processing, flexible controls, and Vicon IMU integration; Nexus enables you to focus on the research, not the software.

**SAVE TIME WITH HIGHLY CUSTOMIZABLE YET SIMPLE PROCESSING PIPELINES**

- Customize your workflow to save time by automating common processing tasks.
- Create a series of steps with the Biomechanics Workflow Builder to combine data collection and offline processing, making it simple to get started with the SCoRE and SARA Functional Calibration.
- Use offline Python/MATLAB capabilities.
- Review labeling quality and automatically detect and fill gaps.
- Manage your data via Vicon’s database management tool, ProEclipse.

**POWERFUL ANALYSIS AND MODELING OF DATA**

Capturing the data is just the first step. Modeling is where the real analysis can begin. Modeling should be intelligent and advanced, designed specifically for life sciences.

- Powerful native and compatible modeling, you can process data using scripts created in Vicon BodyBuilder, Python, MATLAB, and Vicon ProCalc.
- Automated labeling
- Real-time calibration feedback
- Native PiG and CGM2 – can run concurrently to compare datasets

Poor quality, inconsistent data can have a severe impact on decision-making. You need precise and repeatable results from high-quality, clinically validated data.

- Four times more research papers on CGM than any other model*
- Real-time data stream
- Precise and repeatable data capture
- Camera calibration feedback helps to achieve consistent calibrations in the lab, to maintain data standards.

*Google Scholar, Feb 2019
The CGM2 project aims to address the limitations of the CGM while maintaining its strengths.

Dr. Fabien LeBoeuf
**CONVENTIONAL GAIT MODEL 2 – CGM2 – IS AN OPEN SOURCE IMPLEMENTATION THAT REPRODUCES THE PAST, BUT PREPARES FOR THE FUTURE.**

Dr. LeBoeuf’s research concentrated on extensive investigations on the localization of the hip joint center (HJC) to evaluate its impact on kinematics and kinetic CGM outputs. Previously, no study had investigated the effect of HJC mislocation, because the CGM had been implemented in a proprietary commercial package that could not be modified. CGM2 allows you to modify all the parameters of the CGM and its kinematic and kinetic processing. Nexus provides direct native pipeline integration to process your CGM2 data using scripts created in Python, MATLAB and Vicon ProCalc. Nexus meets the modeling needs to enable the comprehensive integration of research pipelines and is equally suitable for quick in-class tuition. It is the most robust, repeatable and reliable real-time labeling and skeletal solving solution available for biomechanics.

**CGM2.2 Upper Body Kinematics**

Calibrates a rigid segment model to the data captured during a static trial and uses inverse kinematics to track marker trajectories captured during the walking trials.

**CGM2.3 Extended Foot Model**

Incorporates a two-segment foot model, where the rear foot model is an adaptation of the CGM foot segment, and a new, additional forefoot segment is added.

**CGM2.4 Knee Calibration**

Removes thigh and desk wand markers from the thigh and shank regions captured during the walking trials that were not used.

**CGM2.5 Upper Body Model**

Selects which part of the upper body model.

**CGM2.6 Skin Clusters**

Model clusters for upper thorax and skin clusters for upper legs and upper arms were added.

**CGM2.1 Hip Joint Center Accuracy**

Uses the regression equations of Hara et al. (2016) to estimate the center of the hip joint based on a measurement of leg length taken from the measured position of markers during the static calibration trial. Dr. LeBoeuf's research concentrated on extensive investigations on the localization of the hip joint center (HJC) to evaluate its impact on kinematics and kinetic CGM outputs. Previously, no study had investigated the effect of HJC mislocation, because the CGM had been implemented in a proprietary commercial package that could not be modified. CGM2 allows you to modify all the parameters of the CGM and its kinematic and kinetic processing. Nexus provides direct native pipeline integration to process your CGM2 data using scripts created in Python, MATLAB and Vicon ProCalc. Nexus meets the modeling needs to enable the comprehensive integration of research pipelines and is equally suitable for quick in-class tuition. It is the most robust, repeatable and reliable real-time labeling and skeletal solving solution available for biomechanics.

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Easily calibrate and configure the system. Seamlessly connect devices via the Vicon Control app. Prepare subjects by creating subject templates, calibrating labeling skeleton templates, creating pipelines, to increase the speed and accuracy of processing data.

The data-processing engine automatically initializes the labeling of your subject, removing the need to label manually. Nexus can automatically detect gaps and display information about labeling quality, enabling quick data correction if needed.

Nexus enables you to capture muscle activity and movement, review trials, assess foot strikes and review data quality. The system identifies events and fills gaps in your data.

Perform modeling, using PiG or CGM2 to derive kinematics and kinetics, or Oxford Foot Model for kinematics. Input subject measurements for PiG or full body analysis. Working with inertial sensors, you can capture, manage, import and export IMU data. Process digital video files and export trial data with 3D video overlay, ASCII or C3D.

WHAT CAN YOU DO WITH NEXUS?

AUTOMATE PROCESSING OPERATIONS

Save time with highly customizable, automated processing operations. You can review your processing history and quickly pull off reports. Create custom pipelines for common processing tasks.

With direct native pipeline integration, you can process data using scripts created in Vicon BodyBuilder, Python, MATLAB and Vicon ProCalc.
Nexo 2.10 can seamlessly integrate with Vicon’s market-leading IMU, Blue Trident, via its wireless network device, Beacon. By adding inertial sensors into the optical world, you can collect synchronized optical and inertial data in one platform.

**HARD SYNC**
Precise timing of inertial to optical data.

**QUATERNIONS**
When combining Blue Trident with Nexus you can describe global joint angles with three-dimensional orientation and rotation.

**OPEN SOUND CONTROL INTEGRATION**
Open Sound Control is the protocol for communication among computer and sound synthesizers for networking technology. Nexus now provides options for streaming data in OSC format, enabling live synchronized or offline. Data can be accessed by any platform that supports OSC for real-time control of sound and other media processing.

**Tobii Eye Tracker Integration**
Tobii’s latest eye tracker is integrated into Nexus 2.10, enabling streaming of synchronized eye-gaze tracking with optical data.

**WHAT’S NEW IN 2.10**
With Vantage+ every single Vantage camera takes another leap forward, giving users enhanced speed and flexibility.

This upgrade to all Vantage hardware offers two ways to increase camera speeds, giving you the flexibility to capture at the speed you want in the way you want, all delivered to your existing set-up via Nexus.

For users capturing high-velocity subjects such as athletes, Vantage+ opens up new possibilities when it comes to tracking at extreme speeds.

**HIGH SPEED MODE**
Our new Vantage+ High Speed Mode allows users to capture fast-moving subjects at higher frame rates, without sacrificing field of view (FOV), by selectively reducing pixel count.

**WINDOWING**
Vantage’s existing windowing functionality improves camera speed while maintaining resolution by reducing FOV.
THEIA MARKERLESS TRACKING

Nexus 2.12 takes markerless tracking within the Vicon ecosystem to the next level. Theia Markerless can now be combined with Vicon's optical tracking, enabling you to capture otherwise technically challenging sports and functional sports assessments. Nexus 2.12 adds direct joint outputs that can easily be imported back into Nexus for you to compare to your optical data.

THEIA MARKERLESS TRACKING

Nexus 2.12 deepens the integration of partner technology into the Vicon ecosystem, offering improvements in markerless capture, eye-tracking and Python support.

Tobii Pro Glasses 3 deliver Tobii Pro's most frictionless eye-tracking experience yet. Built to mimic the design of regular glasses and fit under protective gear such as helmets, the design allows users to interact with their environment in an entirely natural way.

Meanwhile, the scene camera's wide field of view delivers comprehensive data while enabling an unobstructed view for the wearer.

PYTHON 3 COMES TO NEXUS

Nexus 2.12 gives users complete freedom to work with their data in the way that they want thanks to support for the latest version of Python 3.

ALSO INCLUDED IN NEXUS 2.12:
- Forceplate detection to enable users to run a filter pipeline
- The latest Blue Trident software for IMU users
- The latest CGM2 update

ENHANCED VIDEO SUPPORT

Nexus 2.13 deepens your Vicon system's video compatibility, making it easier than ever to compare marker data with reference footage.

The update supports Blackfly S USB3 FLIR cameras into the Vicon ecosystem, while a new Vicon codec enhances compression of video files (H.264) for more efficient processing.

Nexus 2.13 also makes significant quality of life improvements to other aspects of your Vicon system, with the ability to change region of interest and binning mode. It adds support for 64-bit processors for longer captures while enabling better quality with the Blackfly S USB3 (BFS-U3-23S3C-C) - a 2.3MP camera which can capture up to 190Hz*.

Vue and FLIR video cameras are supported together.

*Capture mode dependent.

Vue and FLIR video cameras are supported together.
For more information visit our website or contact us.
www.vicon.com/lifesciences
www.vicon.com/nexus

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**NEXUS SHORTCUTS**

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<th>Key</th>
<th>Description</th>
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<tbody>
<tr>
<td>F1</td>
<td>Vicon Nexus help</td>
</tr>
<tr>
<td>F2</td>
<td>Data management</td>
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<tr>
<td>F4</td>
<td>Quick Reports window</td>
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<tr>
<td>F5</td>
<td>Full screen</td>
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<tr>
<td>F6</td>
<td>Sounds dialog box</td>
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<tr>
<td>F7</td>
<td>Options dialog box</td>
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<tr>
<td>F8</td>
<td>System Preparations Tools pane</td>
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<tr>
<td>F9</td>
<td>Subject Preparations Tools pane</td>
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<tr>
<td>F10</td>
<td>Capture tools pane</td>
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<tr>
<td>F11</td>
<td>Label/Edit Tools pane</td>
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<tr>
<td>F12</td>
<td>Pipeline Tools pane</td>
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</tbody>
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**NEXUS HOTKEYS**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Ctrl+Enter</td>
<td>Start / stop capture</td>
</tr>
<tr>
<td>Ctrl+Tab</td>
<td>Switch live / offline mode</td>
</tr>
<tr>
<td>Ctrl+Space</td>
<td>Display/Hide marker labels</td>
</tr>
<tr>
<td>Ctrl+←</td>
<td>Move to previous event</td>
</tr>
<tr>
<td>Ctrl+→</td>
<td>Move to next event</td>
</tr>
<tr>
<td>Ctrl+Z</td>
<td>Undo</td>
</tr>
<tr>
<td>Ctrl+Y</td>
<td>Redo</td>
</tr>
<tr>
<td>Ctrl+S</td>
<td>Save trial</td>
</tr>
<tr>
<td>Ctrl+R</td>
<td>Reset core processor</td>
</tr>
<tr>
<td>Space</td>
<td>Pause / restart real-time data streaming</td>
</tr>
<tr>
<td>Space</td>
<td>Play / stop offline data</td>
</tr>
<tr>
<td>Esc</td>
<td>Exit current mode (labeling, etc.)</td>
</tr>
</tbody>
</table>

**MOUSE ACTIONS**

- Right-click and drag: Zoom 3D space
- Left-click and drag: Rotate 3D space
- Left and right-click and drag: Move 3D space
- Left-click: Select individual item
- Ctrl + click: Select several items
- Alt + click and drag: Select individual item