

OBJECTIFY REHABILITATION PROTOCOLS

KNEE REPLACEMENT PROTOCOL

Maria João Cabral

Movella



THE 2022
TECH-MED
EVENT

Contact

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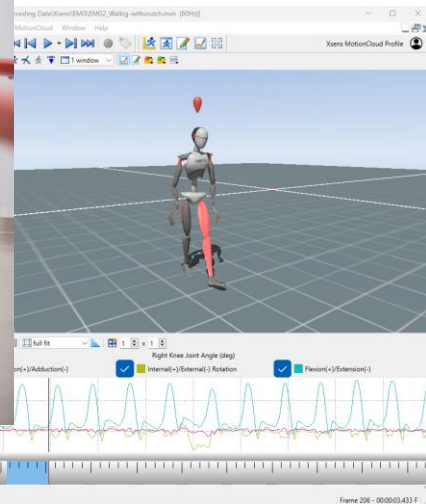


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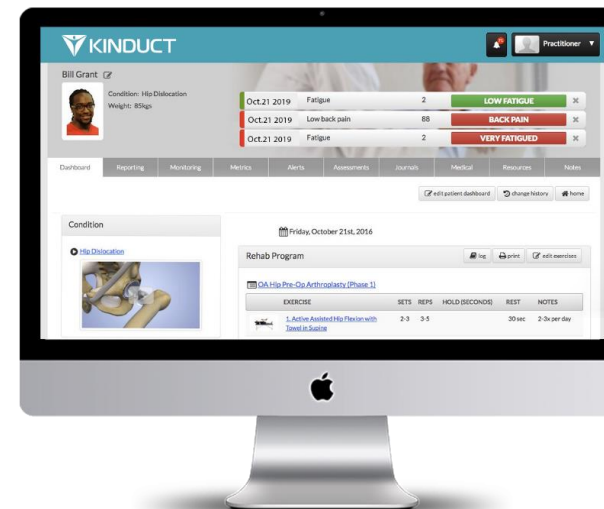
Bringing meaning to movement



xsens



KINDUCT



Sports Surgery Clinic (SSC)

- The leading orthopedic hospital in Dublin, Ireland with both a national and international reputation for orthopedic surgery and sports medicine.
- Centre of excellence in joint replacement (hip, knee, shoulder) and sports soft tissue surgery.
- Working together with Xsens Solutions since 2018 for ACL prevention/rehabilitation protocol (VU)
- Currently, extending the partnership to knee replacement protocol

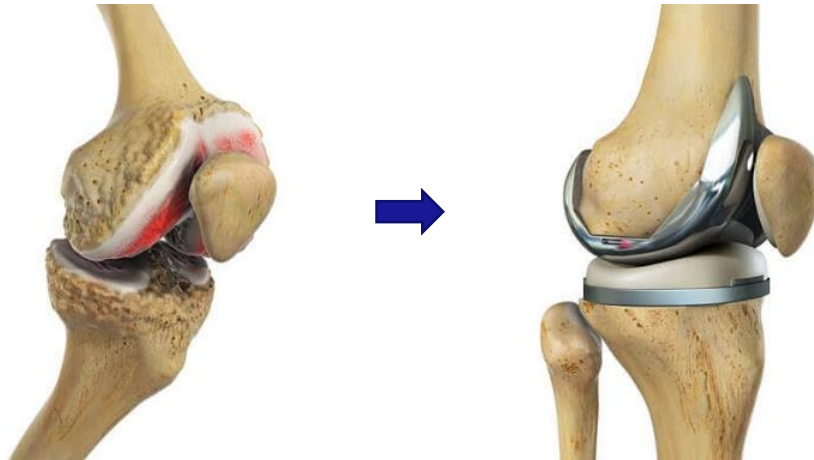
Total Knee Replacement

- Rehabilitation goals:

- Proper walking pattern
- stair walking
- standing up
- muscle strength
- pain free
- stable experience

- Project goals:

- Biomechanical analysis of movement patterns
- Tracking of daily activity
- Relationship between the quality of movement and the muscle strength
- Objective progress tracking



Rehabilitation Protocol

Walking pattern

Xsens Gait Analysis

Stair walking

Xsens Step-up & over

Standing up

Xsens Sit-to-stand

Strength

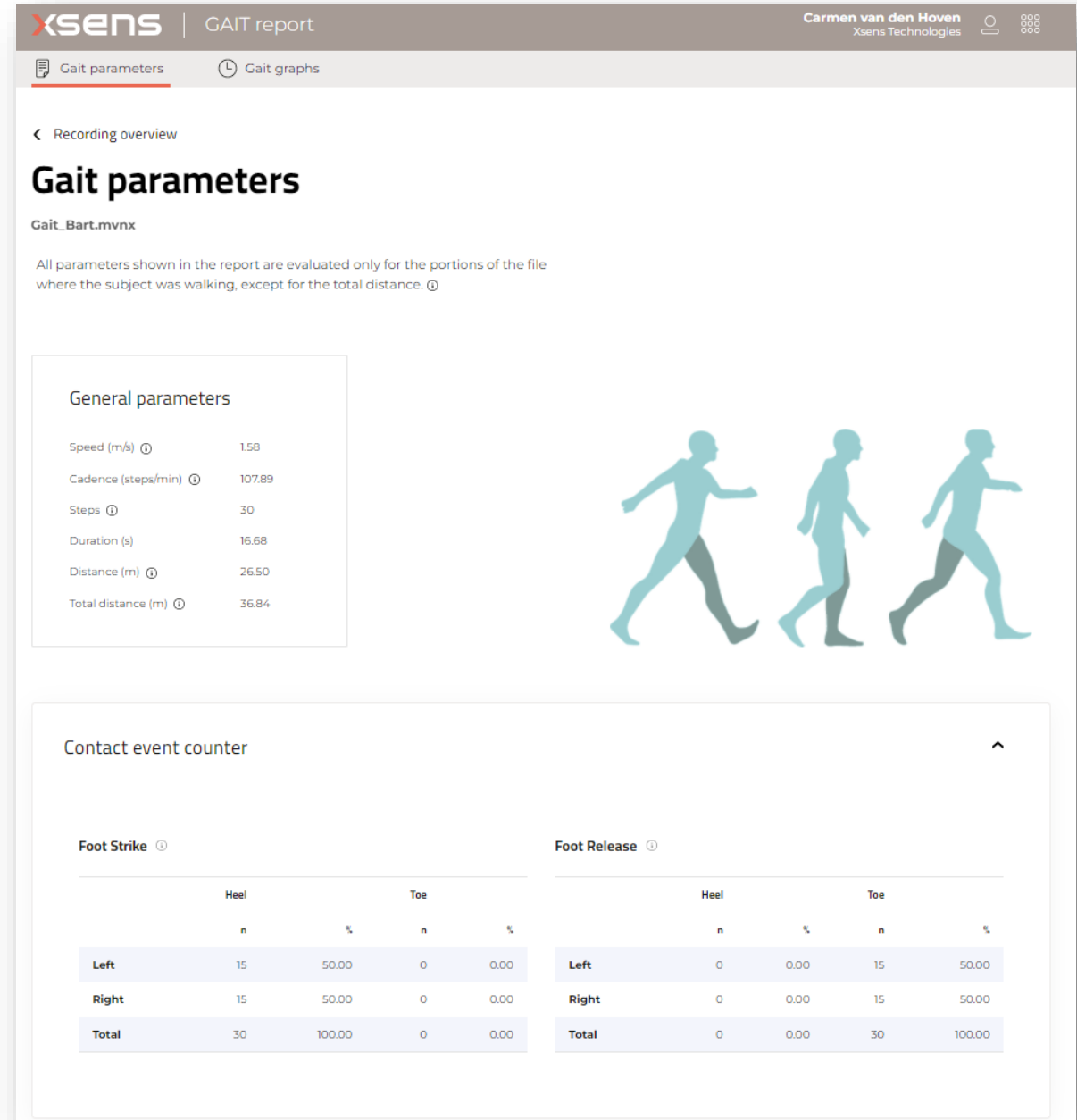
Biodex (integration in Kinduct)

Activity

Fitbit (integration in Kinduct)

Stable & pain-free

Forms/questionnaires in Kinduct



Rehabilitation Protocol

Walking pattern Xsens Gait Analysis

Stair walking Xsens Step-up & over

Standing up Xsens Sit-to-stand

Strength Biodex (integration in Kinduct)

Activity Fitbit (integration in Kinduct)

Stable & pain-free Forms/questionnaires in Kinduct



Step-Up and Over report

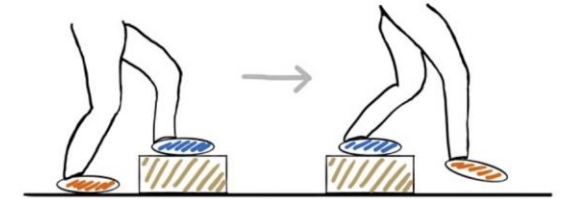
Actor Name: Maria
File Name: step_up-001

Export

All parameters shown in the report are evaluated only for the portions of the file where the subject was performing sit-to-stand motion.

General parameters

Speed (m/s)	0.64
Time (s)	1.96
Distance (m)	1.24



Range of Motion flexion/extension (degrees)

	Knee flexion/extension landing limb								
	Min	Propulsion		Lowering			Weight acceptance		
		Max	RoM	Min	Max	RoM	Min	Max	RoM
Left	3.50	59.98	56.49 ± 2.88	6.16	81.14	74.98 ± 2.23	7.52	17.81	10.29 ± 3.31
Right	7.38	56.39	49.01 ± 2.49	8.68	74.93	66.25 ± 5.24	9.90	20.64	10.74 ± 4.26
Difference	3.88	3.59	7.48	2.52	6.21	8.73	2.38	2.83	0.45

*Propulsion and lowering phase are stepping limb and weight acceptance is landing limb

Rehabilitation Protocol

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Stair walking Xsens Step-up & over

Standing up Xsens Sit-to-stand

Strength Biodex (integration in Kinduct)

Activity Fitbit (integration in Kinduct)

Stable & painfree Forms/questionnaires in Kinduct

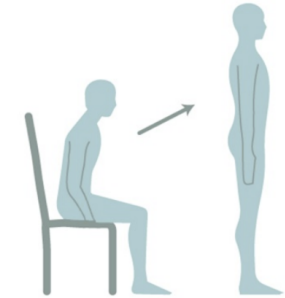
Actor Name: MVN System 1
File Name: Joint lab test Yunus-002

Export

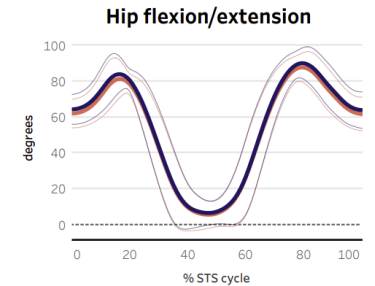
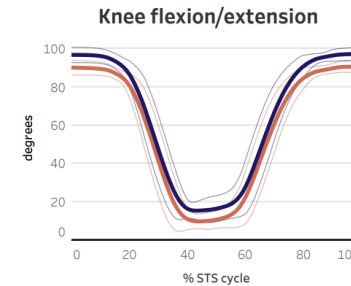
All parameters shown in the report are evaluated only for the portions of the file where the subject was performing sit-to-stand motion.

General parameters

Repetitions	12
Time Sit-to-Stand (s)	1.14
Time Stand-to-Sit (s)	1.34



Left Right Mean



Range of Motion flexion/extension (degrees)

	Knee		
	Sit-to-Stand		
	Min	Max	RoM
Left	14.59 ± 2.63	96.82 ± 1.97	82.23 ± 3.48
Right	9.28 ± 1.82	90.14 ± 1.91	80.86 ± 2.87
Difference	5.31	6.68	1.37

	Hip		
	Sit-to-Stand		
	Min	Max	RoM
Left	6.03 ± 3.08	85.72 ± 2.28	79.69 ± 3.37
Right	5.23 ± 3.55	83.01 ± 2.28	77.79 ± 4.25
Difference	0.80	2.71	1.90

Rehabilitation Protocol

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Standing up	Xsens Sit-to-stand

Strength

Biodex (integration in Kinduct)

Activity

Fitbit (integration in Kinduct)

Stable & painfree

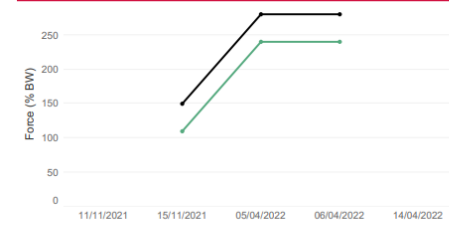
Forms/questionnaires in Kinduct

Joint Lab Assessment

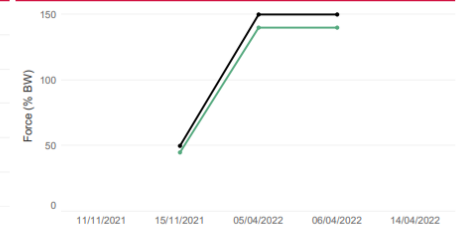
Name:
Allan Demo

■ Non-Operated Leg
■ Operated Leg

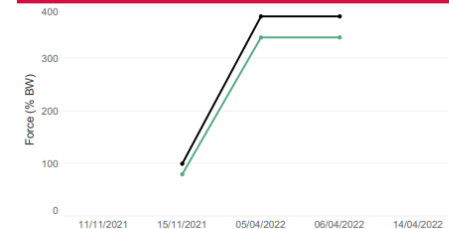
Peak Quad Force



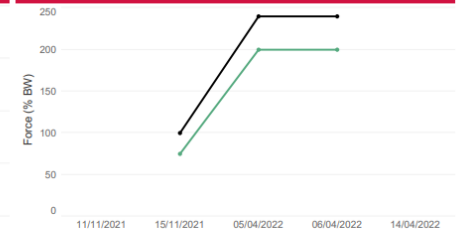
20° Quad Force



Peak Hamstring Force



20° Hamstring Force



Knee Flexion ROM



14/04/2022

Rehabilitation Protocol

Walking pattern	Xsens Gait Analysis
Stair walking	Xsens Step-up & over
Standing up	Xsens Sit-to-stand
Strength	Biodex (integration in Kinduct)
Activity	Fitbit (integration in Kinduct)
Stable & painfree	Forms/questionnaires in Kinduct



Rehabilitation Protocol

Walking pattern

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Standing up

Xsens Sit-to-stand

Strength

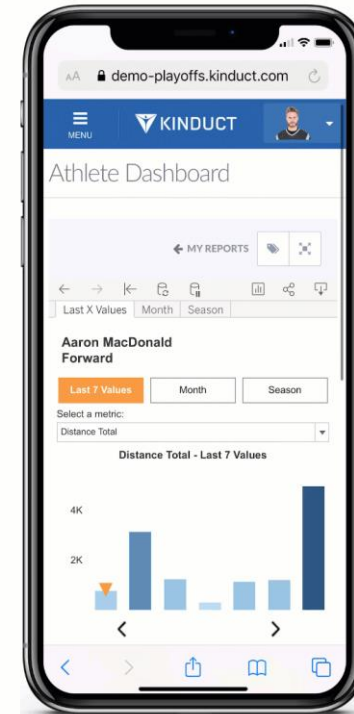
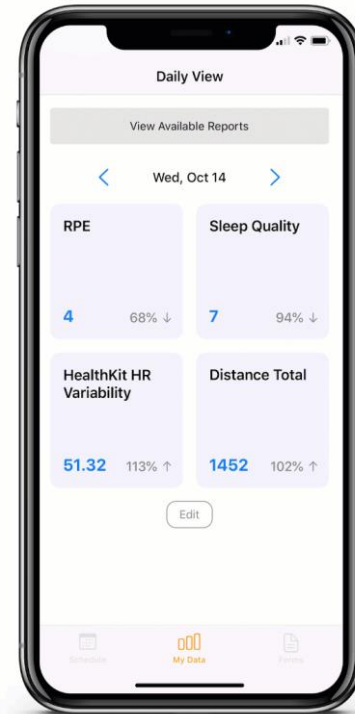
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Activity

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Stable & painfree

Forms/questionnaires in Kinduct



SSC SPORTS SURGERY CLINIC

- + Participant Consent Form
- + Intake Form
- + Intra-Op Questionnaire
- + Oxford Knee Score (Left Knee)
- + Oxford Knee Score (Right Knee)
- + Joint Lab Assessment
- + Daily Wellness Journal
- + EQ-5D-5L
- + Lower Extremity Scan

Dem0, Allan

PREV NEXT



Patient

Active

Training & Testing

Jul. 7, 2021

Pain severity

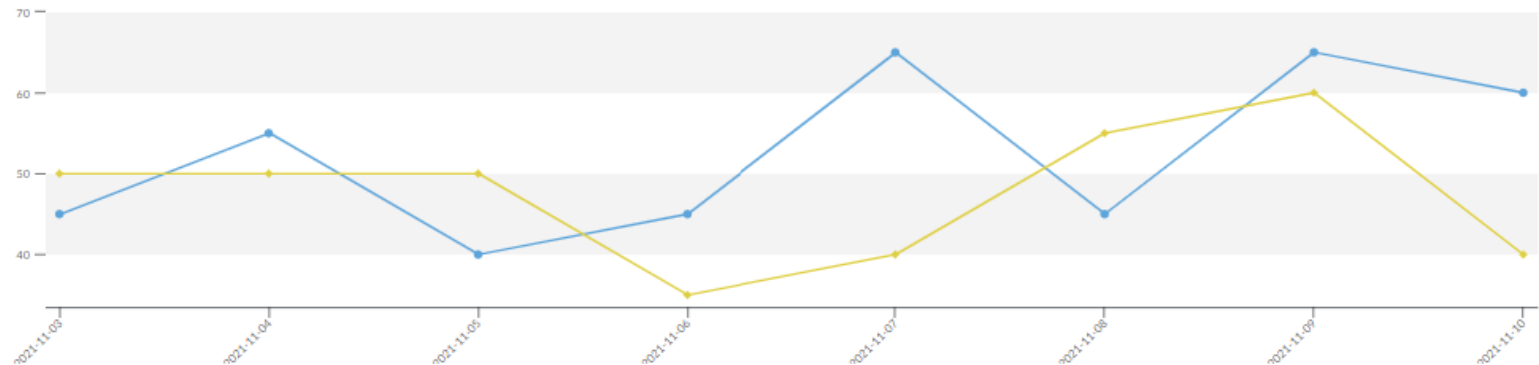
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SEVERE PAIN

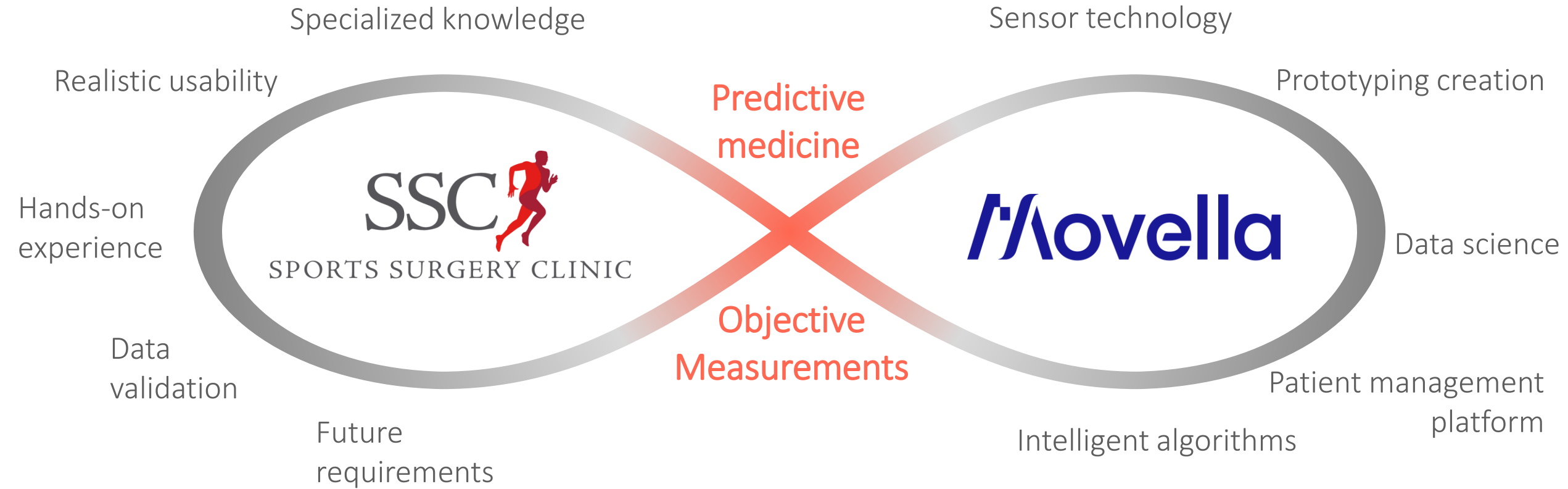
- Overview
- Assessments
- Surveys
- Programs
- Metrics
- Alerts
- Information
- Resources



Metric	Score	Result	Good Cutoff	Bad Cutoff	Charting
Sit-to-Stand - Involved	50	5	10	0	Add To Chart
Forward step downs - Involved	60	9	15	0	Add To Chart
Close Kinetic Chain Lunge	80	28	35	0	Add To Chart
DLS, Hip Adduction - %Diff	0	-40	100	0	Add To Chart
DLS, Knee Flexion - %Diff	100	100	100	0	Add To Chart
Gait, Knee Extension - %Diff	0		100	0	Add To Chart



Partnership project



Future directions: Spine, Hips and Running assessment



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