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# INNOSPORTLAB PAPENDAL

INNOVATIE IN TOPSPORT

## Sports Science at Papendal

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Founders:



Nederlands  
Olympisch Comité  
Nederlandse  
Sport Federatie

Supported by:

Hogeschool



van Arnhem en Nijmegen

INNOSPORTLAB  
PAPENDAL



Europese Unie

Europees Fonds voor Regionale Ontwikkeling

Hier wordt geïnvesteerd in uw toekomst!



Gelderland & Overijssel  
Gebundelde Innovatiekracht

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# NEDERLAND SPORTLAND

## **17 Million inhabitants**

- 65% active in sport > ambition 75%
- Ambition > Top 10 in the world

## **Employment sports sector 2011**

- 200.000 FTE > in 10 years + 200%
- 1.6 million volunteers

## **Economical added value**

- 6.9 billion euro > 1.3% GNP

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# Sport is an ideal innovation environment

- Controlled testing environment with demanding and critical users
- Combining scientific, business and athletic talent
- Development of products/services in the sport offers opportunities for non-sport specific markets
- High marketing value with low communication costs





- InnoSportNL connects sports, science, and business
- Initiate, facilitate, and realise sports innovations
- Carry out program management of sports innovation projects
- Actively involved from idea to prototype to market



Speed skating



Sailing



Recreational sports



Elite Sport



Gymnastic sports



Swimming

# Our team

## Sport scientists:

- Biomechanics
- Physiologists
- Nutritionist
- Visual skills expert



- 7 scientists = 4 FTE, Masters/PhD
- Research interns (various universities)
- Work experience students

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# What do we do?

## Initiate, organise and carry out:

### Elite athlete testing

- 12 sports (senior, junior, talent teams)
- Multidisciplinaire (S&C and SMCP)
- Applied sports research
- Innovation and implementation of new innovations
- Contract research
- Education



## Important: Questions from the sport/coach/Dr!



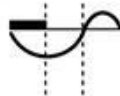
# Themes



**PRESTATIE-MONITORING**



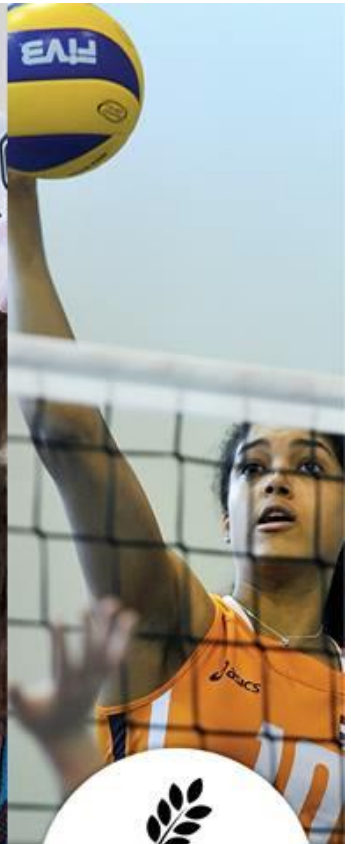
**FYSIOLOGIE**



**HERSTEL**



**SLAAP**



**VOEDING**



# Research and Innovation

## Products

- SportsGrain
- SRM calibrator



## Methods

- Test protocols
- Optimal technique



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# Product Testing

Product development, prototype testing, points of address for subsidies, investment partners, and practical test facilities

- Mio watch
- Nutrition supplements
- Physiological/biomechanical equipment
- Elite athletes or not?



*In the validation of optic heart rate technology in the Mio Alpha watch we have been able to benefit from the InnoSportLab Papendal facilities. Various athletes have functioned as 'guinea pigs' in this process, which has furnished us with very valuable information.*

***John de Lange --- Project manager ---  
Philips Research***

# Where does testing occur?



# Testing Equipment

- OptoJump
- High speed cameras
- Timing gates
- EMG pants
- Force pedals
- Pressure plate
- SRM/Watt bikes
- $VO_{2max}$  testing
- Altitude/climate chamber



# Track and Field

## Technique analysis of:

- Sprint
- Hurdles
- Decathlon/Heptathlon
- Discus
- Shotput
- Javelin
- Long Jump
- Pole Vault
- Middle distance



*Support from InnoSportLab Papendal in the form of biomechanical analysis of sprinters with regard to their start and their top speeds is extremely valuable. It provides concrete information on their technique, from which all involved can directly benefit during the training. In addition, the expert meetings are particularly inspiring.*

**Wigert Thunnissen --- National Sprint Coach ---  
Athletics Association**

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# Cycling

- Track, BMX, road
- Physiological tests (supplements)
- Aerodynamic analysis
- Tandem research – best combination
- Dynamic calibration of SRM
- EMG during training
- Force pedals



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# Team Sports

- Handball, volleyball, wheelchair basketball
- Develop specific test protocols
- Jump shot/technique analysis
- ACL injury prevention screening



# Other Sports

## Bobsleigh

- Start technique



## Archery/Air rifle shooting

- Balance
- Gaze behaviour



## Table tennis

- Gaze behaviour





# Education

## Sport Science Sessions

- Upskill coaches
- Athletes
- Recovery month

## An athlete registration method



# Sprint hurdles

Traditionally: 8 steps



Recent: 7 steps



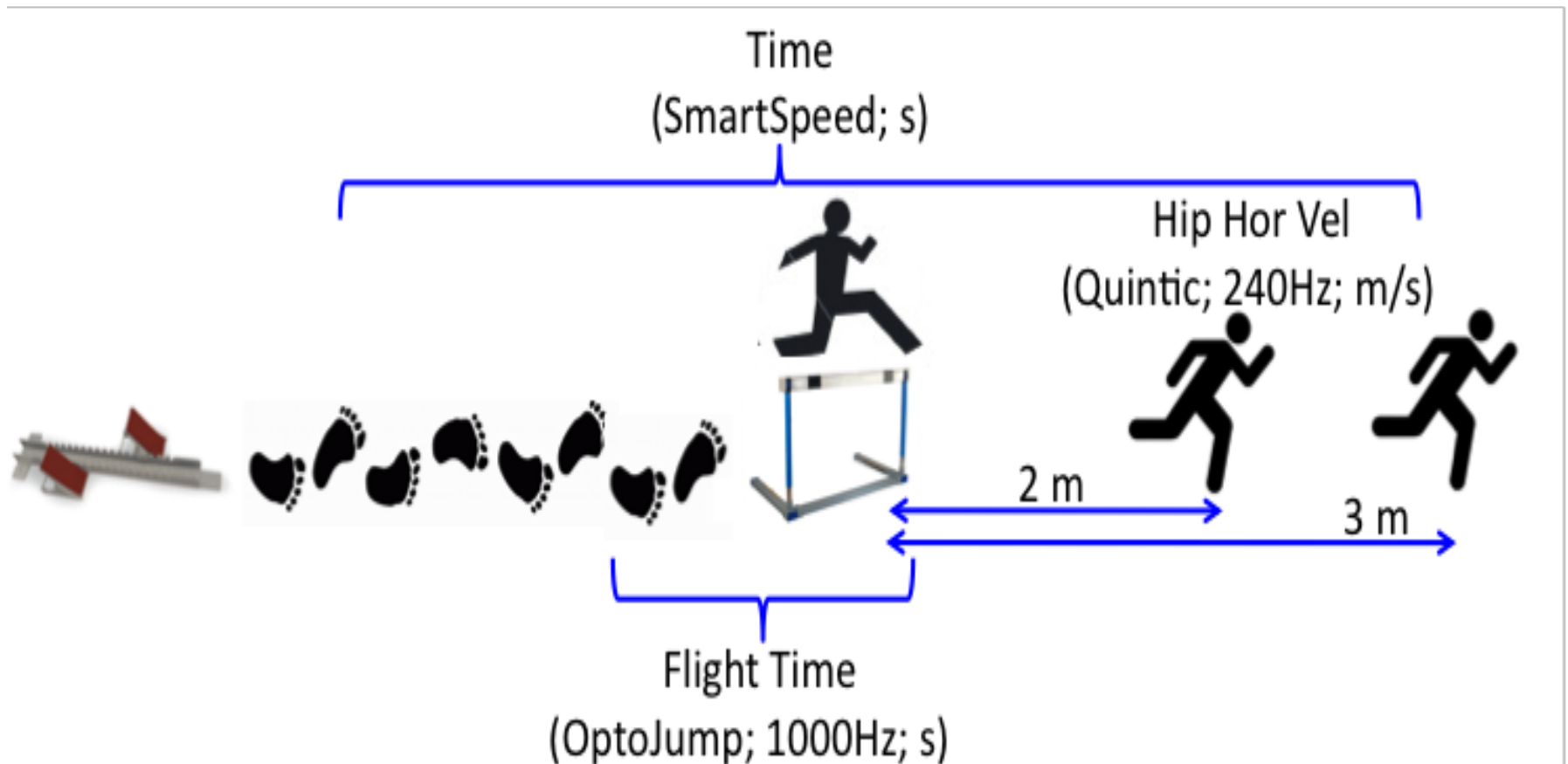
But:

- Change starting foot position
- Need a high hor. vel. with short hurdle flight time

Can an athlete demonstrate the required performance criteria when performing a 7-step approach to the 1<sup>st</sup> hurdle?

# Performance parameters

- 1 elite male hurdler (age = 26yrs; mass = 80kg; height = 1.86m)
- 6 x 7-step approach; 6 x 8-step approach
- Paired samples *t*-test ( $P < 0.05$ )



# Which race strategy?

|                            | 7-step approach | 8-step approach | P value |
|----------------------------|-----------------|-----------------|---------|
| Horizontal velocity (m/s)  | 8.15 ± 0.43     | 8.24 ± 0.50     | 0.236   |
| Time to after hurdle (sec) | 2.54 ± 0.02*    | 2.47 ± 0.01     | 0.001   |
| Flight time (sec)          | 0.424 ± 0.031*  | 0.366 ± 0.018   | 0.007   |



- 7-step approach similar horizontal velocity but slower time to 3m & over hurdle
- 8-step approach adopted for this athlete
- Biomechanical testing can assist coaches with race strategy

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## Thank you

[www.innosportlabpapendal.nl](http://www.innosportlabpapendal.nl)

You can follow InnoSportLab Papendal online and keep up to date with the latest developments and projects.