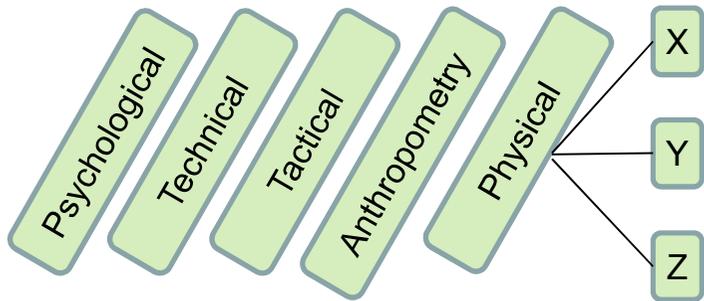
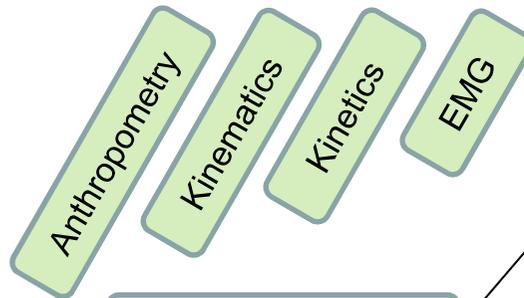


E v i d e n c e b a s e d c l a s s i f i c a t i o n

Theoretical model of determinants of sport-specific performance



Get determinants' data in realistic sport-specific conditions



Gold Standard

Mathematical modelling

As complex as needed



As simple as possible

Implementing evidence-based classification

Instrumented Assessment

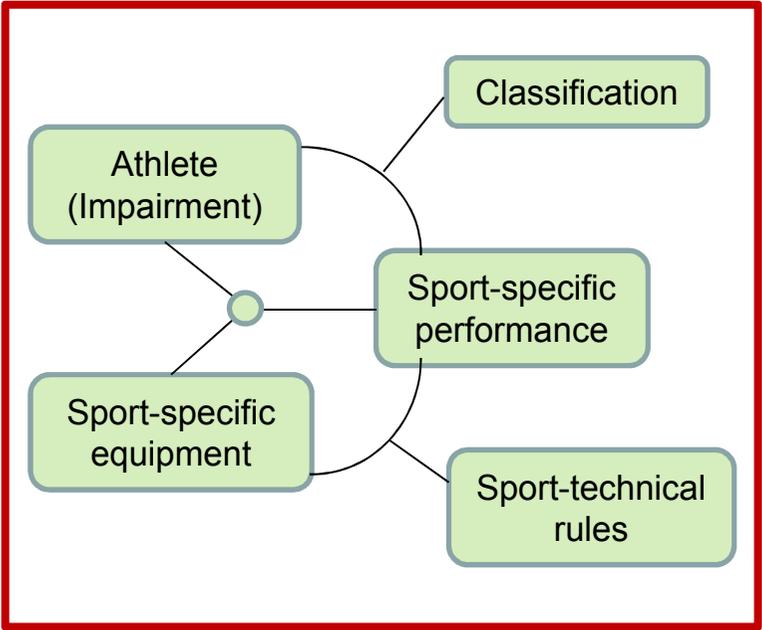
Impairment

performance

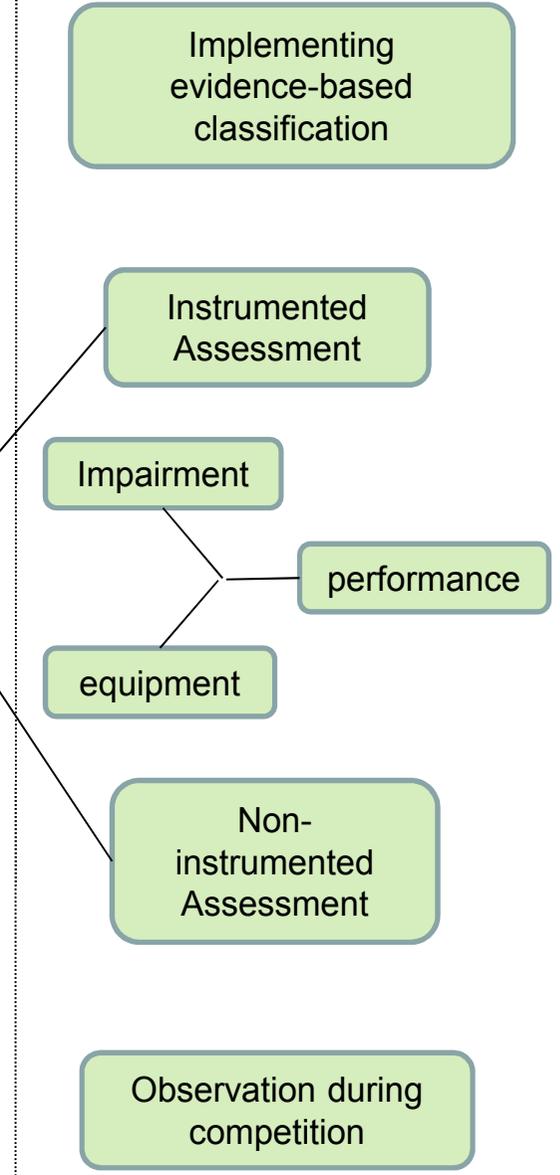
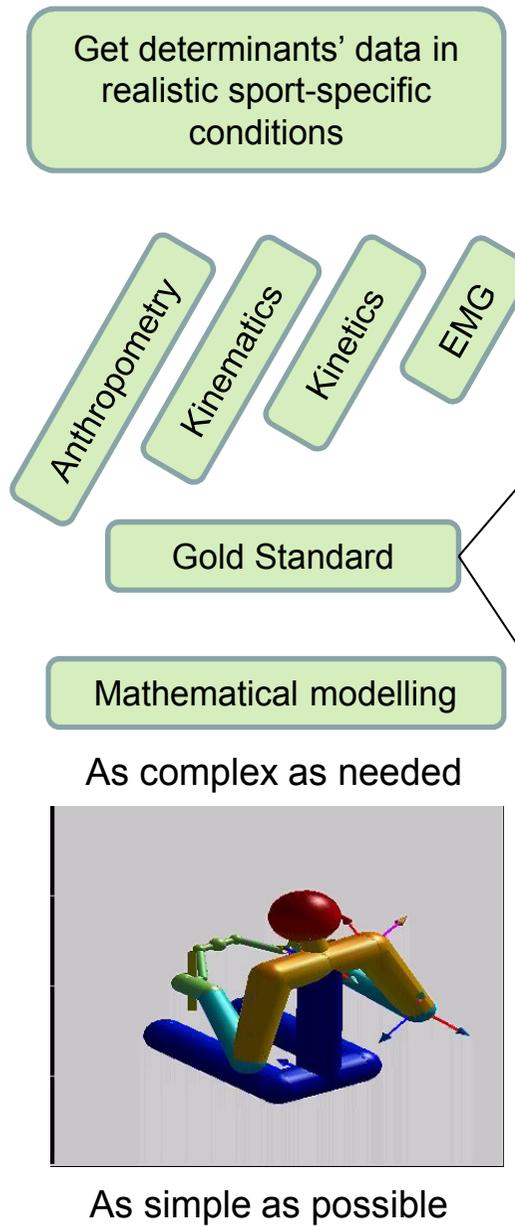
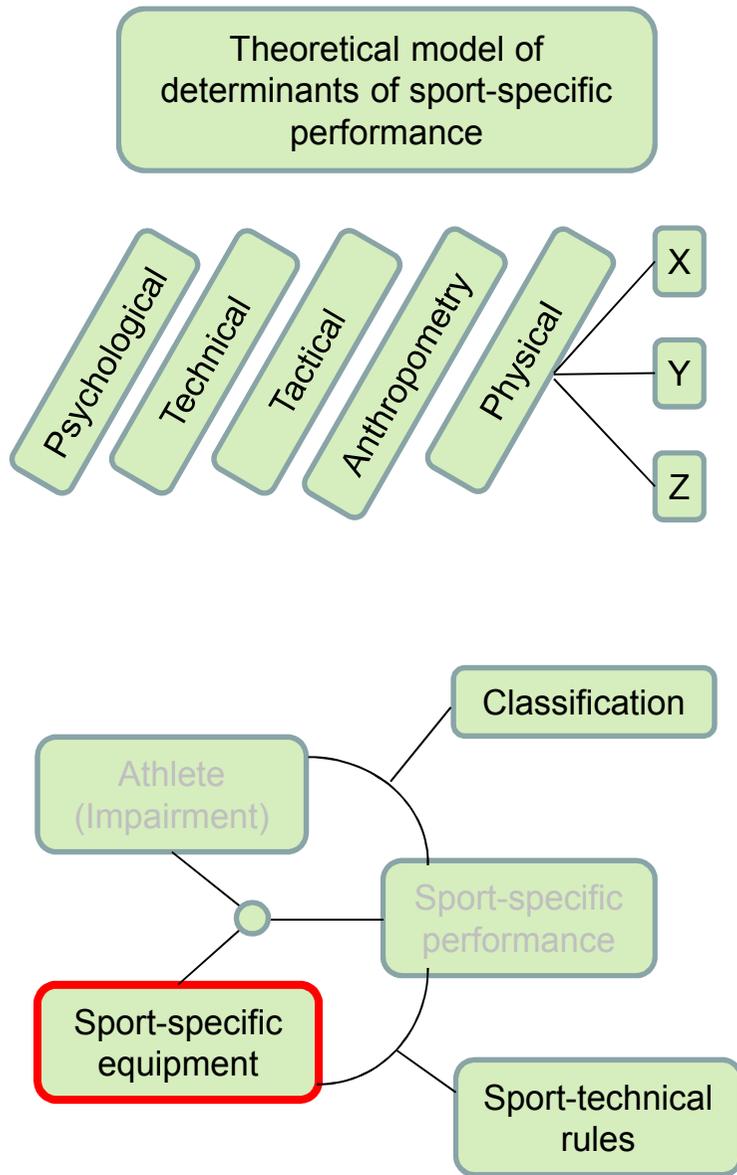
equipment

Non-instrumented Assessment

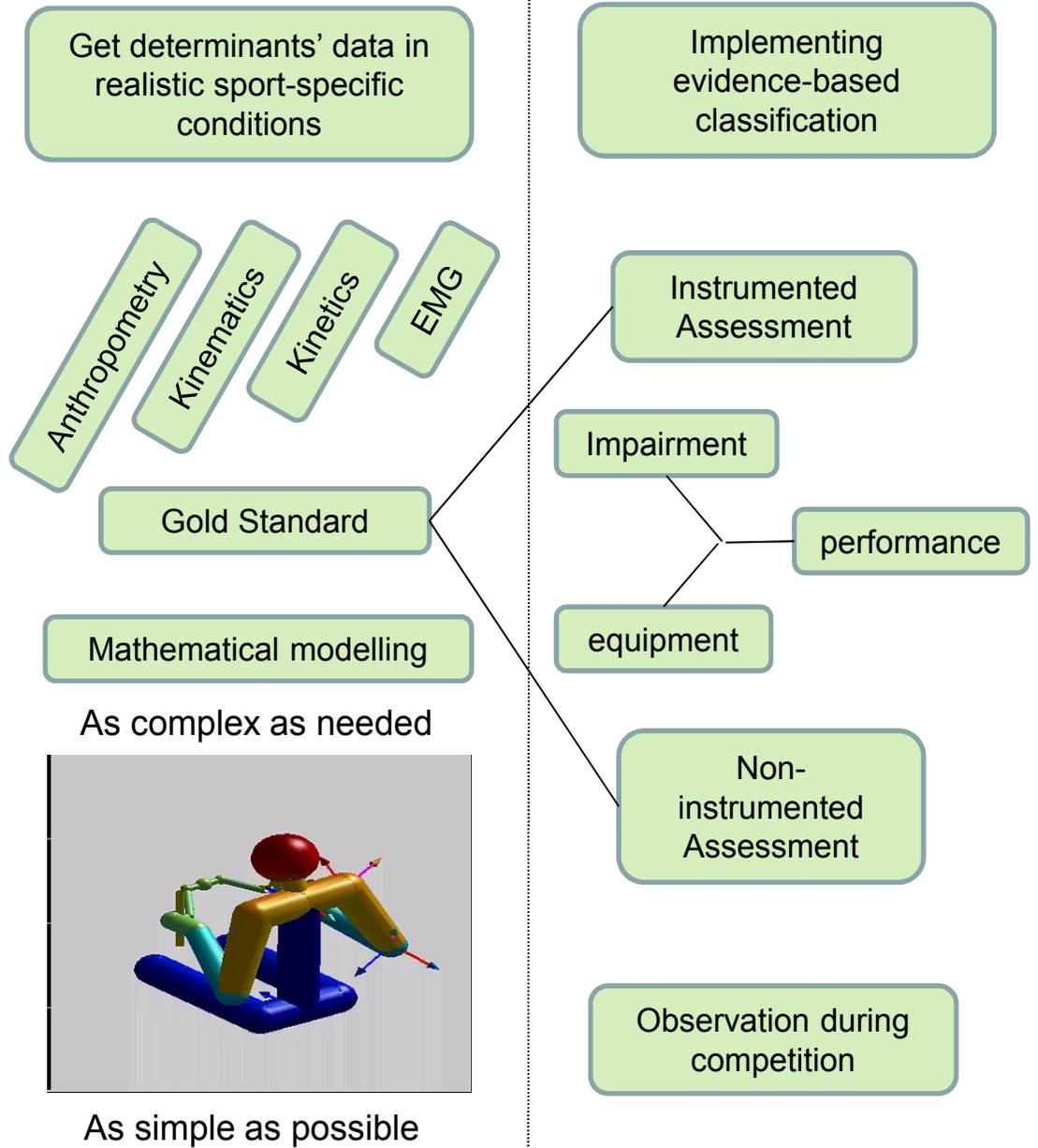
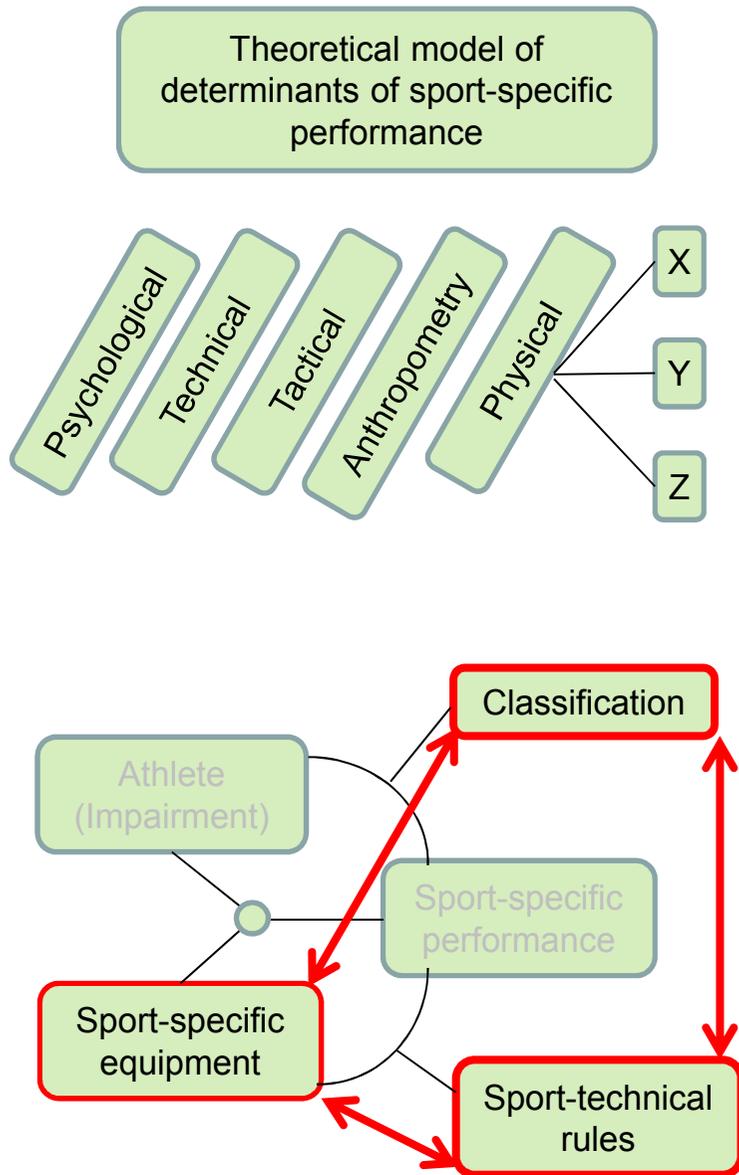
Observation during competition



E v i d e n c e b a s e d c l a s s i f i c a t i o n



E v i d e n c e b a s e d c l a s s i f i c a t i o n

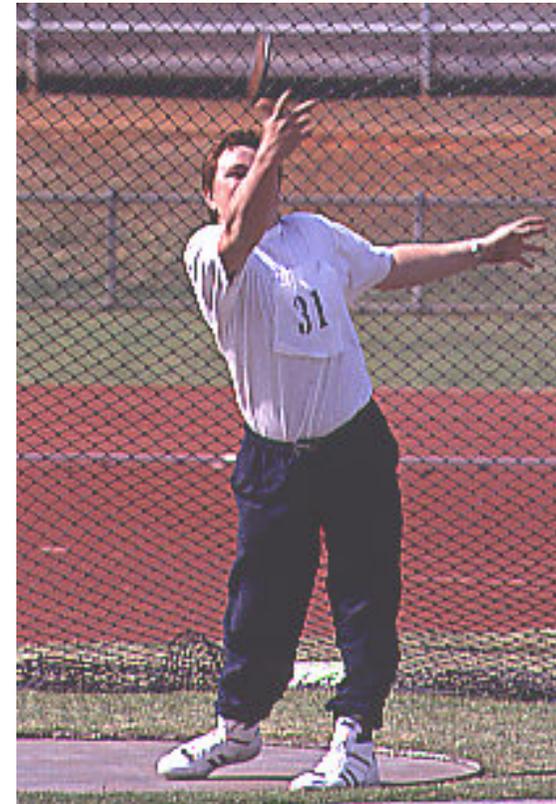


Bermuda Triangle – worked
example of seated throwing for
athletes with hypertonia, ataxia
and athetosis (Class F31-34)

Overview

- Evolution of seated throw for F31-34 in terms of:
 - Equipment;
 - Technical Rules; and
 - Classification Rules
- Consequences of this evolution
 - Who has won? Who has lost? Impact on athletes / classification validity;
- How to proceed? Balancing freedom to maximise potential with need for regulation

The beginning - 1980-1990



Transition period – 1990-2000



Evolution Summary table

Period	Equipment	Technical Rules	Classification Rules
1980 – 1990	No change	No change	No change/minimal change
1990s – 2000	Rapid change – athlete driven	Rapid change – administrators responding	No Change / minimal change
2000- today	Moderate change – athlete refinements	Moderate change – administrators responding	No Change / minimal change

Overview

- Evolution of seated throw for F31-34 in terms of:
 - Equipment;
 - Technical Rules; and
 - Classification Rules
- Consequences of this evolution
 - Who has won? Who has lost? Impact on athletes / classification validity;
- How to proceed? Balancing freedom to maximise potential with need for regulation

- Athlete impairments should be classified according to the extent of activity limitation they cause (IPC Position Stand, 2011);
- Extent of activity limitation caused by an impairment depends not only on impairment type, severity and location, **but what the activity is.**
- Changes in equipment and Technical rules (1990s / 2000s) changed the activity of seated throwing

- Athlete impairments should be classified according to the extent of activity limitation they cause;
- Extent of activity limitation caused by an impairment depends not only on impairment type, severity and location, but what the activity is.
- Changes in equipment and Technical rules (1990s / 2000s) changed the activity of seated throwing
- Individual vs Team Sports (e.g., Basketball)

Overview

- Evolution of seated throw for F31-34 in terms of:
 - Equipment;
 - Technical Rules; and
 - Classification Rules
- Consequences of this evolution
 - Who has won? Who has lost? Impact on athletes / classification validity;
- How to proceed? Balancing freedom to maximise potential with need for regulation

Freedom

- Crowd appeal – bigger is better?
- Athlete rights / athlete centred-ness / freestyle developments in sports

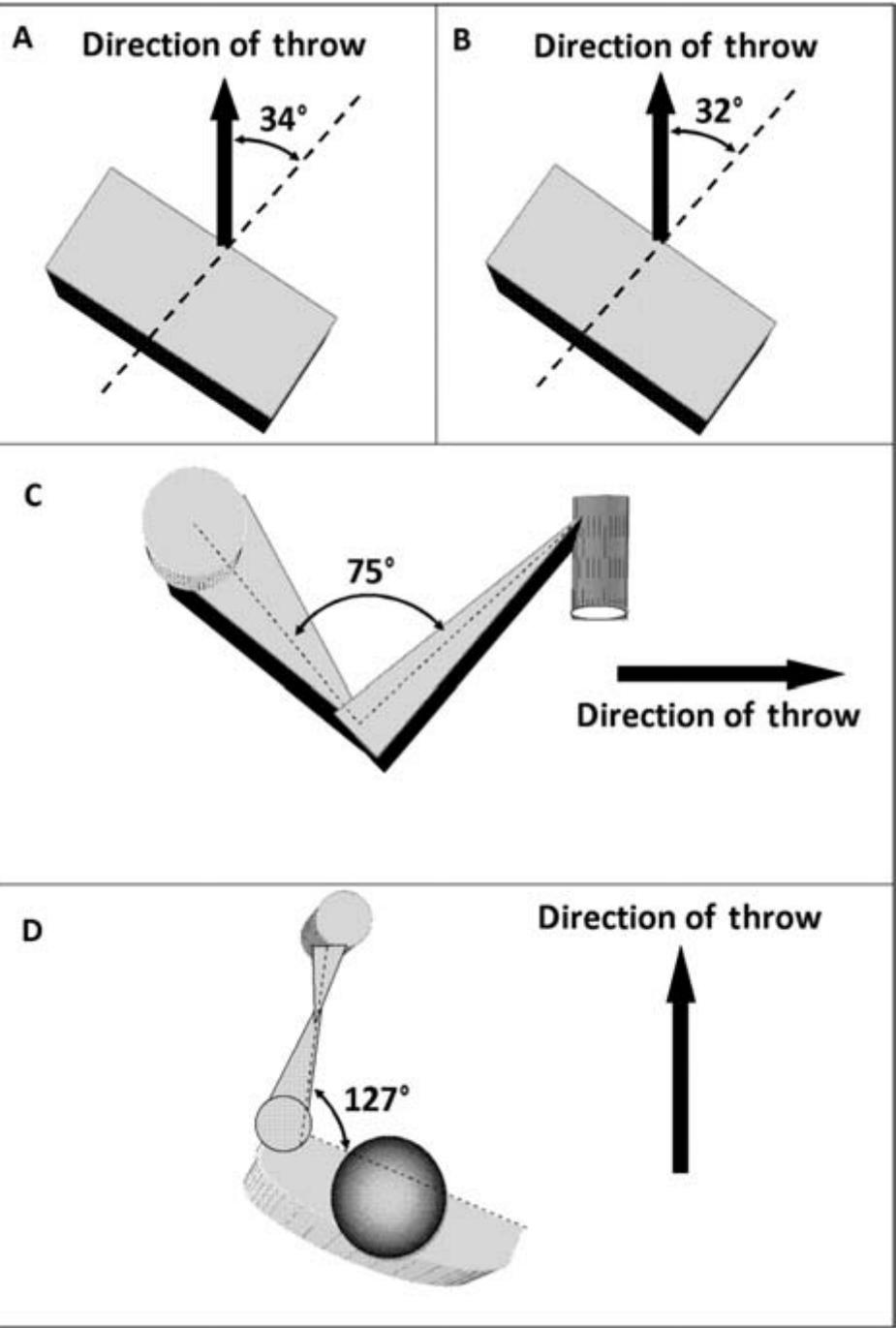
Regulation

- Number of Classes – largest competitive fields, but not disadvantaging most impaired cf least
- Class validity and the Paralympic Vision
- Historical comparability
- Research to develop evidence based systems of classification

RESEARCH ARTICLE

What throwing frame configuration should be used to investigate the impact of different impairment types on Paralympic seated throwing?

SEAN M. TWEEDY¹, MARK J. CONNICK¹, BRENDAN BURKETT², MARK SAYERS²,
CHRISTOPHE MEYER³, & YVES C. VANLANDEWIJCK³



Conclusion

This presentation has demonstrated:

- There is a clear interaction between equipment, Technical Rules and Classification rules;
- To date, freedom to self-optimize equipment and adjust rules ad hoc has led to changes that:
 - Have disenfranchised some athletes in the movement;
 - if unchecked, can threaten the Paralympic vision and limit ability to improve systems of classification;
- Our new, emerging understanding of this interaction demands
 - Strong, considered action to address current situation in some instances
 - Development of a thoughtful, coherent philosophy

Paralympic Vision (Ch 1.1, Paralympic handbook)

- **To Enable Paralympic Athletes to Achieve Sporting Excellence and Inspire and Excite the World**

IPC Classification

- Purpose: ***To minimise the impact of impairment on the outcome of competition*** (athletes don't win because less impaired than others)
- Conceptual basis: classify **impairments** (not athletes) according to how much they affect the core **activities of the sport** (activity limitation).

Performance

Distance lost at T

Distance lost at landing

Height CM at TC

Distance

V_x
Touch down

V_y
Touch down

Horiz.
force

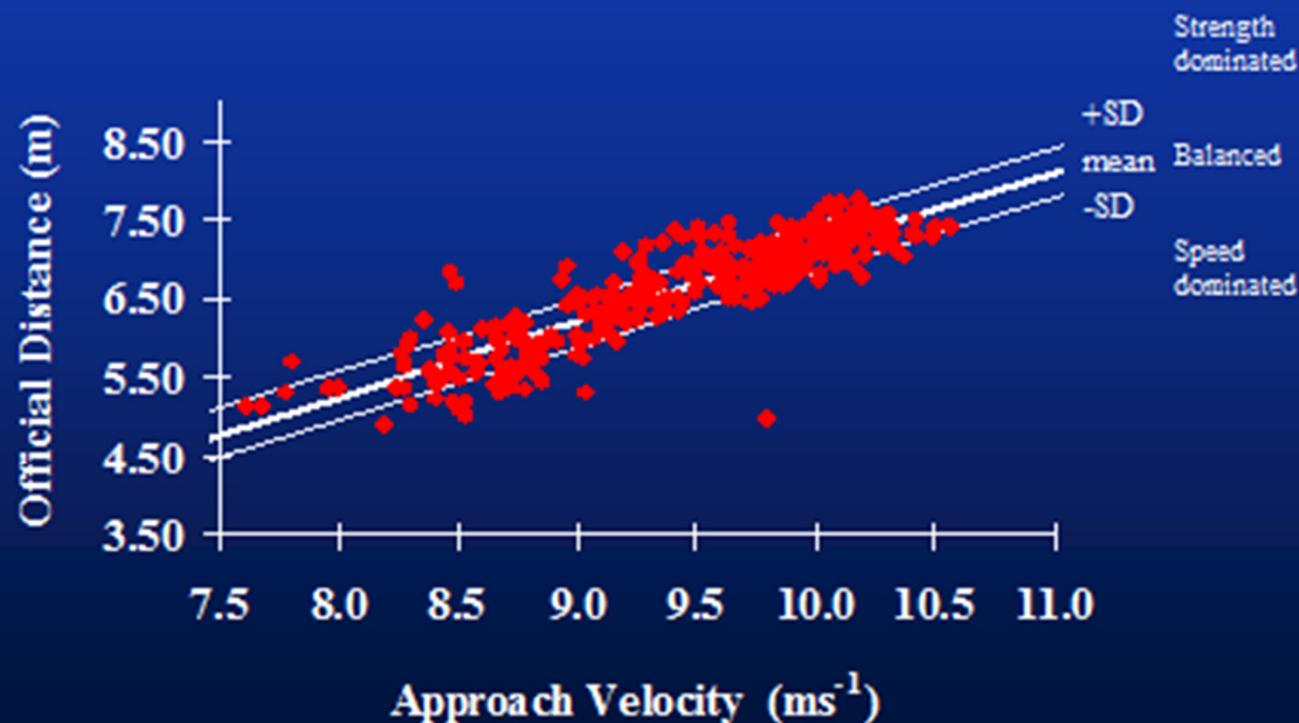
Time of
support

of
t

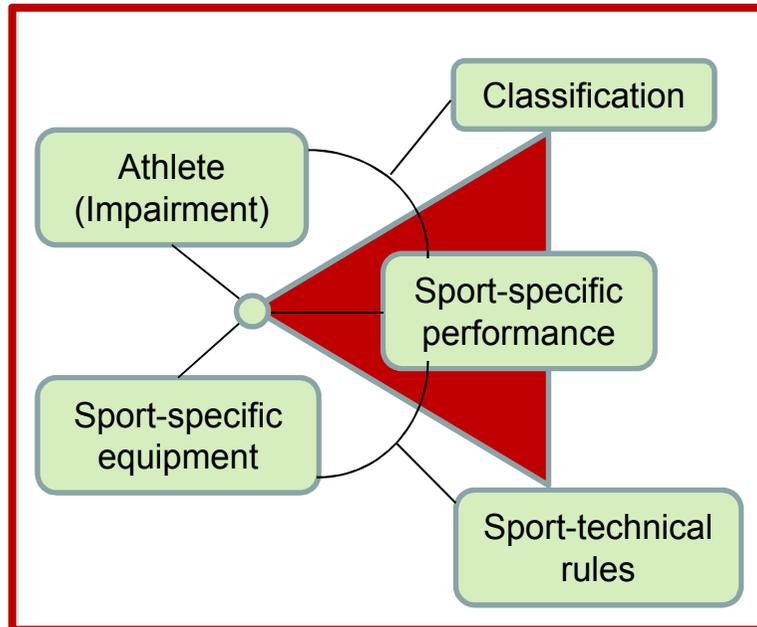
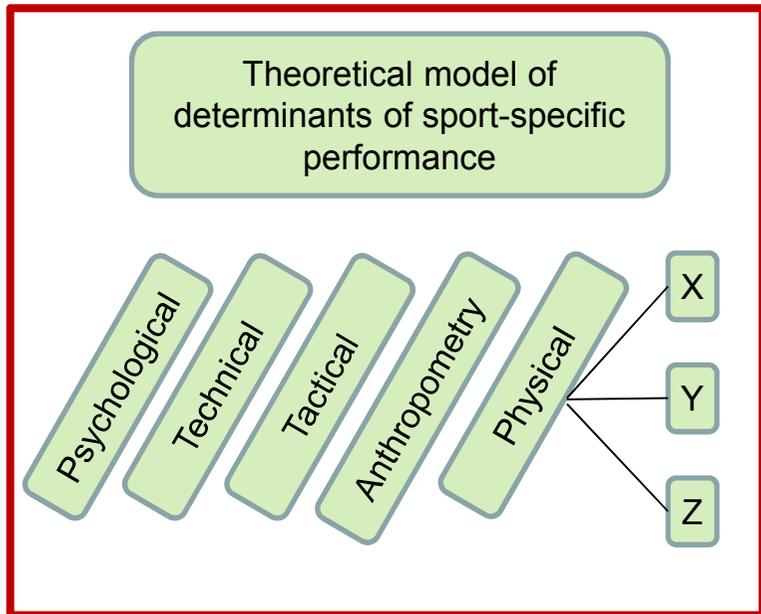
Mass of
the athlete



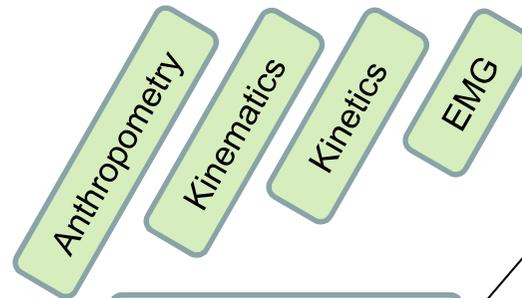
In able-bodied (AB) long jump, relationship between approach speed and distance jumped is robust (Hay et al., 1993; Lees et al., 1993; Lees et al., 1994).



E v i d e n c e b a s e d c l a s s i f i c a t i o n



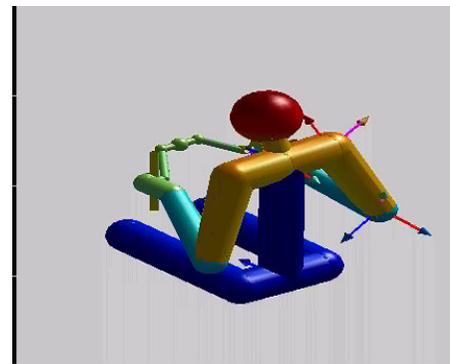
Get determinants' data in realistic sport-specific conditions



Gold Standard

Mathematical modelling

As complex as needed



As simple as possible

Implementing evidence-based classification

Instrumented Assessment

Impairment

performance

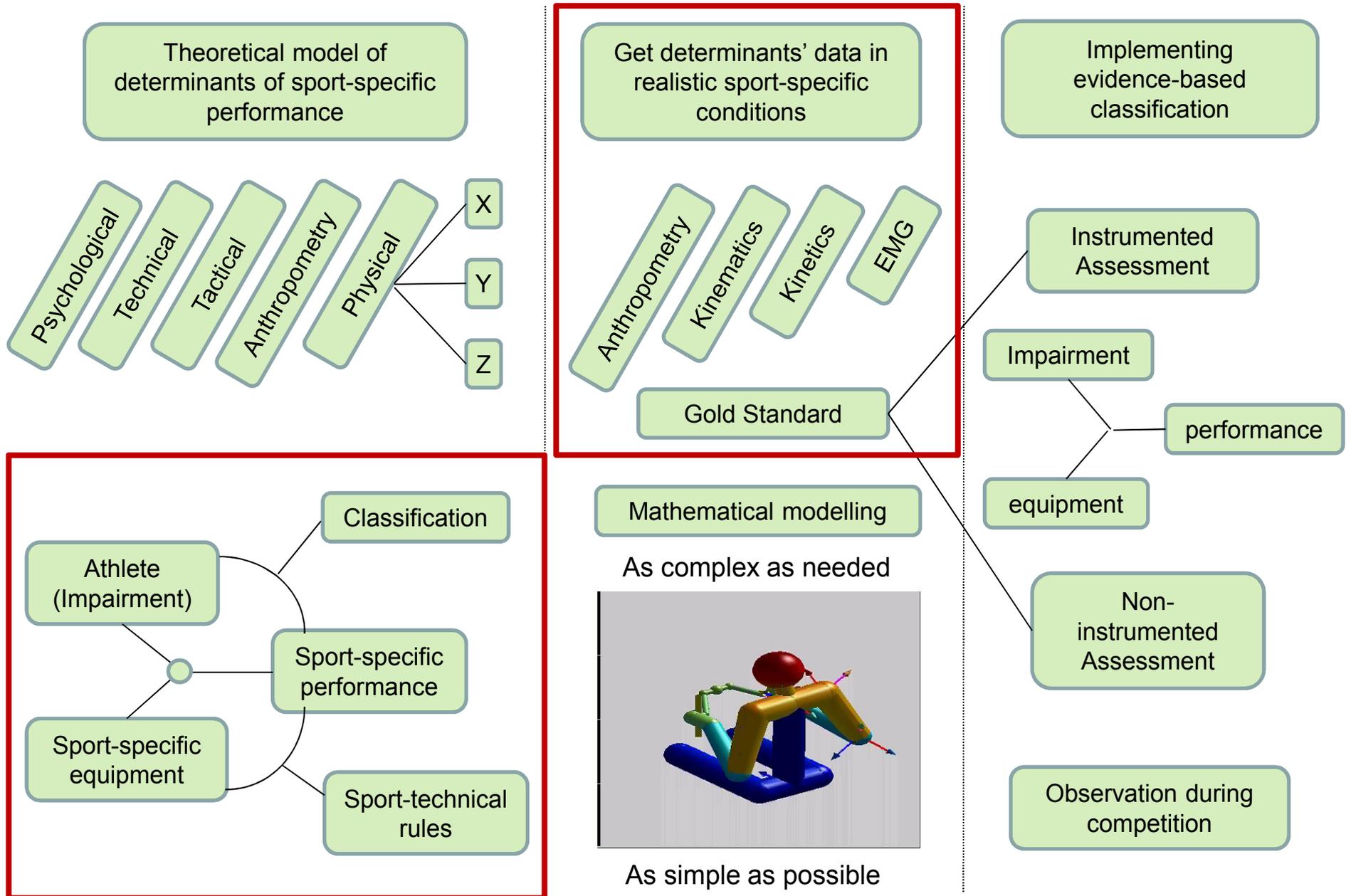
equipment

Non-instrumented Assessment

Observation during competition



E v i d e n c e b a s e d c l a s s i f i c a t i o n



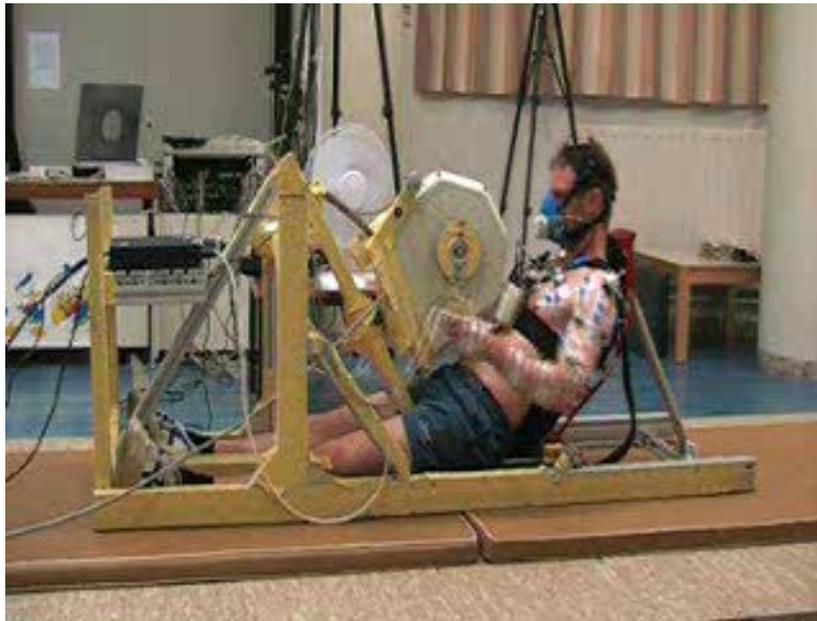


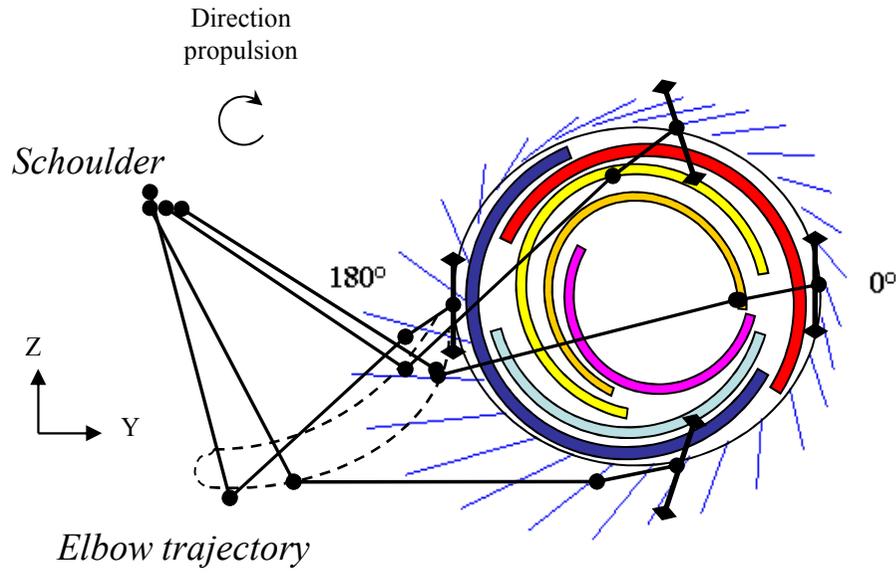


Arm powered

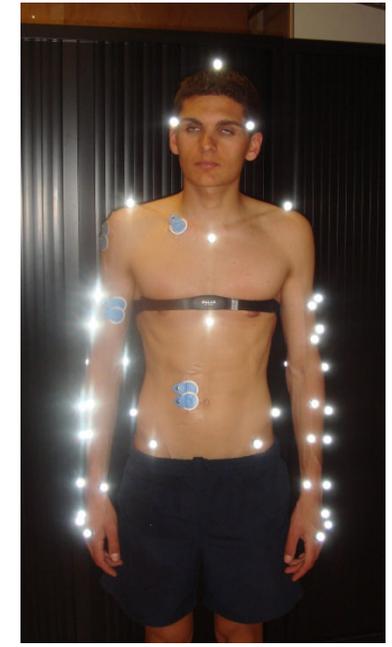


Arm-trunk powered

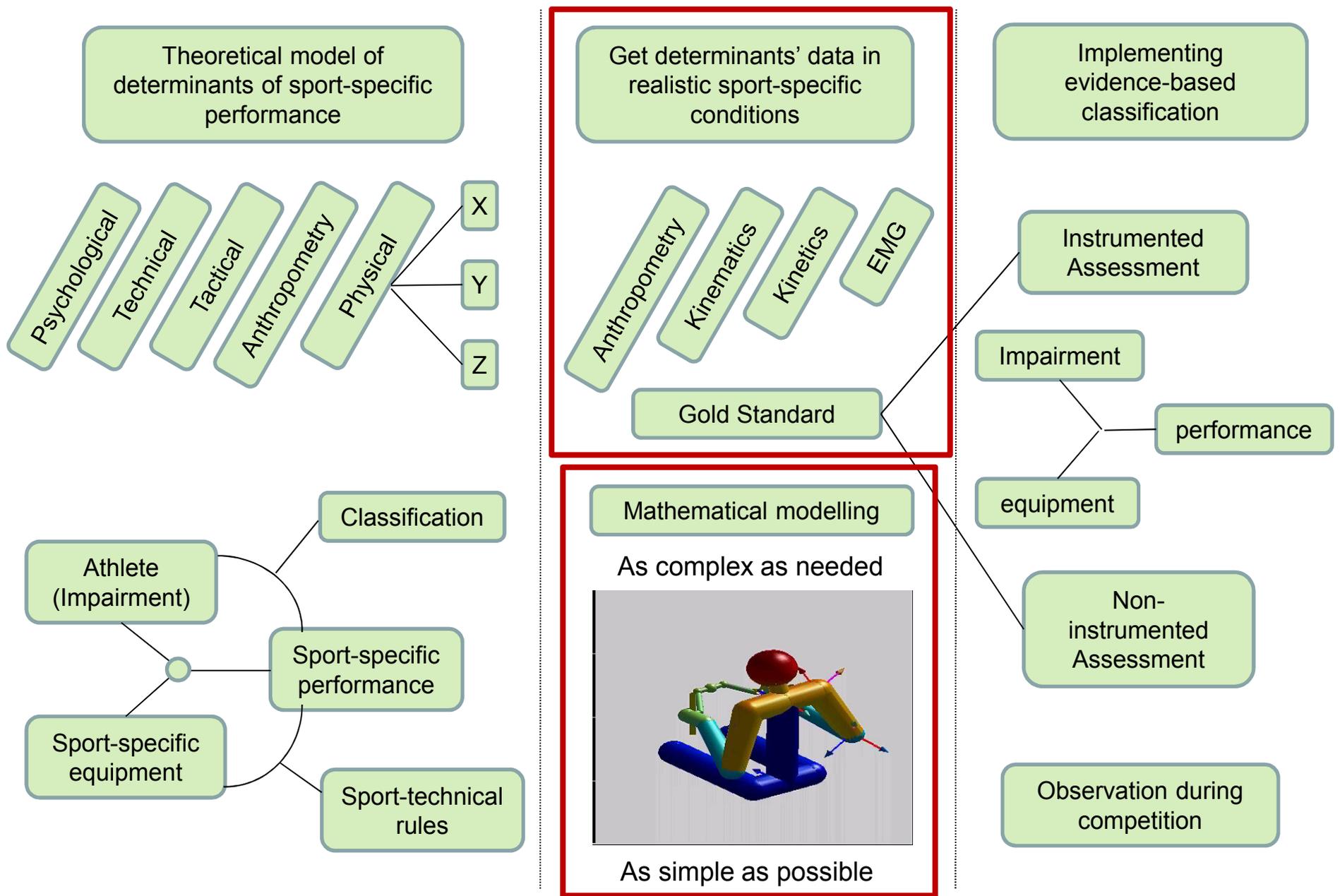




- Biceps
- Triceps
- Deltoïdeus anterior
- Deltoïdeus posterior
- Pectoralis major
- Trapezius
- Force
- Pedal



E v i d e n c e b a s e d c l a s s i f i c a t i o n

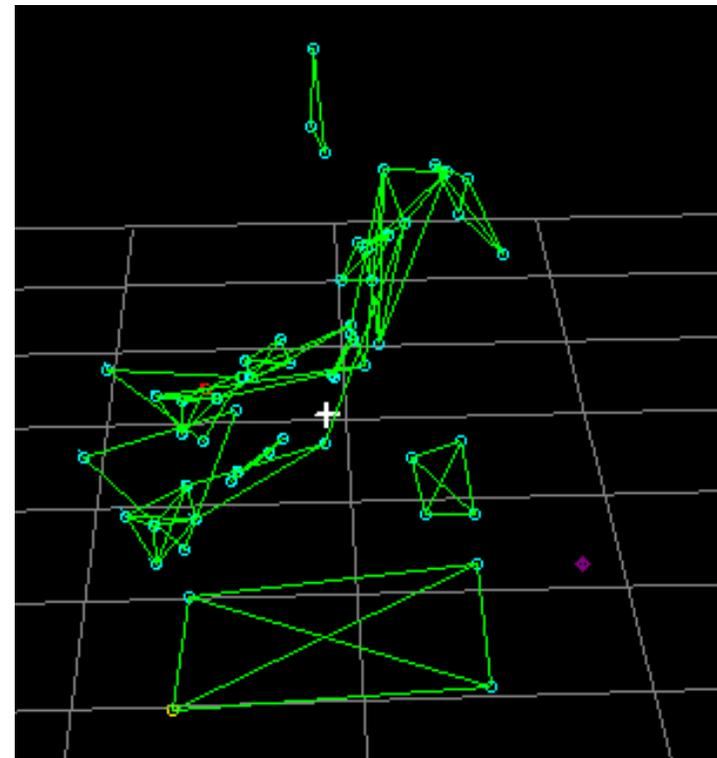
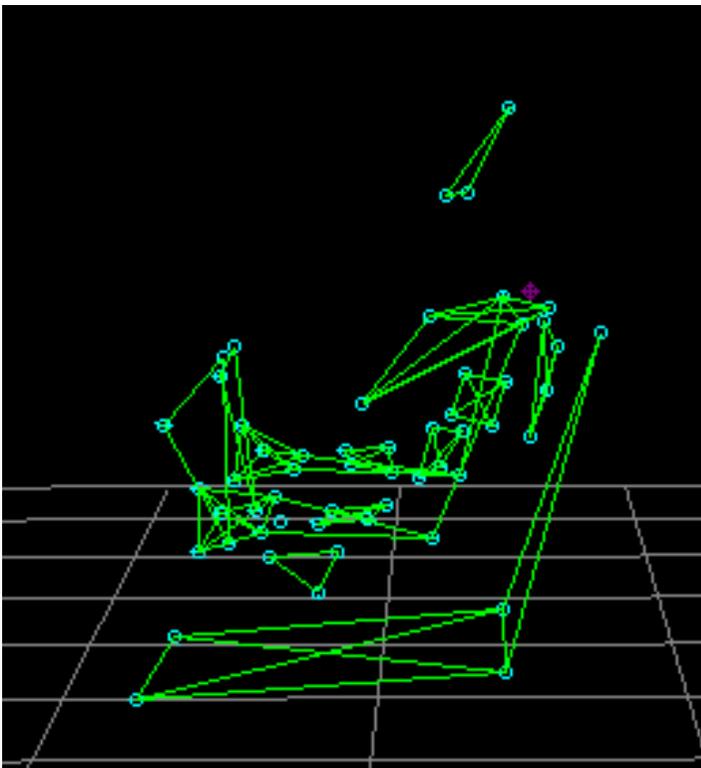


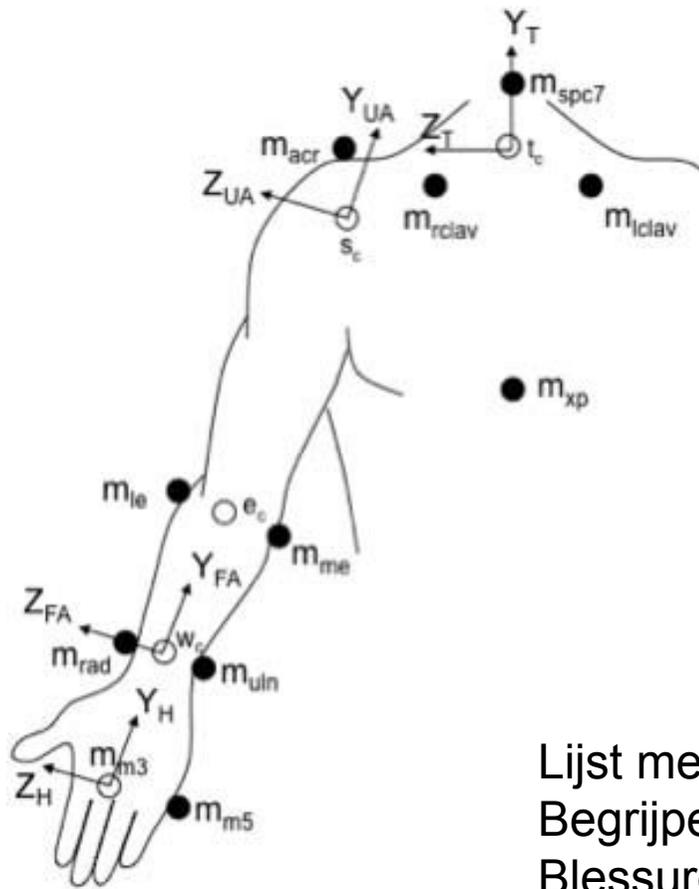


Arm powered



Arm-trunk powered





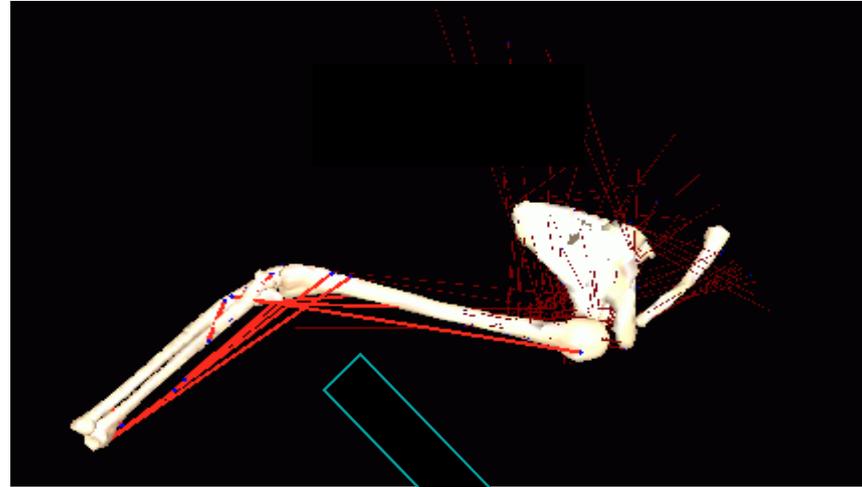
Lijst met mogelijkheden
 Begrijpen van impact van impairment on performance
 Blessure preventie
 Optimalisatie krachtgeneratie

Inverse-dynamic model

Kinematics
- positions
- angles
- derivatives

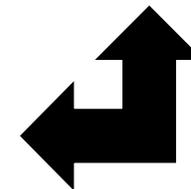
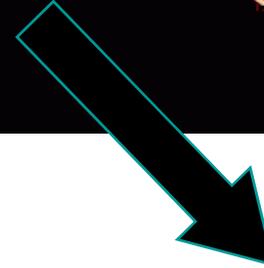
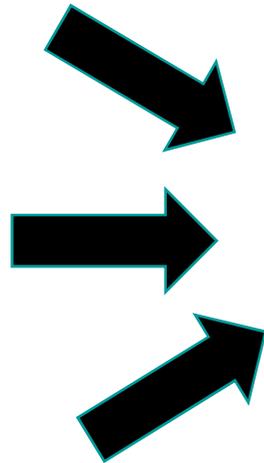
Kinetics
- forces
- moments

Antropometry
- segment mass, mass position
- moments of inertia
- muscle moment arms
- muscle relative force (PCSA)

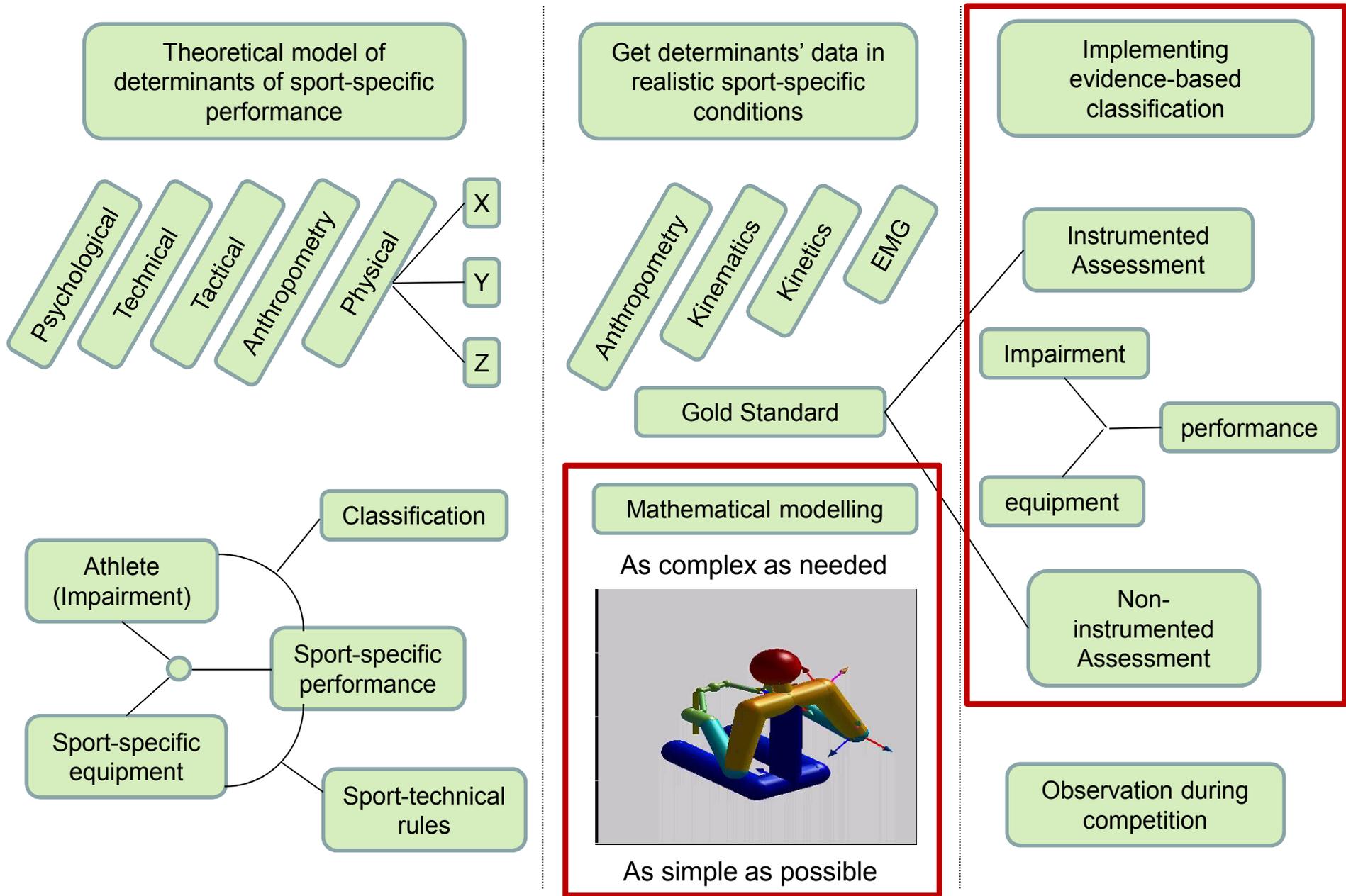


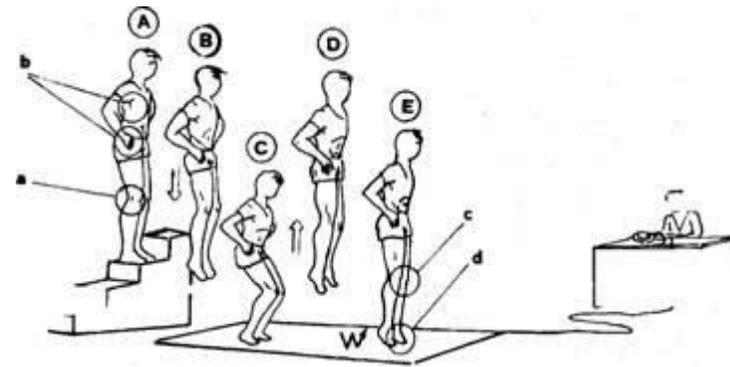
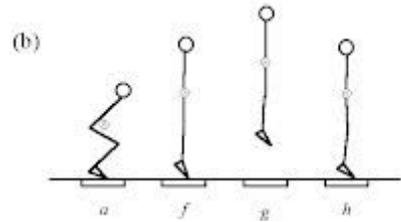
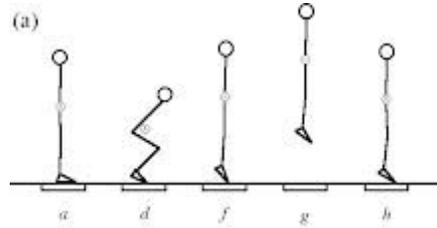
Net moments
Net forces
Muscle forces

Muscle activity
EMG

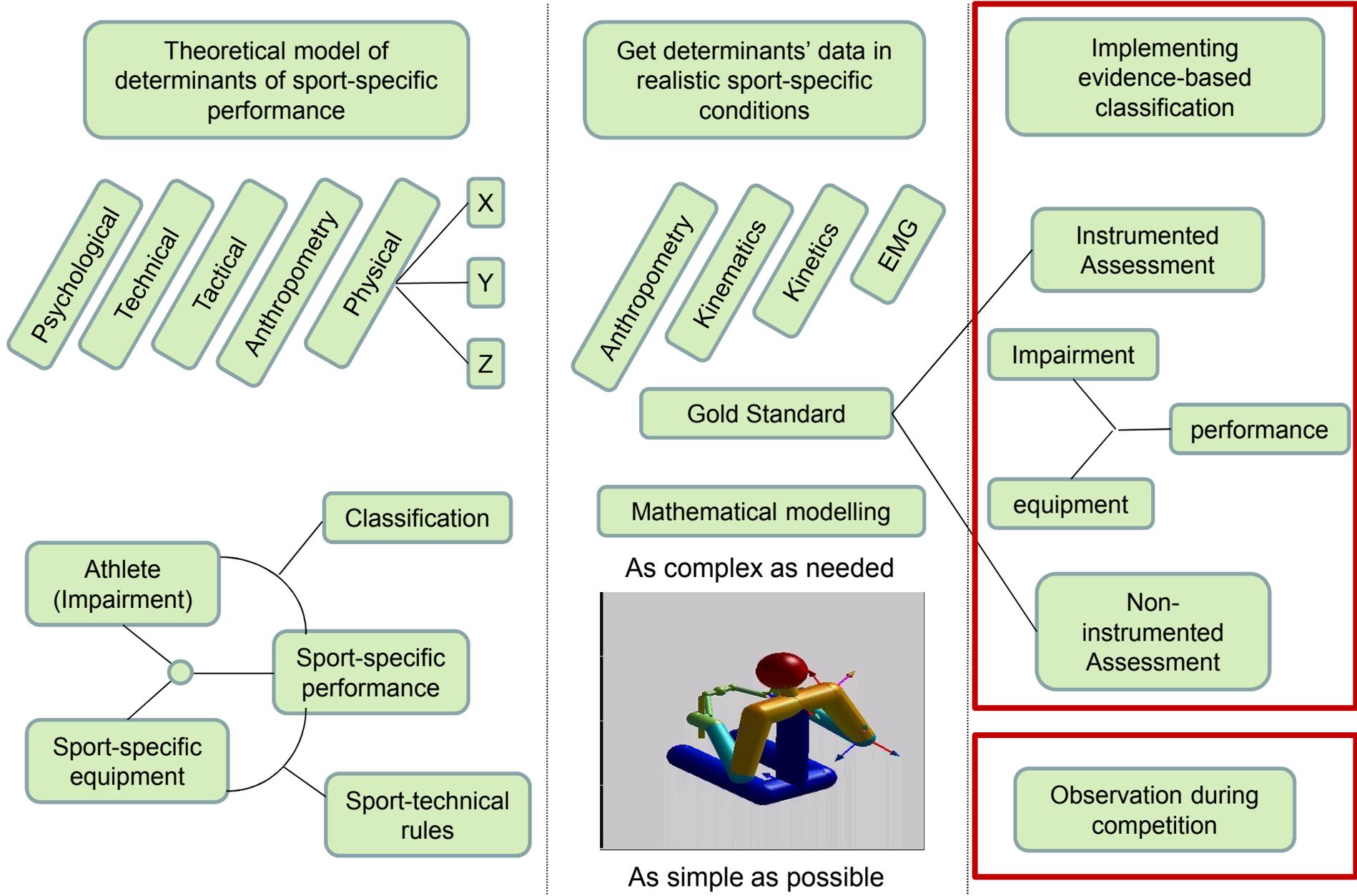


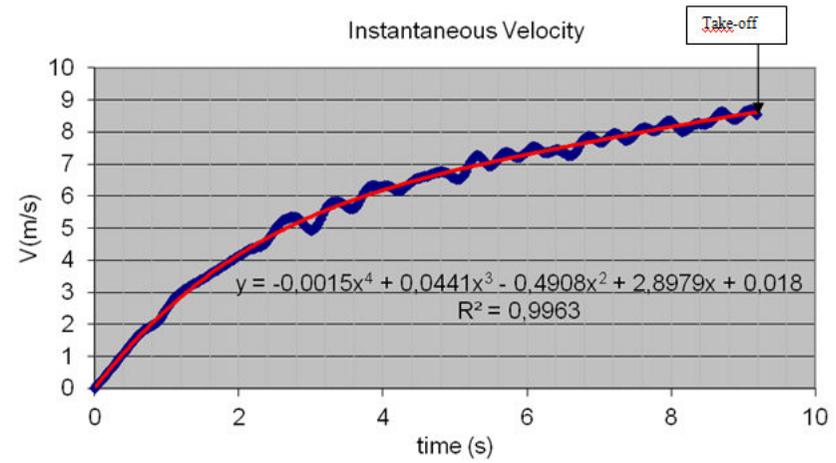
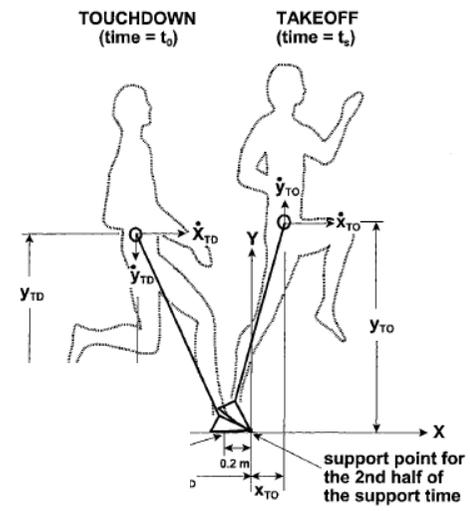
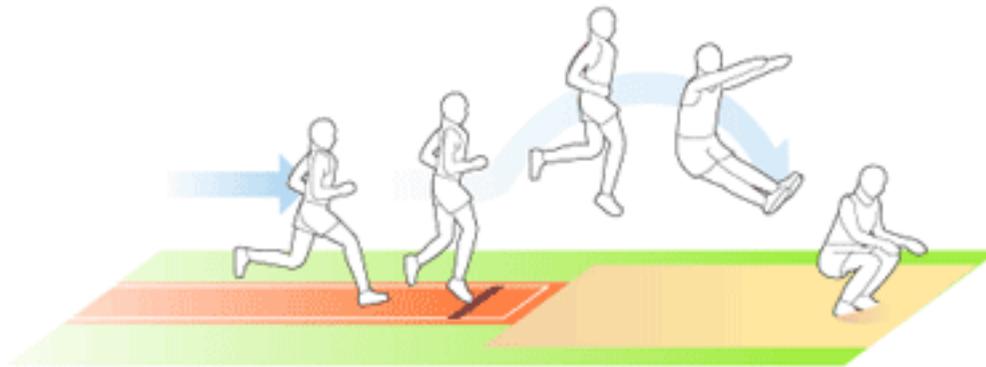
E v i d e n c e b a s e d c l a s s i f i c a t i o n





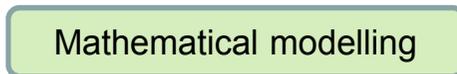
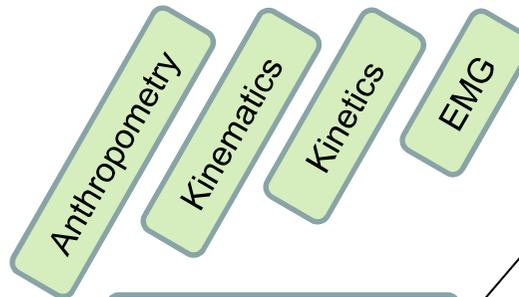
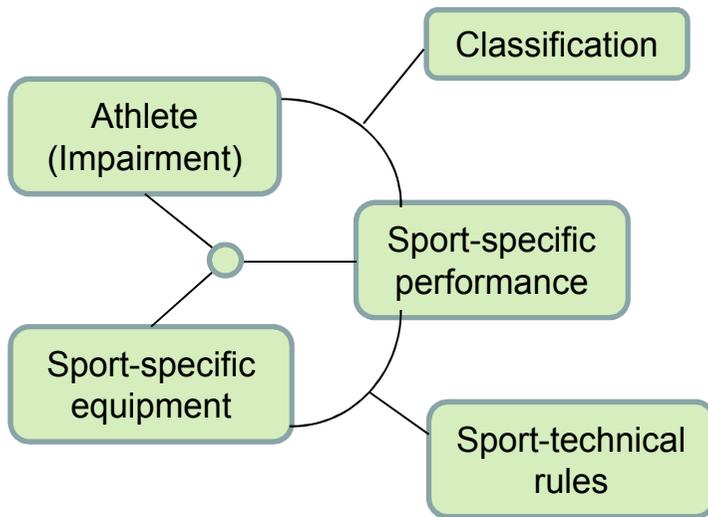
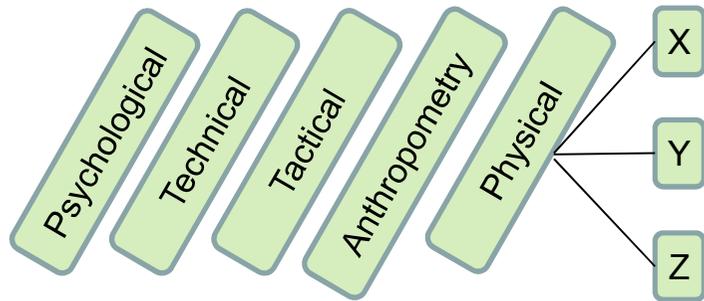
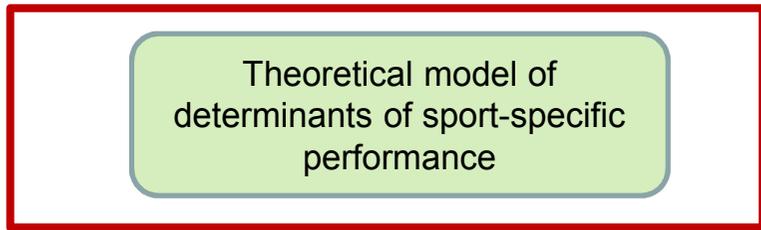
E v i d e n c e b a s e d c l a s s i f i c a t i o n



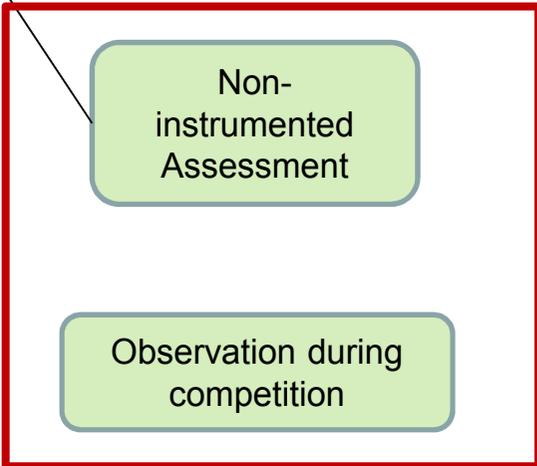
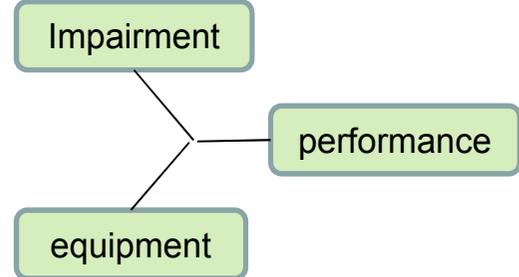
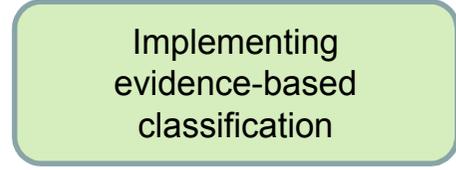


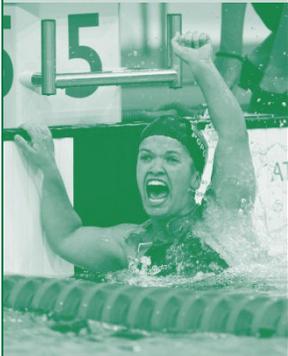
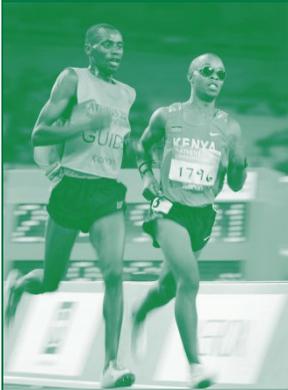
Padulles, 2013

E v i d e n c e b a s e d c l a s s i f i c a t i o n



As complex as needed





SPIRIT IN MOTION