

Output of WEAR Databases to improve the Efficiency of Digital Man Models for Workplace Design and Evaluation

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The WEAR project

- **Gathering the existing methods in Anthropometry and related disciplines - Identifying the databases**
- **Defining the structure of the on-line information system - Developing data models and software tools ==>> output to Digital Man Models**
- **Characterizing populations of 3-D subjects in a manner that can be effectively searched, mined and visualized**
- **Understanding the cognitive processes of anthropometry experts when dealing with such 1-D and 3-D databases - Identifying a means to computationally replicate these processes**

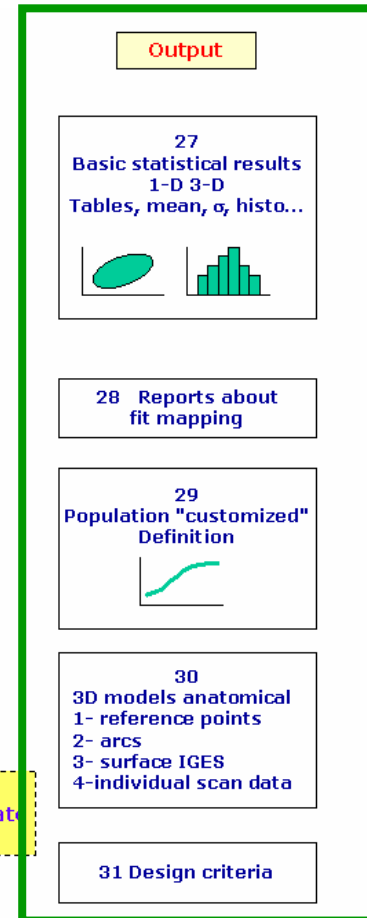
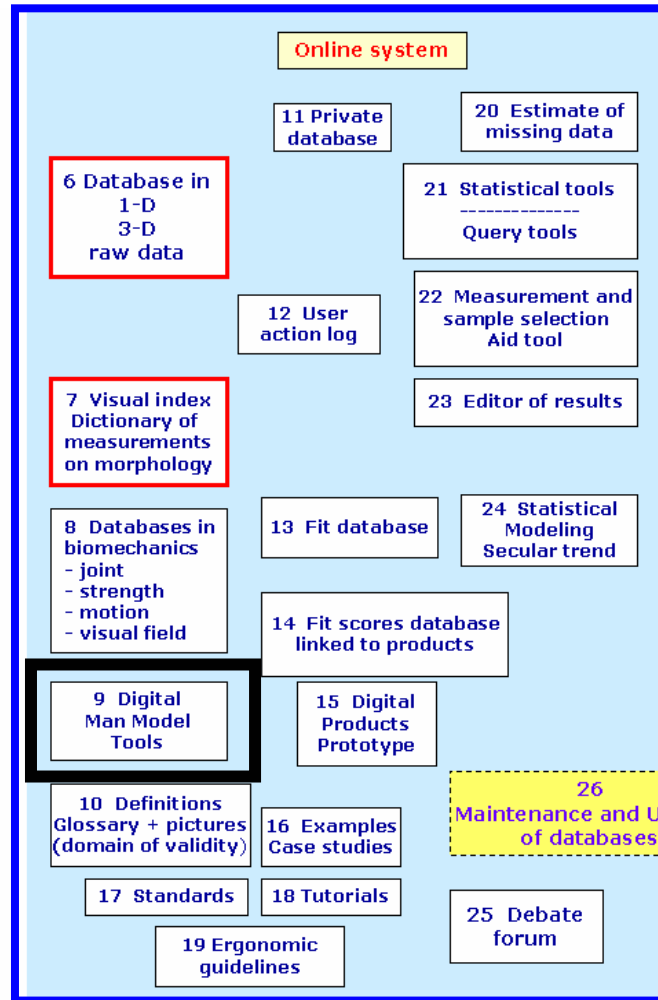
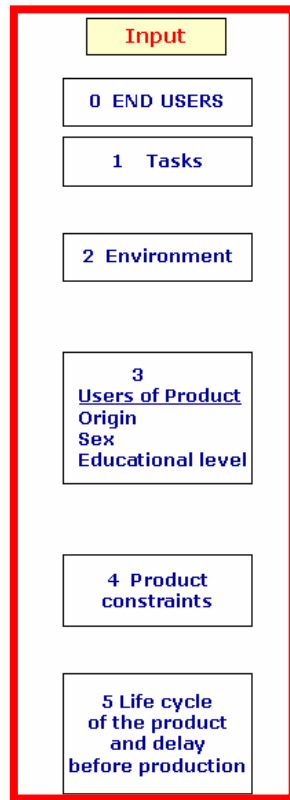
WEAR system contents

3 main tasks

To identify the need

To process the data

To provide comprehensive results



**I-wear
Ideal wear**

[Http://ovrt.nist.gov/projects/WEAR](http://ovrt.nist.gov/projects/WEAR)

32 Off line
Tutorials - Workshop - End user working group

**WEAR
Workshop
Paris-June 2002**

Anthropometric and Ergonomic Database System

Example

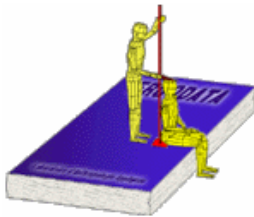
Additional files



Synthesis sheets



Bibliographical Data



Dictionary of measurements

**Demographic data
+
Quality Evaluation
of
Anthropometric Data
+ XXX XXXX**

Data files



Individual Data



Aggregated Data

1-D

**Sorting
Query**



3-D



+

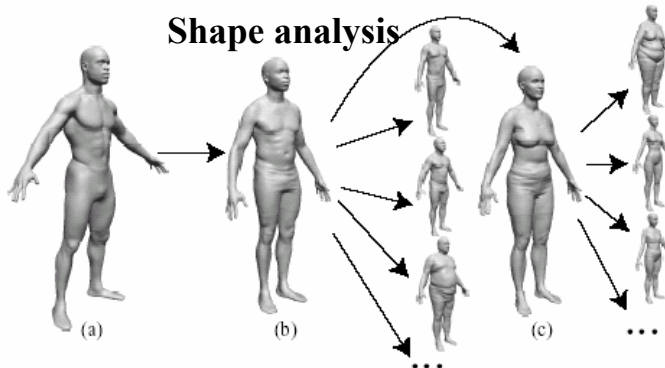
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Data processing

Digital man-models



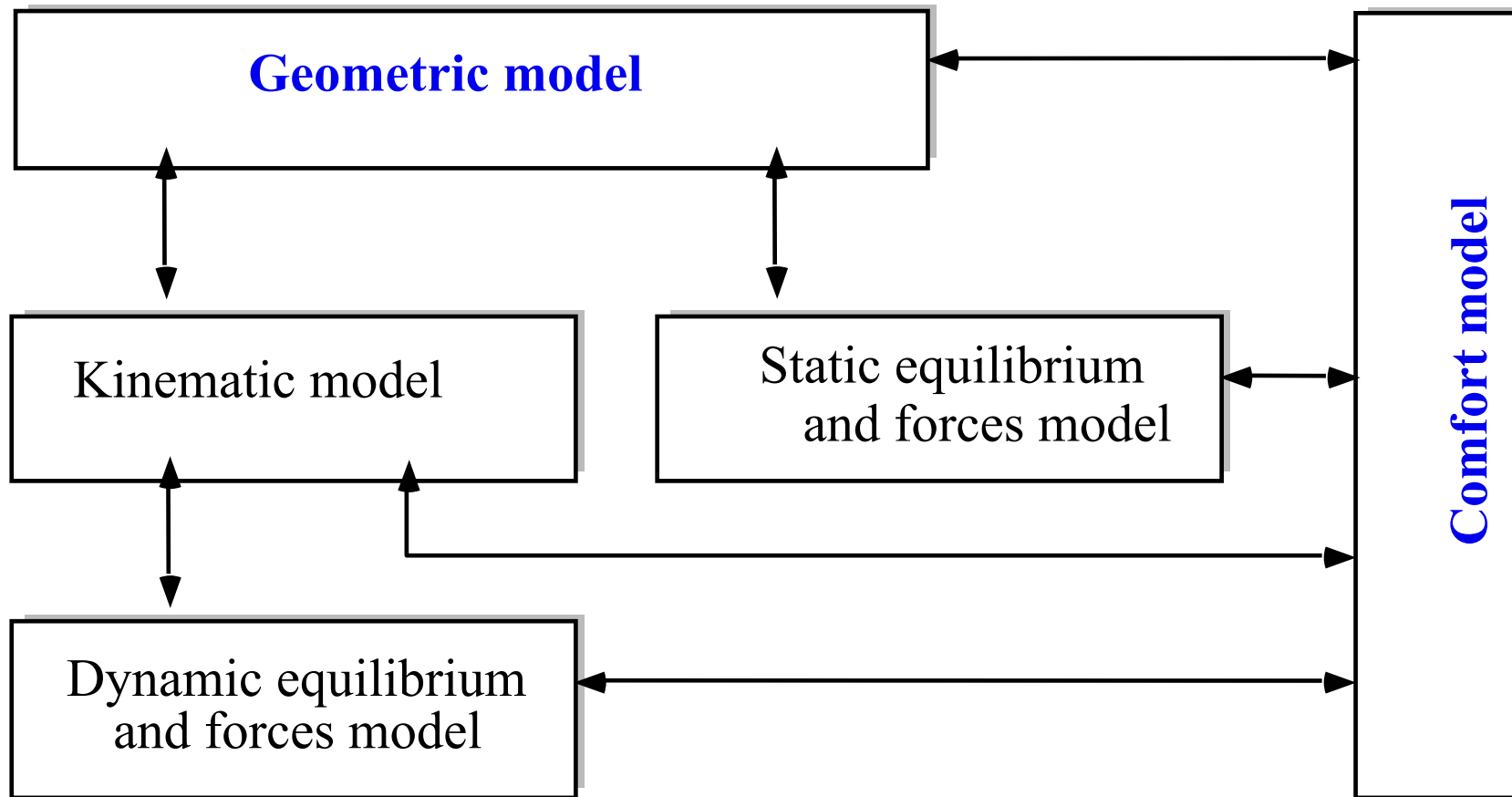
Shape analysis



Fit tests



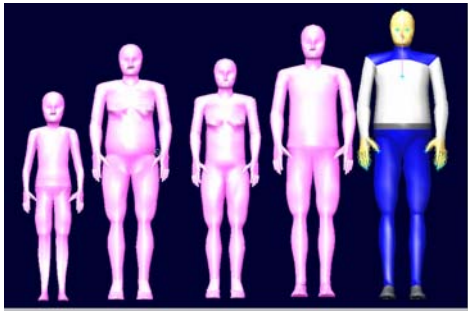
General arrangement of Digital Man Models to an Ideal Physiological Man Model



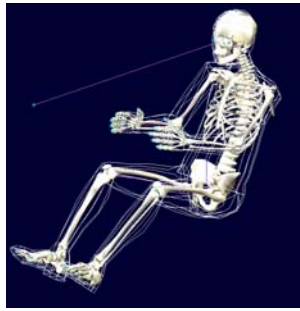
European Programme BRITE EURAM
AIT : DMU-ES (Advanced Information Technology
Digital Mock Up - Ergonomical Simulation)

Digital Man Model functionalities for design and evaluation

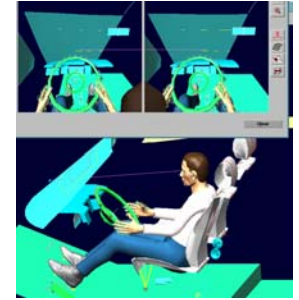
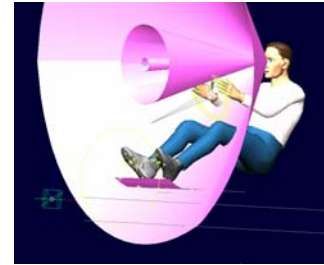
Size variability



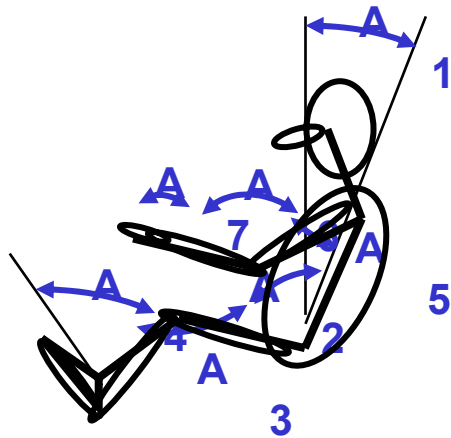
Internal/external



Fields of view



Postures



Reach area capabilities



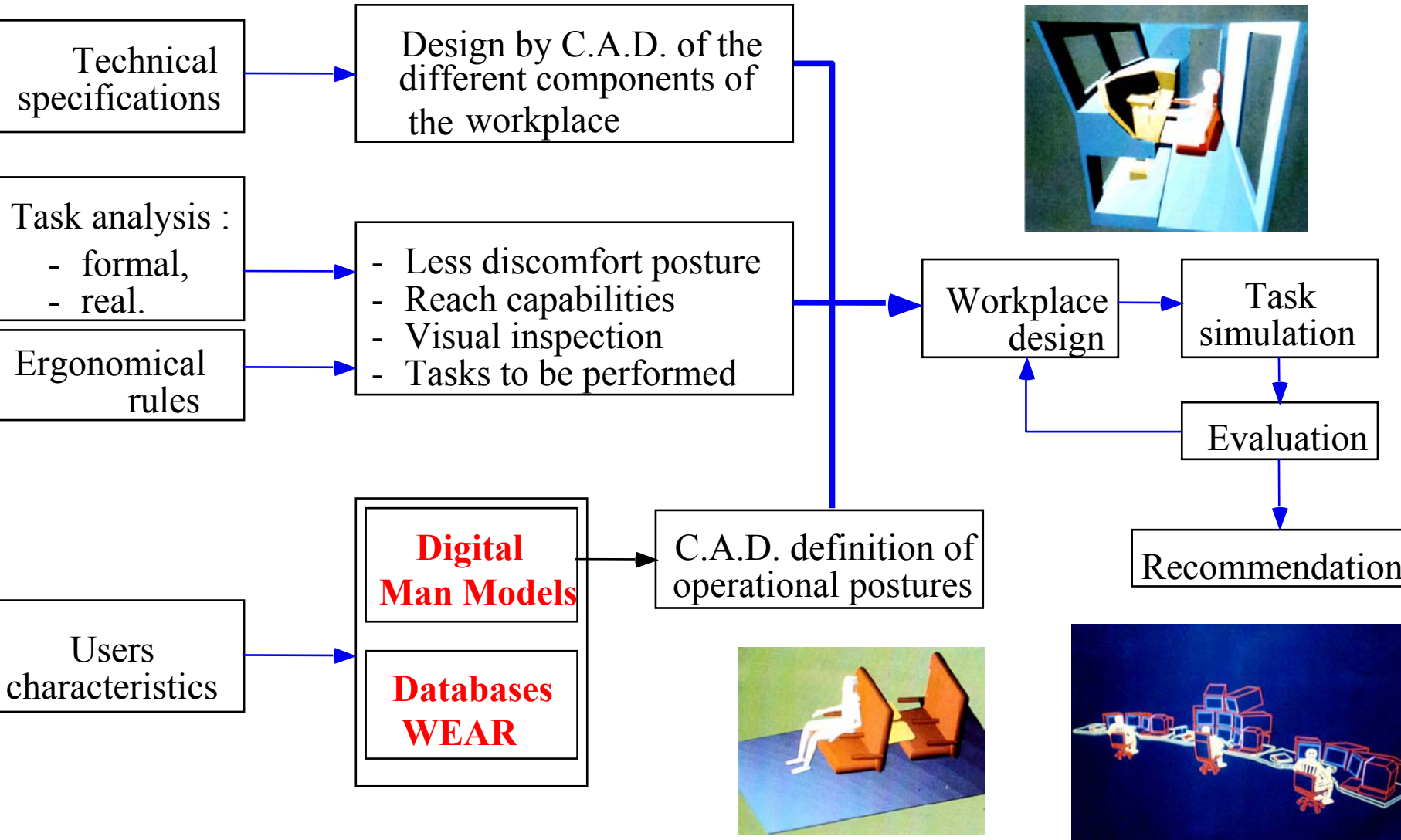
Movements



and more

Digital mock-up analysis

Method



Output from databases

Digital Man Models need various data to be used efficiently
in design and evaluation studies

From classical 1-D values extracted from different surveys
to reach capabilities, fields of view, 3-D posture angles,
3-D motion,

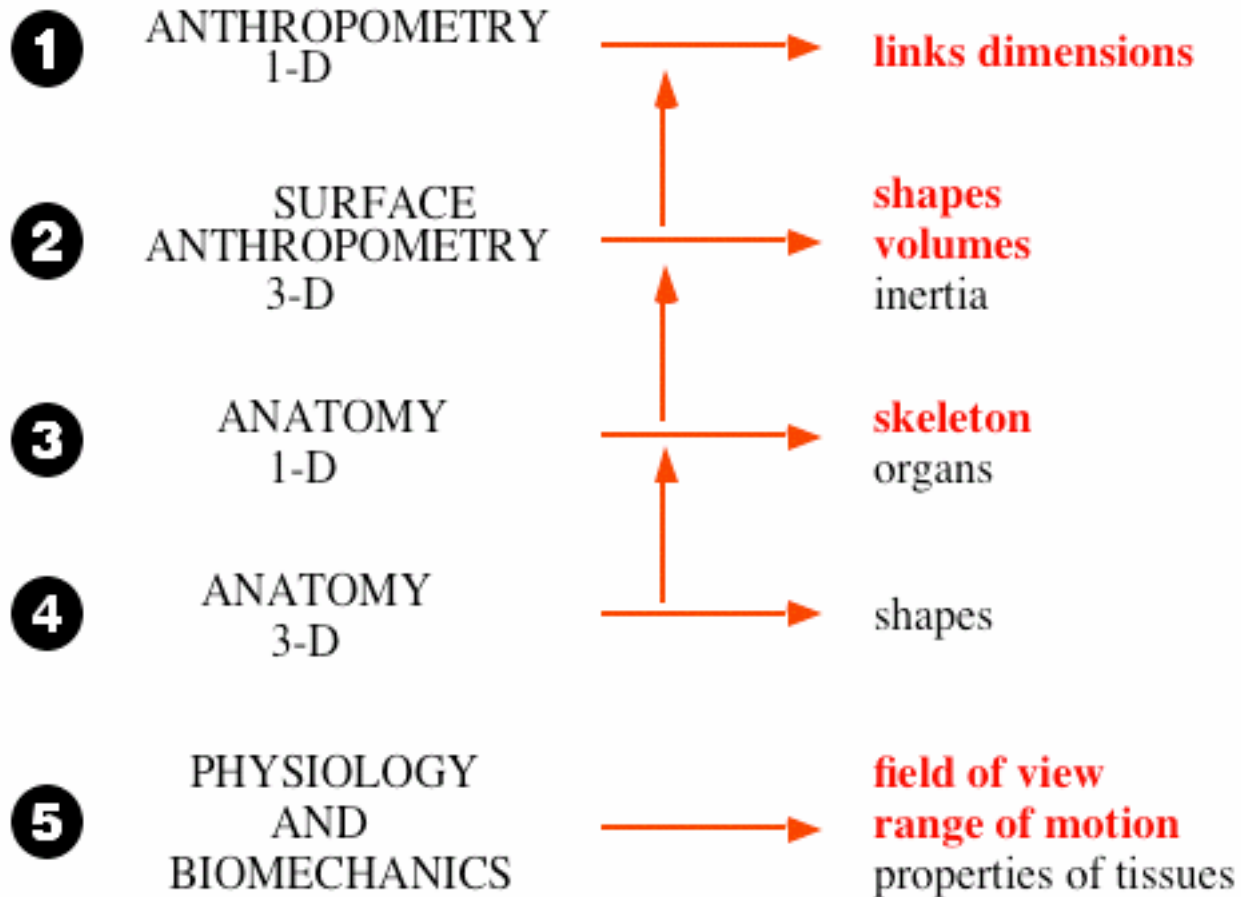
All these data are generally in stored in different files
or documents, standards,...

**Using WEAR databases, these data will be obtained very quickly
and these data, methods, ergonomic rules, ... will have been validated
by the WEAR group**

DATABASE COMPONENTS

MAIN SECTIONS : 1 to 5

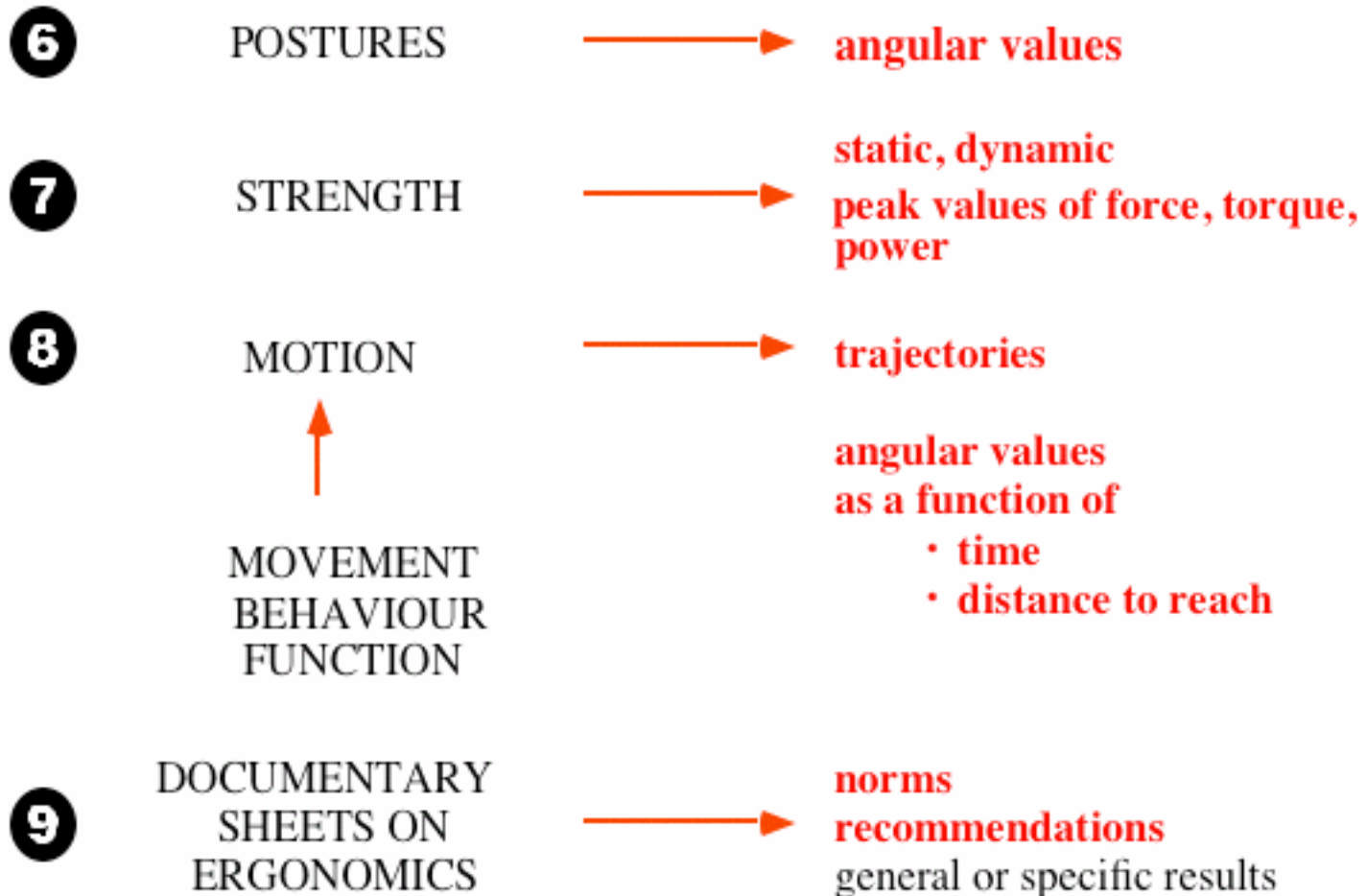
Examples of data needed to improve the use fo Digital Man Models



DATABASE COMPONENTS

MAIN SECTIONS : 6 to 9

Examples of data needed to improve the use fo Digital Man Models

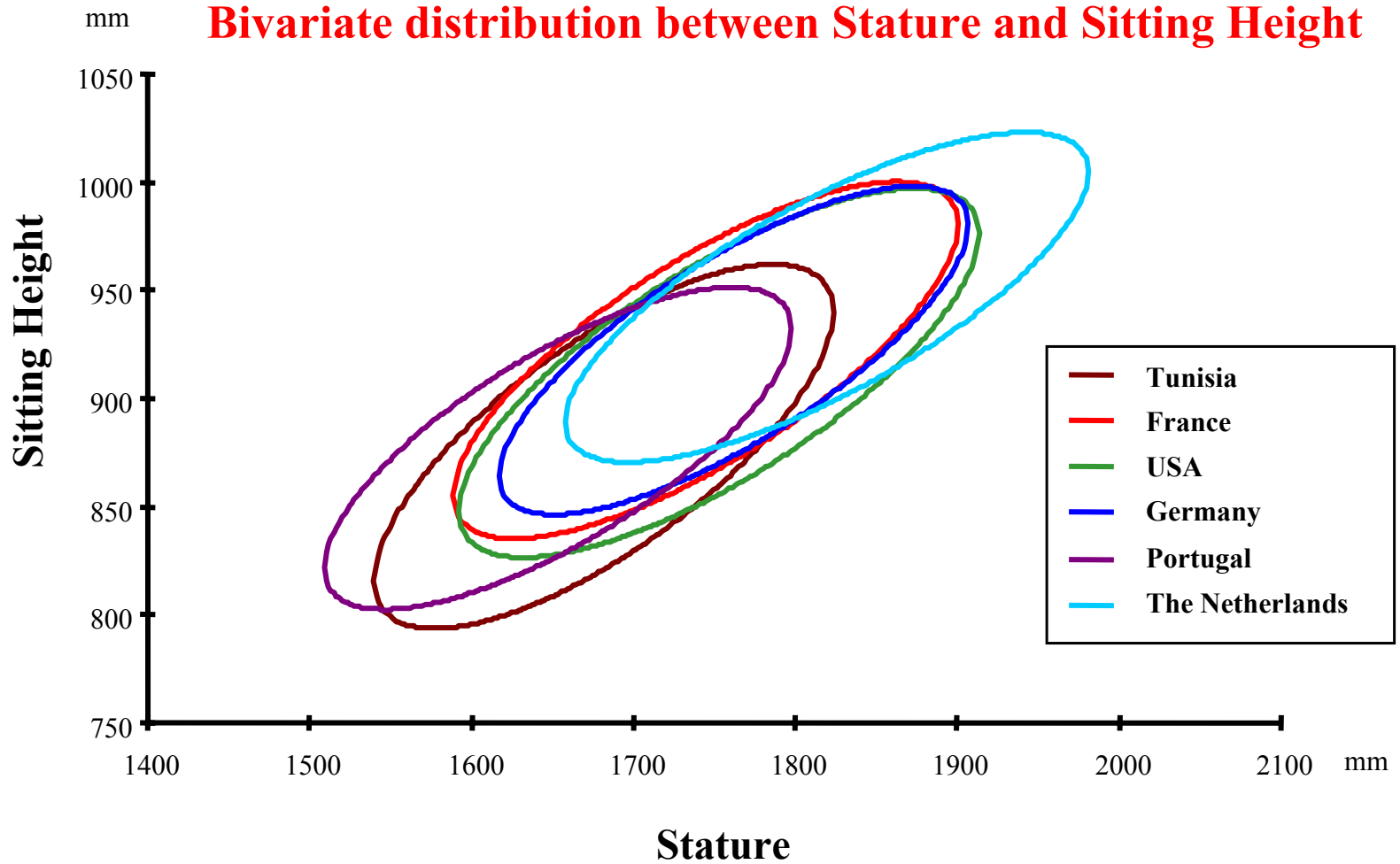


Example : Anthropometric data processing how to choose values for Digital Man Models ?

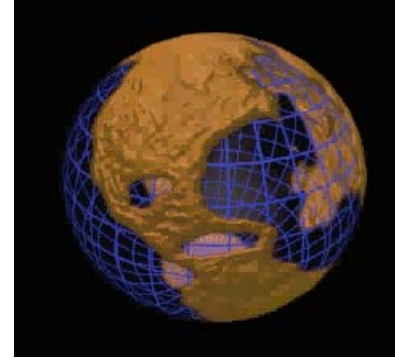
- **Choice of relevant surveys and/or samples**
- **Statistical modeling of increase of morphology**
- **Choice of key measures according to the product :**
 - ex : seated operators - eye-seat height**
 - buttock knee length**
- **Bivariate distributions to define appropriate small, medium and large models**
- **Choice of morphotypes : i.e trunk / lower limbs ratio**
 - ==>> « boundaries » models**

Morphological Variability

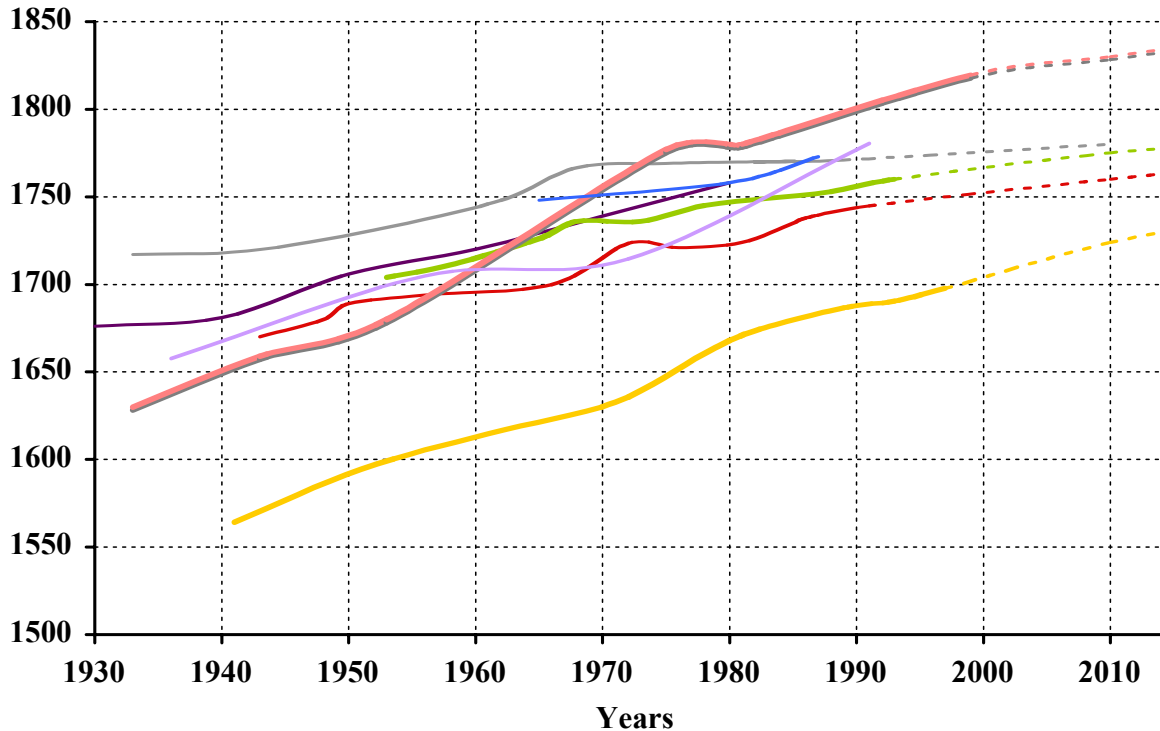
Bivariate distribution between Stature and Sitting Height



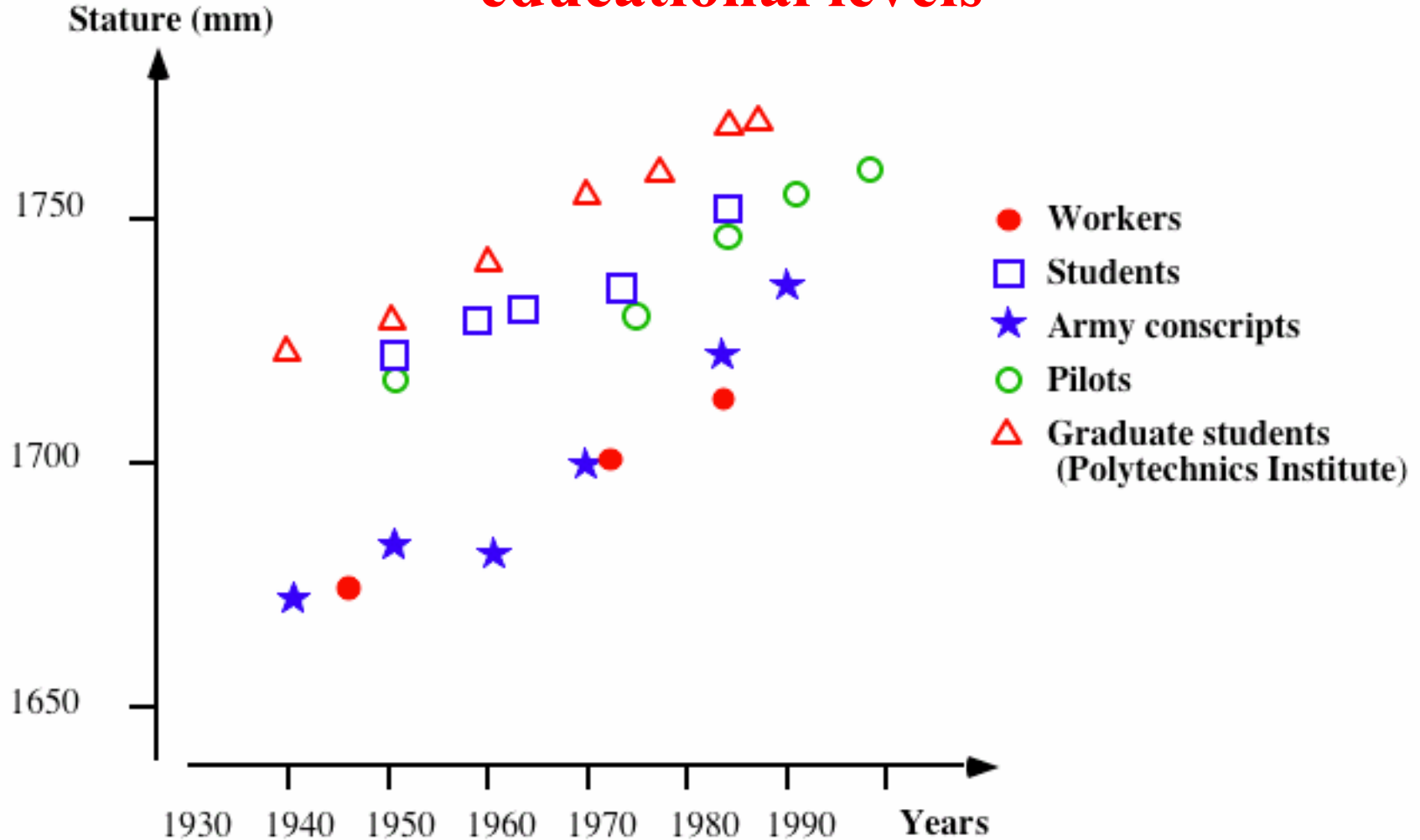
Examples of statistical results extracted from a database system



Increase of STATURE
(mm)



Morphological differences related to educational levels

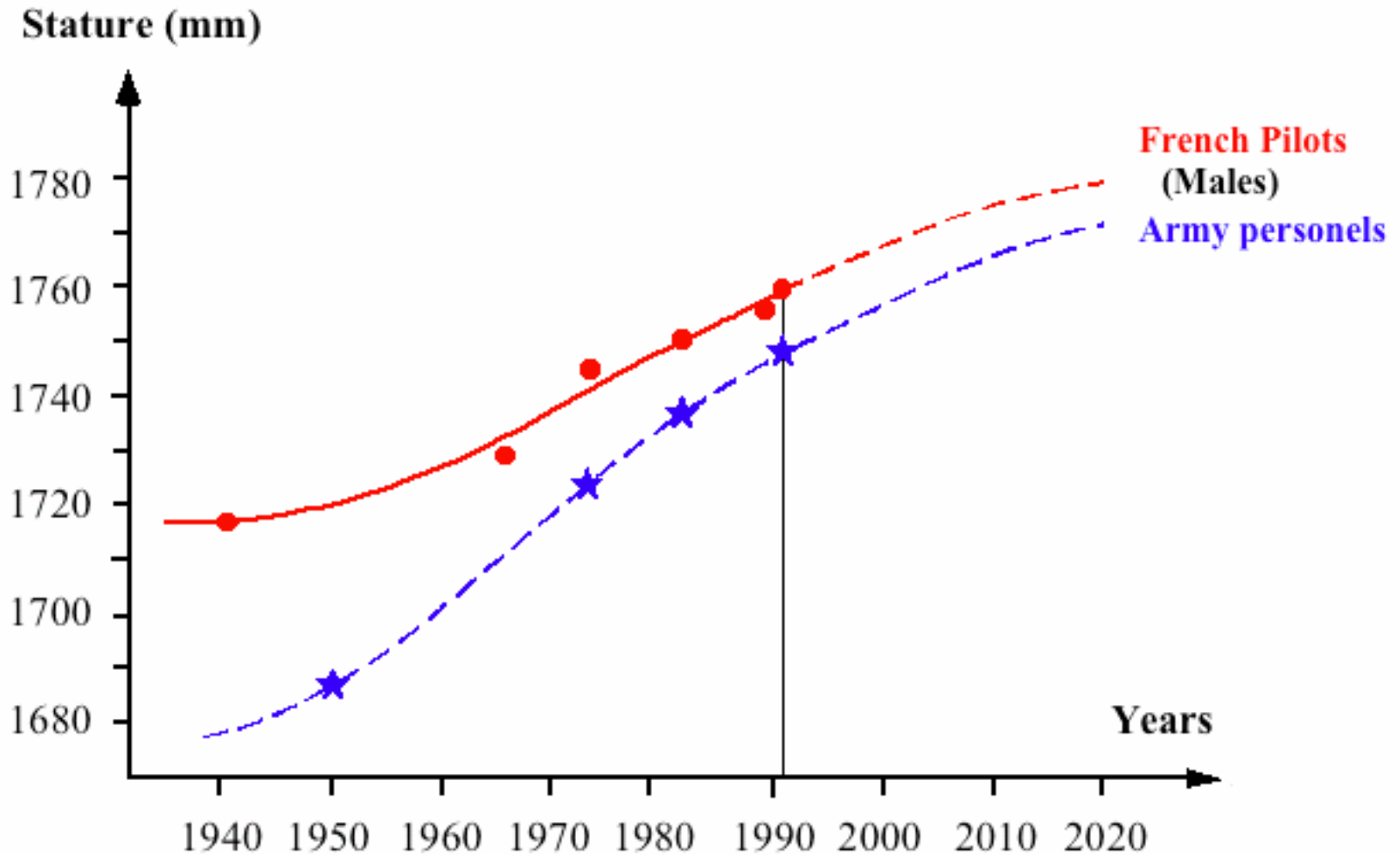


Statistical modeling of increase of morphology

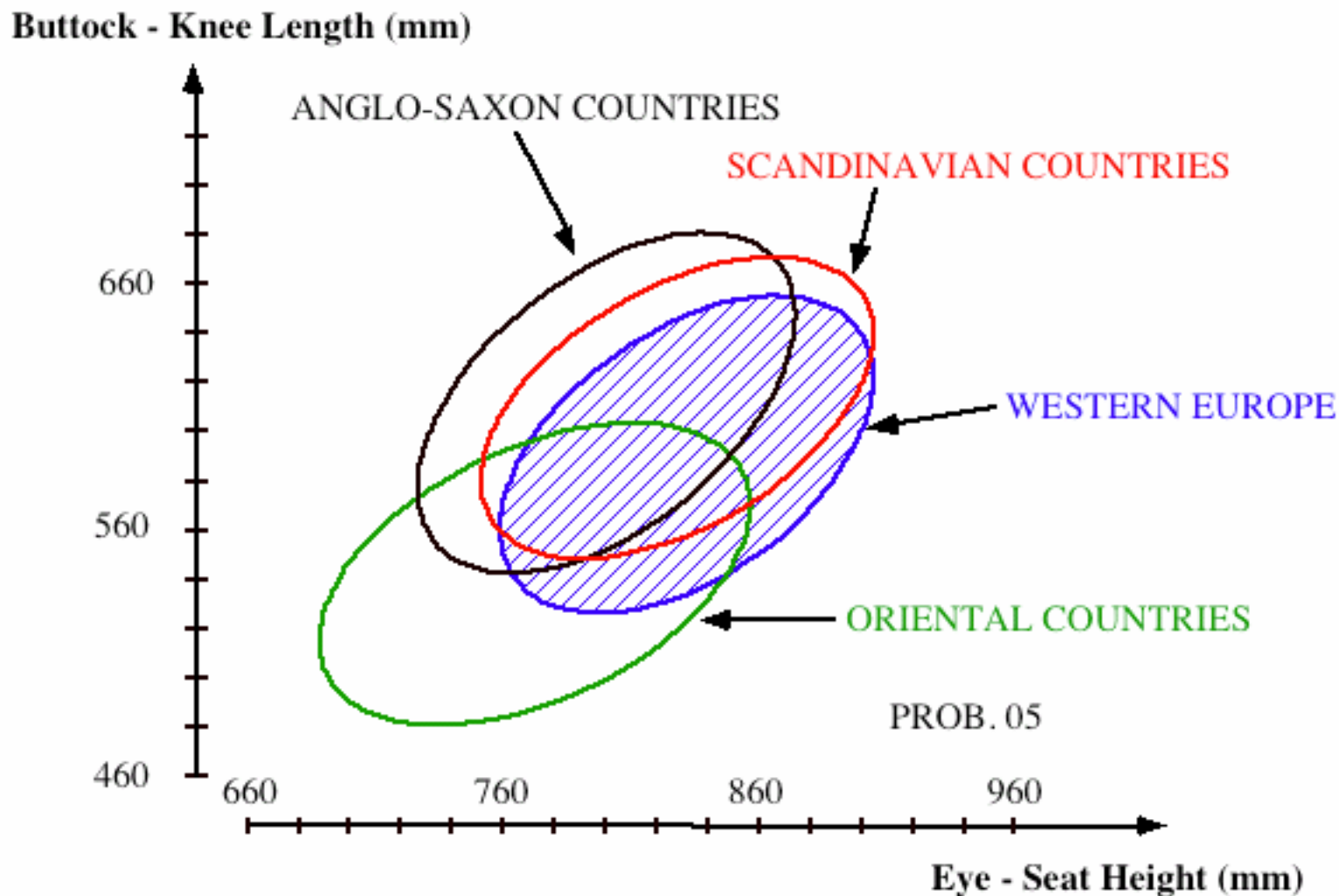
Choice of the relevant surveys/samples

Evolution of stature.

Mean values compared between two populations from 1940 to 1991. Prediction up to 2020.

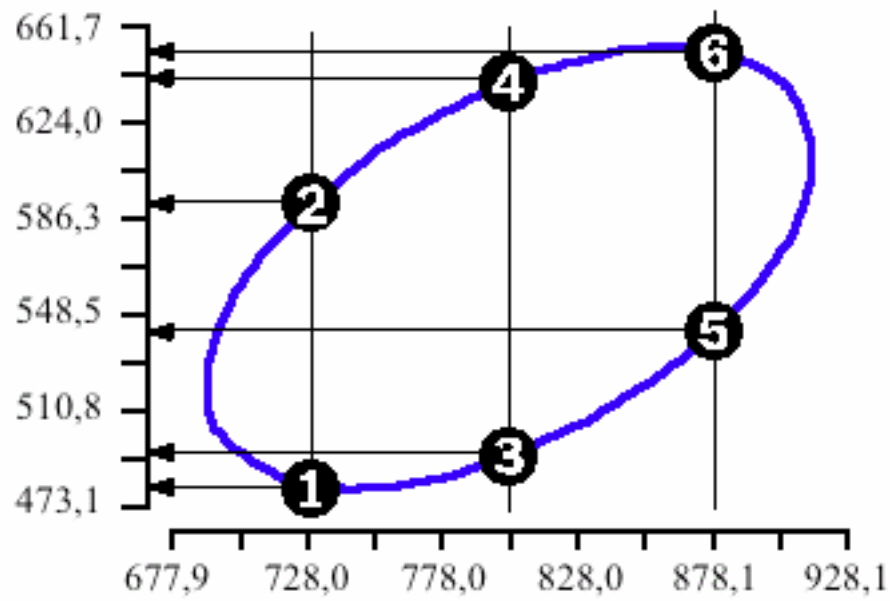


Morphological variability

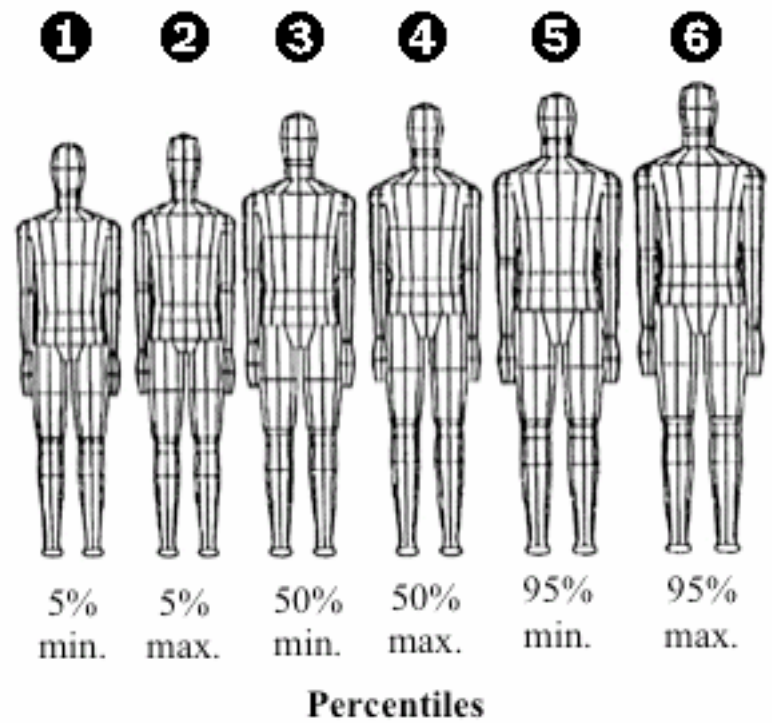


**Choice of typical human body models using bivariate distribution.
 Example to create 5th, 50th and 95th percentiles of ERGOMAN models.**

Buttock knee length



Eye seat height



Choice of morphotypes : trunk / lower limbs ratio

ERGODATA-LAA P5

==>> « boundaries » models

Summary

Digital Man Models need additional data
for each new study or evaluation

The choice of relevant information can be obtained
using on-line databases as proposed in WEAR

⇒ Digital Man Models will be more realist
and representative of the population of end-users

⇒ Workplaces, layouts, equipments will be defined based on the
morpho-mechanical variability of the end-users for the future
and not
for the total population defined in the norms (generally old data)

⇒ Opportunity to include updated data from new surveys