CODATA 2006

Anthropometric Databases and Applications

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October 24 2006

World Engineering Anthropometry Resource

The WEAR Group

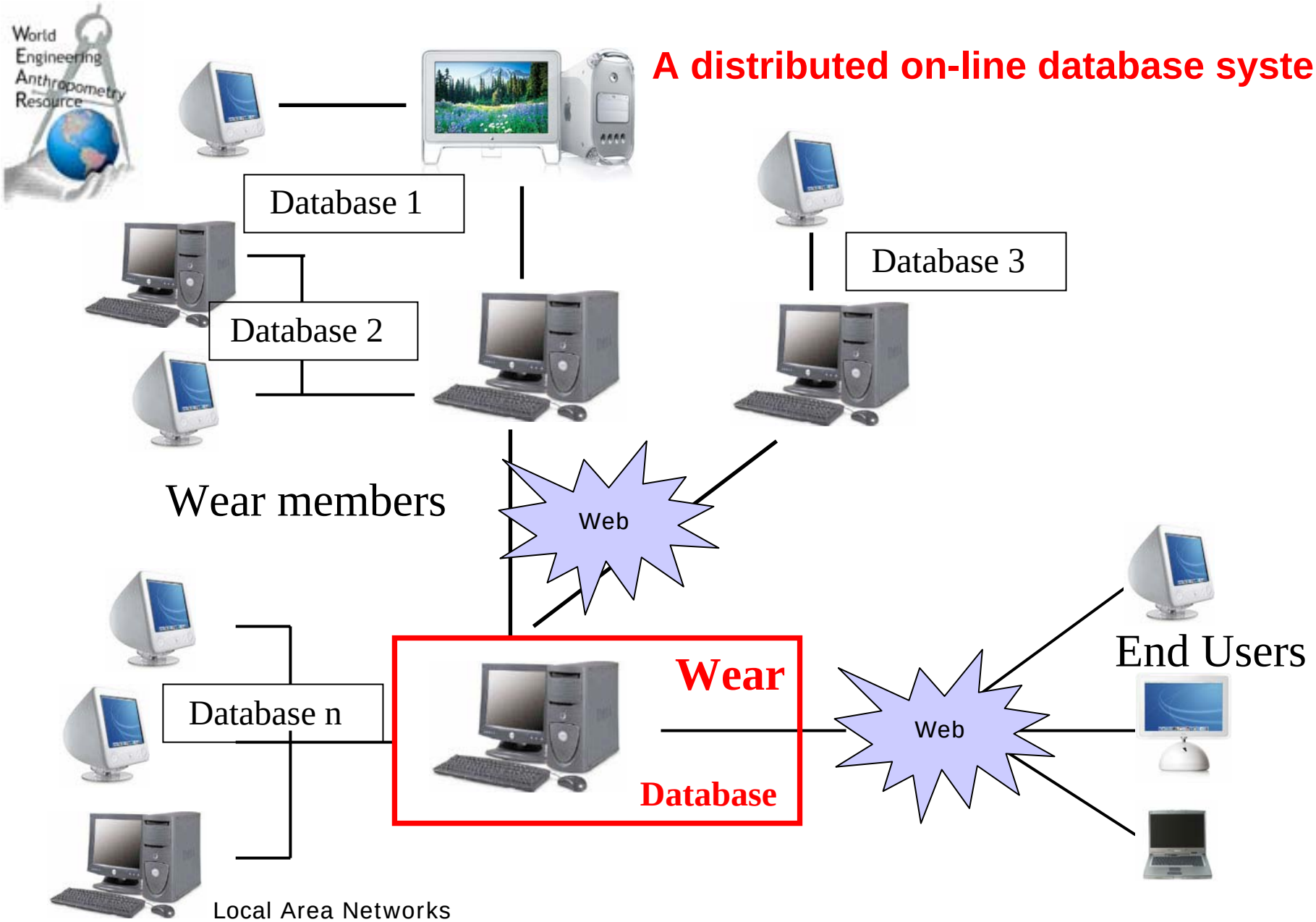
USA- Canada - France - Japan - Korea -The Netherlands
Taiwan - Brazil - South Africa - Australia

……..+ ……..

Setting up during IEA-2000-HFES San Diego August 2000

Aim

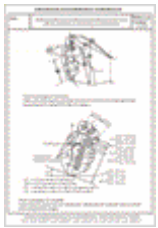
- **Gathering the existing methods in Anthropometry and related disciplines - Identifying the databases**
- **Defining the structure of the on-line information system - Developing databases, data models and software tools**
- **Characterizing populations of 3-D subjects in a manner that can be effectively 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**


World Engineering Anthropometry Resource
A distributed on-line database system
Database 1
Database 2
Database 3
Wear members
Web
Database n
Wear
Database
Web
End Users
Local Area Networks

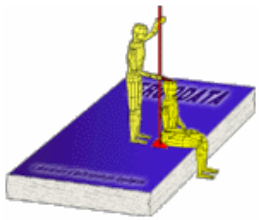
Anthropometric and Ergonomic Database System

Principle

Additional files



Synthesis sheets



Dictionary of measurements

Demographic data
+
Quality Evaluation
of
Anthropometric Data
+ xxx xxxx

Bibliographical Data

Sorting Query

Data files

1-D

Individual Data

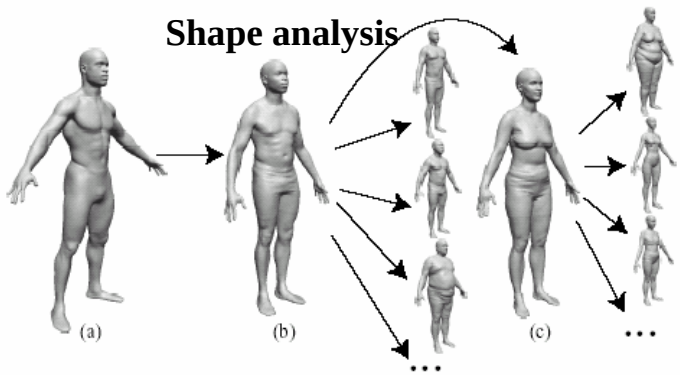
Aggregated Data

3-D
+
XX

Data processing

Digital man-models

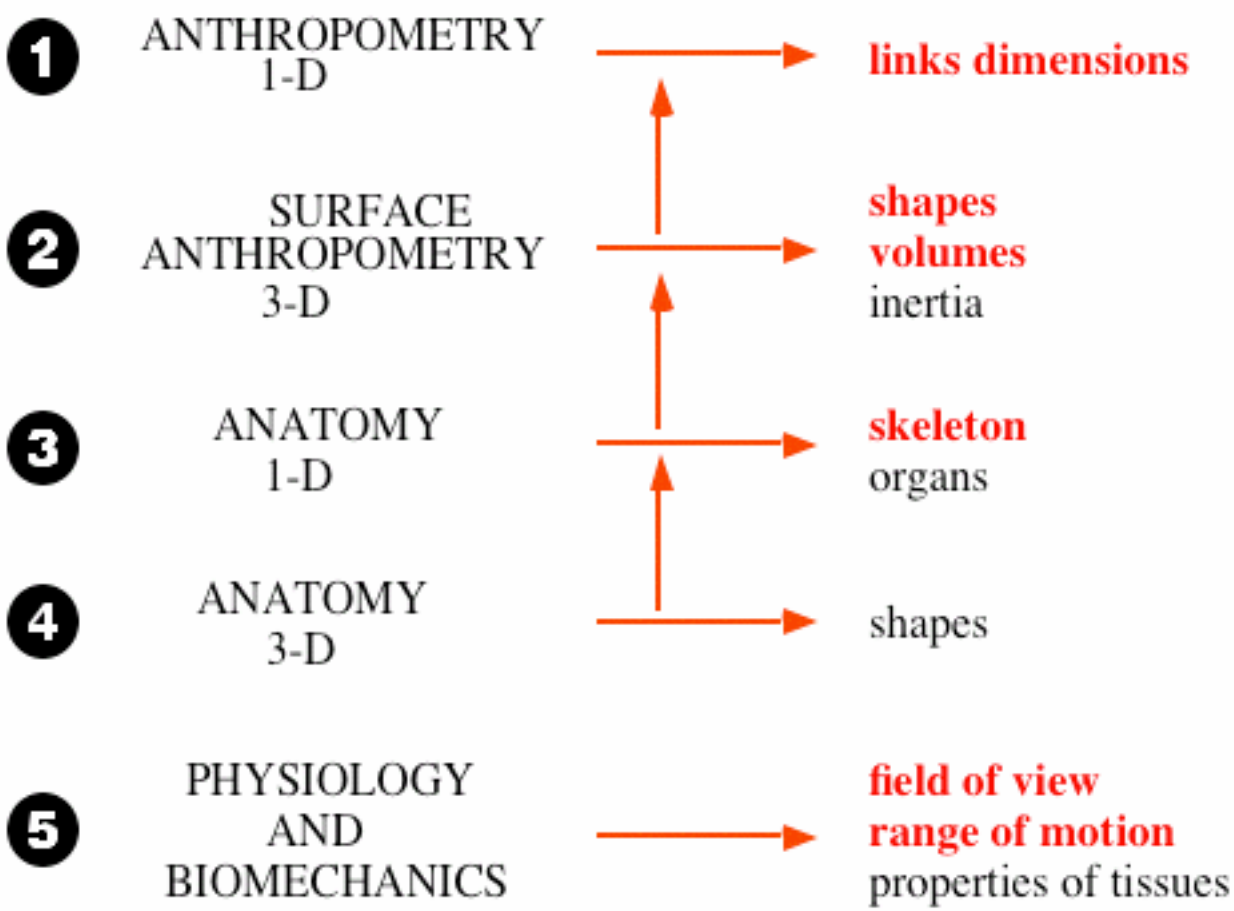
Shape analysis



Fit tests

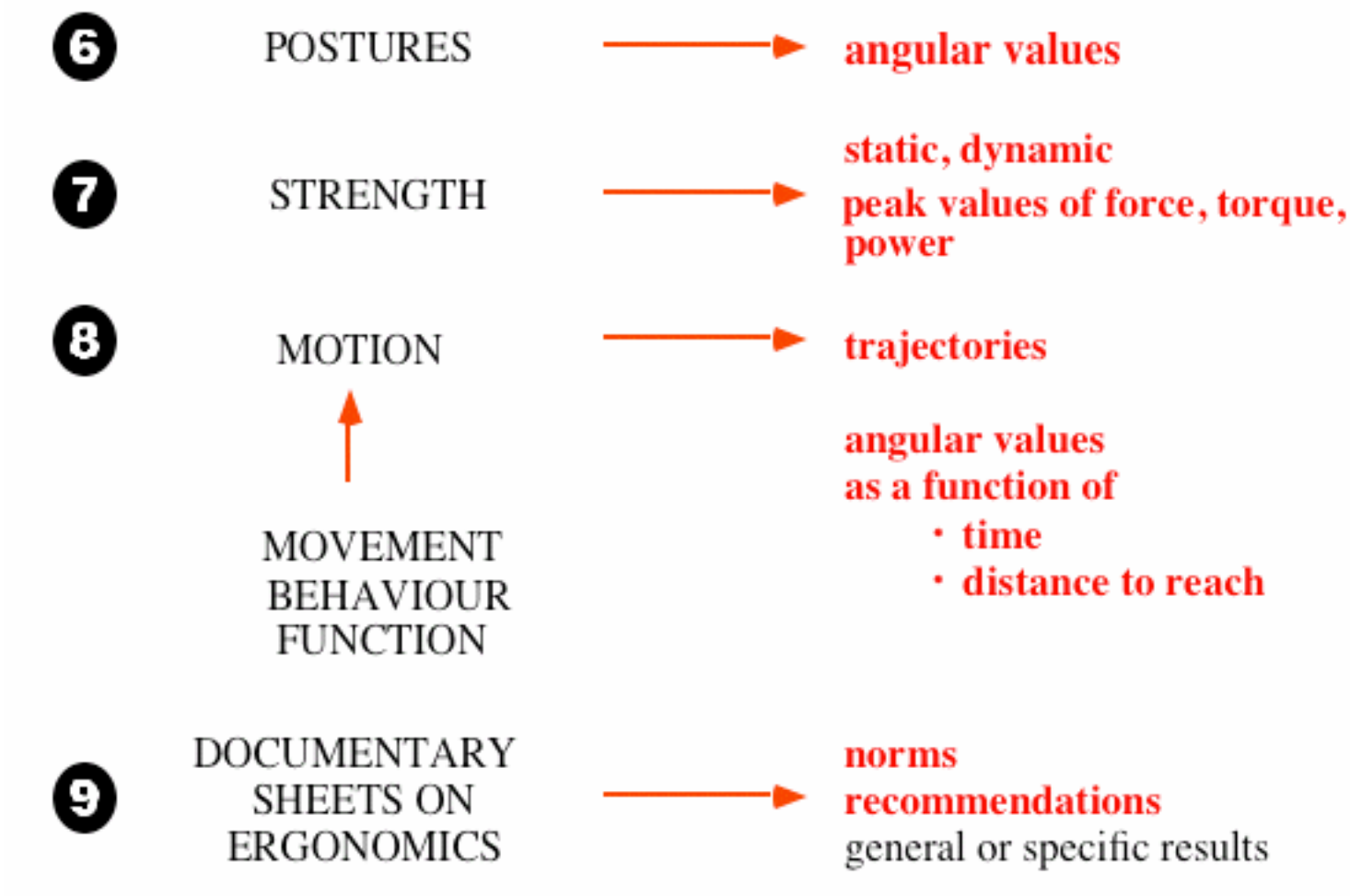
Database components

MAIN SECTIONS : 1 to 5



Database components

MAIN SECTIONS : 6 to 9

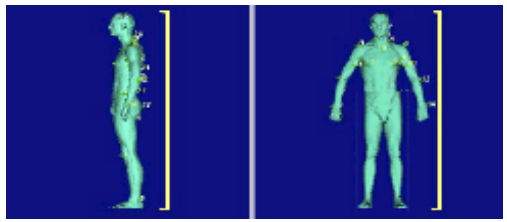


Database components

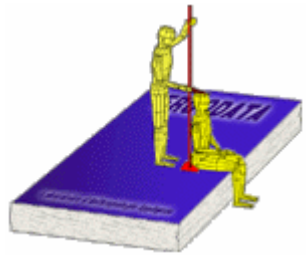
World Engineering Anthropometry Resource

Information on surveys

Demographic data
Sex , Age
+
Educational level
...



3-D scans



1-D data

New Data

Quality Evaluation of Anthropometric Data

+

Dictionary of measurements

1-D Data

3-D Data

Criteria for query

sex, age,
morphological criteria,
Educational level
...

Scanners info

Digital products

.....

Statistical processing

Shape analysis tool set

Example of database structure
(simplified)

INDIVIDUAL DATA

Surveys
Institute
Date (start-end)
Population
Origin
Civilian/Military
...

Subjects
Sex
Age
Civilian/Military
Date of measure
Educational level
Function
...

1D Data
Lengths,
widths,
perimeters ...

Biomechanical Data

3D landmarks
(x, y, z)

3-D Scans
Series of points,
Surfaces,
...

Quality Evaluation of Anthropometric Data

+

Dictionary of measurements
Definition
Method
Units
Graphs
Pictures...

SQL
Structured Query Language

Relational Data Base Management System

Articles
Institute/Authors
Date
Population
Origin
Civilian/Military
...

Samples
Sex
Age
Civilian/Military
Date of measure
Educational level
Function
...

Statistical processing
Mean, standard deviation
Min, max, centiles...

+

Analysis tool set
(Integrate, PSD,..)

Documents
Reports,
Graphs
(format: pdf, jpg...)

AGGREGATED DATA

Dictionary of measurements

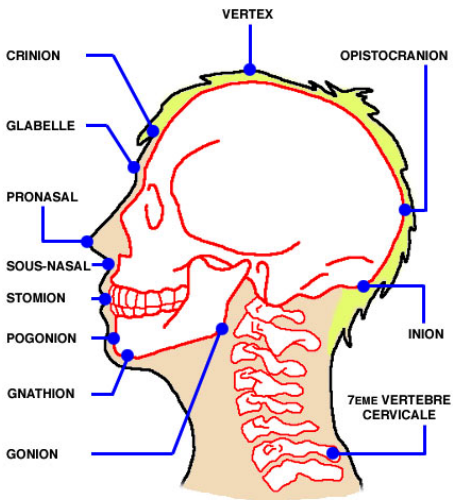
(example)

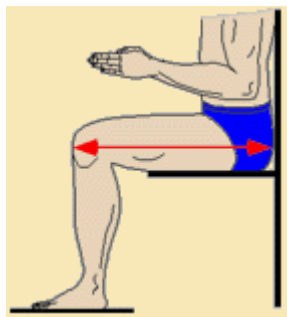
Aim

- Give an unambiguous definition for each mesurement
- Help to define necessary measurements for each survey

Contents

- Graphic representations of the human body with locations of anatomical points
- For each measurement, for each point
  - definition
  - method of measurement
  - graphic





Definition

« Distance plan postérieur du massif fessier - face antérieure du genou »

Method

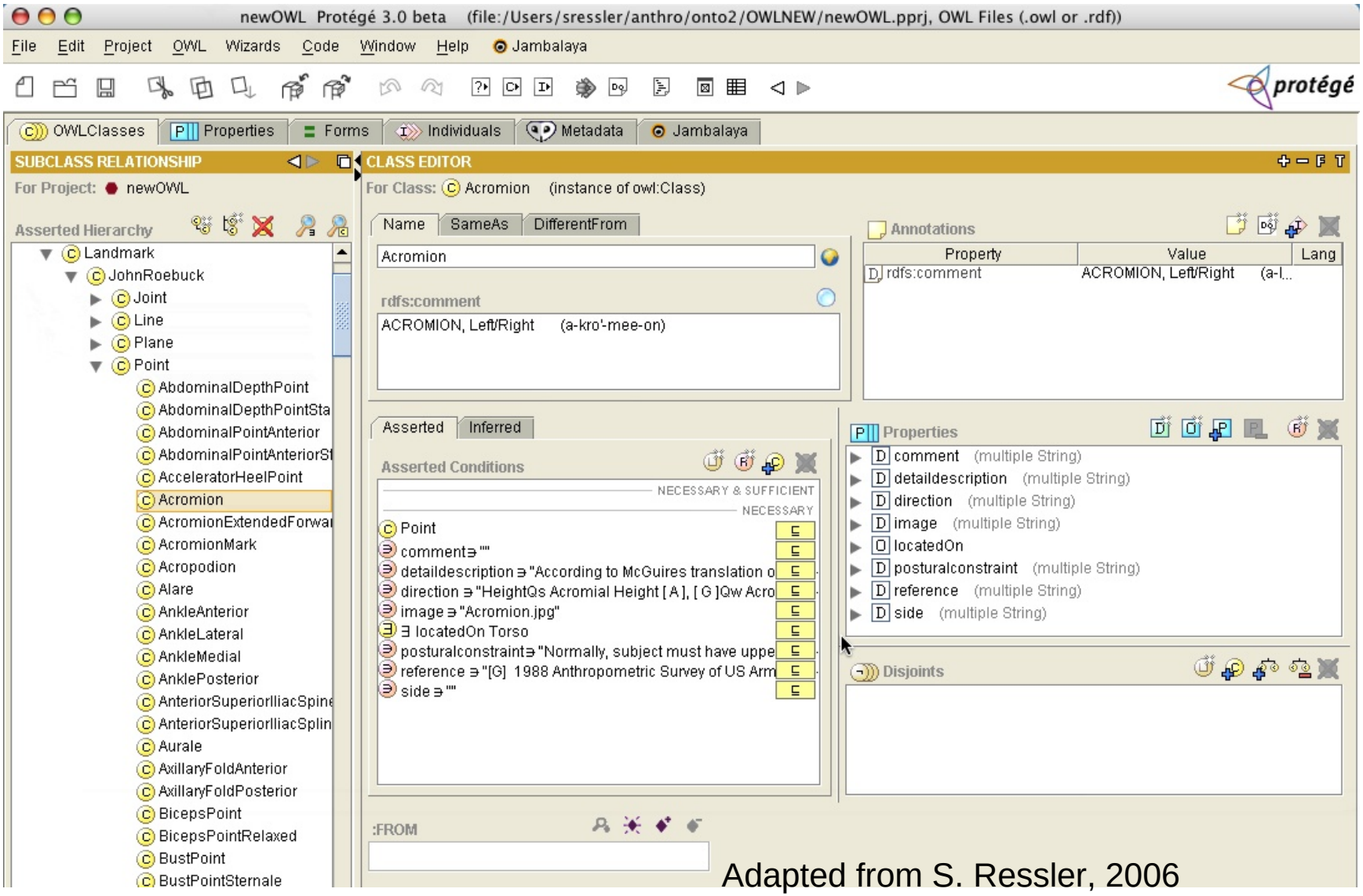
« Sujet assis, jambes fléchies à angle droit, fesses appuyées au mur, distance à partir du mur servant de plan de référence entre la face postérieure des fesses et la face antérieure du genou »

The need to create an Ontology?

- *Common set of terminology*
- *Formal/Testable representation*
- *Take advantage of advanced tools*
  - *(why reinvent work when you can steal from others!)*
- *Integration with new web services and W3C semantic web architecture*

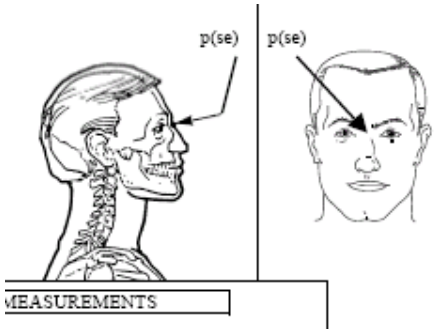
Adapted from S. Ressler, 2006

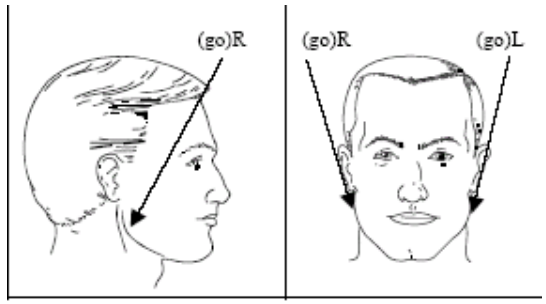
Protégé (Stanford Ontology Tool)

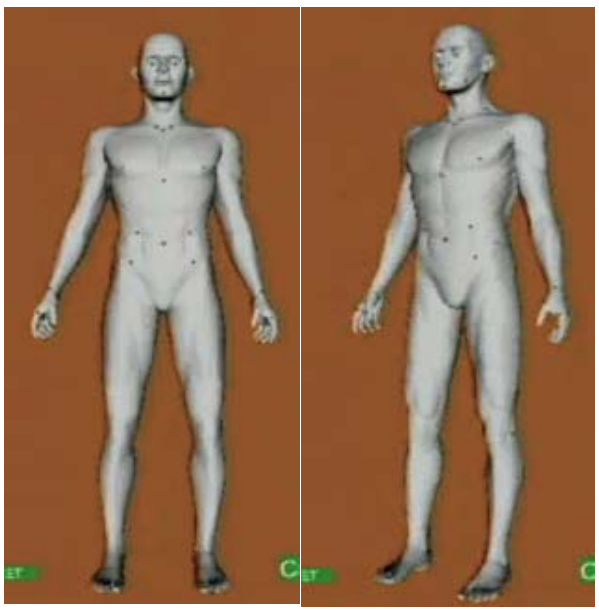


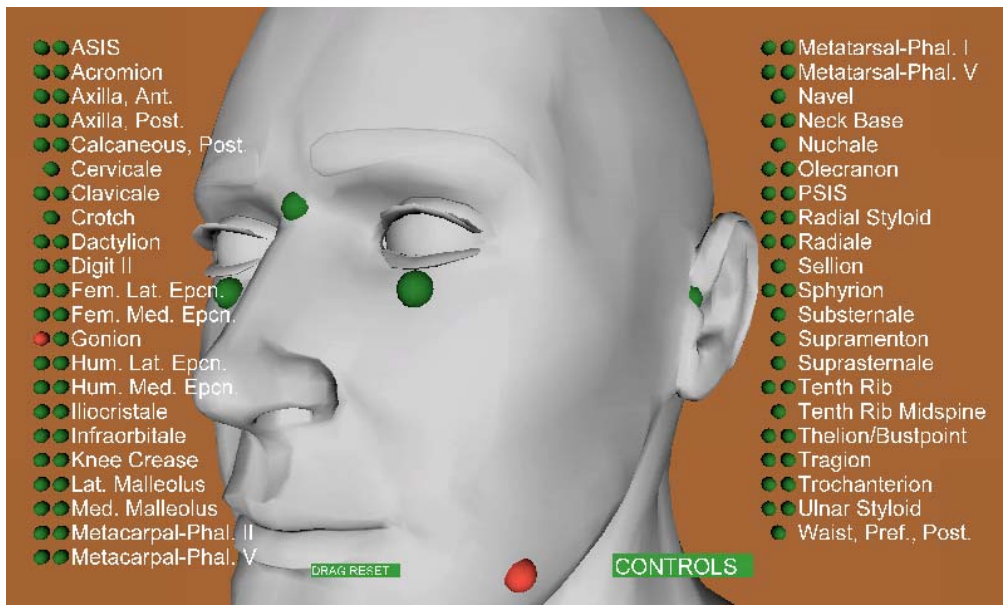
Adapted from S. Ressler, 2006

Enhanced Web Pages (visualizations)



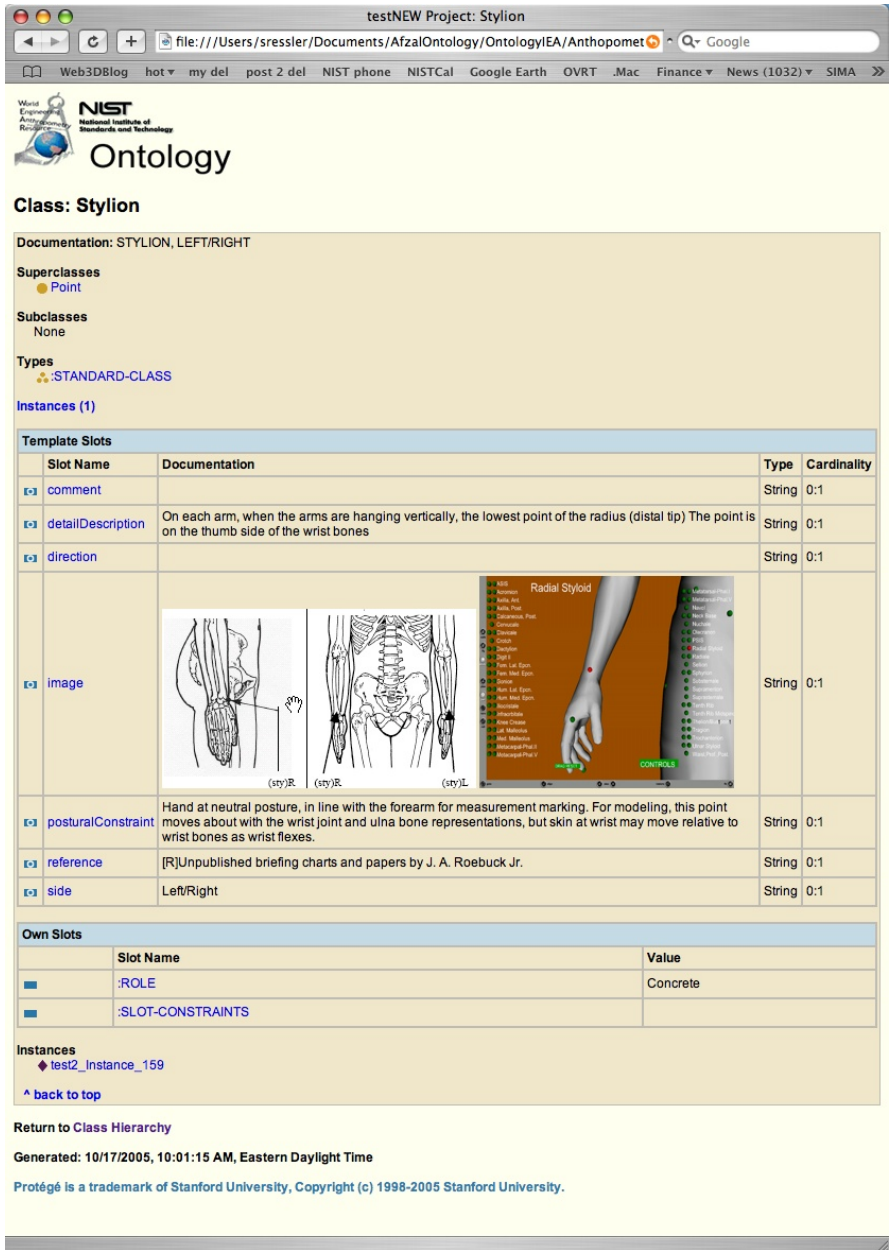






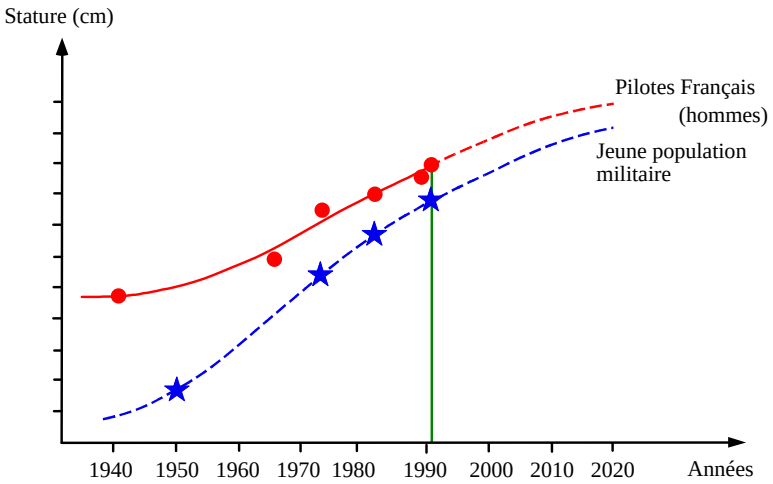
Adapted from S. Ressler, 2006

Semi-Automatically Generated Web Page

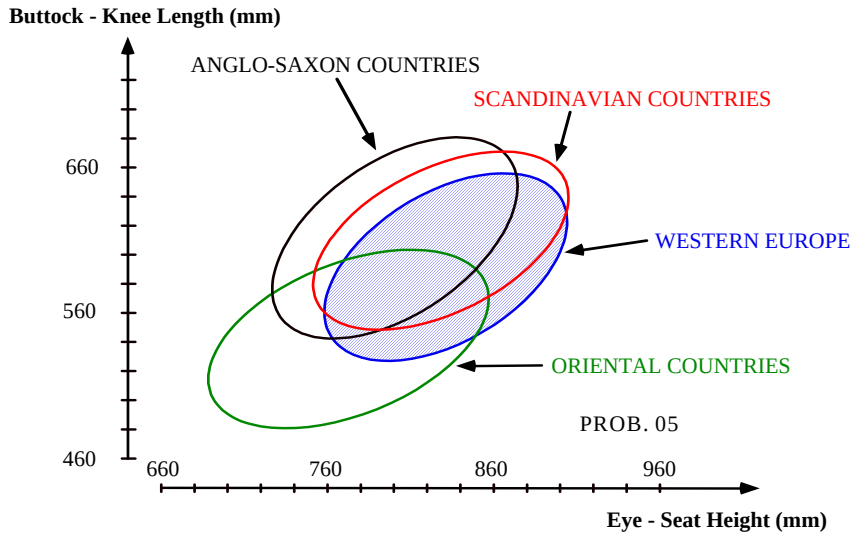


Adapted from S. Ressler, 2006

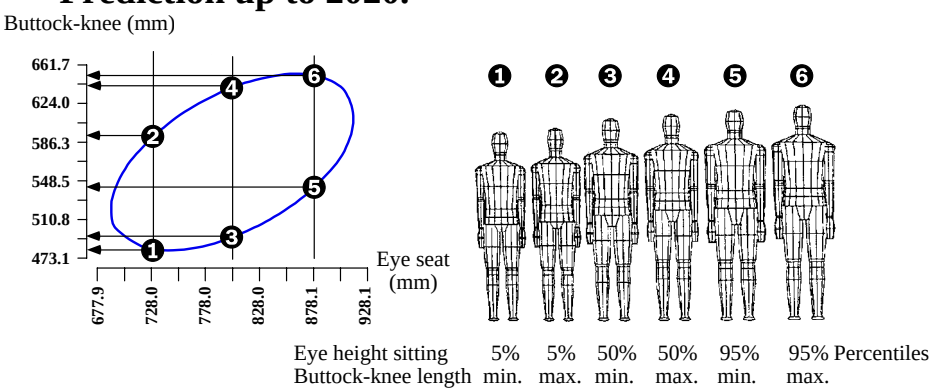
Examples of 1-D anthropometric data processing using Databases of WEAR



Evolution of the stature. Mean values for two french populations from 1940 to 1991. Prediction up to 2020.

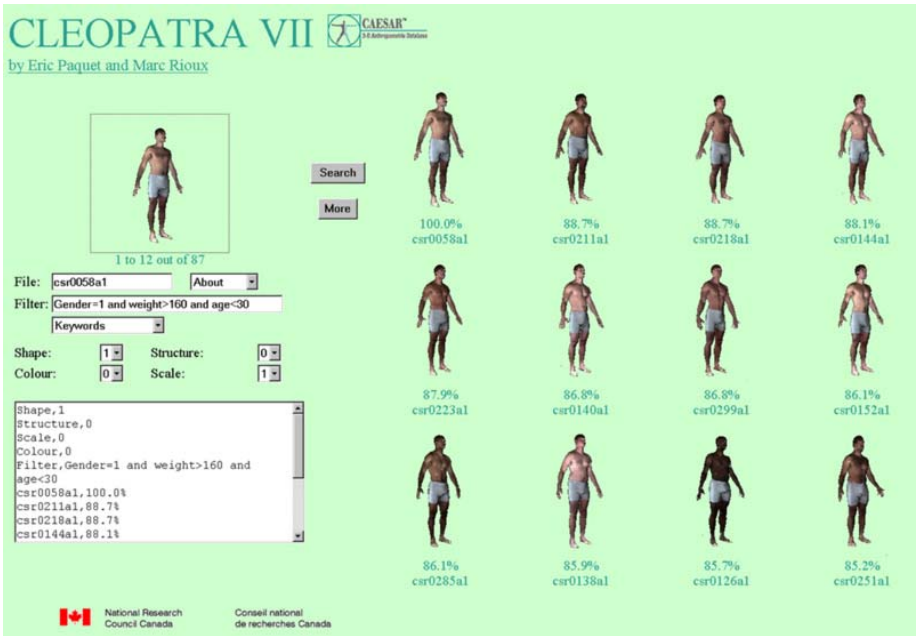


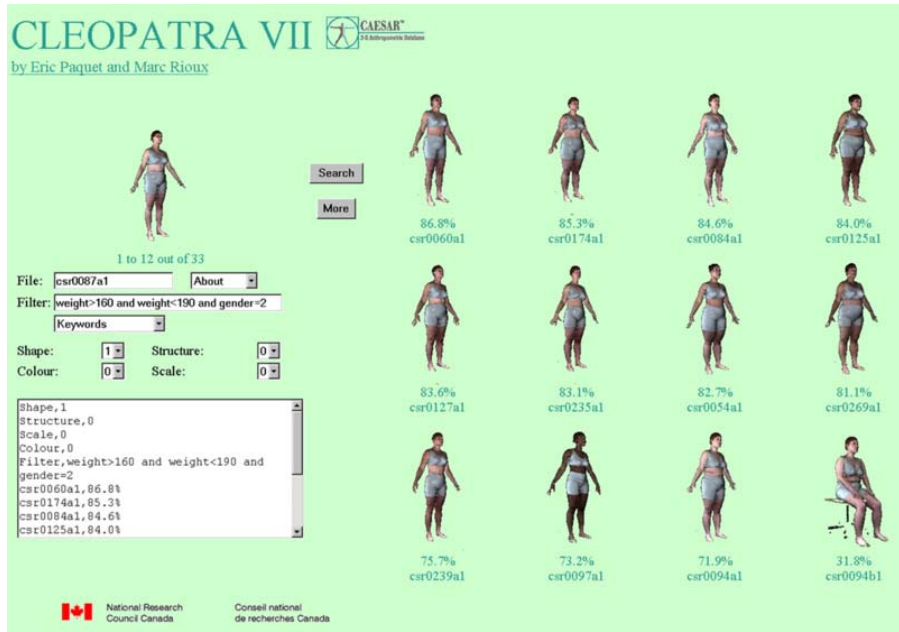
Choice of well-adapted measurements



Choice of typical human body models using bivariate distributions. Example to create 5th, 50th and 95th percentiles of mannikins.

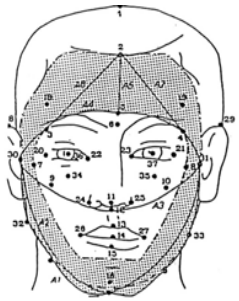
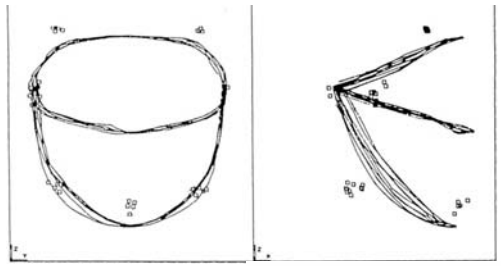
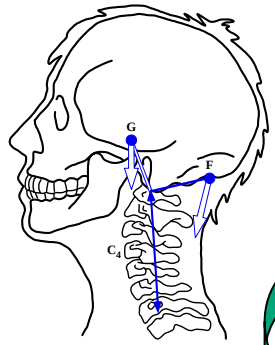
Example of the visual interface of CLEOPATRA to navigate and interrogate a 3-D Database of WEAR



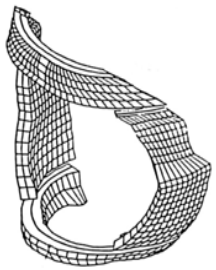
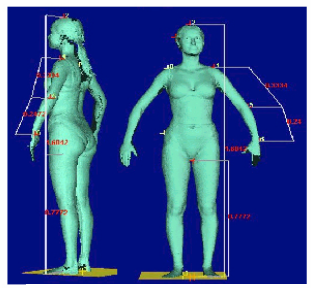


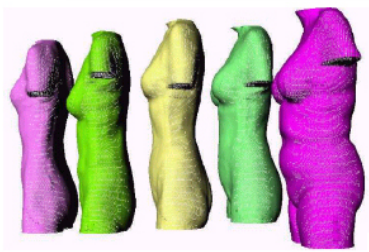
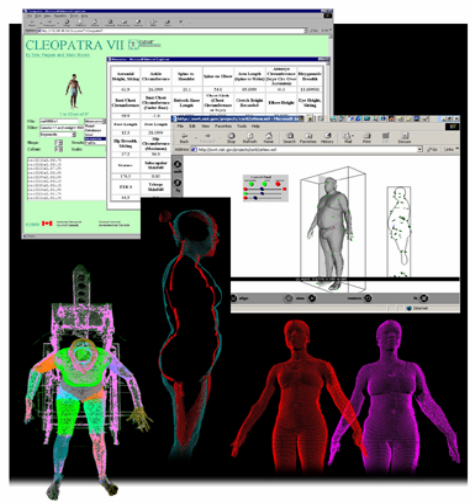
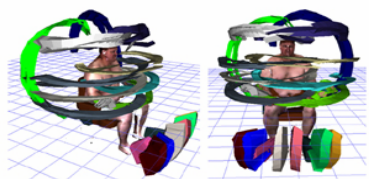
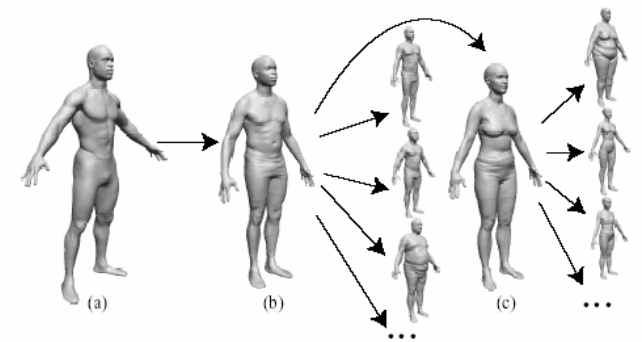
Adapted from M. Rioux, 2005

Examples of 3-D size/shape analysis and fit tests using 3-D Databases of WEAR for the design of equipments



Adapted from K. Robinette, 2002
and R. Mollard, 2003, 2005

Conclusion

==> to develop a Post-Database Creation Ontology

» Enable future integration capabilities
» Check for coverage/completeness
» Formal description of content and methodology for adding semantic hooks
» Improved (semi-automatic) documentation

==> to develop the WEAR on-line database system connected with existing databases