

PRIN 2012

**Mechanical measurements for the musculoskeletal apparatus:
novel and standardizable methodologies for metrological
assessment of measurement systems.**

WP1

Project Overview and Kick-Off meeting

Date: February the 7th 2014

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Partners involved

- # **Partner name**
1. Università degli Studi di Roma “La Sapienza” (RM1)
 2. Università “Campus Biomedico” di Roma (CBM)
 3. Università degli studi di Roma “Roma 3” (RM3)

People involved

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Please report missing or new people to andrea.ancillao@uniroma1.it , so they will be added to this list

Kick-off meeting

Kick-off meeting took place on February the 7th 2014 at Sapienza University of Rome.

The meeting was attended by:

- RM1: Andrea Ancillao, Roberto Di Marco
- CBM: Sergio Silvestri
- RM3: Salvatore Sciuto, Andrea Scorza, Giulia Lupi.

The objective of the project is the development of procedures and instrumentation to test and ensure **quality standards** for measurements conducted in motion analysis laboratories.

The aims of the project are therefore to:

- 1) Develop a method for calibration and uncertainty evaluation of **optoelectronic systems**, where used for movement analysis and mechanical ventilation analysis.
- 2) Develop a method for calibration and uncertainty evaluation of **force platforms**.
- 3) Propose a **standard procedure** to test quality of measurements held in movement analysis laboratories.

Economical contribution by MIUR

The total amount originally budgeted was € 171.500. MIUR contribution assigned to the project is € 86.706, divided as follows (Table 1):

Partner	Assigned contribution €
RM1	35.437
RM3	25.818
CBM	25.451

Table 1: Contribution assigned to each partner

Detailed subdivision of funds is reported in Table 2.

CONTRIBUTO MIUR			ASSEGNATI		
	Richiesta	%	RM1	RM3	CBM
A1 Spese personale di Ruolo	51.000,00	29,738	10.538,12	7.677,66	7.568,52
A2 Costo contratti personale da reclutare	48.000,00	27,988	9.918,23	7.226,03	7.123,31
B - Spese generali	59.400,00	34,636	12.273,81	8.942,21	8.815,10
C - Attrezzature e software	8.500,00	4,956	1.756,35	1.279,61	1.261,42
D - Servizi Consulenza	0,00	0,000	0,00	0,00	0,00
E - Altri costi esercizio	4.600,00	2,682	950,50	692,49	682,65
TOTALE	171.500,00	100,000	35.437,00	25.818,00	25.451,00

Table 2: Breakdown of funds assigned to each partner.

It has been pointed out that there was an important reduction of funds with respect to the original request. This shall be taken into account while organizing the work and purchasing instrumentation. The assigned contribution may not be enough to achieve all the goals of the project.

The First part of the work is the scientific literature review about data quality assessment (**WP2**). The most of the job was already carried out by RM1 (Roberto).

Collected papers will now be shared (via DropBox) with other partners (CBM and RM3) that will examine it and will eventually extend the bibliography.

The collected papers are dated up to July 2013, so a quick literature search should be carried out to check if any updated work has been published.

The design of instrumentation (**WP3**) was also discussed at the meeting.

CBM already developed a method to test quality of measurements of mechanical ventilation by means of optoelectronic systems, so they will deal with this.

A device to test quality of data obtained by the optoelectronic system and force plates is needed.

A six-components load cell, connected to a short stick and equipped with IR reflecting markers was developed by RM1 (Figure 1). RM1 also developed a protocol to test error and accuracy of ground reaction vector measured by the force plate and the optoelectronic system. This protocol consists in the application of the device to different points of the force plate, with arbitrary load and direction.

The applied load and torque are measured by the load cell. The direction of application is measured through markers applied on the device (Figure 1). Force, torque and direction are then compared with force, torque and direction measured by the force plate.

Repeatability of this method is discussed and RM3 partner will study the repeatability of the procedure.

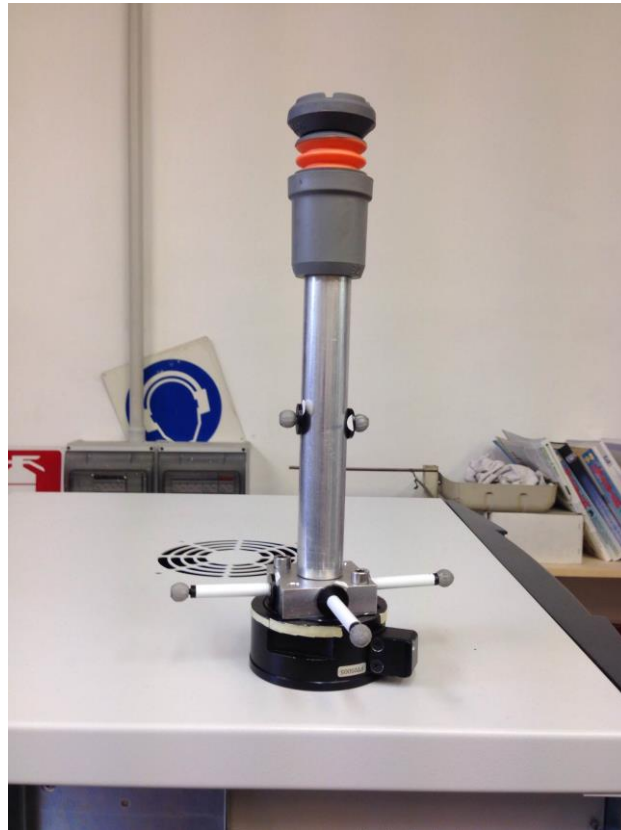


Figure 1: Device built to test the force plates.

This method allows only static measurements, while also dynamic response of the platform should be tested. To study the dynamic response, it was proposed to add a **shaker**, already own by RM3, to the load cell of Figure 1. In this way a variable force can be applied both to the load cell and the force plate to test, and outputs can be compared.

In case of dynamic force generation, the direction of application should be controlled and the spring at the extremity of the device should be removed. RM3 will study the possibility to connect the shaker to the load cell.

To continue working with WP3, a detailed analysis of the dynamical characteristics of force plates and optoelectronic system is needed.

Conclusion

The conclusion of the meeting was to proceed as follows:

- Literature sharing and integration.
- Test and validation of the procedure to test the plates (repeatability).
- Design of a device/protocol to test the dynamic characteristics of the force plates.