BELARUSIAN STATE UNIVERSITY

Work package 4

Developing the Sharing Modelling and Simulation Environment platform

BELARUSIAN STATE UNIVERSITY

Team (we welcome more)!

Igor Timoshchenko

Associated professor of Higher Math and Mathematical Physics department

timoshchenkoia@bsu.by

Vladimir Galynsky

Deputy head of department of international relations

Galynsky@bsu.by

Alexander S. Fedotov

Senior Lecturer of Computer Modelling department

fedotov.alehandro@gmail.com

Work Package 4

Developing the **S**haring **M**odelling and **S**imulation **E**nvironment platform

Description:

Developing the Sharing Modelling and Simulation Environment platform for online, distance and virtual laboratory works for students / teachers learning

&&

teaching of modelling and simulation of CPS. Creation methodologies for implementing distance and virtual laboratory based on application of ICT tools.

Work Package 4

Tasks of Work Package:

1. **Analyse** of experience of the contemporary technical solutions and development of a concept of the SMSE;

2. **Development of the technical platform** of the SMSE and designing of web interface for SMSE platform;

3. **Development of computer classes** with on-distance/ virtual laboratory in framework of SMSE platform.

Work Package 4

Tasks 1: Analyse of experience and development of a concept of the SMSE

a) **BSU and the other partners will analyse experience** of the contemporary technical solutions concerning content of Sharing Modelling and Simulation Environment applied in EU countries.

b) PCs and EU partners will collect and analyse materials concerning students' training in the Sharing Modelling and Simulation Environment;

c) **BSU and EU partners will develop a concept of the SMSE** that will be a base for the tender on development of a technical specification for the SMSE.

Work Package 4

Tasks 2: Development of SMSE technical platform

a) Designing of web interface for SMSE platform (by a subcontractor);

b) Programming work using freeware for implementing the SMSE platform;

Tasks 3: Development of classes in SMSE framework

a) Development of course, classes, methodological experience, guides;

b) Arrangement of the workshop in Minsk, Belarus (BSU) for the teaching staff

What do we need from platform?

Feature	Requirement
Placement of instructions (pdf, etc.)	+++
Placement of media	+
Executable content	++
Evaluation of students	+

SMSE

From olden times

Moodle experience:

- Placement of instructions
- Placement of media
- Evaluation of students
- Executable content

- Strict structure;
- User access politics;
- Ecosystem for BSU students.

https://eduphys.bsu.by/course/index.php?categoryid=15

SMSE

What do we want from online simulation capabilities?

- Easy-to-create scripts = no hard code;
- General-purpose high-level language;
- Tools for CBP;
- Good visualization

Who meet requirements?

Language	Online deployment	License
Wolfram Mathematica	Through Wolfram Demonstration Cloud	Commercial
MatLab	?	Commercial
Python	Jupyter Notebook	Open source

Experience of others – big projects

Open Source Physics project:

https://www.compadre.org/osp/

- Standardized Java code library;
- Guides and labs.

NanoHUB project:

https://nanohub.org/

- Cloud supercomputing with web-interface;
- MOOC are still not fully integrated in courses.

SMSE

Experience of others – smaller project

Lorena Barba group:

https://lorenabarba.com/blog/cfd-python-12-steps-to-navier-stokes/

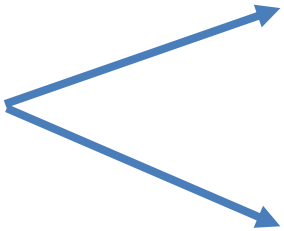
- Python notebooks support lectures

Our proposal for SMSE

File, media and textbooks:

Executable content

Moodle



Wolfram Demonstration Cloud

https://demonstrations.wolfram.com/

Python Jupyter Notebook

https://colab.research.google.com/

…Beside, team asks for funds

1) Management of Moodle: user accounts, file uploads, overall maintenance

2) To prepare books as soon and as high-quality as possible we can hire TeX-translator