



Project no. 043338

Project acronym: EMERGENCE

Project title: A foundation for Synthetic Biology in Europe

Instrument: NEST Pathfinder

Thematic Priority: Synthetic Biology

#### **D4.2: Application of design tools on standardized promoters available as a demonstrator suite on the IT infrastructure**

Due date of deliverable: November 2009

Actual submission date: November 2009

Start date of project: 01.12.2006

Duration: 36 months

#### **Victor de Lorenzo**

Centro Nacional de Biotecnología CSIC

Campus de Cantoblanco, Darwin 3, 28049 Madrid (Spain)

<b>Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)</b>		
<b>Dissemination Level</b>		
<b>PU</b>	Public	<b>x</b>
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	

CO	Confidential, only for members of the consortium (including the Commission Services)	
----	--	--

The activities that were the subject of this deliverable were ultimately materialized through the celebration of a high-level EU-US sandpit on Transcription standards, the details of which are described below.



## SANDPIT

### Transcription standards: setting criteria for measuring and exploiting promoter activity in engineered prokaryotic systems\*

21-22 October 2009 Illetes (Mallorca, Spain)

**Background.** The sandpit is organized as a high-level international discussion on transcription quantification. The purpose of this meeting is to have an informed debate on the setting of standards (if such a thing is possible) for formatting promoter activity aimed at engineering robust genetic circuits and other gene expression networks in prokaryotes. This is growingly important in view of the expansion of Synthetic Biology, where different scientific and engineering cultures and languages intersect -not always harmonically. The issue of promoter strength seems to be amazingly complicated. There are at least two 2 challenges: one is to use Systems Biology to understand the rules. The second is to exploit the rules for Synthetic Biology endeavors. The more one looks at actual data, the more we see failed attempts to be able to predict promoter strength. Is there anything we can do to set reliable principles and actual units of measurement, given that we may still miss some fundamental facts on transcription control?

**Participation** in this event will be by-invitation-only, as this is expected to be more of a operational group with a mission than a typical Workshop for presentation of data. The sandpit will keep a good part of the time allotted for open discussions between speakers and the attendants, as these are welcome to contribute to the general dialogue.

**Structure and flow of the sandpit.** The focus of the meeting will be set by a first sessions (morning of Wes Oct 21) where the 8 speakers of the event (see list) are invited to take stock, from their own perspective, of everything that needs to be addressed in connection to transcription standards and formatting of promoter activity measurements. The next sessions (afternoon of Wes Oct 21) will engage a general discussion among the speakers and the attendants of the sandpit, open to contributions from different standpoints. The following session (First part morning, Thurs Oct 22) will involve a division of labor in smaller teams to structure the main topics and propositions that have emerged in previous stages. Each of such subgroups will have a *rapporteur* who will record the debates and summarize the conclusions. Finally, the last session (Second part of morning, Thurs Oct 22) will consist of the accounts of

---

\* The sandpit is planned as a satellite of the Workshop organized by John McCarthy, Yoshi Nakamura, Virginia Cornish and Víctor de Lorenzo for the previous days (18-20 October) on *Evolution and Design of Biomolecular Systems Concepts and strategies for systems and synthetic biology* (<http://www.mib.ac.uk/sbmallorca>)

the *rapporteurs* and a final wrap up.

**Outcome.** The main deliverable of the sandpit is expected to be a position paper on issue at stake, hopefully including some specific propositions for transcription standards which are acceptable to both the scientific and the engineering communities. Given the stature of the contributors it is virtually granted any consensus that is reached in the meeting will be adopted by the larger community and may even have a pre-normative value at both sides of the Ocean.

**Timing.** The plan for the sandpit involves getting to the BonSol Hotel the day before (Oct 20), have an early start the 21 and continue the meeting until lunchtime of Oct 22.

#### PRESENTER / RAPPORTEUR

**Victor de Lorenzo**

Systems Biology Program  
National Center of Biotechnology  
Calle Darwin 3, Campus de Cantoblanco  
Madrid 28049 Spain  
[vdlorenzo@cnb.csic.es](mailto:vdlorenzo@cnb.csic.es)

#### SPEAKERS

**Virgil Rhodius** □

Dept of Microbiology and Immunology  
University of California at San Francisco  
San Francisco, CA 94158-2517  
[Virgil.Rhodius@ucsf.edu](mailto:Virgil.Rhodius@ucsf.edu)

**Ido Golding**

Department of Physics  
University of Illinois at Urbana-Champaign  
Urbana, Illinois 61801, USA.  
[igolding@illinois.edu](mailto:igolding@illinois.edu)

**Steve Busby**

School of Biosciences,  
The University of Birmingham  
Edgbaston, Birmingham, B15 2TT, UK  
[s.j.w.busby@bham.ac.uk](mailto:s.j.w.busby@bham.ac.uk)

**Martin Buck** □

Department of Biological Sciences  
Imperial College of Science, Technology and Medicine  
London SW7 2AZ, United Kingdom □  
[m.buck@imperial.ac.uk](mailto:m.buck@imperial.ac.uk)

**Fernando de la Cruz**

Departamento de Biología Molecular, Universidad de Cantabria  
Instituto de Biomedicina y Biotecnología de Cantabria (UC-CSIC-IDICAN)  
C. Herrera Oria s/n

39011 Santander, Spain  
fernando.cruz@unican.es

**Ron Weiss**

Department of Electrical Engineering  
Princeton University  
Princeton, NJ 08544-5263  
rweiss@princeton.edu

**Drew Endy**

Stanford University  
Dept Bioengineering  
Stanford, CA 94305  
endy@stanford.edu

**Richard L. Gourse**

Department of Bacteriology  
University of Wisconsin  
Madison, WI 53706-1567  
[rgourse@bact.wisc.edu](mailto:rgourse@bact.wisc.edu)

OBSERVERS

**Ioannis Economidis**

European Commission  
Biotechnology, Agriculture and Food Research  
Unit E.2 Biotechnology  
B1049 Brussels, Belgium  
[ioannis.economidis@ec.europa.eu](mailto:ioannis.economidis@ec.europa.eu)

**Sven Panke**

ETH Zurich  
Department of Biosystems Science and Engineering  
4058 Basel, Switzerland

**Vitor Martins dos Santos**

Helmholz Center for Infections Research  
38214 Braunschweig  
Germany

## PROGRAM OF THE SANDPIT

### Wes Oct 21

#### Introduction Session

09.00-09.15. Víctor de Lorenzo. Welcome and setting the scenario

09.30-10.00. Ioannis Economidis. *Transatlantic agenda in Biological Standards*

#### 1<sup>st</sup> Session. Taking stock of 30 years of transcriptional regulation research

10.00-10.30. Víctor de Lorenzo

10.30-11.00. Richard Gourse

#### 11.00-11.30. Coffe Break

11.30-12.00. Steve Busby

12.00-12.30. Martin Buck

12.30-13.00. Session wrap up (V. de Lorenzo)

#### 13.00-15.00. Lunch

#### 2<sup>nd</sup> Session. New approaches to prokaryotic promoters

15.00-15.30. Ido Golding

15.30-16.00. Virgil Rhodius

16.00-16.30. Fernando de la Cruz

16.30-17.00. Session wrap up (Fernando de la Cruz)

#### 17.00-17.30. Coffe break

#### 3<sup>rd</sup> Session. Engineering needs

17.30-18.00. Ron Weiss

18.00-18.30. Drew Endy

18.30-19.00. Session wrap up (Drew Endy)

19.00-19.30. Organization of next day working plan, appointment of *rapporteurs*

### Thurs Oct 21

09.00-11.00. Working groups discussion

#### 11.00-11.30. Coffe Break

11.30-12.30. Reports of working groups and general discussion

12.30-13.00. Conclusions, agenda for action and things-to-do list

**13.00-15.00. Lunch**

**END OF THE SANDPIT**

### **Follow up**

A follow up activity of the sandpit has been programmed in 2010, sponsored by the *US-EC Task Force in Biotechnology*:

**EC-US Workshop on Standards in Biotechnology:  
*Towards Standards in Synthetic Biology***

*An Exploratory Workshop of the US-EC Task Force in Biotechnology*  
Parador de Segovia (Segovia, Spain). June 4-6, 2010

**Co-Convenors:** Drew Endy (Stanford, US)  
V́ctor de Lorenzo (Centro Nacional de Biotecnología, Spain)

This will be a working meeting with 5 sessions, each devoted to one specific area. Each session will include a combination of invited brief remarks (15 min + 5 min questions) followed by a structured discussion that will be recorded by a rapporteur in each case. The goal for each discussion will be to identify tangible needs or next steps. Additional open discussion and breakout periods will be included. Participants will be expected to contribute to all discussions, despite background.