Emergence final meeting 12. November 09

Present:

Randy Rettberg
Victor de la Torre (CNIO)
Nicolas Szitas (London)
Raik Grunberg, Andreu Alibes (CRG, Barcelona)
Mario Marchisio (ETHZ)
Zoltan Pragai (DSM)
Vitor Martin dos Santos (HZI)
Frank Notka (Geneart)
Alfonso Jaramillo (Valencia)
Esteban Martinez (CSIC, Madrid)
Sven Panke, Sonja Billerbeck (ETHZ)
Jim Haselhoff (Cambridge)

Project no.: 043338

Project acronym: EMERGENCE

Project title: A foundation for Synthetic Biology in Europe

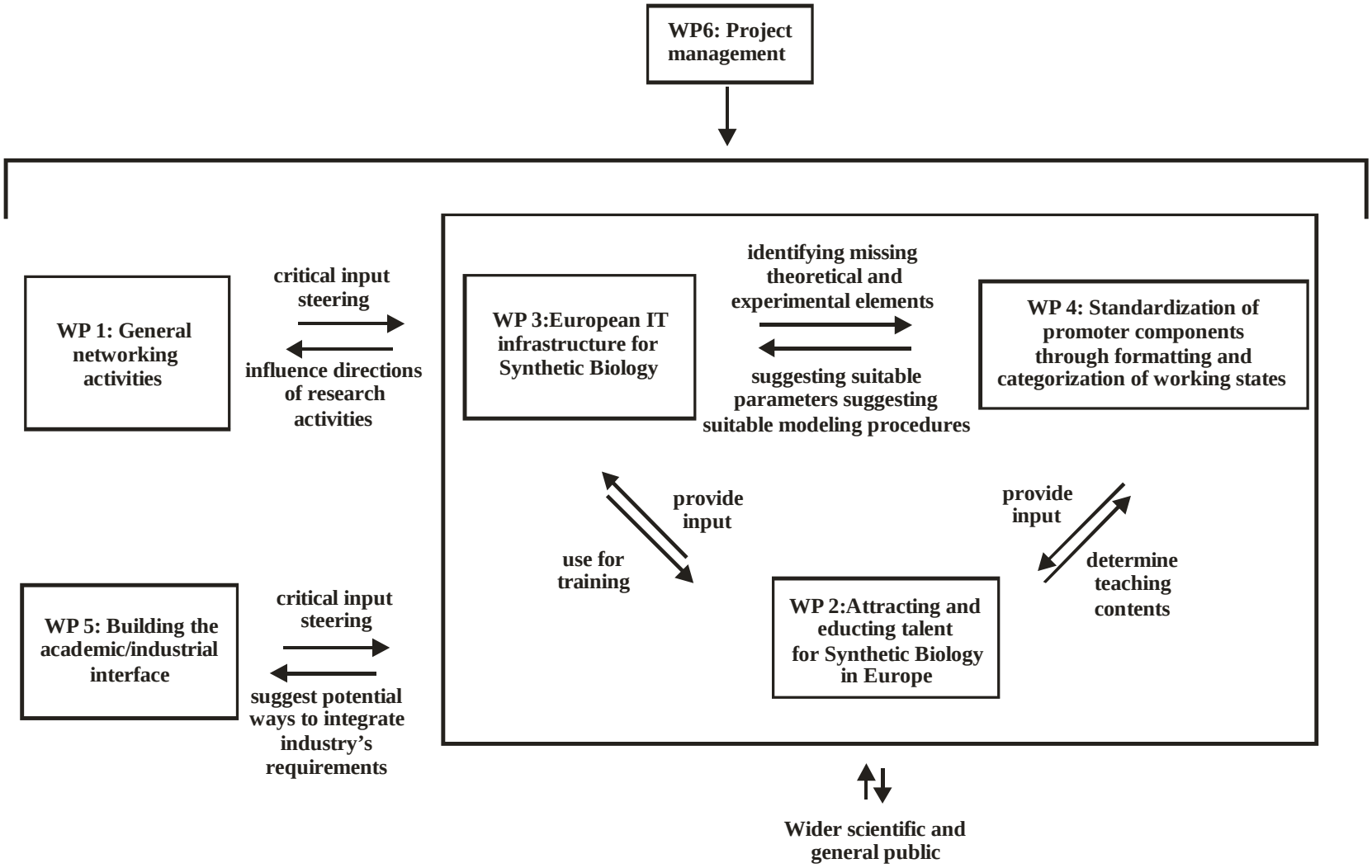
Start 1.12.2006, official end: 30.11.2009, we are in month 36

Present:
ETHZ: OK (Panke, Marchisio, Stelling)
CSIC: OK (V. de la Torre)
CNIO: OK
DSM: OK
UCL: OK
CRG: OK
UCAM: OK
EP: OK
Geneart: OK

Agenda Emergence Meeting, 29.4.2009, 11:00, ETH Zurich, Center Campus

ML building, room J37.1

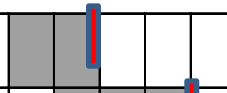
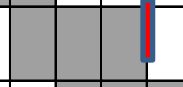
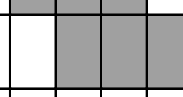
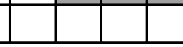
1. 08:00-08:30: Welcome, Introduction (Sven Panke)
2. 08:30-09:30: WP3, Victor de la Torre
3. 09:30-10:30: WP 4, Esteban Martinez
4. 10:30-10:45: Coffee
5. 10:45-11:45: WP5, Frank Notka
6. 11:45-12:45: WP2, Sven Panke
7. 13:00-14:00: Lunch
8. 14:00-15:00: WP1, Vitor Martins dos Santos
9. 15:00-15:30: Final remarks, Sven Panke
10. 15:30: end of meeting


WP6: Project management
WP 1: General networking activities
critical input steering
influence directions of research activities
WP 3:European IT infrastructure for Synthetic Biology
identifying missing theoretical and experimental elements
suggesting suitable parameters suggesting suitable modeling procedures
WP 4: Standardization of promoter components through formatting and categorization of working states
provide input
use for training
provide input
determine teaching contents
WP 5: Building the academic/industrial interface
critical input steering
suggest potential ways to integrate industry's requirements
WP 2:Attracting and educting talent for Synthetic Biology in Europe
Wider scientific and general public

e	#	Participant name	Participant short name	Country	Date enter	Date exit
	1	Eidgenössische Technische Hochschule Zurich	ETHZ	Switzerland	Month 1	Month n
	2	Consejo Superior de Invstigaciones Scientificas	CSIC	Spain	Month 1	Month n
	3	Spanish National Cancer Research Centre	CNIO	Spain	Month 1	Month n
	4	Helmholtz Zentrum für Infektionsforschung	HZI	Germany	Month 1	Month n
	5	Royal DSM	DSM	The Netherlands	Month 1	Month n
	6	Univ College London	UCL	UK	Month 1	Month n
	7	Geneart AG	Geneart	Germany	Month 1	Month n
	8	Center for Genomic Regulation	CGR	Spain	Month 1	Month n
	9	University of Cambridge	UCAM	Great Britain	Month 1	Month n
	10	Ecole Polytechnique	EP	France	Month 1	Month n

Start 1.12.2006, official end: 30.11.2009, we are in month 36

WP 3 - overview

Work-packages	Month 1 to 12	Month 13 to 24	Month 25 to 36
WP 3: European IT infrastructure for Synthetic Biology			
3.1 Developing the concepts for integrated workflow infrastructure based on the registry			
3.2. Implementation of basic software infrastructure and the integration of tools and methods for sequence design and analysis.			
3.3 Development and integration of software for model-based sequence analysis and design describing the software			
3.4. Proof of concept study with integrated system			

Workpackage number	3	**Start date or starting event:**						Month 1		
Workpackage title European IT infrastructure for Synthetic Biology										
Participant id	1	2	3	4	5	6	7	8	9	10
Person-months per participant:	29	1	75	40	1	0	3	40	0	0
EU-funded	25		21	14				21		

Description of work

Basic IT infrastructure: We will provide a mirror of the registry and interfaces to databases and computational tools based on internationally standardized data formats / communication structures.

Tools for sequence analysis and design: With a focus on transcription factors and their binding sites, methods and tools will be integrated for semi-automatic component design, function prediction, and assessment of unintended side-effects of synthetic components / circuits.

Tools for model-based systems analysis and design: We will integrate tools for model generation, simulation and analysis with the basic IT infrastructure, and develop novel methods for computer-assisted design in synthetic biology.

Tools and strategies for gene synthesis and assembly: interfacing of the IT infrastructure with tools to optimize genes

Milestones[7] and expected result	
M3.1. Decision on concept and implementation issues for integrated workflow (month 6).	Yes
M3.2. Decision on and prototypes for integration of existing software in the domains of component and systems analysis (month 12).	Yes
M3.3. Specification of design and first version of integrated IT infrastructure including novel tools for component and systems design (month 24)	
M3.4. Proof-of-concept for integrated workflow operation for the example of a genetic circuit design based on standardized components / specifications (in collaboration with WP4) (month 36).	

Actions:

NONE

Suggestions for writing in the final report:

M3.3. CNIO/AV – Mario (JS) 0.5 page of „framing text“ plus the pdf‘s of the paper and the review manuscript to Sven, including AJ paper

M3.4. look at deliverable

MTR

Deliverable No[5]	Deliverable name	Lead participant	Est. person months	Delivery date [6] (months)	Nature [7]	Dissemi-nation level [8]
D.3.1	Document describing the concepts for integrated workflow infrastructure based on the registry	3	60	6	R	PP
D.3.2	Report describing the implementation of software and the integration of tools and methods for sequence design and analysis	3	60	12	R	PP
D.3.3	Report describing the software for model-based systems design and analysis, and its integration	3	35	24	R	PP
D.3.4	Document describing the proof-of-concept study exploiting the integrated workflow for genetic circuit design	3	35	36	R	PU

Yes, Rep ok

Yes, Rep ok

D3.3. Yes, sent by Mario, comment on integration

D3.3. Mario (JS) – delayed but finished
D3.4. JS: resources spent.
Some tools are with AV, some with WP4 (promoter formatting), some with JS.

Our feeling: 2 people in two different locations, 6 months each – 12 months are required to finish. JS has none left AV – please coordinate to find the 12 months.

Task: LS: please provide background on the 21 man-months CRG should have spent on WP3. Could this be the time to finish D3.4.?

Task 1: Basic IT infrastructure

A mirror of the MIT registry will be the anchor point for the European IT infrastructure for Synthetic Biology. For the extensions with design databases and tools, we will provide suitable interfaces for data exchange and for methods integration. Information will be stored, curated, maintained and distributed using databases and DAS servers. Specifically, integration of the database on promoter functions developed by WP4 will provide a proof-of-concept for this approach. Methods will be connected using, for instance, Moby technology. In both cases, priority will be given to internationally standardized approaches, such as the Systems Biology Markup Language for model description and exchange. In close collaboration with WP4, we will develop standardized representations for the functional characterization of parts, in particular, promoter components (see description of WP4 below), which are currently lacking.

Task 2: Tools for sequence analysis and design

This task aims at implementing protein design tools into the planned infrastructure. To focus the effort, we will concentrate on the rational design of transcription factors (TFs) and of transcription factor binding sites (TFBs). One aim is to provide an integrated tool that proposes design alternatives for both classes of functional elements at the parts level according to given specifications, starting from an annotated collection of known TFs and TFBs. The development and integration of methods for quantitative function prediction will be critical for this aspect. In addition, the tool suite will allow for the analysis of side-effects of the proposed design in the context of the host organism, which is critical for achieving a modular design of synthetic circuits. As a test case, we will focus on the integration of methods and tools for promoter formatting provided by WP4. In addition, the tool suite will encompass methods for identifying regulatory sequences that may explain variations in gene expression and phenotypes (e.g. due to segregation of sub-populations, see WP4), which involves the identification of promoters, enhancers and other potential regulatory regions.

Task 3. Tools for model-based systems analysis and design.

The objectives of this task are (i) to make modeling and simulation tools available via the registry to establish a unified IT infrastructure, and (ii) to develop and integrate methods for forward-engineering of genetic circuits. The key idea here is to provide mechanisms for a quasi-automatic development and analysis of mathematical models according to the users' specifications of circuit designs. Ideally, we will enable iterative refinement of the design with the help of computational tools developed in tasks 2 and 3. This will involve (i) developing a set of standard modeling objects to describe basic functions of standardized biological parts, (ii) establishing mechanisms for instantiating modeling objects according to the users' selections of parts from the registry, (iii) developing interfaces between the registry and modeling / simulation tools through model exchange via SBML, and (iv) providing novel methods for computer-assisted circuit design. In particular, the development of design methods will be critical for closing the design cycle. Here, it is envisaged to provide methods (i) for optimization of circuit layout according to behavioral specifications provided by the user, and (ii) for specification of allowable parts' characteristics (e.g. binding affinities of TFs) that are consistent with the behavioral specification. In conjunction with tools provided by task 2, detailed design (e.g. DNA sequences) could then be carried out semi-automatically.

Task 4. Strategies and tools for gene synthesis and assembly.

Since rationally designed genes and operons do not exist in nature they have to be constructed and cloned *de novo* from synthetic oligonucleotides. Whereas short genes up to 1 kb can be assembled by PCR and overlapping oligonucleotides, long genes over 5 kb, full synthetic operons and even genomes are extremely difficult and cumbersome to construct (see Fig. 3). Based on type 2S and multiplex ligation strategies, newly developed methods for the *de novo* operon construction will be made available to the IT infrastructure. Differently optimized genes in combination with different promoters and ribosomal entry sites could then be tested (outside of EMERGENCE) for their contribution to the operon efficiency, which would provide a direct link to the standardization tasks carried out by WP4. In the mid-term perspective, it will be possible to combine multiple synthetic operons to complex genetic circuits, for instance, to support the production of complex biocompounds. As already confirmed by the current development of the gene synthesis market, concomitantly, an enormous demand on synthetic genes will ensue. In anticipating this development, participant 8 will establish a bioinformatic based laboratory information management system (LIMS) which operationally links the gene synthesis technology pipeline comprising gene design, provision of synthetic oligonucleotides, gene assembly, operon building and final quality controls. Thus, by providing interfaces to this tool-chain, the IT infrastructure will be able to cover all essential elements of the fabrication process.

WP 4 - overview

Work-packages	Month 1 to 12				Month 13 to 24				Month 25 to 36			
WP 4: Standardization of promoter components through formatting and categorization of working states												
4.1 Data mining for quantitative promoter description												
4.2. Theoretical foundations for parameter determinations												
4.3. Design case study using standardized promoters												

Workpackage number	4	**Start date or starting event:**				Month 1			
Workpackage title: Towards a consensus language for synthetic biology: Conceptual and hermeneutical tools for formatting and categorization of transcriptional working states									
Participant id	1	2	3	4	5	6	7	8	9	10
Person-months per participant:	1	45	1	0	0	15.5	0	0	0	0
EU-funded		21				14				

Description of work. This WP will involve the following related activities:

Data mining and Literature mining on quantitative data relevant to promoter functioning. This will imply not only an expert survey of available published data, but the exploitation and improvement of advanced software for text mining and automated text reading and graphical/numerical representation of the relevant information.

Integrating a complete design data set for 4 types of prokaryotic promoters and exploiting them as the standard components of choice for building complex regulatory circuits. We will provide from the literature the complete physical data set (providing quantitative values for relevant design parameter, such as including strength of DNA-protein interactions) for different types of promoters that are archetypical examples

Providing a theoretical basis for adequate protocols in data generation for synthetic biology. Analysis of collected data for significance, providing the theoretical basis for suitable experimental protocols for parameter estimation.

Application of design tools of WP3 to set of standardized promoters of WP4 as case study.

MTR

Deliverable No[5]	Deliverable name	Lead participant	Est. person months	Delivery date [6] (months)	Nature [7]	Dissemi-nation level [8]
D.4.1	Database on quantitative prokaryotic promoter performance	2	40	13	D	PU
D4.2	Application of design tools on standardized promoters available as a demonstrator suite on the IT infrastructure	2	22.5	36	D	PU

Yes

D4.2: CNB/VdL

a) D4.1. We need data for D3.4 (proof of concept) and also for D4.1. For details: see proposal.
b) Potential work around: standard promoter systems, categorized by : promoter, copy number, copy number of the regulator, inducer concentration, medium, growth phase, host, antibiotic.
c) Needed ASAP
d) Conference call Luis S, Alfonso V, Jörg S, Victor dL, Sven P
e) Jörg: Explain situation to Alfonso V (WP Leader 3)

Task 1

• **Data mining and Literature mining on quantitative data relevant to promoter functioning.** This will imply not only an expert survey of available published data, but the exploitation and improvement of advanced software for text mining and automated text reading and graphical/numerical representation of the relevant information. …. The data will be curated for biological meaning and numerical formatting. The results will be deposited in a repository of promoter performance data that will be available first to consortium participants and then to the wider community. In collaboration with WP3, the database will be part of the European synthetic biology IT infrastructure to provide an integrated design workflow. While converting soft descriptions of promoter functioning into stringent quantitative data might turn out to be a virtually impossible task, we expect to categorize the results into 10 discrete operative levels of transcriptional activity using as reference the parameters of Fig. 4 endowed with either linear or logarithmic scales.

• **Integrating a complete design data set for 4 types of prokaryotic promoters and exploiting them as the standard components of choice for building complex regulatory circuits…..** Consequently, we have to provide from the literature the complete physical data set (providing quantitative values for relevant design parameter, such as including strength of DNA-protein interactions) for different types of promoters that are archetypical examples…. Such types will include [i] One set of non-regulated σ^{70} promoters with 5 discrete levels of constitutive activity. Candidates include a range of housekeeping promoters of *Escherichia coli* and *Pseudomonas putida* [ii] One set of negatively regulated σ^{70} promoters with 5 levels of capacity (see Fig. 4) and five cognate levels of effector-dependent and effector-independent repression states; candidates will include not only the classical LacI and CI repressors, but also effector-responsive negative regulators recruited from circuits of model organisms in environmental biotechnology. [iii] One set of positively regulated σ^{70} promoters with 5 levels of capacity and five cognate levels of effector-dependent and effector-independent activation states; the favorite candidates will be promoters regulated by activators of the AraC/XylS family. [iv] A collection of σ^{54} promoters which are activated at a distance by effector-responsive regulators of the XylR class; these are particularly suited for synthetic biology applications and design of regulatory circuits, as effector specificity can be altered by rational design or directed evolution and final output can be checked by DNA geometry. An important angle of promoter types [i]-[iv] will be the prediction of their mode of operation at the population level, i.e., as unicellular on/off switches or as rheostats (variable resistors) (Fig. 5).

Task 2

Ad [ii]:

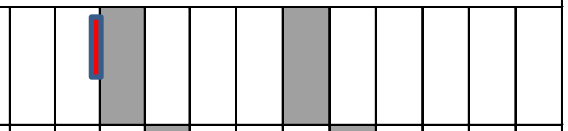
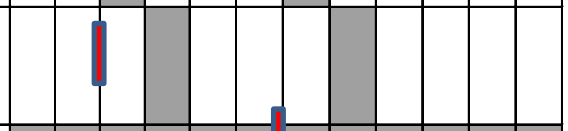
• **Providing a theoretical basis for adequate protocols in data generation for synthetic biology.** In order to serve indeed as a solid basis for engineering input, the quantitative data collected in [i] will need to be statistically analyzed in order to define their reliability and the corresponding error margins. In particular when acknowledging that the current concept of promoter activity (which will be reflected in many of the data sets extracted from the literature) requires break down in steps that can be exactly characterized, this means in turn that the data are aggregate data and their usefulness in determining values of the various contributing parameters needs to be carefully analyzed. In addition, this will lead to clear instructions on the most appropriate experimental design for such experiments. Furthermore, in view of the future, it will be important to identify the most critical steps that contribute to such aggregate values and then decide whether, from an engineering perspective, we can afford to measure aggregate values or whether we will need to develop in the future novel measurement methods that allow addressing directly, for example polymerase promoter clearance rate instead of reporter protein activity. On the same note, the measurement of population averages can hide the cell-specific outcome of measurements to an extent that it invalidates the measurement approach as such (see below, on/off and rheostat behaviour). Consequently, to evaluate the existing data sets, the possibilities of such “disguising” effects need to be considered. This in turn will inevitably dictate the structure of measurements and the corresponding measurement technology. It is not too bold to predict that in order to produce quantitative data that are useful as inputs into design efforts will require a much larger degree of parallelization than is currently applied today, which will ultimately connect synthetic biology to the field of microfluidics.

Ad [iii]

• ***In silico*** **analysis of the data collected in order to develop standard tools for application applied to the engineering of components for building complex regulatory circuits.** Here we will try to use the information from [i] and the predictive frames for DNA and RNA structure, binding affinities of TFs for DNA sequences and computer-aided protein design tools from WP3, to apply the data collected above to engineering purposes. The different software packages will be critically examined for their performance. The outcome will be an integrated package that will help in the engineering of new components; the package will provide the test case for the integration of methods into the IT infrastructure (see also WP3).

The final outcome of WP4 will be a robust, standardized, and quantitatively well equipped conceptual toolbox for formatting promoter components and expressing their performance in quantitative and connectable ways. Such a robust concept will be the basis for agreement on a transatlantic consensus on the best possible description of minimal biologically active elements amenable to rational combination and predictable conduct.

WP 5 - overview

Work-packages	Month 1 to 12	Month 13 to 24	Month 25 to 36
WP 5: Building the academic/industry interface (incl. IP rights)			
5.1 Two industry workshops to define the priorities of the European industry in the field of synthetic biology, and to evaluate the fit of the European synthetic biology projects with the industry needs			
5.2 Two workshops (associated to industry-relevant scientific conferences) to teach the industry in synthetic biology concepts and tools Developing an IP strategy in the field of synthetic biology			
5.3. Development of an IP strategy			

Workpackage number	5	**Start date or starting event:**				0			
Workpackage title: Building the Academia-Industry Interface									
Participant id	1	2	3	4	5	6	7	8	9	10
Person-months per participant:	2	1	1	1	4	0	0	0	0	0
EU-funded										

Description of work

- We will bring together representatives of major European industries to discuss the needs of industry in the emerging field of synthetic biology, and how industry can help in shaping and developing synthetic biology in the interest of the European economy
- We will organize workshops for industry to get the major European industries acquainted with the concepts and tools of synthetic biology, and to stimulate seamless adoption of synthetic biology in industry to leverage the full potential that is inherent in this field
- We will make an inventory of the patent environment and use this information to evaluate means of the European industry to develop a strong IP position
- We will challenge the concepts, approaches and tools developed in the other WPs from an industrial perspective

MTR

Milestones[9] and expected result

M5.1. Discussion of, commenting on, and deriving actions from the position paper on priorities of the European industry in the field of synthetic biology, by advisory board and steering committee (month

Delayed

[9] Milestones are control points at which decisions are needed; for example concerning which of several technologies will be adopted as the basis for the next phase of the project.

12)

M5.2. Discussion and recommendations for suggestions regarding IP strategy. Preliminary recommendations are proposed by advisory board and steering committee (month 12)

M5.3. Final comments on recommendations for IP strategy, including a set of key patent applications (month 36)

Delayed

M5.2. Geneart/RW_FN

M5.3. Geneart/RW_FN

Contact: TU Delft, new project, Dr. David Koepsell, d.r.koepsell@tudelft.nl

MTR

Deliverable No[5]	Deliverable name	Lead participant	Est. person months	Delivery date [6] (months)	Nature [7]	Dissemination level [8]	
D5.1	Reports on two industry workshops to define the priorities of the European industry in the field of synthetic biology, and to evaluate the fit of the European synthetic biology projects with the industry needs	6	1	7 19	R	RE	Yes - ½
D5.2	Reports on two workshops (associated to industry-relevant scientific conferences) to teach the industry in synthetic biology concepts and tools	6	1	12 24	R	RE	NO
D5.3	Position paper on the priorities of the European industry in the field of synthetic biology, evaluation of fit with current EU synthetic biology projects, and decision on how to address the potential gaps (month 20)	6	1	24	O	PU	
D5.4	Intermediate and final report on status of discussion regarding IP strategy in the field of synthetic biology, originating from company internal assessments and summarizing the ideas on IP-management (same workshops as in D5.1)	6	8	12 36	R	PU	Yes - ½

D5.1: Geneart/RW_FW: Evaluate iGEM accessory meeting as second workshop – FN
D5.2: Geneart/RW_FW: SB4.0, DECHEMA – produce two reports - FN
D5.3: Geneart/RW_FW: in progress, FN
D5.3: Geneart/RW_FW: Sven?

DSM:
What would be a useful contribution for DSM?

Geneart does not need an IP regulation – DSM does

5.4 – second report goes to DSM

(1) In two workshops among major European industries, mediated by key players in synthetic biology, the primary needs and interests of industry in synthetic biology are defined. For instance, industry may be asked to (i) define a set of non-natural compounds for which development of suitable biotechnological production processes, based on synthetic biology approaches, would most dramatically enhance the fields of use of biotechnology in the European industry; (ii) describe the main bottlenecks in current metabolic engineering concepts and approaches; or (iii) define the most appropriate properties for future biotechnological production strains (e.g., minimal genome size; lack of repetitive sequences; or use of DNA tags for strain diagnostics). The consolidated industrial input will help the other WPs and the EU to define the most appropriate research path in synthetic biology with an optimal balance of short-, medium- and long-term benefits for the European economy.

2) Linked to major industry-relevant scientific conferences in Europe (e.g., Metabolic Engineering VI in October 2006), workshops in synthetic biology will be organized to familiarize and train industry representatives in the concepts and tools of synthetic biology.

(3) Participation of industry representatives in student workshops and academic conferences in the field of synthetic biology will help to improve understanding of the industrial needs and will help to spot talents who may help to (i) adopt and develop synthetic biology in industry, and (ii) prevent drain of the still few talents in this emerging discipline to competing fields which, in turn, would slow development of the synthetic biology competence in Europe.

(4) For securing the competitiveness of the European industry in synthetic biology, building an effective IP position that rewards industrial research and innovation efforts but does not stifle broad exploitation will be crucial, as the latter point is intrinsic to the concept of Synthetic Biology. This debate has already been triggered in the US community (http://openwetware.org/wiki/Synthetic_Society) and the corresponding situation on patents and licenses need to be thoroughly evaluated in the beginning Based on this analysis, the best approach towards an effective IP position needs to be defined. To prevent a bias towards (short-term) industrial benefits, drafting of an IP strategy will be a shared task between academia and industry, with ETHZ and DSM, respectively, having the lead in this endeavor and integrating efforts going on at the Technical University Munich Prof. Joachim Henkel, Technology and Innovation Management).

(5) The activities in this WP (e.g., IP landscape), together with concepts developed in the other WPs as well as in other European synthetic biology projects will help to prioritize most attractive business areas for start-ups and SMEs. Depending on the evaluations and progress in this CA, a workshop will be held on either the opportunities for start-ups in the field of synthetic biology, or with potential investors to evaluate their priorities and interests in synthetic biology

WP 2 - overview

Work-packages	Month 1 to 12				Month 13 to 24				Month 25 to 36			
WP 2: Attracting talents to Synthetic Biology in Europe												
2.1. Preparing, carrying out, and evaluating the first European summer school in synthetic biology												
2.2. Preparing, carrying out, and evaluating the second European summer school in synthetic biology												
2.3. Preparing, carrying out, and evaluating the third European summer school in synthetic biology												
2.4. Exploring and possibly implementing a European Master in Synthetic Biology												
2.5. Implementing the web-resource at the IET												

Workpackage number	2	**Start date or starting event:**				Month 1			
Workpackage title: Attracting talent to synthetic Biology in Europe									
Participant id	1	2	3	4	5	6	7	8	9	10
Person-months per participant:	7	0	0	0	0	0	0	0	4	4
EU-funded	0	0	0	0	0	0	0	0	0	0

Description of work

a) We will host from 2007 to 2009 two or three 2-week summer schools, lab and theoretical, for European participants in the iGEM Synthetic Biology Summer course. It will be developed over the three years to an optimized teaching event involving ever improved lab- and theoretical instructions. As it will be a compact and intensive event, we will be able to recruit excellent instructors from the synthetic biology community.

b) We will explore first within the education focus group and then within the body of the CA and the wider synthetic biology community the possibility of implementing a European Master and, if considered feasible, will go ahead and do so.

c) We will provide an educational web-based resource in cooperation with the IET.

Milestones[6] and expected result	MTR
M2.1 Decision about course in 2007 at the first steering committee meeting (month 1)	Yes (Del)
M2.2 Decision location of first summer school (months 1, 12, 24)	Yes (BSSE)
M2.3. Discussion of event evaluation and decision on final format of the event by steering committee (month 12 or 24)	Yes (Del)
M2.4. Decision on how to proceed with summer schools after end of CA (month 36)	
M2.5. Decision on feasibility and desirability of European Master in Synthetic Biology (month 9)	Yes
M2.6. Decision on participating schools (month 15)	Yes
M2.7. Decision on go/no go for Master in month 34 (month 24)	

M2.7. EP/AJ

MTR

Deliverable No[5]	Deliverable name	Lead participant	Est. person months	Delivery date [6] (months)	Nature [7]	Dissemination level [8]	
D2.1	Reports documenting the synthetic biology summer course, including syllabus	1	7	8? 20 32	R	PP	Del
D2.2	Report on the possibilities and feasibility of implementing a European Master in Synthetic Biology – if considered feasible, then	10	1	9	R	PU	Yes
D2.3	Report on state of planning affairs at schools intending to participate in the Master	10	1	24	R	PU	Yes
D2.4	Master studies implemented at the leading and the collaborating schools	10	2	34	O	PU	
D2.5	Educational resource at IET available and continuously updated.	9	4	12	D	PU	

D2.1.: ETHZ/SP – get in contact with Jim H on workshop in Cambridge
D2.3: EP/AJ
D2.5. : UCAM/JH, via Jim A., asked for a one page doc to illiustrate how the webpage fits the deliverable http://www.synbio.org.uk/

Issues WP2

a) Summer schools - SP

b) Master studies – AJ, SP

c) Public resource – JH

Ad a) NO summer school has happend – Sven‘s responsibility (there will be one in the frame of TARPOL, but as the extension has not been granted, it will not be in the time of EMERGENCE)

Ad b) Master Studies implemented at ETHZ, Imperial, Evry. Other?

Ad c) Status, developments?

a) Summer schools: The iGEM international summer competition in Synthetic Biology provides a unique forum to attract students from a variety of disciplines to the field. It provides them with an intensive and very effective training in the fundamentals of synthetic biology. Typically, a team of 6 to 12 students from natural and engineering sciences carries out a biological design project over the summer break and presents it then at a final meeting at one of the participating schools (the iGEM2005 final at the MIT event hosted teams from 15 schools from the US, Canada, and Europe, including Harvard U, Caltech, Princeton, UC Berkeley, UC San Francisco, Toronto U, UCAM, and ETH Zurich). A central element of these courses is to provide complementary training for the students, specifically training in wet biology for engineering students and training in system analysis and design for natural science students. Also in order to foster the sense of a synthetic biology community in Europe, we propose to carry out this intensive training phase in a central location at the beginning of the project as a two-week training course. The students will have the opportunity to undergo intensive lab-training over a period of two weeks which makes them familiar with basic wet-biology technologies and the specific repositories that are available to the synthetic biology community. These projects will be organized and supported by the applicants and managed with the help of those students from the project that have a suitable experimentally oriented background. In turn, the practical parts will be complemented by an intensive course in systems design and analysis, which is correspondingly organized.

Due to its compact organization, the course will become a focal point for the exchange of synthetic biology faculty from all over the world. We will recruit scientific exponents of the field as instructors for the various theoretical lectures and thus provide a very stimulating atmosphere throughout the course, including the participants in this CA.

b) European Master in Synthetic Biology: As initiatives such as the iGEM competition show, synthetic biology is attracting the interest of undergraduates all over the world and in particular in Europe. The exponential increase of undergraduate students joining iGEM shows the potential for success of an advanced training in synthetic biology at the postgraduate level. Due to the interdisciplinary nature of synthetic biology, together with its international character, it would be most appropriate to develop a master program in synthetic biology at the European level. It would also the best way to set up the basis for a synthetic biology community: by developing the community from the bottom. Consequently, we will explore the possibilities for this in the frame of this coordination action and, if considered feasible, will proceed to implement it.

We would pay particular attention to the involvement of biotech industry in our European master, as we consider that it should be the essential ingredient in any engineering discipline such as synthetic biology. Ideally, we would like to promote a two-way exchange of ideas between industry and universities, which would contribute to an exponential advancement of synthetic biology.

This master would consist on a two-year program, with the first year taking place at the Master program coordinator's institution (e.g. the Ecole Polytechnique) and the second one at a partner institution. The centralization would offer clear advantages such as facilitating the gathering of appropriate resources, facilitating the involvement of other institutions (public and private) or providing greater dynamism with the curriculum (required by this emerging discipline). The curriculum would consist of block-courses taught by research specialists (from the partners and associated institutions) and of a research project at the end of the second year. There would be theoretical, computational and experimental courses. We also expect to have non-technical courses in subjects such as bioethics and intellectual property issues. The master thesis project would be done at any of the collaborating institutions, considering favorably the participation of the student in that institution's iGEM project.

c) A complementary activity will be the establishment of educational resources to aid recruitment and training into the field. Synthetic biology is a new interdisciplinary endeavor which involves the adoption of engineering principles in biology. New students and workers are coming into the field from very diverse areas, and need to come to grips with the details of unfamiliar biological systems, engineering tools and computer sciences. There is a demand for specialized coverage of this new field, including educational and review materials. In cooperation with the Institute of Engineering and Technology http://www.theiet.org), we plan to construct an integrated web resource for educational material. This web based resource will be hosted by the IET and be associated with a new journal, IET Synthetic Biology (http://www.theiet.org/publications/). The web resource will include downloadable teaching materials, video presentations, online reviews and technical articles. For example, a server at http://www.iet.tv will provide dual screen, streaming video containing review and technical material. The resource will be available free of charge.

WP 1 - overview

Work-packages	Month 1 to 12				Month 13 to 24				Month 25 to 36			
WP 1: General networking activities												
1.1. Developing & maintaining meeting structure												
1.2. Workshops on IT/standardization implementation												
1.3. Establishing study groups												
1.4. Workshop/meeting platform												
1.5. Promoting of Euro-Asian exchange												

Workpackage number	1	Start date or starting event:				Month 1			
Workpackage title: General networking activities									
Participant id	1	2	3	4	5	6	7	8	9	10
Person-months per participant:	23	2	2	10	1	1	2.5	2	0.5	0.5
EU-funded	19	0	0	0	0	0	0	0	0	0

Description of work

Task 1: Developing, maintaining, and evaluating a standardized meeting structure that allows efficient review and distribution of the conclusions obtained at individual meetings.

Task 2: Hosting workshops on development of the European IT infrastructure for synthetic biology, design tools for synthetic biology, and standardization of biological parts.

Task 3: Establishment of study groups on specific subjects relevant to synthetic biology. Meetings and conclusions will be distributed via the EMERGENCE web-page. Whenever relevant, the study groups will interface with other activities within EMERGENCE. "External" experts can be invited for an exchange visit.

Task 4: Platform for organizing thematic workshops/courses/meetings, resulting from maturation of study groups into specific workshops, courses, or small scientific meetings, or from initiatives from members of the advisory board or the steering committee.

Task 5: EMERGENCE will promote exchange and training visits between European and overseas participants, in particular with the Middle East and Asia, including: invitations for a number of leading scientists in the field to participate in study groups; seeking actively to participate in similar initiatives in those countries; and inclusion of Middle Eastern/Asian researchers in the EMERGENCE communication and dissemination pipelines. The participation of senior European synthetic biology scientists in Asian meetings will be particularly encouraged.

Deliverable No[1]	Deliverable name	Lead participant	Est. person months	Delivery date [2] (months)	Nature [3]	Dissemination level [4]
D1.1	Material and rules for standardized meeting structure in place for the first time	5	1	3	O	PU
D1.2	Report on the first workshop on development of the European IT infrastructure for synthetic biology	3	7	3	R	PU
D1.3	Report on the first workshop for design tools for synthetic biology	3	7	4	R	PU
D1.4	Report on recommendations of the intra-consortium expert group on suitable promoter standardization formats	2	7	12	R	PU
D1.5	Updated material for the appropriate section in the quarterly Synthetic Biology Newsletter regarding tasks 2, 3, and 4	1	2	Quarterly, starting month 3	R	PP
D1.6	Report on workshop on foundations of measurement statistics in synthetic biology	7	5	24	R	PU
D1.7	Document identifying "common European-Asian interests and ways to develop them" or similar document in place and signed by extra-European and European groups/organizations involved in synthetic biology	1	2	32	O	CO

Midterm-report?	Final
1) OK, M6	
2) OK, M8	
3) OK, M12	
4) OK, M?	
5) OK	
	6) ?
	7)?

D1.6. UCL/NS, CNB VdL

D1.7. HZI/VMdS

Last time, support:

MTR

Milestones[5] and expected result	
M1.1. Recommendations for the European IT infrastructure for synthetic biology are discussed and recommendations issued (month 3)	YES
M1.2. Recommendations for design tools on the IT infrastructure are discussed and recommendations issued (month 4)	YES
M1.3 First experiences with the study group format are reviewed by the steering committee after 6 and by advisory board and steering committee after 12 months and the format is adapted, if necessary (month 6, 12)	YES
M1.4. Recommendations on standardization of biological parts are discussed (month 11)	YES
M1.5. Recommendations on measurement systems in synthetic biology are discussed (month 24)	
M1.6. Steering committee and advisory board decide whether the critical mass in Europe-Asian relations in synthetic biology has been reached and drafting a "common interests" document is going to be useful (month 24)	

M1.5. VdL, NS, to be expected in month 36. NS will evaluate material after MF workshop in London (month 32) and then communicate with VdL after his workshop (month 36) – one or two papers
Website: access/links to other standardization activities (Biobricks foundation, RFC request for comments)
M1.6. Decision: YES(chen). VMdS to follow up and produce document with Chinese & Indian/Japanese representative

Last time, support:

Midterm report

Deliverable No[5]	Deliverable name	Lead participant	Est. person months	Delivery date [6] (months)	Nature [7]	Dissemination level [8]
D1.1	Material and rules for standardized meeting structure in place for the first time	4	1	3	O	PU
D1.2	Report on the first workshop on development of the European IT infrastructure for synthetic biology	3	7	3	R	PU
D1.3	Report on the first workshop for design tools for synthetic biology	3	7	4	R	PU
D1.4	Report on recommendations of the intra-consortium expert group on suitable promoter standardization formats	2	7	12	R	PU
D1.5	Updated material for the appropriate section in the quarterly Synthetic Biology Newsletter regarding tasks 2, 3, and 4	1	2	Quarterly, starting month 3	R	PP
D1.6	Report on workshop on foundations of measurement statistics in synthetic biology	7	5	24	R	PU
D1.7	Document identifying "common European-Asian interests and ways to develop them" or similar document in place and signed by extra-European and European groups/organizations involved in synthetic biology	4	2	32	O	CO

Yes (mon. 6)
Yes (mon. 8)

Yes (mon. 12)

Yes

Yes – BUT??

delayed

Delayed to 36 pending further discussions

D1.5. ETHZ/SP
D1.6. UCL/NS, CNB VdL
D1.7. HZI/VMdS

Last time, support:

Task 1: *Communication pipeline*

This task is concerned with the development of an efficient communication structure among the participants of the CA and with the distribution of the highly specific and rapidly developing knowledge regarding synthetic biology matters, both those of the WPs specifically addressed in this CA, and cross-project matters (see inter-project networking below). The goal is to achieve personal interactions towards the goals of the network in a cost- and time efficient manner. This task consists of developing, maintaining, and evaluating a standardized meeting structure that allows efficient review of the conclusions obtained at individual meetings. Results of the meetings and workshops are made available in a comprehensive and structured way that reduces paper load and allows easy access to the necessary information. The WP will make intensive use of WWW-based communication via the CA web-page to distribute the conclusions and minutes of the individual meetings and courses.

Task 2: W Last time, support: s:

A prime objective of the CA is the outreach into the current and future synthetic biology community to discuss the different issues that require the input and consensus within this community. These issues are spread over three major areas:

a) Scientific issues relating to common standards and practices

b) IP-related issues

c) Ethics and safety related issues.

Within WP1, we will address primarily a), while b) will be treated in a separate package, and c) is treated within SYNBIOSAFE (see above). Regarding the scientific issues, two burning issues are easy to anticipate which need to be discussed early in the framework of the CA to direct subsequent efforts:

[i] **Requisites and determinants for biological design tools and requirements and set-up of a European synthetic biology informatics infrastructure**

[ii] **Standardization in synthetic biology**: The issue of standardizing biological parts requires early assembly of an intra-consortium expert group to develop an agenda for tackling the bottlenecks in standardization of biological components/functions which limit the ability of rationally designing complex circuits. ….. This group will set up a series of 3 Workshops and 1 general meeting aimed at producing pre-normative recommendations on the formatting of elements for general use.

Last time, support:

Task 3: *Study groups*

A number of informal study groups on specific subjects relevant to synthetic biology and to the various on-going projects will be set. The scope, remit, and composition of these groups will be set flexibly on the half-annually CA steering committee meetings on the basis of the needs in the synthetic biology community. Next to the initiative taken by the steering group, there will be ample room for bottom-up initiatives from the advisory board or any other member of the community. In particular, the establishment of interdisciplinary groups will be encouraged, that is groups where engineering and natural scientists come together. The aim of these study groups is very focused and may be directed at mapping particular on-going activities, identifying hurdles and bottlenecks in a particular systems or process, and propose a number of follow-up measures in the particular area of the study. These groups will also have the opportunity (should the WP-leader support this, see task 3) to organize workshops or small scientific meetings regarding their specific topics. Examples of possible fields are (as an indication only):

Foundational technologies, including e.g. high-throughput genome minimization, DNA synthesis), potential of genetic circuits, modularity in proteins, handling noise & error propagation in biological systems, robustness in biological systems, transferability of engineering foundations, and so forth.

Societal interest, e.g. in close interaction with SYNBIOSAFE), including biological risks and security, understanding and perception, ethics, etc.

These study groups are expected to recruit their participants from ongoing synthetic biology or researchers with specific expertise on the subject in question. To keep paper and work load to a minimum (facilitating thereby participation), a one-page downloadable generic template report will be used by one of the group initiators to fill in at the end of each meeting or at the end of the study with the main conclusions, recommendations or follow-up measures. Thus, the study groups, though flexible, will have a clear remit and tangible deliverables that can be posted on the CA- web-page. These meetings may be face-to-face, virtual or by video conference. When face-to-face, they will generally take place around any of the planned network activities (see e.g. WP2). Often, such study groups may draw partly on information or activities being carried out elsewhere in Europe or overseas (e.g. US, Japan, China, etc.). In some cases, if a given subject is of particular importance, one more experts could be invited for an exchange visit to discuss the matter, a budget has been allocated for these activities.

Last time, support:

Task 4: *Thematic Workshops*

Some of the study groups will be encouraged to “mature” into specific workshops, courses, or small scientific meetings. Where topics of particular interest are treated – such as foundational technologies (e.g. DNA synthesis) - the steering committee might take the initiative and push this. These workshops /courses target participants (in particular younger scientists) across the various projects within the PATHFINDER, but also from the broader Synthetic Biology community.

To facilitate knowledge transfer on specific technologies, methods or processes key to synthetic biology, the CA would encourage a number of short exchange visits by experienced researchers to expert groups, within or beyond the CA and the various SB projects. Examples would be visits to labs with experience on genome minimization, standardization of biological parts, circuit design and simulation, network analysis and error propagation, etc. The CA-supported “visitor” will produce short reports on the visits that will be posted in the CA´s webpage. These actions altogether will accelerate the dissemination of concepts and methodologies being developed and/or applied across the various SB projects and in particular, on the standardization of biological and computational protocols.

Task 5: *Global and European networking*

Last time, support:

European

The CA will naturally establish itself as a point of reference for National and European funding agencies. The CA will take up the responsibility to provide information and promote synthetic biology with these organizations. Where appropriate, outreach meetings will be held to prepare the grounds for future larger-scale consortia / projects.

Extra-European

EMERGENCE has a strong remit to foster networking with the scientific communities outside Europe, as the power of the approach increases with the scope of the community that is addressed (c.f. high expert group report on Frontier Research: a European Challenge, http://europa.eu.int/comm/research/future/pdf/hleg_fullreport_frontier_research_april2005.pdf).

Interactions in the field of Synthetic Biology with the US community are becoming increasingly stronger and frequent (see this CA, European participation in iGEM2005 and 2006, the US-European exchange in synthetic biology within the frame of the US/EU-task force on biotechnology, and the ESF-sponsored workshop on synthetic biology (www.esf.org/esf_article.php?language=0&activity=4&domain=3&article=477&page=1213), all of which have members of the CA in crucial responsible positions). Networking with Asian researchers has been scarce so far, but, as synthetic biology is quickly emerging there as well, the CA has the clear aim of interlinking EU activities with those in Asia from the very beginning, with the goal of extending the "community structuring" effort of this CA. In this regard, the WP leader (participant 5) has already undertaken initial activities such as the organization of a Sino-German Workshop on synthetic biology (the first initiative of its kind in China) in Beijing at the end of 2006, as well as visits to a number of Chinese and Japanese labs working in the field.

Hence, in addition to the already on-going initiatives with the US and Israel, EMERGENCE will specifically support networking initiatives with Asian researchers using the instruments described, namely expert visits from Asian to European labs and the other way around, and by invitation of a number of leading Asian scientists in the field to participate in study groups, incorporating Asian researchers in the communication and dissemination pipelines on synthetic biology. Strategic meetings with Asian funding agencies (e.g. JSPS in Japan or CAS in China) will be sought to prepare the ground for future joint projects.

MTR

Deliverable No[5]	Deliverable name	Lead participant	Est. person months	Delivery date [6] (months)	Nature [7]	Dissemi-nation level [8]
D6.1	Minutes of steering group plus advisory board meeting	1	2	1, 12, 24, 36	R	RE
D6.2	Consortium Agreement, version 1	1	2	2	O	PP
D6.3	Web-based resource centre available	1	7	2	D	PU
D6.4	Minutes of steering group meeting	1	7	6 18 30	R	RE
D6.5	Quarterly Synthetic Biology Newsletter	1	7	Quarterly, starting month 3	O	PU
D6.6	Revised consortium agreement	1	7	18	O	PP
D6.7	Midterm report	1	7	20	R	RE
D6.8	Final report including final plan on using and disseminating knowledge	1	7.5	38	R	RE

4/19/HK
Ok
Yes
4/11/18

7/12/17

Sven

20

xx

ALL Ds: ETHZ/SP

Workpackage number	6	**Start date or starting event:**								Month 1
Workpackage title: Project management and dissemination										
Participant id	1	2	3	4	5	6	7	8	9	10
Person-months per participant:	17	2	2	2	1	0.5	0.5	2	0.5	0.5
EU-funded	10									

Dissemination activities

Anybody present at DFG/Leopoldina workshop?
Anybody at ECSBII San Feliu? (Sven, Vitor, Victor)
Dechema meeting/advisory board (Wagner, dos Santos, Panke)
Dechema group on SynBio
CWG group
ESF Proposal
EU Advisory group
OECD Meeting Wash
Workshop Spain
Tarpol meetings
SATW workshop
Ethics in Brussels
Microfluidics London
BSSE Symposium
BMBF workshop
Ethik der Synth Biologie
Workshop in Delft
Promoter Formatting Mallorca

Description of work

Coordination of project includes:

Coordination of overall project progress

implementation of a preliminary and a final consortium agreement

administration and finances of the project

organization and coordination of project meetings including preparation of minutes where relevant

verifiable assessment and reviewing of the project against the deliverables and milestones

identification of potential applications of technological results of the project and protection of intellectual properties to facilitate industrial exploitation

streamline communication and material exchange between partners, communication with EU commission and communication of project results to stake holders

Ensuring of dissemination by scientific publications, presentations at meetings, web resource, and newsletter.

From the proposal

a) A regularly updated collection of “synthetic biology showcases” on the CA-web page. These showcases should be understandable for the layman. Their immediate objectives is to point out the (potential) benefits of synthetic biology and to illustrate central features of the issue.

b) An inventory of articles that have appeared in the European and international press regarding the topic (irrespective of their attitude towards synthetic biology). However, we will not be able to implement a regular “media screen”, so we will be unable to guarantee completeness.

c) We will use the web-page to openly document the ideas and discussions regarding the topics risks, impact of IP, and ethics. This will include relevant presentations at SB2.0 and SB3.0, where possible mirroring the web-site of the SSA SYNBIOSAFE, and protocols from relevant meetings in the frame of the CA.

d) The members of the CA commit themselves to participate to a reasonable extent in any public discussions that take place in their countries or on a European level regarding the broader area of synthetic biology.

e) Finally, UCAM will provide together with the IET an integrated web-resource which will be an excellent tool to communicate educational and research material to the scientific and general public.

Financial planning

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Coordination Action

A3.1

Please use as many copies of form A3.1 as necessary for the number of partners

Proposal Number	043338	Proposal Acronym	EMERGENCE

Financial information - whole duration of the project

Participant n°	Organisation short name	Cost model used	Estimated eligible costs and requested EC contribution (whole duration of the project)		Costs and EC contribution per type of activities: Coordination activities (1)	Training activities (2)	Consortium Management activities (3)	Total (4)=(1)+(2)+(3)	Total receipts
1	ETHZ	AC	Eligible costs	*Direct Costs (a)*	291'000.00	82'000.00	60'000.00	433'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	58'200.00	16'400.00	12'000.00	86'600.00	
				Total eligible costs (a)+(b)	349'200.00	98'400.00	72'000.00	519'600.00	
			Requested EC contribution		349'200.00	98'400.00	72'000.00	519'600.00	
2	CSIC	FC	Eligible costs	*Direct Costs (a)*	135'000.00		4'000.00	139'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	27'000.00		800.00	27'800.00	
				Total eligible costs (a)+(b)	162'000.00	.00	4'800.00	166'800.00	
			Requested EC contribution		162'000.00		4'800.00	166'800.00	
3	CNIO	FC	Eligible costs	*Direct Costs (a)*	134'667.00		4'000.00	138'667.00	
				of which subcontracting			4'000.00	4'000.00	
				Indirect costs (b)	33'667.00		.00	33'667.00	
				Total eligible costs (a)+(b)	168'334.00	.00	4'000.00	172'334.00	
			Requested EC contribution		161'600.00		4'000.00	165'600.00	
4	HZI	AC	Eligible costs	*Direct Costs (a)*	181'000.00		4'000.00	185'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	36'200.00		800.00	37'000.00	
				Total eligible costs (a)+(b)	217'200.00	.00	4'800.00	222'000.00	
			Requested EC contribution		217'200.00		4'800.00	222'000.00	
5	DSM	FC	Eligible costs	*Direct Costs (a)*	42'500.00		2'500.00	45'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	21'250.00		1'250.00	22'500.00	
				Total eligible costs (a)+(b)	63'750.00	.00	3'750.00	67'500.00	
			Requested EC contribution		51'000.00		3'000.00	54'000.00	
6	DTU	AC	Eligible costs	*Direct Costs (a)*	93'000.00		2'000.00	95'000.00	
				of which subcontracting			.00	.00	
				Indirect costs (b)	18'600.00		400.00	19'000.00	
				Total eligible costs (a)+(b)	111'600.00	.00	2'400.00	114'000.00	
			Requested EC contribution		111'600.00		2'400.00	114'000.00	

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Coordination Action

A3.1

Please use as many copies of form A3.1 as necessary for the number of partners

Proposal Number	043338	Proposal Acronym	EMERGENCE

Financial information - whole duration of the project

Participant n°	Organisation short name	Cost model used	Estimated eligible costs and requested EC contribution (whole duration of the project)		Costs and EC contribution per type of activities: Coordination activities (1)	Training activities (2)	Consortium Management activities (3)	Total (4)=(1)+(2)+(3)	Total receipts
6	DTU	AC	Eligible costs	*Direct Costs (a)*	93'000.00		2'000.00	95'000.00	
				of which subcontracting			.00	.00	
				Indirect costs (b)	18'600.00		400.00	19'000.00	
				Total eligible costs (a)+(b)	111'600.00	.00	2'400.00	114'000.00	
			Requested EC contribution		111'600.00		2'400.00	114'000.00	
7	Geneart	FCF	Eligible costs	*Direct Costs (a)*	42'500.00		2'500.00	45'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	8'500.00		500.00	9'000.00	
				Total eligible costs (a)+(b)	51'000.00	.00	3'000.00	54'000.00	
			Requested EC contribution		51'000.00		3'000.00	54'000.00	
8	CRG	AC	Eligible costs	*Direct Costs (a)*	102'000.00		4'000.00	106'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	20'400.00		800.00	21'200.00	
				Total eligible costs (a)+(b)	122'400.00	.00	4'800.00	127'200.00	
			Requested EC contribution		122'400.00		4'800.00	127'200.00	
9	UCAM-DPLS	AC	Eligible costs	*Direct Costs (a)*	15'000.00	15'000.00	2'000.00	32'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	3'000.00	3'000.00	400.00	6'400.00	
				Total eligible costs (a)+(b)	18'000.00	18'000.00	2'400.00	38'400.00	
			Requested EC contribution		18'000.00	18'000.00	2'400.00	38'400.00	
10	EP	FCF	Eligible costs	*Direct Costs (a)*	15'000.00	15'000.00	2'000.00	32'000.00	
				of which subcontracting				.00	
				Indirect costs (b)	3'000.00	3'000.00	400.00	6'400.00	
				Total eligible costs (a)+(b)	18'000.00	18'000.00	2'400.00	38'400.00	
			Requested EC contribution		18'000.00	18'000.00	2'400.00	38'400.00	
TOTAL			Eligible costs		**1'281'484.00**	**134'400.00**	**104'350.00**	**1'520'234.00**	**.00**
			Requested EC contribution		**1'262'000.00**	**134'400.00**	**103'600.00**	**1'500'000.00**	

WP	Item	Allocated budget [k€]
1	**Networking**	
	Thematically not pre-defined meetings/study groups	108
	Workshops IT infrastructure	43.2
	Workshops standardization	42
	Travel to workshops, etc.	213.6
	Support Networking	127.2
	Total WP 1	**534**
2	**Summer schools**	
	Hosting of summer schools	98.4
	European Master in Synthetic Biology	18
	Web resource at IET	18
	Total WP2	**134.4**
3	**IT Infrastructure**	
	Personnel ETHZ, 25 m	177.6
	Personnel CNIO, 21 m	100.4
	Personnel CGR, 21 m	104.4
	Personnel ZFI, 14 m	91.2
	Total WP3	**473.6**
4	**Standardization**	
	Personnel Madrid, 21 m	102
	Personnel Copenhagen, 14 m	93.6
	Total WP4	**195.6**
5	**Industrial interface**	
	Meetings/workshops, industry & IP-related	58.8
	Total WP5	**58.8**
6	**Project management**	
	Project administrator (see also support networking)	62.4
	Auditing	41.2
	Total WP6	**103.6**
	Total budget CA [k€]	**1`500**

Distribution of resources - 1

#	Contractor	Item	WP	Sum allocated [k€]	Coordin. activ.	Training activ.	Man. activ.
1	ETHZ	Travel to workshops, workshops	1	37	37		
	AC	Summer schools	2	82		82	
		Personnel, 25 months	3	148	148		
		Project assistant, 36 months, 80%	1,6	158	106		52
		Auditing	6	8			8
		Overhead 20%		86.6	58.2	16.4	12
		Total		**519.6**	**349.2**	**98.4**	**72**
2	CSIC	Travel to workshops, workshops	1	50	50		
	FC	Personnel, 21 months	4	85	85		
		Auditing	6	4			4
		Indirect 20%			27		0.8
		Total		**166.8**	**162**	**0**	**4.8**
3	CNIO	Travel to workshops, workshops	1	51	51		
	FC	Personnel, 21 months	3	83.7	83.7		
		Auditing	6	4			4
		Indirect 20%		26.9	26.9		
		Total		**165.6**	**161.6**	**0**	**4**
4	HZI	Travel to workshops, workshops	1	105	105		
	AC	Personnel, 14 months	3	76	76		
		Auditing	6	4			4
		Overhead 20%		37	36.2		0.8
		Total		**222**	**217.2**	**0**	**4.8**
5	DSM	Travel to workshops	1	18	18		
	FC	IP/industry interface workshops	5	24.5	24.5		
		Auditing	6	2.5			2.5
		Indirect 20%		9	8.5		0.5
		Total		**54**	**51**	**0**	**3**

#	Contractor	Item	WP	Sum allocated [k€]	Coordin. activ.	Training activ.	Man. activ.
6	DTU	Travel to workshops	1	15	15		
	AC	Personnel, 14 months	3	78	78		
		Auditing	6	2			2
		Overhead 20%		19	18.6		0.4
		Total		**114**	**111.6**	**0**	**2.4**
7	GENEART	Travel to workshops	1	18	18		
	FCF	IP/industry interface workshops	5	24.5	24.5		
		Auditing	6	2.5			2.5
		Indirect 20%		9	8.5		0.5
		Total		**54**	**51**	**0**	**3**
8	CRG	Travel to workshops, workshops	1	15	15		
	AC	Personnel, 21 months	3	87	87		
		Auditing	6	4			4
		Overhead 20%		21.2	20.4		0.8
		Total		**127.2**	**122.4**	**0**	**4.8**
9	UCAM	Travel to workshops	1	15	15		
	AC	Web-resource located activities	2	15		15	
		Auditing	6	2			2
		Overhead 20%		6.4	3	3	0.4
		Total		**38.4**	**18.2**	**18.2**	**2**
10	EP	Travel to workshops	1	15	15		
	FCF	Master-related activities	2	15		15	
		Auditing	6	2			2
		Indirect 20%		6.4	3	3	0.4
		Total		**38.4**	**18.2**	**18.2**	**2**
		Total budget CA [k€]		**1`500**	**1262**	**134.4**	**103.6**