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 29

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

CLA Building, room J1

1. 11:00-11:10 Welcome
2. 11:10-11:30 Update (general status, financing for second half, ESF call)
3. 11:30-12:15 WP 1, General networking activities: Vitor Martins dos Santos
    a. Status deliverables
    b. Status finances
    c. Planned activities until end of Emergence (30.11.2009)
    d. Discussion
4. 12:15-13:00 WP 2: Attracting talent: Sven Panke
    a. Status deliverables
    b. Status finances
    c. Planned activities until end of Emergence (30.11.2009)
5. Lunch, 13:00 – 14:00, Dozentenfoyer, ETHZ
6. 14:00 – 14:45 WP3: European IT infrastructure: Alfonso Valencia/Jörg Stelling
    a. Status deliverables
    b. Status finances
    c. Planned activities until end of Emergence (30.11.2009)
7. 14:45 – 15:30 WP4: Standardization of promoter components: Victor de Lorenzo (replacement)
    a. Status deliverables
    b. Status finances
    c. Planned activities until end of Emergence (30.11.2009)
8. 15:30-16:15 WP5: Academia-industry interface: Frank Notka
    a. Status deliverables
    b. Status finances
    c. Planned activities until end of Emergence (30.11.2009)
9. 16:15-17:00 WP6: Project management
    a. Project extension required?
10. 17:00-18:00 Final discussion
11. 18:00-18:30 Wrap-up, action points.
12. 18:30: End of meeting
13. 19:00: Joint dinner in “Linde Oberstrass”, approx. 10 min walking from meeting room.

Crucial objectives for the day

What remains to do, for whom?
Financial status?
Extension of Emergence Yes/No?

What do we still need to do to do a good job to the European SynBio community?

Brief comment of financial situation:

Requested money distribution

Contract Preparation Forms

EUROPEAN COMMISSION

6th Framework Programme on Research, Technological Development and Demonstration

Coordination Action

A3.2

Proposal Number	043338	Proposal Acronym	EMERGENCE

Estimated breakdown of the EC contribution per reporting period

Reporting Periods	Start month	End month	Estimated Grant to the Budget	
			Total	In which first six months
Reporting Period 1	1	18	940'000.00	.00
Reporting Period 2	19	36	560'000.00	187'000.00
Reporting Period 3	25	36	.00	.00
Reporting Period 4	37	48	.00	.00
Reporting Period 5	49	60	.00	.00
Reporting Period 6	61	72	.00	.00
Reporting Period 7	73	84	.00	.00

Cost Budget Follow-up Table

*) total budget figures - not EC funding

Contract N°: 43338	Acronym: EMERGENCE						Date:					
PARTI-CIPANTS	TYPE of EXPENDITURE (as defined by participants)	BUDGET	ACTUAL COSTS (EUR)					Pct. spent				Remaining Budget (EUR)
			18 months	18-36 months	0	0	Total	18 months	18-36 months	0	Total	
		a	a1	b1	c1	d1	e1	a1/a	a1+b1/a	a1+b1+c1/a	a1+b1+c1+d1/a	a-e1
Part. 1 ETHZ	Total Person-month	54	22				22	41%	0%	0%	41%	32
	Personnel costs	306000	126620.05				126620.05	41%	0%	0%	41%	179379.95
	Travel	37000	7137.49				7137.49	19%	0%	0%	19%	29862.51
	Workshops	82000	-				0	0%	0%	0%	0%	82000
	Indirect costs, audits	94600	28111.05				28111.05	30%	0%	0%	30%	66488.95
	Total Costs	519600	161868.59	0	0	0	161868.59	31%	0%	0%	31%	357731.41
Part. 2 CSIC	Total Person-month	21	16				16	76%	0%	0%	76%	5
	Personnel costs	85000	63401.87				63401.87	75%	0%	0%	75%	21598.13
	Travel	50000	1964.72				1964.72	4%	0%	0%	4%	48035.28
	Workshops	0	0				0	0%	0%	0%	0%	0
	Indirect costs, audits, other	31800	74343.88				74343.88	234%	0%	0%	234%	-42543.88
	Total Costs	166800	139710.47	0	0	0	139710.47	84%	0%	0%	84%	27089.53
Part. 3 CNIO	Total Person-month	21	12				12	57%	0%	0%	57%	9
	Personnel costs	83700	45754.5				45754.5	55%	0%	0%	55%	37945.5
	Travel	51000	20350.22				20350.22	40%	0%	0%	40%	30649.78
	Workshops	0	0				0	0%	0%	0%	0%	0
	Indirect costs, audits, other	30900	18687.53				18687.53	60%	0%	0%	60%	12212.47
	Total Costs	165600	84792.25	0	0	0	84792.25	51%	0%	0%	51%	80807.75
Part. 4 HZI	Total Person-month	14	0				0	0%	0%	0%	0%	14
	Personnel costs	76000	0				0	0%	0%	0%	0%	76000
	Travel	105000	15711.07				15711.07	15%	0%	0%	15%	89288.93
	Workshops	0	0				0	0%	0%	0%	0%	0
	Indirect costs, audits	41000	3142.21				3142.21	8%	0%	0%	8%	37857.79
	Total Costs	222000	18853.28	0	0	0	18853.28	8%	0%	0%	8%	203146.72

Cost Budget Follow-up Table

*) total budget figures - not EC funding

Contract N°: 43338 | Acronym: EMERGENCE | Date:

PARTI-CIPANTS	TYPE of EXPENDITURE (as defined by participants)	BUDGET	ACTUAL COSTS (EUR)					Pct. spent				Remaining Budget (EUR)
			18 months	18-36 months	0	0	Total	18 months	18-36 months	0	Total	
		c	a1	b1	c1	d1	e1	a1/c	a1+b1/c	a1+b1+c1/c	a1+b1+c1+d1/c	c-e1
Part. 5 DSM	Total Person-month	1	0.5				0.5	50%	0%	0%	50%	0.5
	Personnel costs	13500	7867				7867	58%	0%	0%	58%	5633
	Travel	10000	2800				2800	28%	0%	0%	28%	7200
	Workshops	19000	0				0	0%	0%	0%	0%	19000
	Indirect costs, audits	11500	2133				2133	19%	0%	0%	19%	9367
	Total Costs	54000	12800	0	0	0	12800	24%	0%	0%	24%	41200
Part. 6 UCL	Total Person-month	14	0				0	0%	0%	0%	0%	14
	Personnel costs	78000	0				0	0%	0%	0%	0%	78000
	Travel	15000	678.21				678.21	5%	0%	0%	5%	14321.79
	Workshops	0	0				0	0%	0%	0%	0%	0
	Indirect costs, audits	21000	135.64				135.64	1%	0%	0%	1%	20864.36
	Total Costs	114000	813.85	0	0	0	813.85	1%	0%	0%	1%	113186.15
Part. 7 Geneart	Total Person-month	1	0.5				0.5	50%	0%	0%	50%	0.5
	Personnel costs	19500	17309.26				17309.26	89%	0%	0%	89%	2190.74
	Travel	13000	5092.98				5092.98	39%	0%	0%	39%	7907.02
	Workshops	10000	0				0	0%	0%	0%	0%	10000
	Indirect costs, audits	11500	4480.45				4480.45	39%	0%	0%	39%	7019.55
	Total Costs	54000	26882.69	0	0	0	26882.69	50%	0%	0%	50%	27117.31
Part. 8 CRG	Total Person-month	21	1				1	5%	0%	0%	5%	20
	Personnel costs	87000	2483.2				2483.2	3%	0%	0%	3%	84516.8
	Travel	15000	1755.85				1755.85	12%	0%	0%	12%	13244.15
	Workshops	0	0				0	0%	0%	0%	0%	0
	Indirect costs, audits	25200	847.81				847.81	3%	0%	0%	3%	24352.19
	Total Costs	127200	5086.86	0	0	0	5086.86	4%	0%	0%	4%	122113.14

Cost Budget Follow-up Table

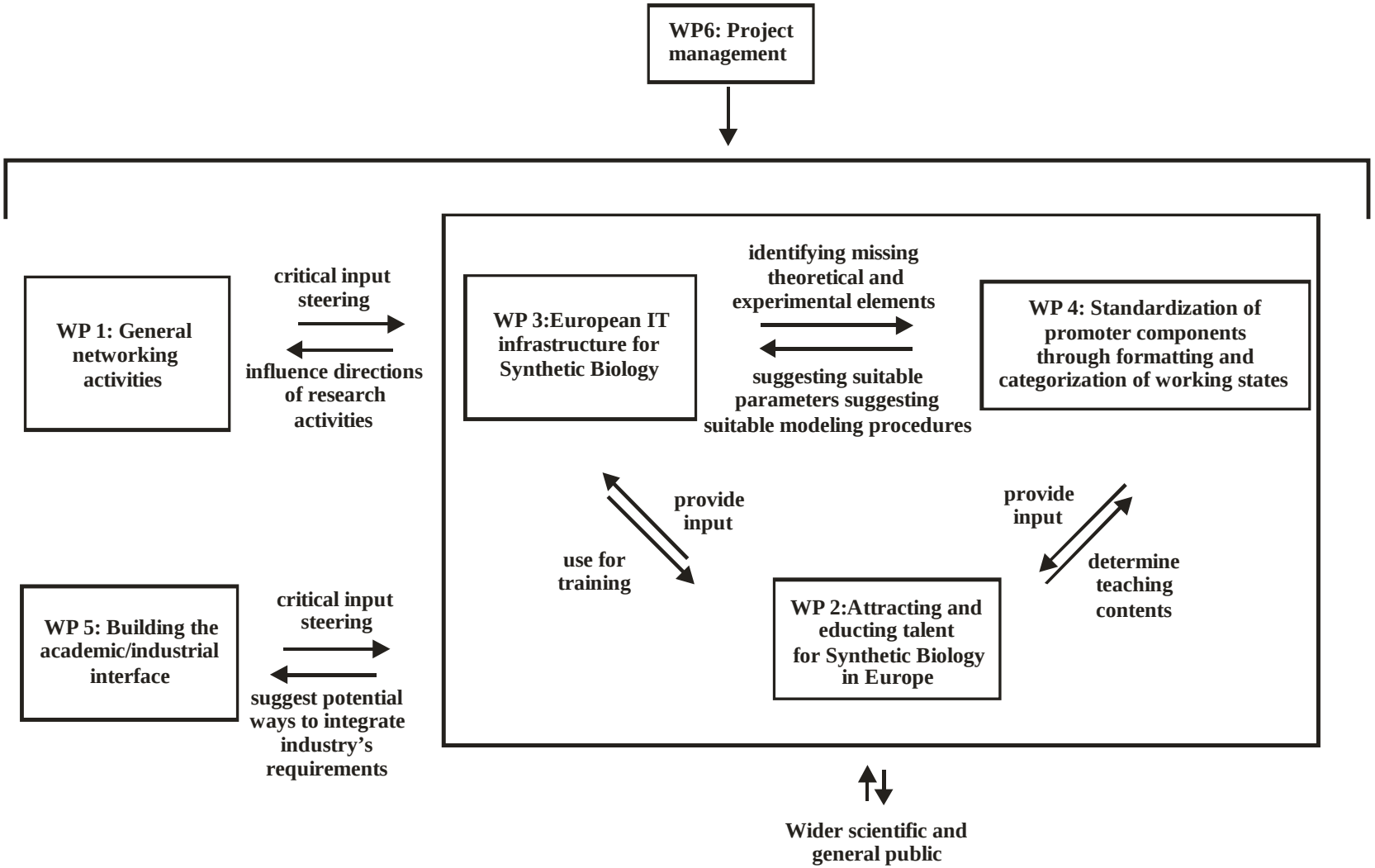
*) total budget figures - not EC funding

Contract N°:	43338	Acronym: EMERGENCE					Date:				
PARTI-CIPANTS	TYPE of EXPENDITURE (as defined by participants)	BUDGET	ACTUAL COSTS (EUR)					Pct. spent				Remaining Budget (EUR)
			18 months	18-36 months	0	0	Total	18 months	18-36 months	0	Total	
		a	a1	b1	c1	d1	e1	a1/a	a1+b1/a	a1+b1+c1/a	a1+b1+c1+d1/a	a-e1
Part. 9 UCAM	Total Person-month	0	0				0	0%	0%	0%	0%	0
	Web-resource activities	15000	3340.64				3340.64	22%	0%	0%	22%	11659.36
	Travel	15000	0				0	0%	0%	0%	0%	15000
	Workshops	0	0				0	0%	0%	0%	0%	0
	Indirect costs, audits	8400	668.11				668.11	8%	0%	0%	8%	7731.89
	Total Costs	38400	4008.75	0	0	0	4008.75	10%	0%	0%	10%	34391.25
Part. 10 EP	Total Person-month	0	0				0	0%	0%	0%	0%	0
	Master-related activities	15000	153.70				153.7	1%	0%	0%	1%	14846.3
	Travel	15000	2'195.29				2195.29	15%	0%	0%	15%	12804.71
	Workshops	0	0.00				0	0%	0%	0%	0%	0
	Indirect costs, audits	8400	469.80				469.798	6%	0%	0%	6%	7930.202
	Total Costs	38400	2'818.79	0	0	0	2818.788	7%	0%	0%	7%	35581.212
TOTAL	Total Person-month	147	52				52	35%	0%	0%	35%	95
	Personnel costs	778700	263'435.88				263435.88	34%	0%	0%	34%	515264.12
	Travel	326000	57'685.83				57685.83	18%	0%	0%	18%	268314.17
	Workshops	111000	-				0	0%	0%	0%	0%	111000
	Indirect costs, audits, other	284300	136'513.82				136513.818	48%	0%	0%	48%	147786.182
	Total Costs	1500000	457'635.528	0	0	0	457635.528	31%	0%	0%	31%	1042364.472

Person-Month Status Table

Update with end of period WP totals

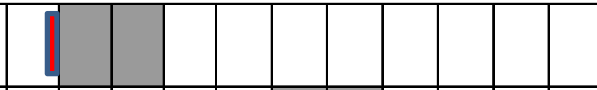
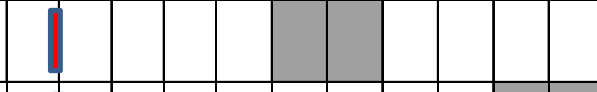
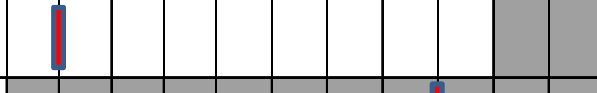
CONTRACT N°:	43338																						
ACRONYM:	EMERGENCE	Partner - Person-month per Workpackage															AC - own staff						
PERIOD:	1.12.2007 - 31.05.2008	TOTALS	Coord.	ETHZ	CSIC	CNIO	HZI	DSM	UCL	Geneart	CRG	UCAM	EP				AC TOTA	ETHZ	HZI	UCL	UCAM	CRG	
Workpackage 1:	**Actual WP total:**	**6**		6	0	0	0	0	0	0	0	0	0				**7**	2	4	1	0	0	
Networking	**Planned WP total:**	**19**		19	0	0	0	0	0	0	0	0	0				**17.5**	4	10	1	0.5	2	
Workpackage 2:	**Actual WP total:**	**0**		0	0	0	0	0	0	0	0	0	0				**4**	2	0	0	2	0	
Attracting talent	**Planned WP total:**	**0**		0	0	0	0	0	0	0	0	0	0				**11**	7	0	0	4	0	
Workpackage 3:	**Actual WP total:**	**25**		12	0	12	0	0	0	0	1	0	0				**17**	2	5	0	0	10	
IT infrastructure	**Planned WP total:**	**81**		25	0	21	14	0	0	0	21	0	0				**49**	4	26	0	0	19	
Workpackage 4:	**Actual WP total:**	**16**		0	16	0	0	0	0	0	0	0	0				**0**	0	0	0	0	0	
Standardization	**Planned WP total:**	**35**		0	21	0	0	0	14	0	0	0	0				**2.5**	1	0	1.5	0	0	
Workpackage 5:	**Actual WP total:**	**1**		0	0	0	0	0.5	0	0.5	0	0	0				**3**	2	1	0	0	0	
Industry/Academia	**Planned WP total:**	**2**		0	0	0	0	1	0	1	0	0	0				**3**	2	1	0	0	0	
Workpackage 6:	**Actual WP total:**	**4**		4	0	0	0	0	0	0	0	0	0				**4**	3	1	0	0	0	
Project management	**Planned WP total:**	**10**		10	0	0	0	0	0	0	0	0	0				**12**	7	2	0.5	0.5	2	
Workpackage 7:	**Title** **WP total:**	**0**															**0**						
	Planned WP total:	**0**															**0**						
Workpackage 8:	**Title** **WP total:**	**0**															**0**						
	Planned WP total:	**0**															**0**						
Workpackage 9:	**Title** **WP total:**	**0**															**0**						
	Planned WP total:	**0**															**0**						
	Actual total:	**52**	**0**	**22**	**16**	**12**	**0**	**0.5**	**0**	**0.5**	**1**	**0**	**0**	**0**	**0**	**0**	**35**	**11**	**11**	**1**	**2**	**10**	
Total Project Person-month	**Planned total:**	**147**	**0**	**54**	**21**	**21**	**14**	**1**	**14**	**1**	**21**	**0**	**0**	**0**	**0**	**0**	**95**	**25**	**39**	**3**	**5.0**	**23**	


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 2:Attracting and educting talent for Synthetic Biology in Europe
WP 5: Building the academic/industrial interface
critical input steering
suggest potential ways to integrate industry's requirements
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 29

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/

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.

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**	

iGEM 30.10-2.11.
Micro TAS 1.11-5.11
Dechema 9./10.11.

Invite:
Imperial
Edinburgh
Freiburg i Br
Groningen
A. Moya
Genopole people, A. Danchin
Kopenhagen
Markus Schmidt
G. Posfai
Ljubljana
PL Luisi
Diego di Bernardo

12 k€

US
H. Sauro
Drew Endy
T. Knight
W Lim
C. Voigt
C. Smolke
R. Weiss
A. Arkin
J. Keasling

H. Ueda
Hongkong?

20 k€

Managing complexity and design
Defining the boundaries of SynBio
Current bottlenecks in SynBio
Challenges in SynBio
Possible success stories in SynBio

Is there a life after Emergence?

1.5 days

Th/Fr
Mo/tu

12/13
16/17
19/20
23/24
26/27

EMERGENCE: A foundation for Synthetic Biology in Europe

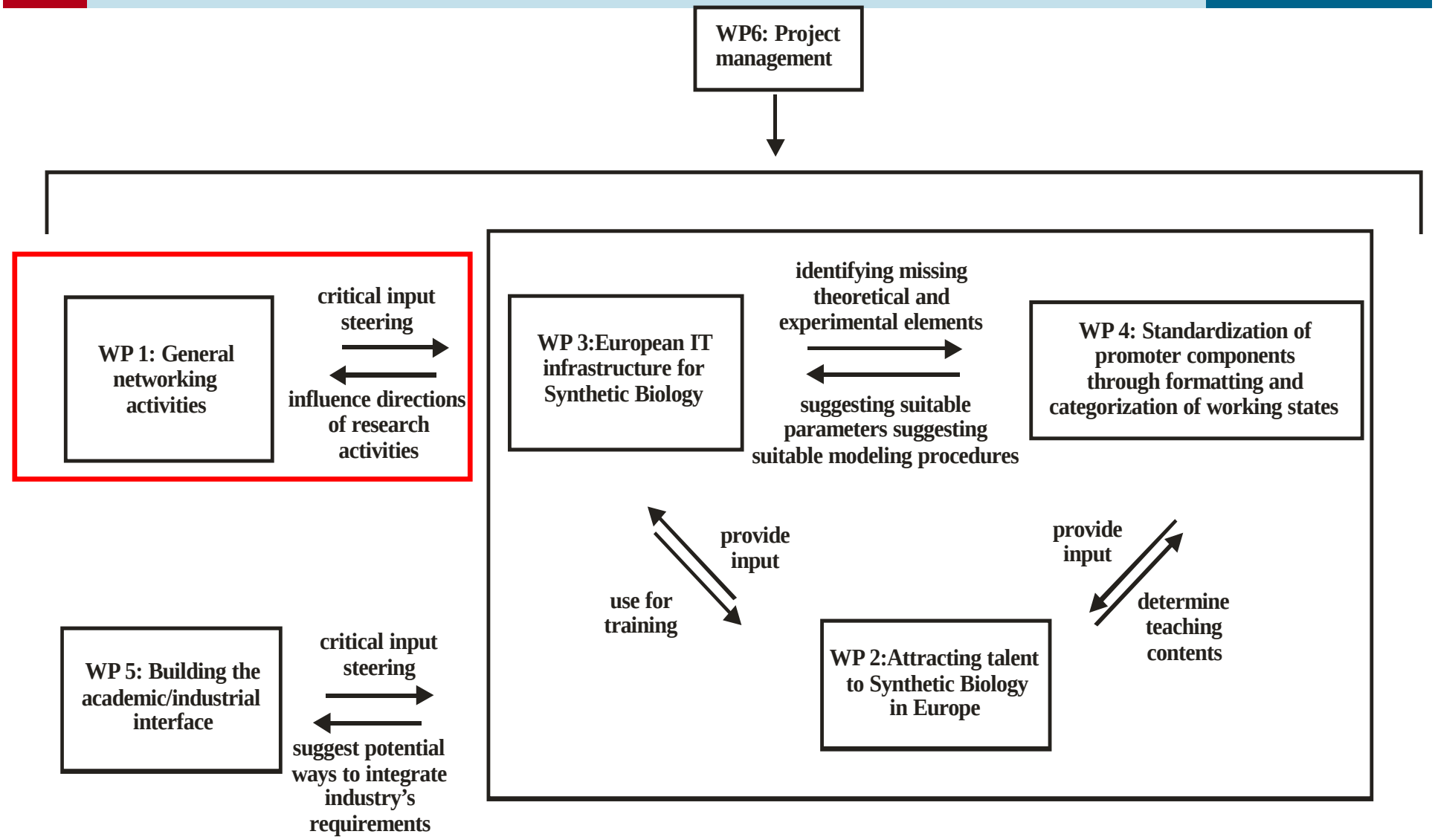
WP1: General Networking activities

Fostering a community of knowledge

Vítor Martins dos Santos

Systems and Synthetic Biology Group
Division of Microbiology
Helmholtz Centre for Infection Research
Braunschweig, Germany

Project Structure



WP1: General Networking Activities

Objectives:

a) To establish a networking platform for current and future synthetic biology projects

b) To rapidly organize workshops for urgent issues in European synthetic biology

c) To implement a Europe-wide, cross-disciplinary framework for discussion on the possibilities, needs, limitations, and implications of synthetic biology.

d) To foster interactions with extra-European initiatives, with special emphasis on US, the Mid-East and Asia: Global knowledge space

Description of Tasks I

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

Overarching, jointly with WP Management

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

Jointly with WP3 (IT infrastructure), WP4 (Design tools and Biological parts), Standardisation Issues (Overarching)

Description of Tasks II

Task 3: *Establishment of study groups on specific subjects relevant to synthetic biology*

“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
……..

Description of Tasks II

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.

Deliverables Month 1-18

D1.1: Material and rules for standardized meeting structure in place for the first time (month 3). Responsible: HZI

D1.2: Report on the first workshop on development of the European IT infrastructure for synthetic biology (month 8) Responsible: HZI

D1.3: Report on the first workshop for design tools for synthetic biology (month 4) Responsible: CNIO

D1.4. Report on recommendations of the intra-consortium expert group on suitable promoter standardization formats (month 12) Responsible: CNB

Deliverables 18-36 month

D1.5: Updated material for the appropriate section in the quarterly Synthetic Biology Newsletter regarding tasks 2, 3, and 4 (months 3, 6, 9, 12, etc): Responsible ETH

D1.6. Report on workshop on foundations of measurement statistics in synthetic biology (month 24)

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 (month 32)

Milestones and expected results

M1.1. **Recommendations for the European IT infrastructure for synthetic biology** are discussed and recommendations issued (month 3)

M1.2. **Recommendations for design tools on the IT infrastructure** are discussed and recommendations issued (month 4)

M1.3 **First experiences with the study group format** are reviewed by the steering committee after 6 months and by advisory board and steering committee after 12 months and the format is adapted, if necessary (month 6, 12)

M1.4. **Recommendations on standardization of biological parts** are discussed (month 11)

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)

D1.1 - Material and rules for standardized meeting structure

Web-based template document:

Definition of the theme and Scope

The need for the SynBio community and goals

Implementation plan (size, mode, participants

Timeline

Financing possibilities

Process:

Submission to Steering committee (WP-leaders, Coordinator)

Eg. IT: A. Valencia; Teaching: Sven P.; INdustry: L. Pasamontes

D1.1 - Material and rules for standardized meeting structure: examples themes

Tier	Theme	Number of Participants	Length	Contribution to Emergence	Deliverable	Estimated Cost (€)	Financial contribution requested (€)	WP

Tier means 1 - initial, 2 - follow-up or 3 - full meeting
WP means the Work package to which the proposed meeting would contribute

minimal genomes / minimal systems

what to measure / how to measure?

design concepts
how can we handle “systems“ (made of parts)?

context-independent biological systems/modules

microfluidics technologies / single cell measurents

D1.2 -Report on the first workshop on development of the European IT infrastructure for synthetic biology

Workshop Computational Infrastructure and Methods for Synthetic Biology

The 9th Annual BioPathways Meeting

VÍtor Martins dos Santos
Vincent Schachter
Vincent Danos
Joanne Luciano
Aviv Regev
Eric Neumann

July 19-20, 2008
Satellite Meeting ISMB 2008
Toronto, Canada

7:30 – 8:30	**Registration**	
8:30-8:45	VÍtor Martins dos Santos, Helmholtz Center for Infection Research, Braunschweig, DE	Opening remarks
Session 1 & Analysis : **Databases & Software Tools** Chair: Vítor Martins dos Santos		
8:45-09:30	Trey Ideker, University California San Diego, USA	Mapping pathways through integration of physical and genetic interactions
9:30-10:15	Peter Karp, AI.SRI, Menlo Park, USA	The MetaCyc and BioCyc database collection
10:15-10:45	**Coffee Break**	
10:45-11:30	Phillip Bourne, University California San Diego, USA	The role of biopathways in drug repositioning and determining side effects
11:30-12:00	Geoffrey Winsor, Simon Fraser University, CA	InnateDB - Facilitating Systems Level Analyses of the Mammalian Innate Immune Response
12:00-12:30	Jennifer Gardy, Centre for Microbial Diseases & Immunity Research, University of British Columbia, CA	Cerebral 2.0: A Cytoscape plugin for the network-based visualization of datasets from multiple experimental conditions
12:30-13:30	**Lunch**	
Session 2: Network Reconstruction & Analysis Chair: Eric Neumann, Teranode		
13:30-14:10	Rune Linding – Institute for Cancer Reseatrch, London, UK	Constructing in vivo phosphorylation networks
14:10-14:50	Terry Gasterland, University California at San Diego, USA	Examining Cell Cycle Control Networks at Single Cell Resolution
14:50-15:30	Kobi Benenson, Harvard University, Cambridge, USA	Molecular automata: from concepts to applications
15:30-16:00	**Coffee Break**	
16:00-16:35	Ran Kafri, Harvard Medical School, Boston, USA	Functional redundancies - an evolutionarily conserved control element in signal transduction and metabolism
16:35-17:05	Tijana Milenković, Nataša Pržulj, University California Irvine, USA	From network structure to biological function in protein-protein interaction networks
17:05-17:35	Jean Krivine, Harvard Medical School, Boston, USA	Rule-based modeling of large protein networks
17:35-18:15	Peer Bork, EMBL, Heidleberg, DE	Get the most out of your metagenome: computational analysis of environmental sequence data
General Discussion		
18:15-18:30	**Network analysis, Databases & Tools**	

Session 3 : Computational Methods and Infrastructure for Synthetic Biology Chair: Kobi Benenson, Bauer Centre		
8:30-9:00	Vitor Martins dos Santos, Helmholtz Center for Infection Research, Braunschweig, DE	EMERGENCE: a Foundation for Synthetic Biology in Europe
9:00-9:40	Randy Rettberg, MIT, Cambridge, USA	Synthetic Biology Based on Standard Parts: Design Competitions and Catalogs
9:40-10:15	Ildefonso Cases, CNIO, Madrid, ES	Bioinformatics tools to help in the design of biological systems
10:15-10:45	**Coffee Break**	
10:45-11:25	Shoshana Wodak, Hospital Sick Children, Toronto, CA	Identifying meaningful pathways in metabolic networks without the help of chemistry
11:25-12:00	David Gilbert, University of Glasgow, UK	A behaviour driven approach to design and implementation in Synthetic Biology
12:00-12:30	Martijn van Iersel, University of Maastricht, NL	WikiPathways, pathway creation and online collaboration
12:30-13:30	**Lunch**	
Session 4: Evolution of pathways and networks Chair: Joanne Luciano, MITRE		
13:30-14:15	Chris Sander, Sloan-Kettering, New York, USA	Systems biology modeling
14:15-14:50	Edwin Wang, National Research Council, McGill University, Montreal, CA	Principles of microRNA regulation of cellular networks
14:50-15:30	Chris Myers, Cornell University, USA	Sloppiness in cellular networks
15:30-16:00	**Coffee Break**	
15:30-16:05	Matthew de Jongh, Hope College, Holland (MI), USA	Generation and Refinement of Metabolic Reaction Networks in the SEED
16:05-16:35	Andrey Ptitsyn, Colorado State University, Fort Collins, USA	The Structure of Biological Pathways in Time
16:35-17:10	Zhenjun Hu, Boston University, USA	Metagraph: a new graph structure for multiple-scale visualization and modeling of biological networks/pathways
17:10-17:45	Pedro Beltrao, University California San Francisco	Evolution of Cellular Networks
Round Table Discussion		
17:45	**Network Reconstruction, Pathways and Evolution**	

D1.3 - Report on workshop for design tools for synthetic biology (CNB)

Satellite meeting to the ESF – EMBO on SynBio

November 2007

(Alfonso, Jörg, Randy, etc)

Report finished (CNIO)

D1.4 - **Report on recommendations of the intra-consortium expert group on suitable promoter standardization formats** (CNB)

VDL – Done

Plus: Silva-Rocha R, de Lorenzo V.
Mining logic gates in prokaryotic transcriptional regulation networks.
FEBS Lett. 2008 Apr 9;582(8):1237-44.

Up-coming meeting on Promoter standards (October 2009, VDL)

D1.4 -Updated material for the appropriate section in the quarterly Synthetic Biology Newsletter regarding tasks 2, 3, and 4

Frauke Greve / Sven Panke

Newsletters Dec 2006, June 2007, Dec 2008, June 2009

Includes list of conferences, research highlights, press releases, funding activities

Activities towards Task 4 (European Networking)

EUROPEAN SCIENCE FOUNDATION
SETTING SCIENCE AGENDAS FOR EUROPE

UNIVERSITAT DE BARCELONA

RESEARCH CONFERENCES

ESF-UB Conference in Biomedicine

European Conference on Synthetic Biology (ECSB): Design, Programming and Optimisation of Biological Systems

Hotel Eden Roc, Sant Feliu de Guixols • Spain
24-29 November 2007

Chair: **Alfonso Valencia**, CNIO Madrid, ES
Co-Chairs: **Natalio Krasnogor**, University of Nottingham, UK
- **Sven Panke**, ETH, Zürich Institute of Process Engineering, CH
- **Victor de Lorenzo**, Centro Nacional de Biotecnologia, Madrid, ES

www.esf.org/conferences/07241

Activities towards Task 4 (European Networking)

Series of Workshops (co-)sponsored or attended on different aspects of SynBio:

-ESF European Conf. SynBio, S. Feliu, Nov 2007, Co-sponsored

-Biofine (Tessy), Freiburg April 10, 2008 and 16/17 April 2009

-Genopole (Jaramillo), 26-27 June, 2008

-IRGC Workshop Session on the Risk Governance of Synthetic Biology (26 & 27 June - Geneva, Switzerland)

-Stakeholder meeting Roadmap SynBio (Tessy), 10 June 2008

- Microfluidics Workshop, May 28/29 UCL, London, (co-sponsored)

-ESF workshop on Minimal Systems (with A. Moya), Sept 2009, Co-organised/ co-sponsored

Activities towards Task 4 (Global Networking)

Series of Workshops (co-)sponsored or attended on different aspects of SynBio:

-Computational design tools in SynBIO: Sattellite to ISMB 2007, 2008, 2009) - Organisation/Sponsoring
- Synthetic Aproaches to Cellular Functions, Tokyo, 13 October 2006,

Organised jointly by D. Kige (JP), H. Ueda (JP), D. Endy (US), Martins dos Santos („EU“)

-Session on Computational design principles in SynBio at SB4.0, Hong Kong, Nov 2008

- New Directions on SynBio: participation on the NSF/EPSRC Sandpit

Further networking activities Asia (broadly)

Sino-German Exploratory Workshop on Synthetic Biology, Hangzhou, China, 2009/2010. Couple to Probactys (EU) and perhaps other projects

To be organised jointly with Huanming Yang (Beijing Genome Institute, CN)

Exchange of students/ scientists:

China (2 students 7 month each plus 2 scientists 1 week in 2007)

India (2 Students 4 month each, plus scientist 1 week 2008)

Joint HGF-Russia exploratory wokshop Feb 2008

Explorative project in Israel on digital evolving microbial communities

Indian - EU workshop on Synthetic Biology (Early 20102). Meeting brokered at CRG with Minister of Health and Sci Advisore SynBio in July 2008

ESF-JSPS Frontier Science Conference Series for Young Researchers (Synbio tentative for 2010)

Status Deliverables

D1.1: Material and rules for standardized meeting structure in place for the first time (month 3) done

D1.2: Report on the first workshop on development of the European IT infrastructure for synthetic biology (month 9)

D1.3: Report on the first workshop for design tools for synthetic biology (month 12)

D1.4. Report on recommendations of the intra-consortium expert group on suitable promoter standardization formats (month 15)

D1.5: Updated material for the appropriate section in the quarterly Synthetic Biology Newsletter regarding tasks 2, 3, and 4 (months 3, 6, 9, 12, etc)

D1.6. Report on workshop on foundations of measurement statistics in synthetic biology (month 24) D1.7. Document identifying “common European-Asian interests and ways to develop them” or similar document in place and signin synthetic biology (month 32) To be done (VDL)

D 1.7 Document identifying “common European-Asian interest and ways to develop them” or similar document in place and signed by extra-European and European groups/organizations involved in synthetic biology. To be done. Pending on Asia Workshops

Status Finances at HZI

			planned	spent/blocked
Workshop org / Networking			105,000	82,139
Personnel			76,000	53,519
Auditing			4000	2000
Overheads			36000	xxx

How shall we proceed?

Report on the identification of scientific & infrastructure bottlenecks in SB (jointly WP4 & WP3)

Study groups: bottom-up, priorital themes?

Possible themes:

- **context-independent biological systems/modules**
- **microfluidics technologies / single cell measurents**
- **minimal genomes / minimal systems**
- **what to measure / how to measure?**
- **design concepts**
- **how can we handle “systems“ (made of parts)?**
- **.....**

Thematic Workshops: IT and Standardization. Time plan?

Exchange visits?

WP3: IT Infrastructure for Synthetic Biology

WP leader: Alfonso Valencia

Jörg Stelling

joerg.stelling@bsse.ethz.ch

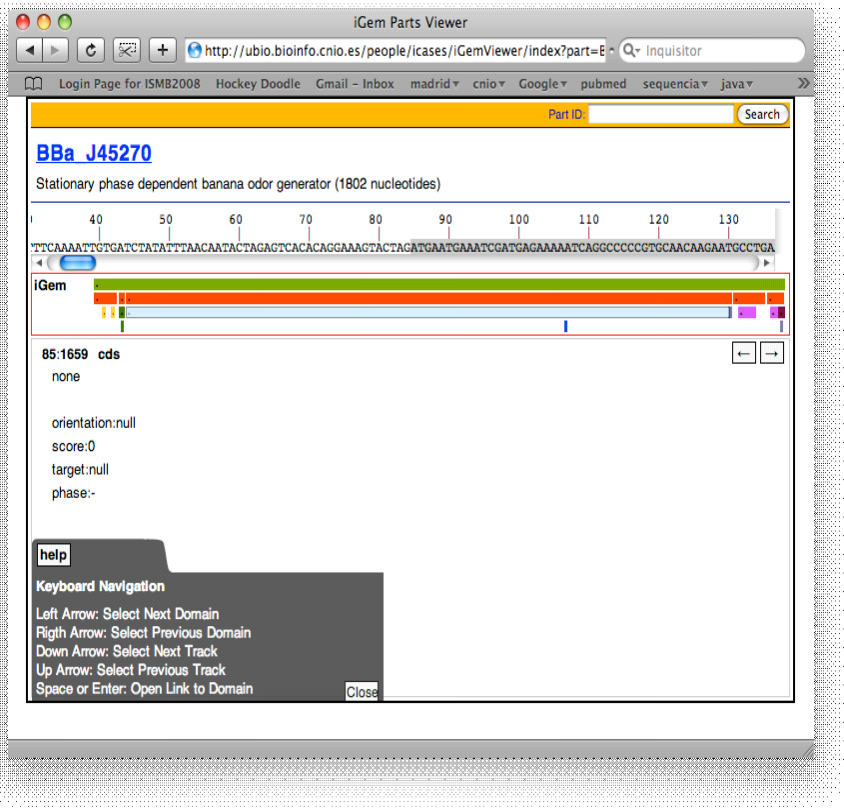
EMERGENCE Meeting

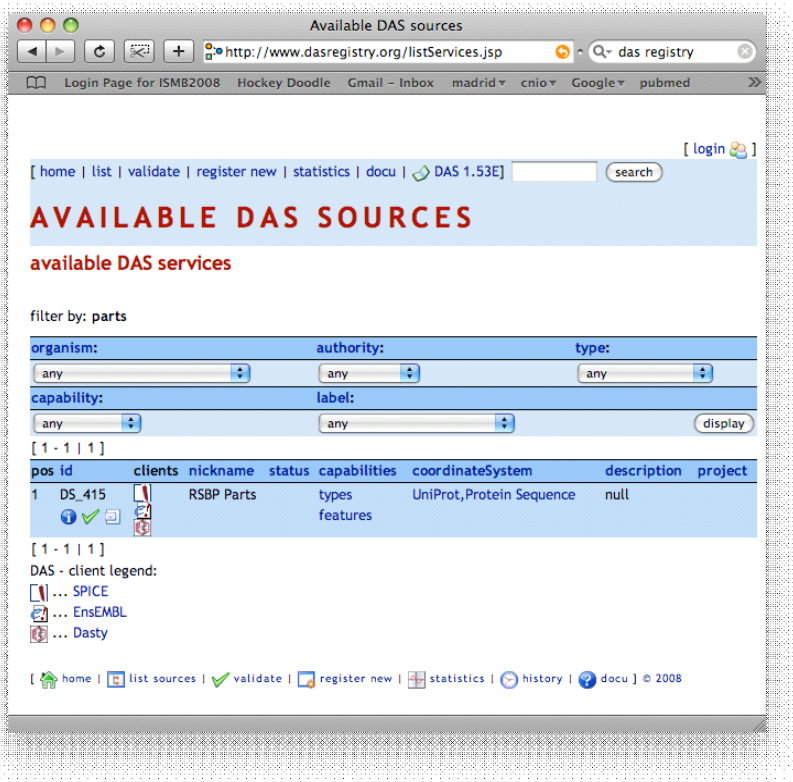
Zurich, April 2009

WP3: Aims and Tasks

- **Specific aims and responsibilities:**
  - Information integration via (an instance of) the MIT Registry of Standardized Biological Parts (**CNIO, CGR, GBF**).
  - Methods and tools for model-based parts and systems design (**CGR, ETHZ**).
  - Tools for gene synthesis and assembly (**Geneart**).
- **IT infrastructure: Integrated work-flow for the design of synthetic genetic circuits similar to 'traditional' engineering disciplines.**

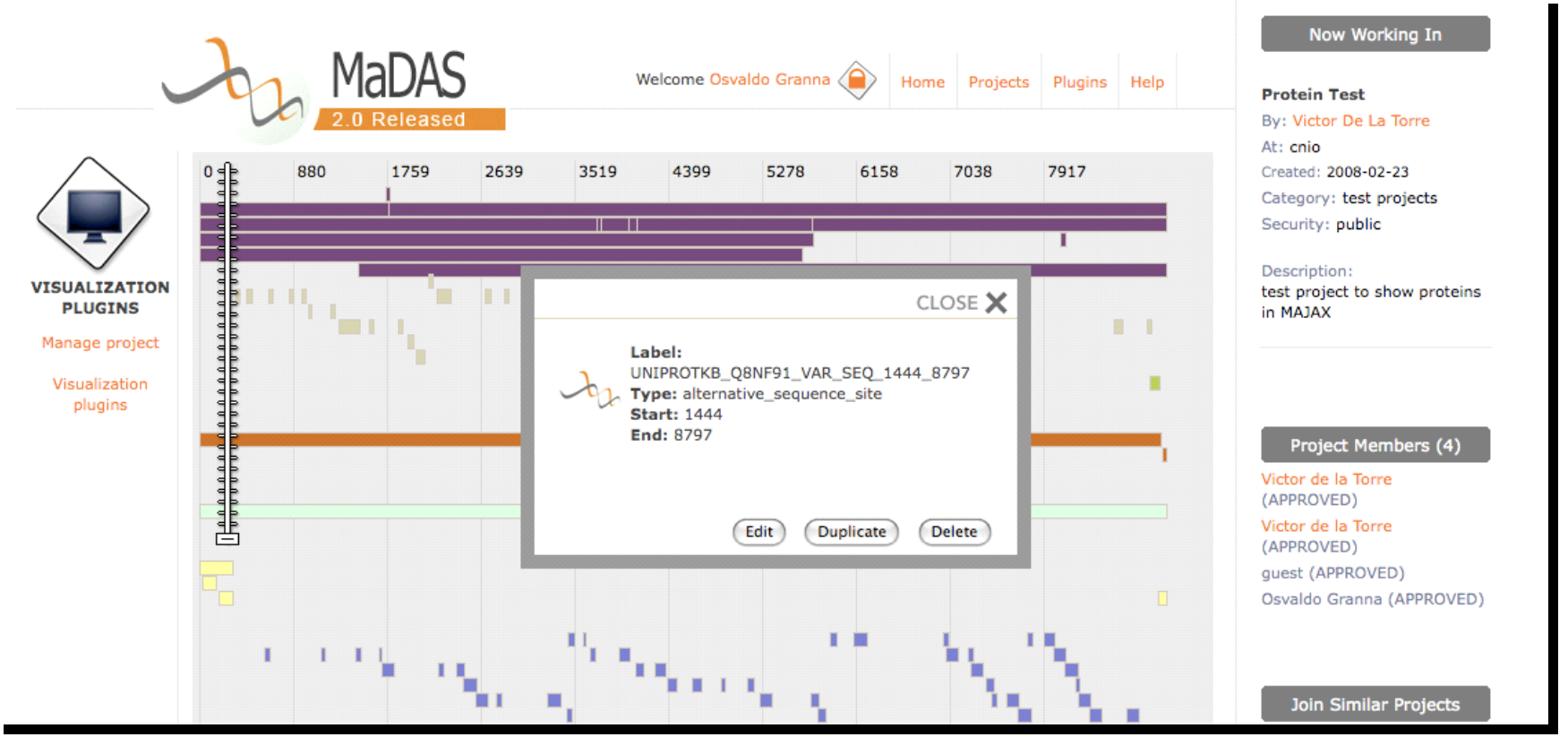
Status: Information Integration (1)





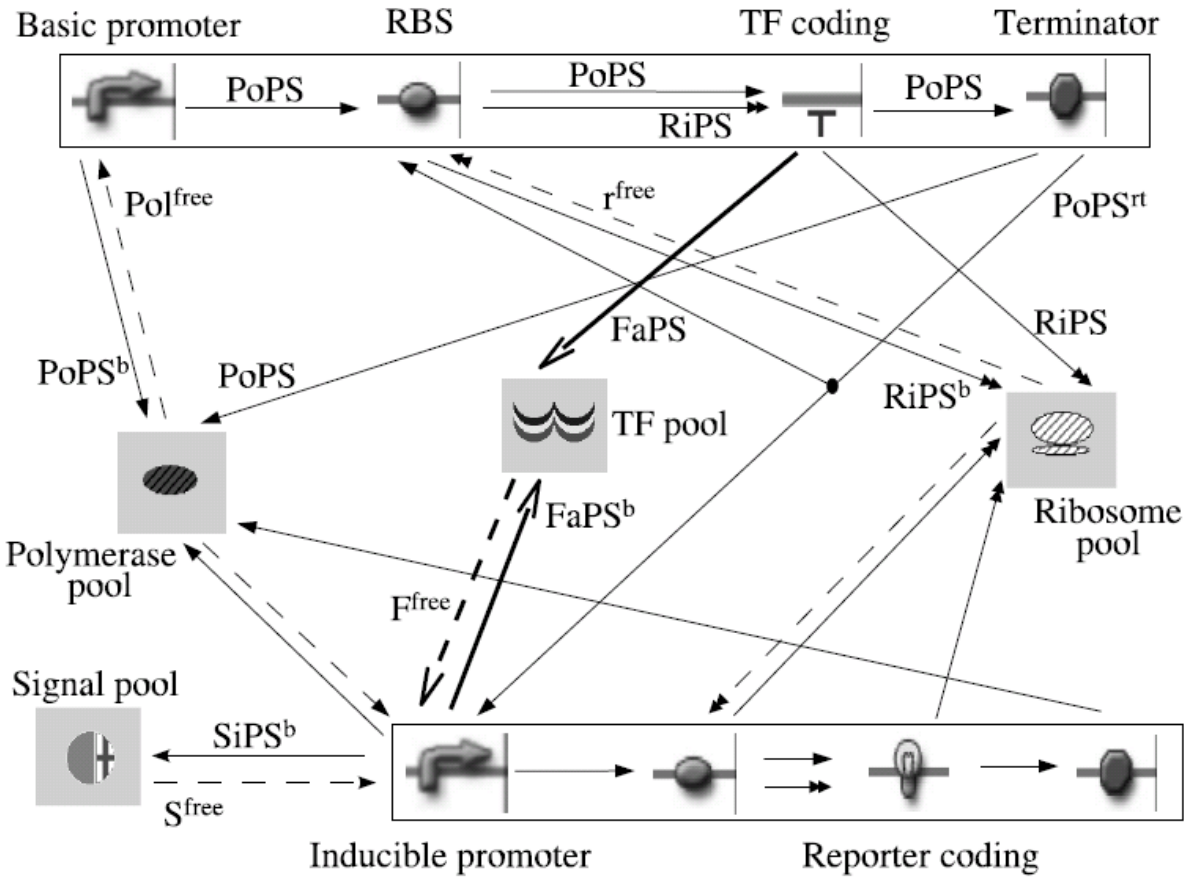
- Information distribution tools and methods are needed for integration, visualization and processing.
- Approach: Infrastructure based on DAS protocol (prototypes for Parts reference server, annotation server based on Uniprot).

Status: Information Integration (2)



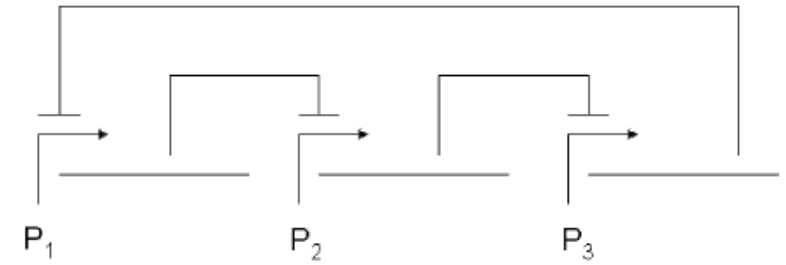
- Multi-user annotation system MaDAS 2.0 for collaboration.
- Limitation: Standard vocabularies and formats lacking.
- Limitation: Low-level distribution method needed (e.g. SQL).

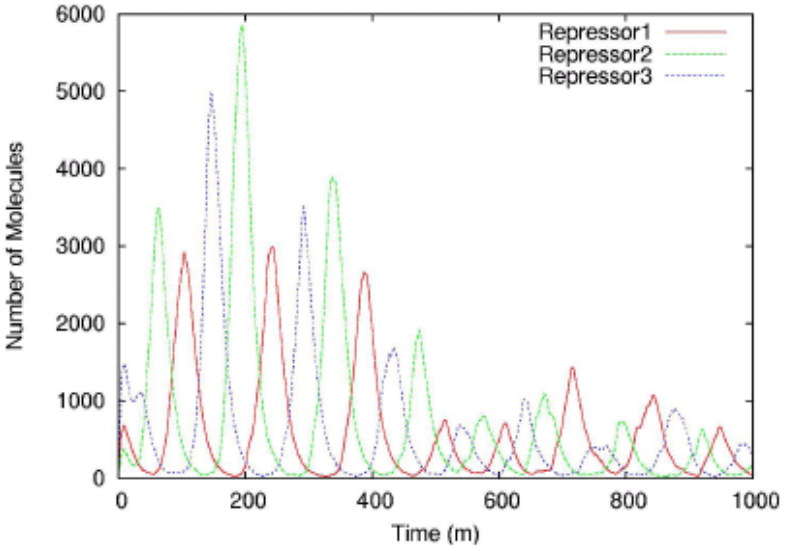
Status: Model-based Design (1)

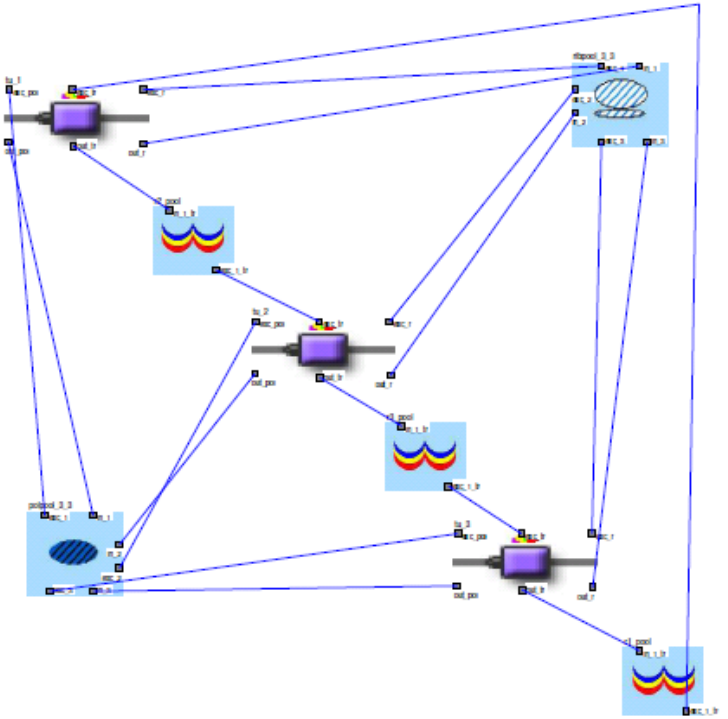


- Key challenges: Composability and functional composition.
- Composability: Standardized methods for modular and hierarchical aggregation of parts (and models thereof).

Status: Model-based Design (2)







- Model library for standard biological parts incorporated into 'drag&drop' modeling software (ProMoT, MPI Magdeburg).
- Current work: Automatic design (logical gates & circuits).

WP3: Deliverables

Deliverable No[1]	Deliverable name	Lead participant	Est. person months	Delivery date [2] (months)	Nature [3]	Dissemination level [4]
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

- Deliverable 3.3: Material available (ETHZ: 2 papers published or accepted, 1 paper in preparation)
- **Deliverable 3.4: Needs coordination / integration!**

WP3: Milestones

Milestones[7] and expected result
M3.1. Decision on concept and implementation issues for integrated workflow (month 6).
M3.2. Decision on and prototypes for integration of existing software in the domains of component and systems analysis (month 12).
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).

- Alignment with the deliverables – same situation.
- Needs integration with WP4 (consensus language).

WP3: Finances

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	40	1	0	3	0	0
EU-funded	25		21	21	14					

- ETHZ (1): 132 kEUR -> 124 kEUR spent (24 MM)
- CNIO (3): ??
- CGR (4): ??
- Helmholtz (5): ??

WP3: Perspectives

- **Forward integration into tool chain:**
  - Links between registry, annotation / database system, parts and systems modeling & simulation; expansions of all of the above technical capabilities.
  - Standardized interfaces and parts characterizations.
- **Current bottlenecks for proof-of-principle:**
  - Unclear relationships with MIT Registry: To be solved.
  - Insufficient information on parts and systems: WP4 and integration of *in silico* predictions / literature mining.

CENTRO NACIONAL DE BIOTECNOLOGÍA

EMERGENCE WP4

Towards a consensus language for SB:

Conceptual and hermeneutical tools for post-genomic analysis & engineering

Esteban Martínez (CSIC)

EMERGENCE WP4

1- Re-design of biological functions

2- Planned activities (Meetings)

3- Deliverables & Financial status

Re-design of biological functions

1. Engineer artificial communities

2. Produce a laboratory friendly strain & tools

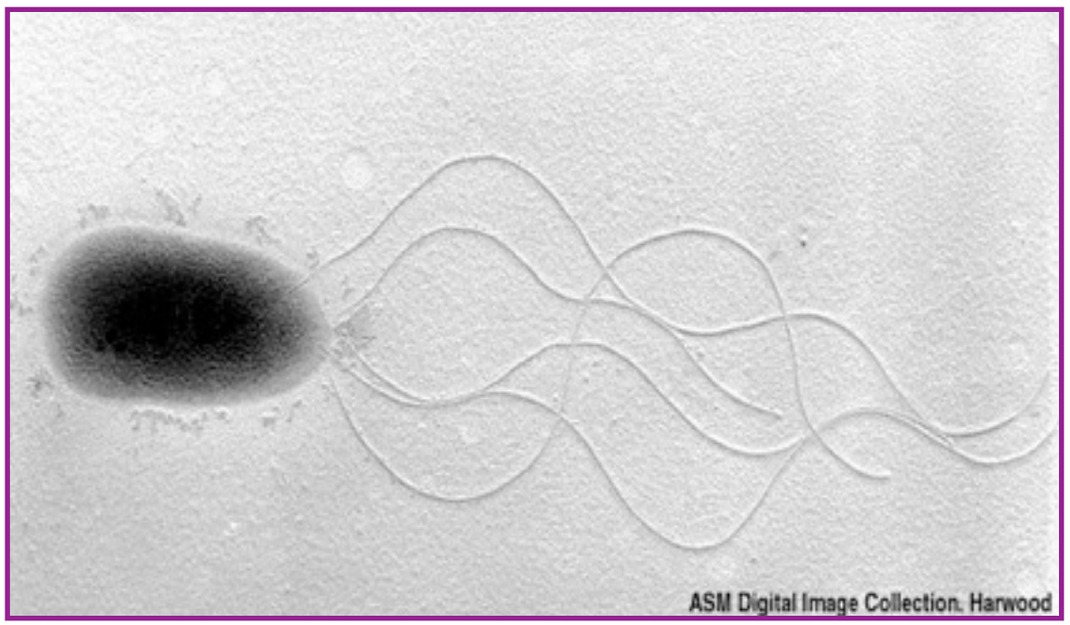
Final goal: Designing microorganisms á la carte

(for environmental release)

Pseudomonas putida

Pseudomonas putida

- Gram-negative rod-shaped
- Aerobic
- Ubiquitous
- Non-pathogenic

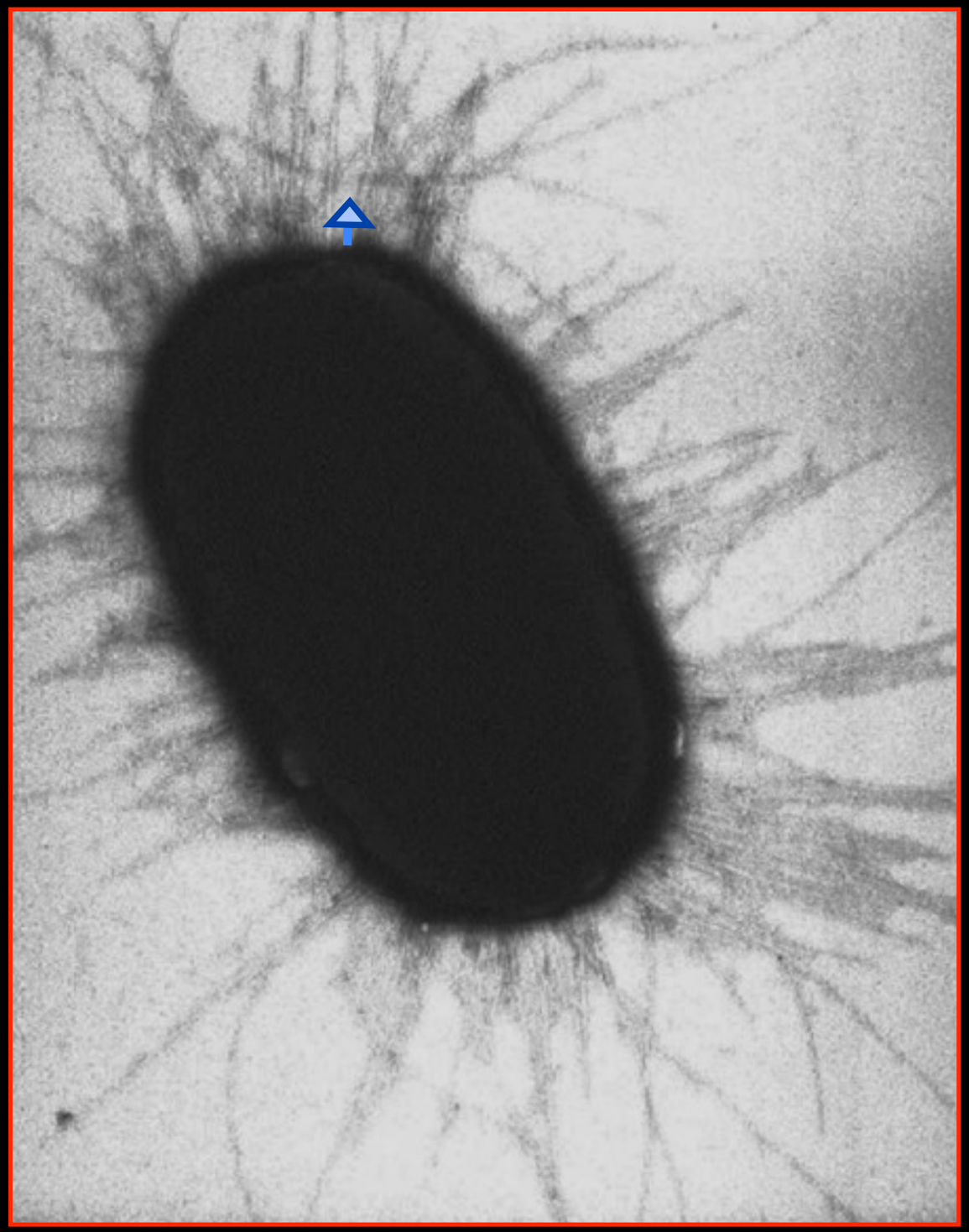


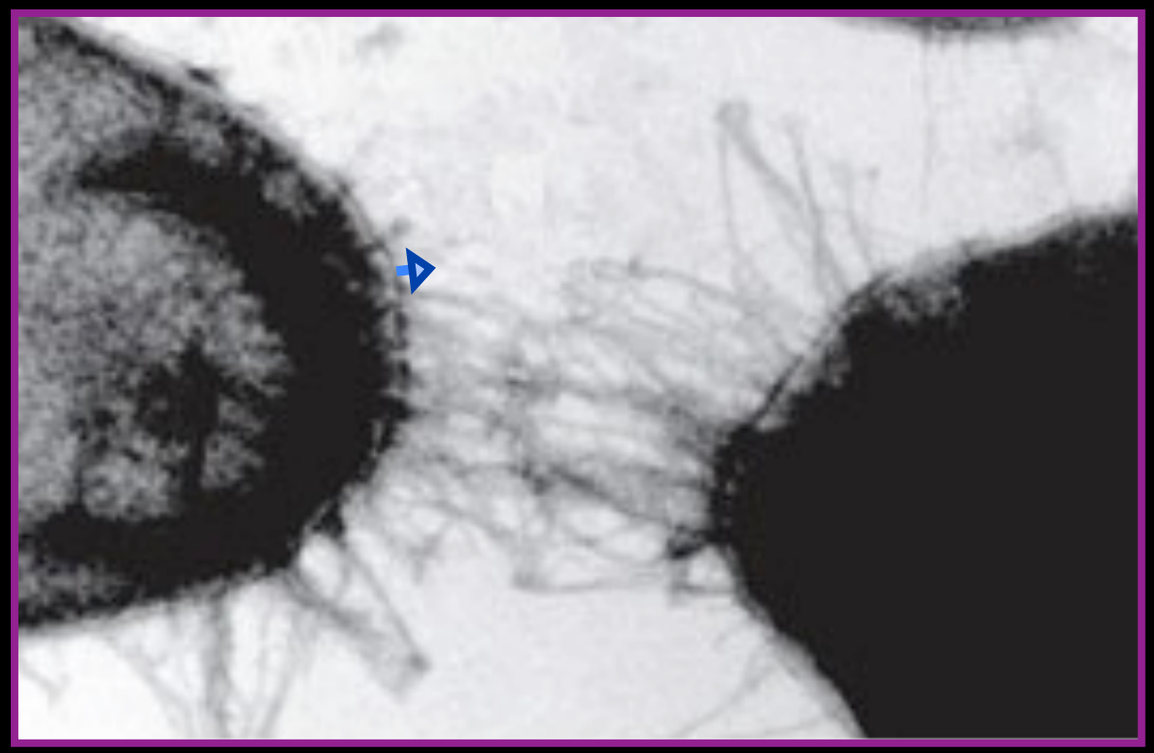
- Simple nutritional requirements
- Multiple biotechnological uses
  (bioremediation, biocontrol & organic synthesis)
- First patented organism in the world

Engineer artificial communities

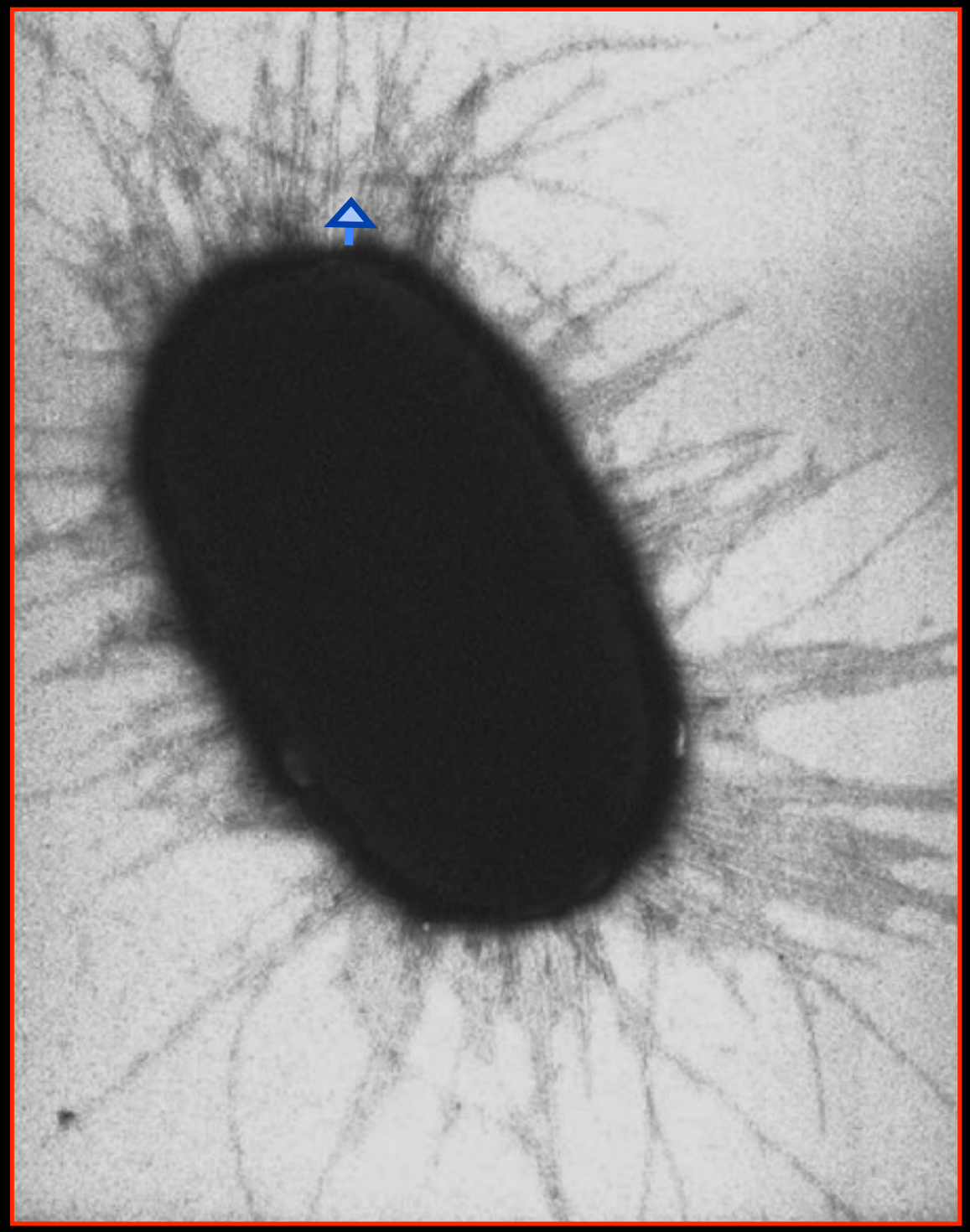
Modified adhesin

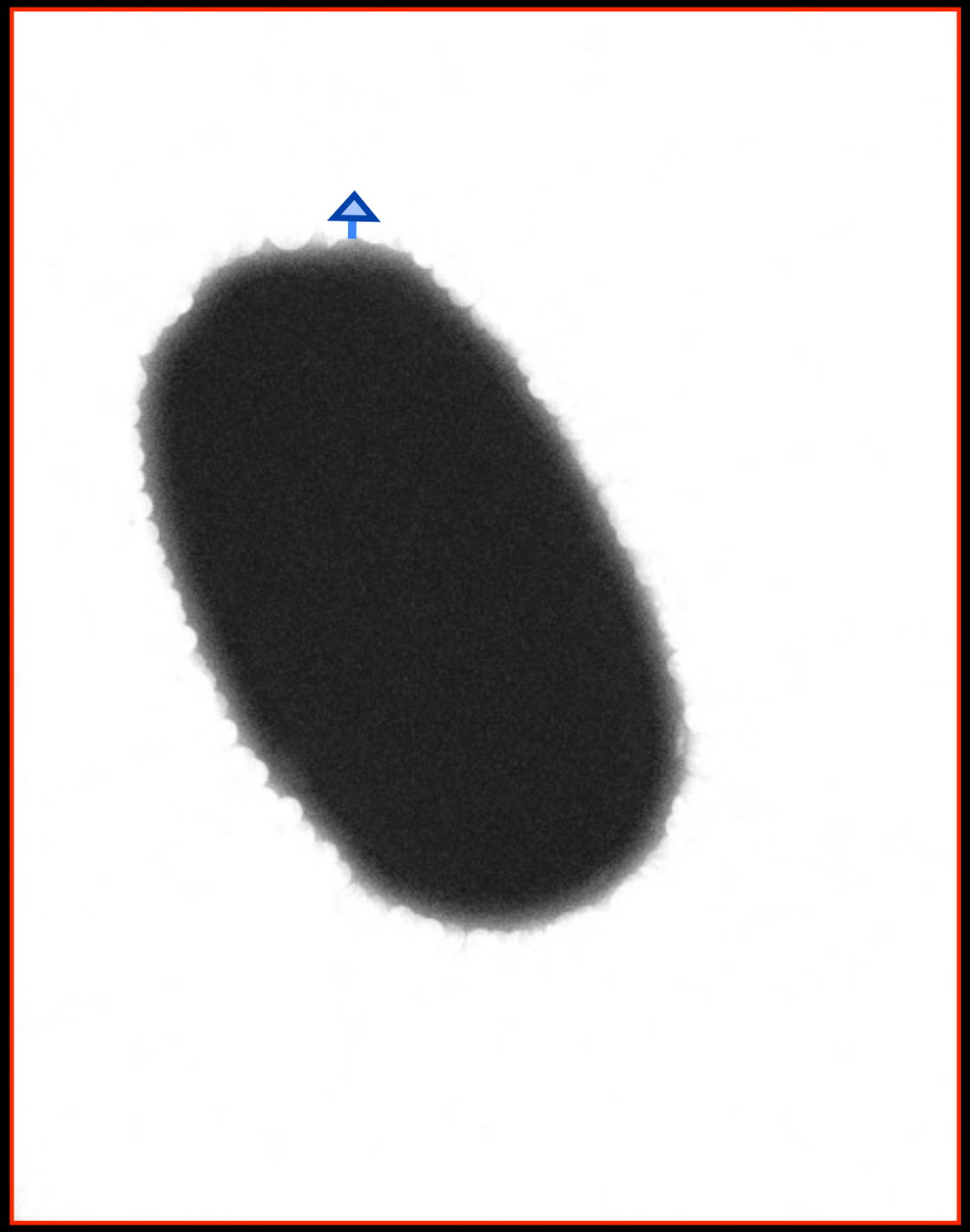
Own adhesins interferences





Own adhesins interferences





Outer membrane structures

- Fimbriae — 6 operons
  - Type I fimbriae — 2 operons
  - Type IV pili — 4 operons
- Curli fiber — 1 operon
- Alginate — 1 operon
- Surface proteins — 3 genes
- Rhs elements — 3 genes
- Autotransporters — 4 genes
- Lipopolysaccharide (LPS) — 1 cluster (multiple operons)
- Flagella — 1 cluster (multiple operons)

Problems of working with *P. putida*

- Naturally resistant to many antibiotics

- Low transformation efficiency

- Difficult to maintain plasmids

- Time-consuming to generate mutants

- Limited amount of genetic tools

We need to develop a standard laboratory strain!!

How??

Engineering *P. putida* into a standard laboratory workhorse

- Prophages, transposases & transposons
  - 4 Prophages within KT2440 genome (2.8%)
  - 1 tn7 transposase operon
  - 1 Tn4652 transposon
- Endonucleases & restriction/modification systems
  - *endA-1*
  - *endA-2*
  - *hsdRMS*
- Antibiotic resistance genes
  - *ampC*
  - *mexE*
  - *ttgA*
- Toxin-antitoxin genes

How to manipulate the existing systems?

Importance of having the appropriate tools

Many genetic systems & tools developed for *E. coli*

But not that many for other gram-negative bacteria

Develop of appropriate tools to tackle these problems

Standard Genetic tools for engineering

- Modular design (allowing module interchange)

- Free of the most common restriction sites in its sequence

- Bordering features with rare restriction sites

- Improve features expression

- Removing non-functional DNA sequences

Standard Genetic tools for engineering

- Plasmid deletion system

  pJP5603-ISceIv$_2$

- Transposon plasmid system (pBAM1)

  pBornAgainstMinitranspon1

- pSEVA vectors

  pStandardEuropeanVectorArchitecture

Standard Genetic tools for engineering

- **Plasmid deletion system**

  pJP5603-ISceIv$_2$

- Transposon plasmid system (pBAM1)

  pBornAgainstMinitranspon1

- pSEVA vectors

  pStandardEuropeanVectorArchitecture

Common gene deletion procedures:

- Antibiotic insertions (limited amount of antibiotics)
- Counter-selectable markers (*sacB*, *pyrF*)
- FLP-*FRT* / res-ParA recombination system

Develop of a system to produce multiple clean deletions

I-SceI deletion strategy

(based on Posfai method for *E. coli*)

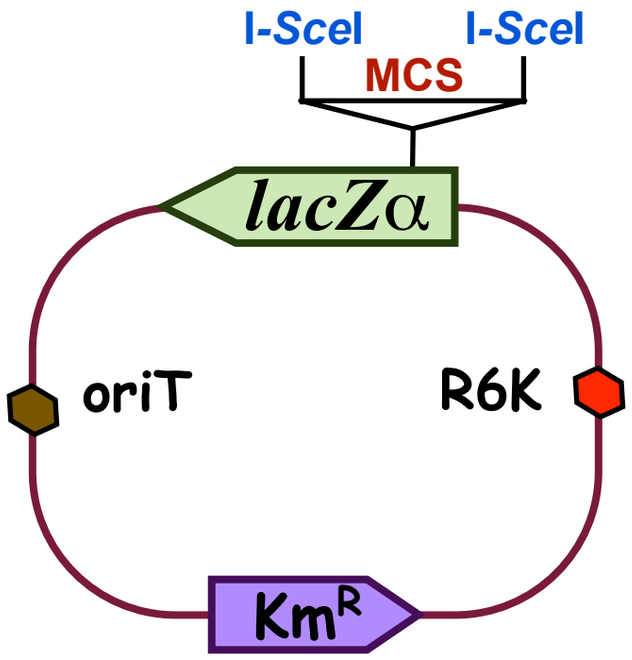
I-SceI: Endonuclease responsible for intron homing in yeast

Recognizes an 18 bp sequence

(sequence not present in the bacterial genomes sequenced)

I-SceI plasmid deletion system

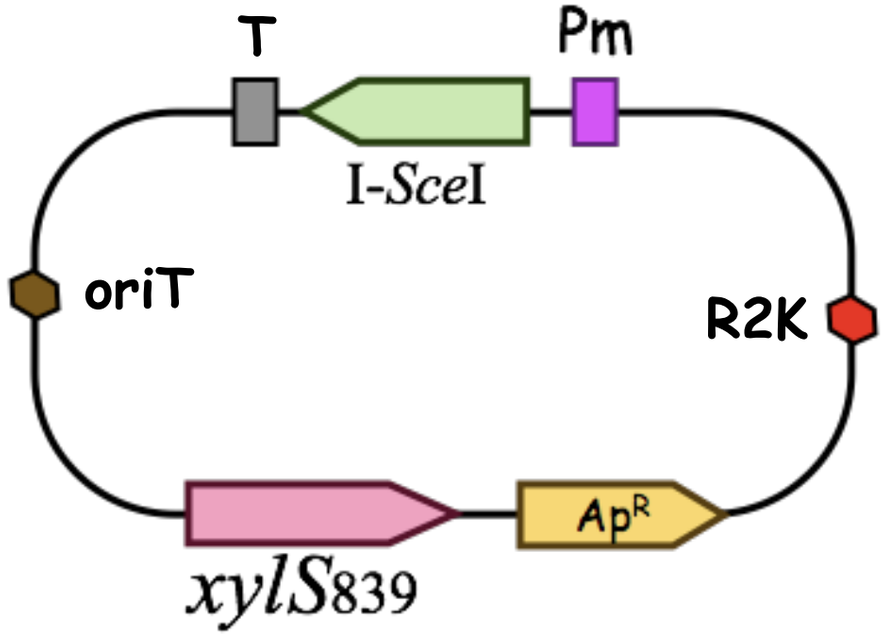
Suicide plasmid with I-SceI sites



pJP5603-ISceIv2

- LacZ alpha complementation
- Suicide vector (pJP5603)
- Introduce two I-SceI restriction sites

I-SceI expressing plasmid

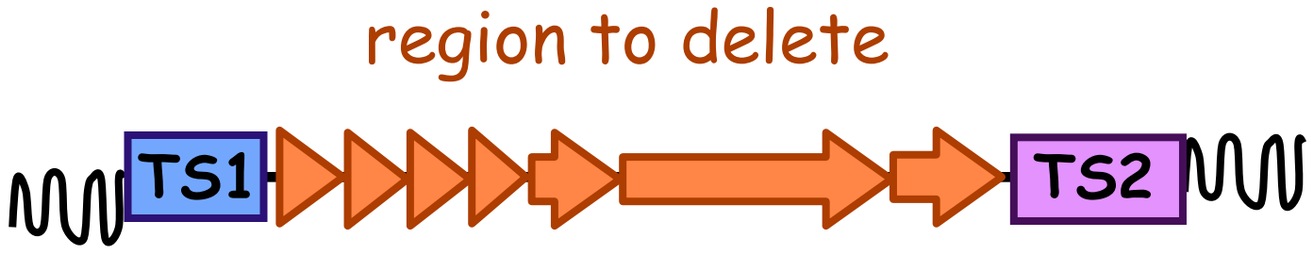


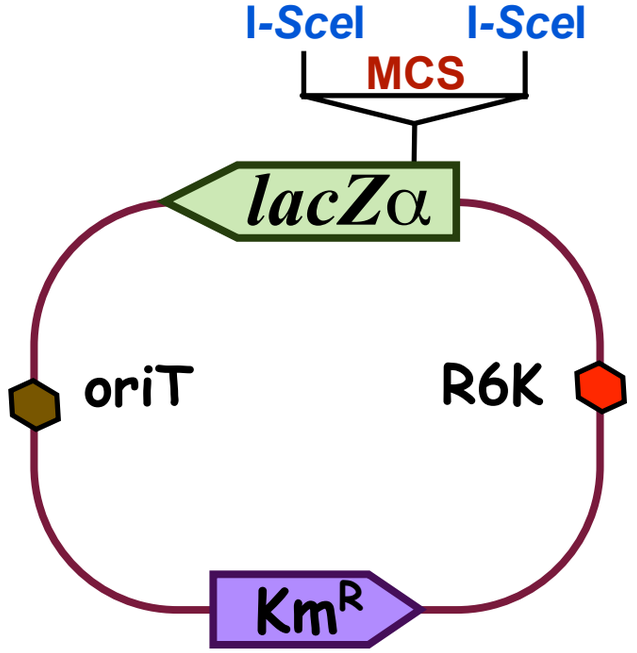
pSW (I-SceI)*

- Broad host range plasmid
- I-SceI induced by 3 MB
- Easily cured

*: Provided by Sandy Wong

I-SceI plasmid deletion system

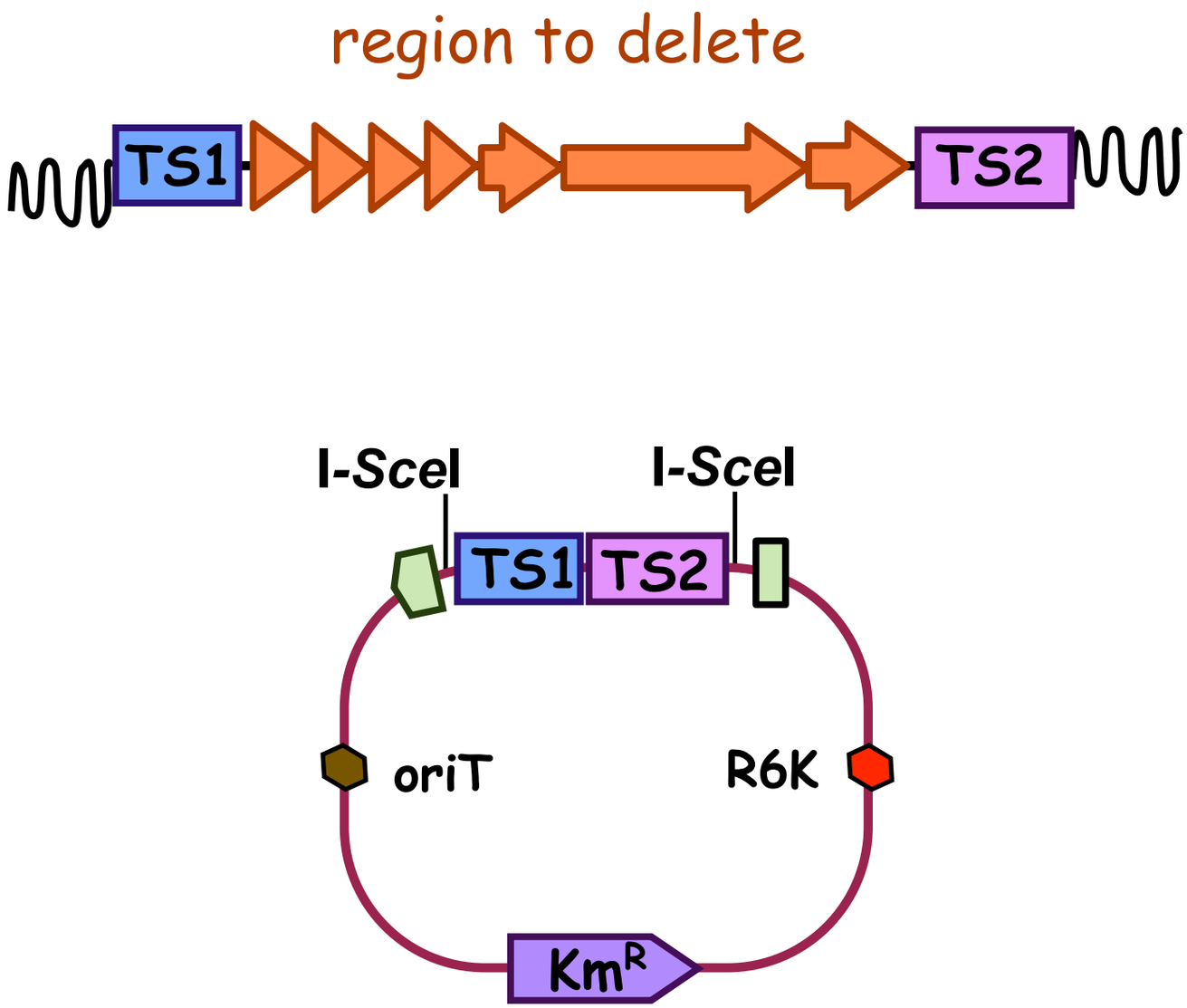




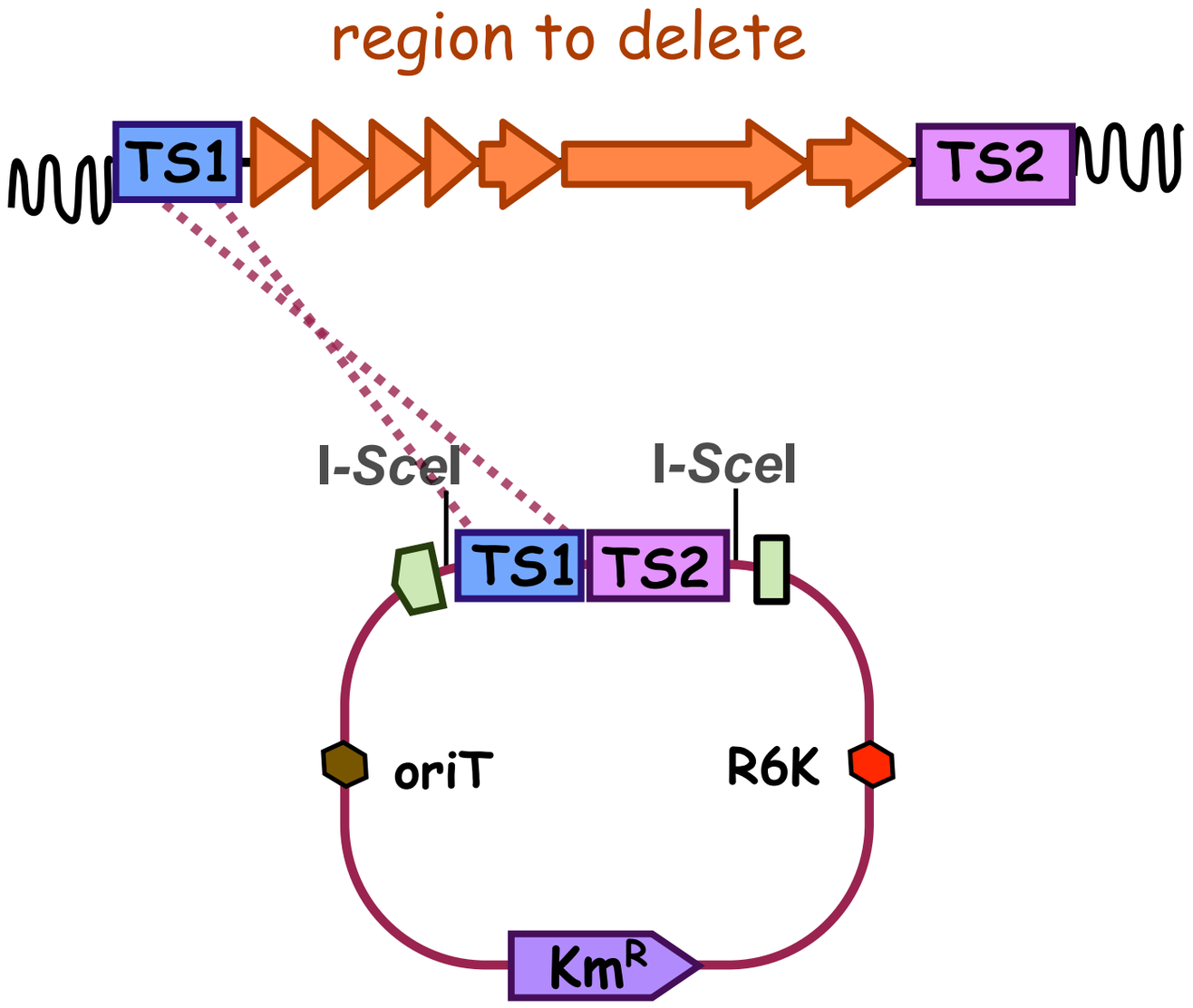
pJP5603-ISceIv2

+

I-SceI plasmid deletion system



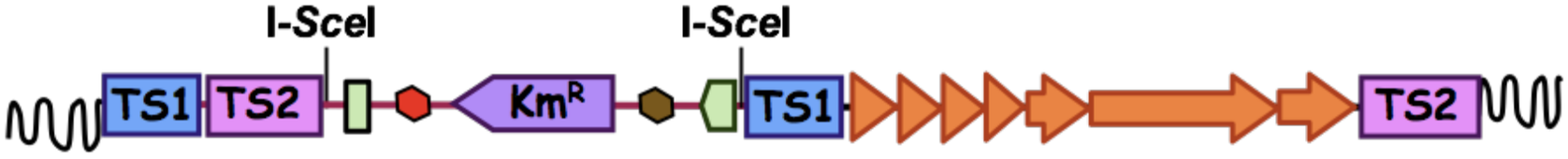
I-SceI plasmid deletion system



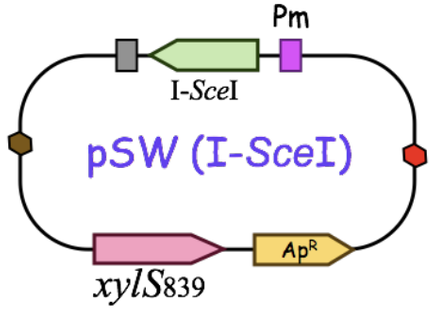
Cointegration

I-SceI plasmid deletion system

Cointegrate

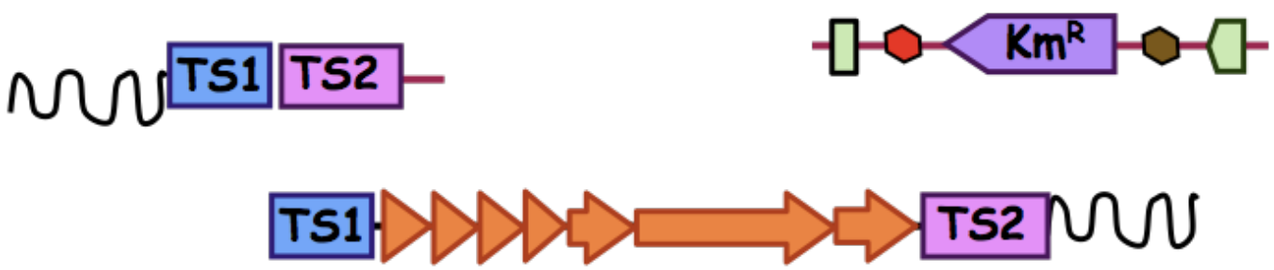


Transform

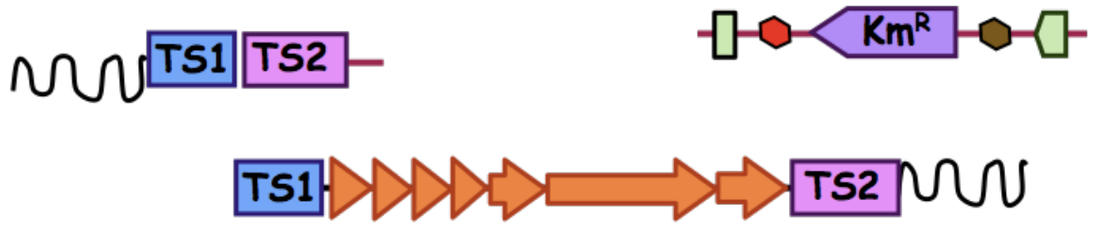


I-SceI induction

Double strand breaks (DSB)

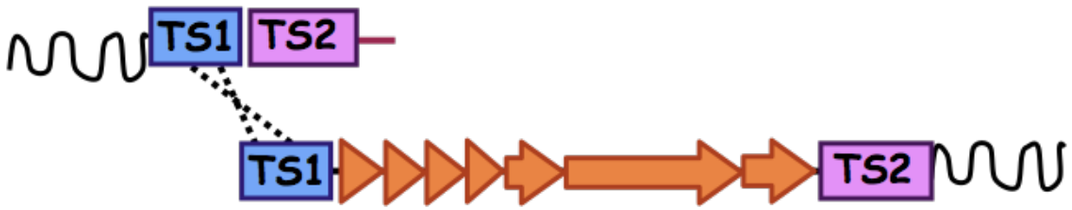


I-SceI plasmid deletion system



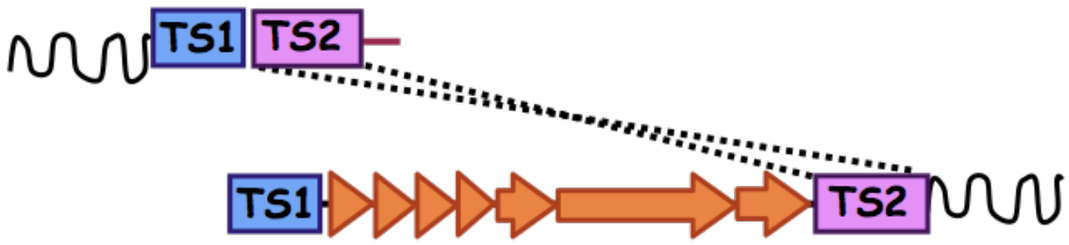
DSB must be repair!!

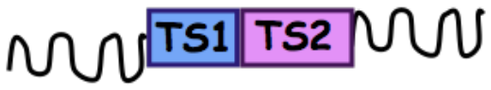
1)



WT 50 %

2)





Deleted 50 %

I-SceI plasmid deletion system

1- Cloning targeting sequences in a suicide vector

2- Check for cointegration events

3- Transformation with the plasmid that express I-SceI

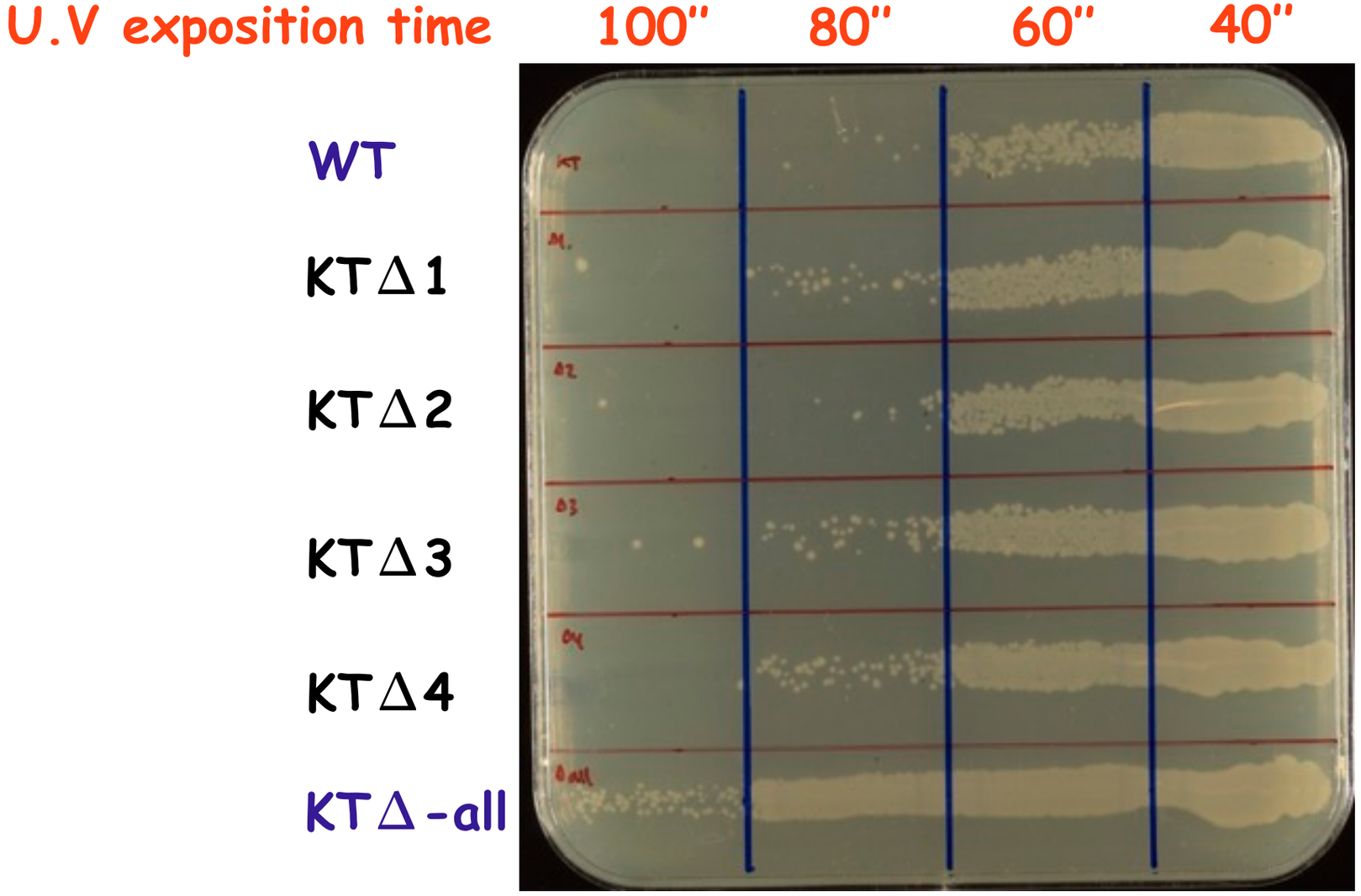
4- Induction of the I-SceI enzyme

5- Deletion confirmation

6- pSW (I-SceI) curation

KT2440 standardization report

- KTΔ(4 prophages-Tn7 transposase-*endA-1-endA-2*)



- KTΔ*mexE*
- KTΔ*ttgA*

More susceptible to chloramphenicol and ampicillin!!

KT2440 trimming report

- Fimbriae	6 operons
Type I fimbriae	2 operons
Type IV pili	4 operons
- Curli fiber	1 operon
- Alginate	1 operon
- Surface proteins	3 genes
- Rhs elements	3 genes
- Autotransporters	4 genes
- Lipopolysaccharide (LPS)	1 cluster (multiple operons)
- Flagella	1 cluster (multiple operons)

Standard Genetic tools for engineering

- Plasmid deletion system

  pJP5603-ISceIv2

- **Transposon plasmid system (pBAM1)**

  pBornAgainstMinitranspon1

- pSEVA vectors

  pStandardEuropeanVectorArchitecture

Why we designed pBAM1?

JB Journal of Bacteriology

HOME HELP FEEDBACK SUBSCRIPTIONS ARCHIVE SEARCH

Institution: Centro Nacional de Biotecnología - Biblioteca Sign In as Member

The 20 Most-Frequently Cited Articles

in J. Bacteriol. as of January 1, 2009 -- updated monthly

Most-cited rankings are recalculated at the beginning of the month.
Rankings are based on citations to articles on this journal site from articles in HighWire-hosted journals.

7. V de Lorenzo, M Herrero, U Jakubzik, K N Timmis
Mini-Tn5 transposon derivatives for insertion mutagenesis, promoter probing, and chromosomal insertion of cloned DNA in gram-negative eubacteria.
J. Bacteriol. Nov 01, 1990; 172: 6568-6572.
(In "Research Article") [Abstract] [PDF]

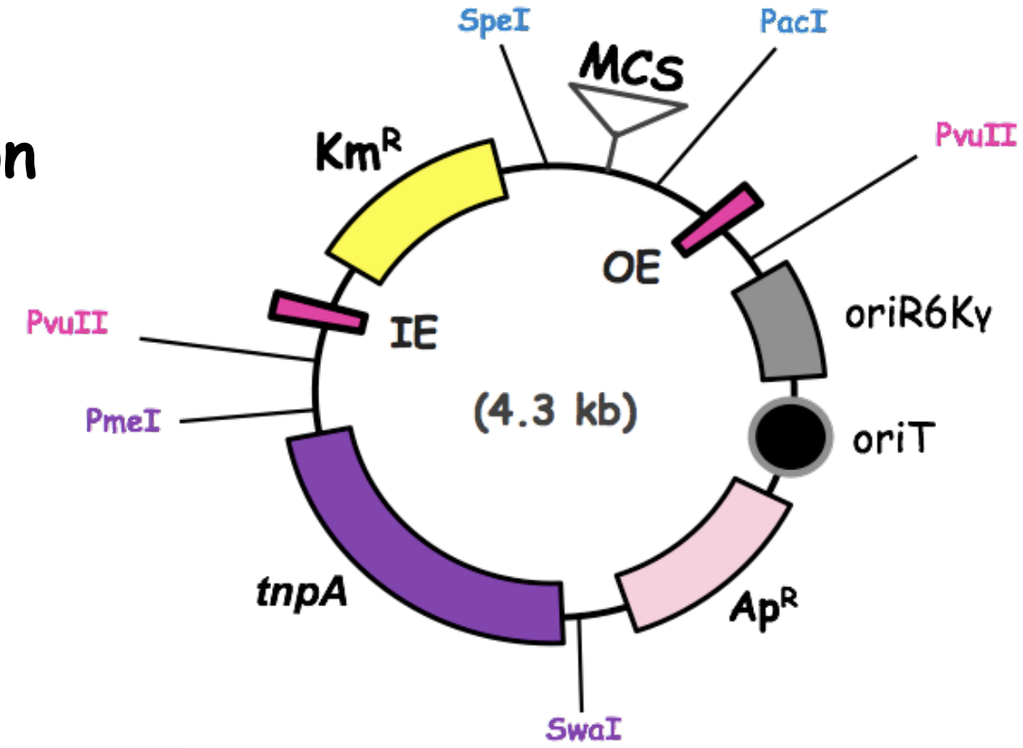
8. M Herrero, V de Lorenzo, K N Timmis
Transposon vectors containing non-antibiotic resistance selection markers for cloning and stable chromosomal insertion of foreign genes in gram-negative bacteria.
J. Bacteriol. Nov 01, 1990; 172: 6557-6567.
(In "Research Article") [Abstract] [PDF]

pUT plasmid series

pBAM1 is a standard version of the pUT plasmid

pBornAgainstMinitranspon1

- Modular design
- Delivered by mating or electroporation
- Random genome mutagenesis
- Integrate cargos in the genome



Plasmid validation

- Frequency of mutants per mating: $2*10^{-3}$
- Frequency of mutants per electroporation: $1*10^{-7}$
- 100 % of Transposon unique insertions
- Insertions points easily mapped by arbitrary PCR

Standard Genetic tools for engineering

- Plasmid deletion system

  pJP5603-ISceIv2

- Transposon plasmid system (pBAM1)

  pBornAgainstMinitranspon1

- pSEVA vectors

  pStandardEuropeanVectorArchitecture

pStandardEuropeanVectorArchitecture

Minimal plasmid backbone

- Origin of transference: **oriT** minimum sequence needed (254 bp)

- Terminators: T_0 forward terminator from lambda phage

  T_1 forward terminator of *rrnB* from *E. coli*

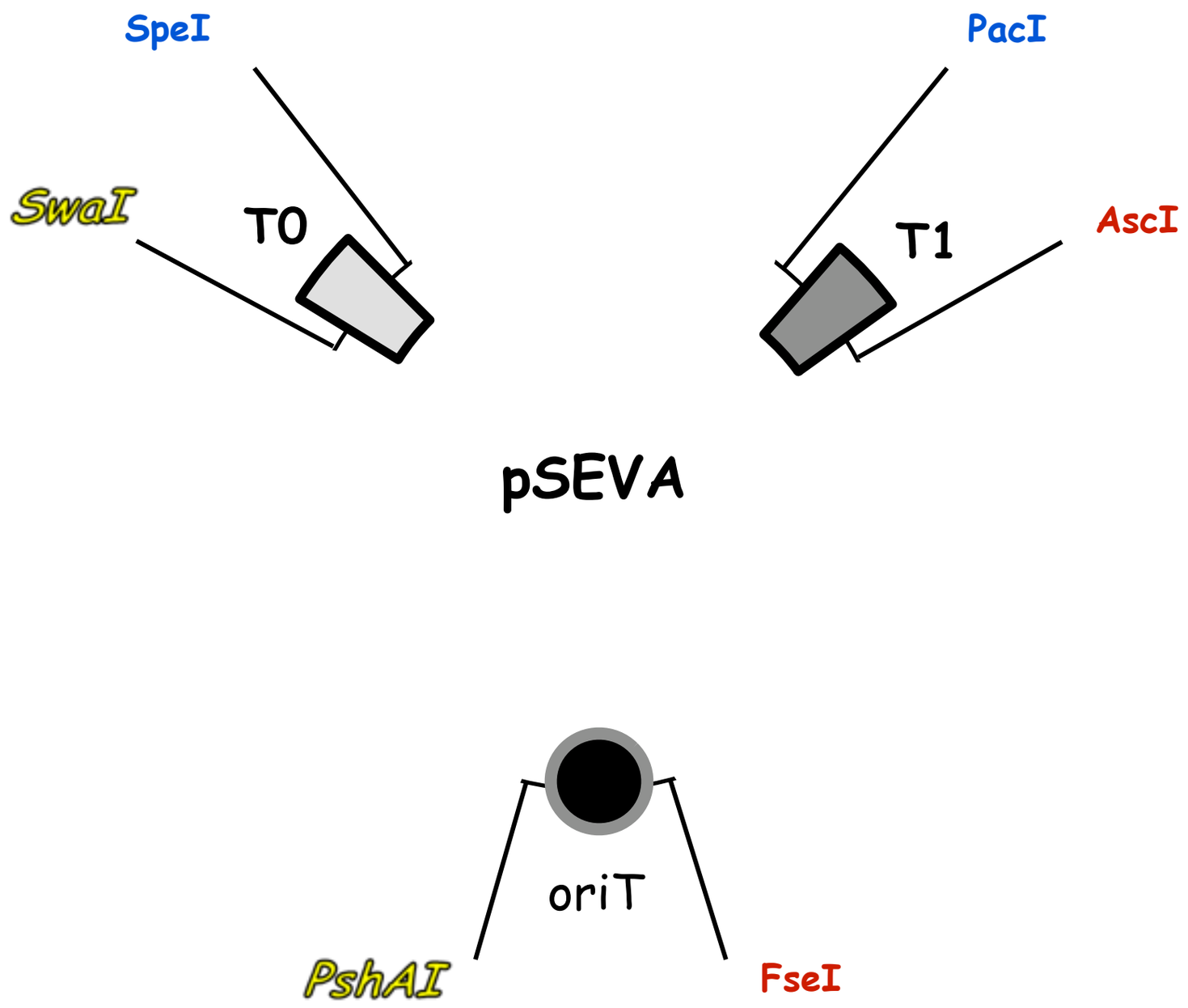
- Flanked by **rare** cutting restriction enzymes

*Spe*I	*Swa*I
*Pac*I	*Fse*I
*Asc*I	*PshA*I

GENEART

pStandardEuropeanVectorArchitecture

Backbone



pStandardEuropeanVectorArchitecture

Minimal plasmid backbone

- Origin of transference: oriT

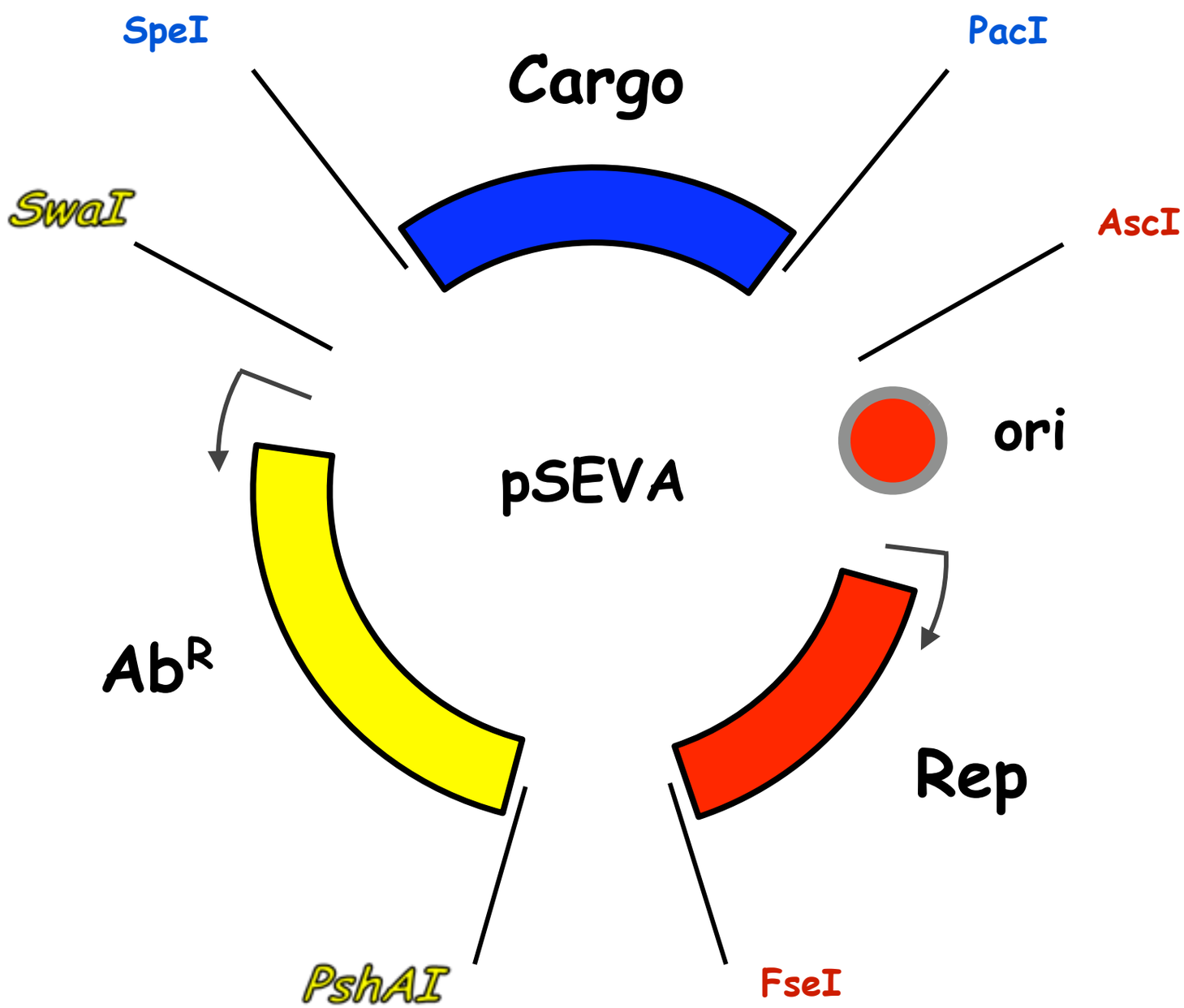
- Terminators: T_0
  T_1
  - Flanked by rare cutting restriction enzyme

Modules

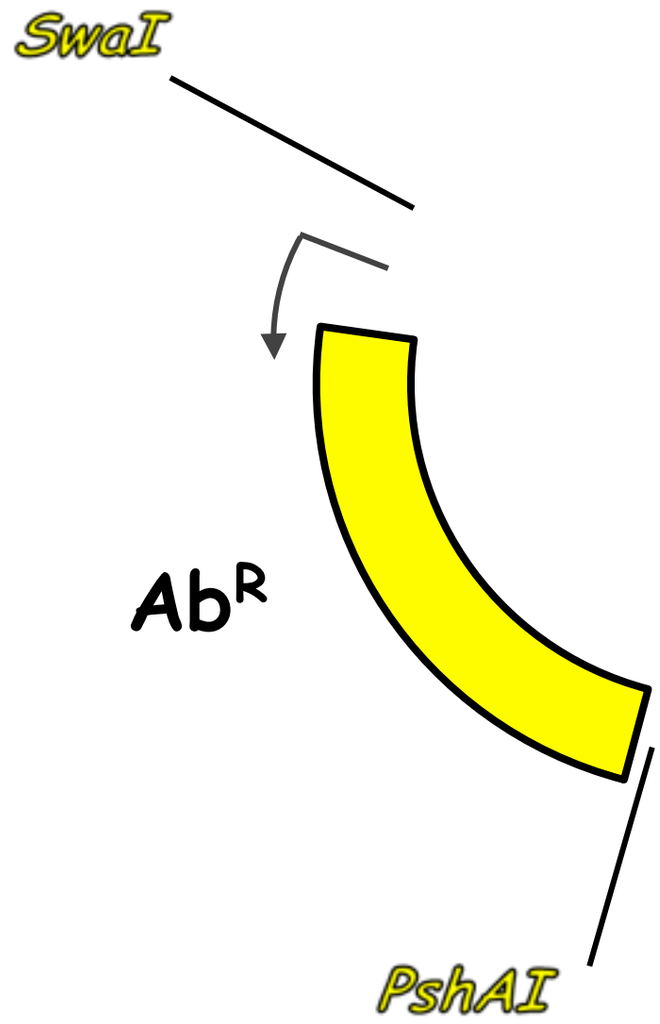
- Origin of replication
- Antibiotic resistance marker
- Cargo

pStandardEuropeanVectorArchitecture

Modules



pStandardEuropeanVectorArchitecture



Antibiotics

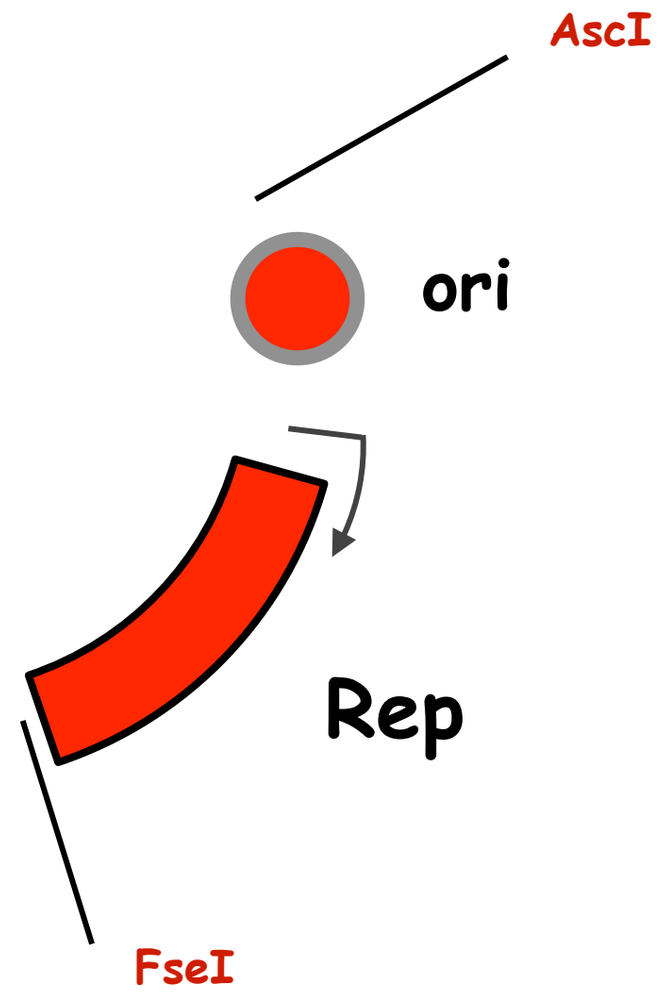
- Ampicillin
- Gentamycin
- Kanamycin
- Streptomycin
- tetracycline
- Chloranphenicol

pStandardEuropeanVectorArchitecture

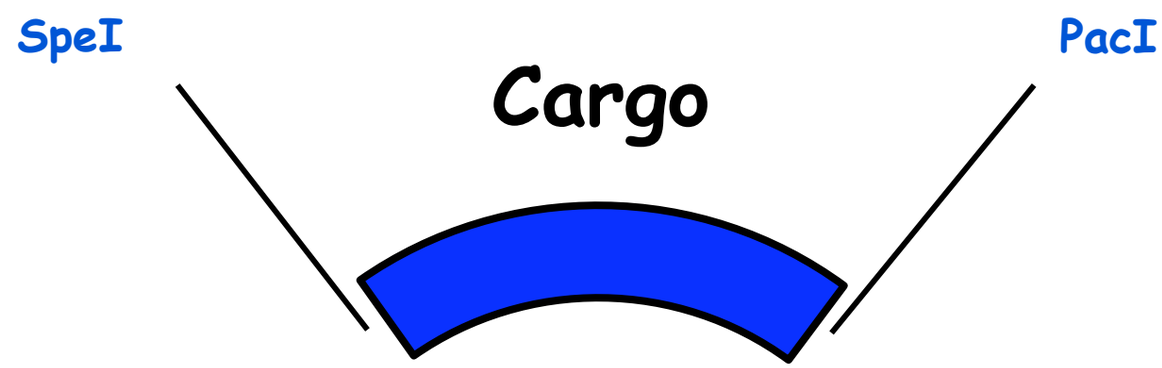
Broad-host range replicons

Origins of replication

- RK2 (very low copy number)
- pBBR1 (medium copy number)
- pRO1600 (high copy number)
- R6K (π-dependent replication)



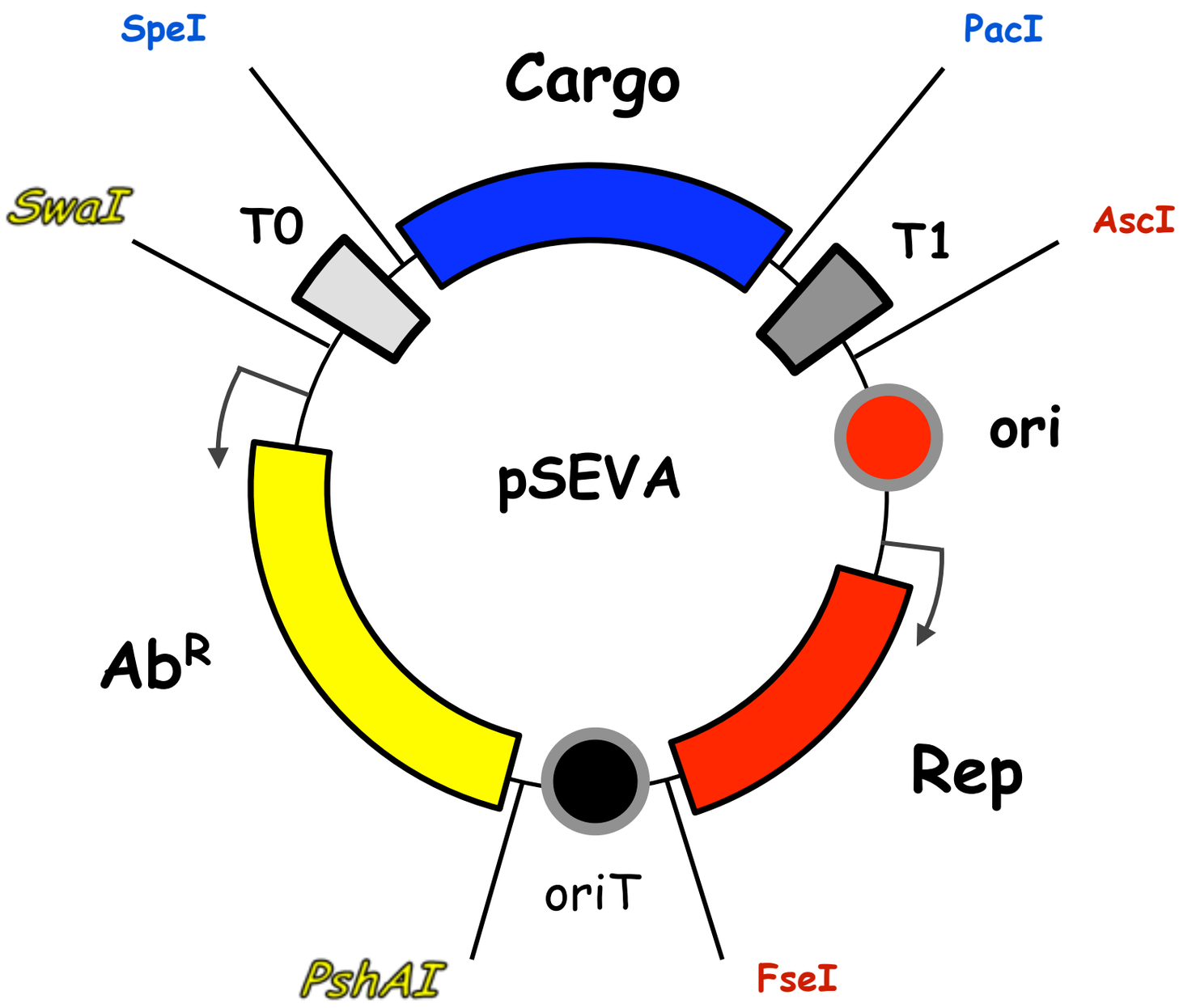
pStandardEuropeanVectorArchitecture



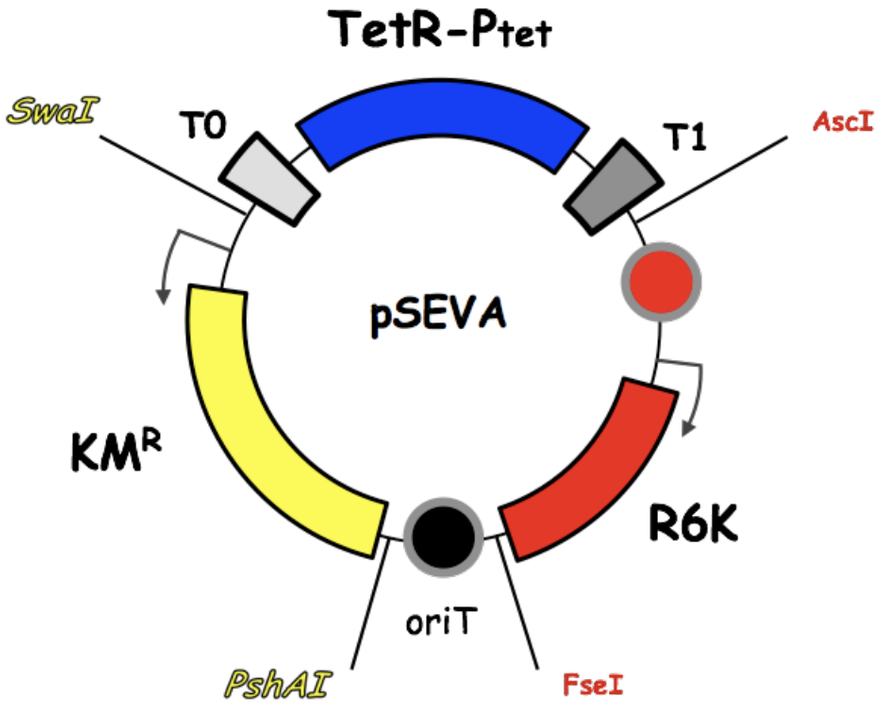
Cargo

- *gfp* without promoter
- *lux* without promoter
- Multiple cloning site (MCS)
- XylS-Pm
- XylR-Pu
- TetR-Ptet

pStandardEuropeanVectorArchitecture

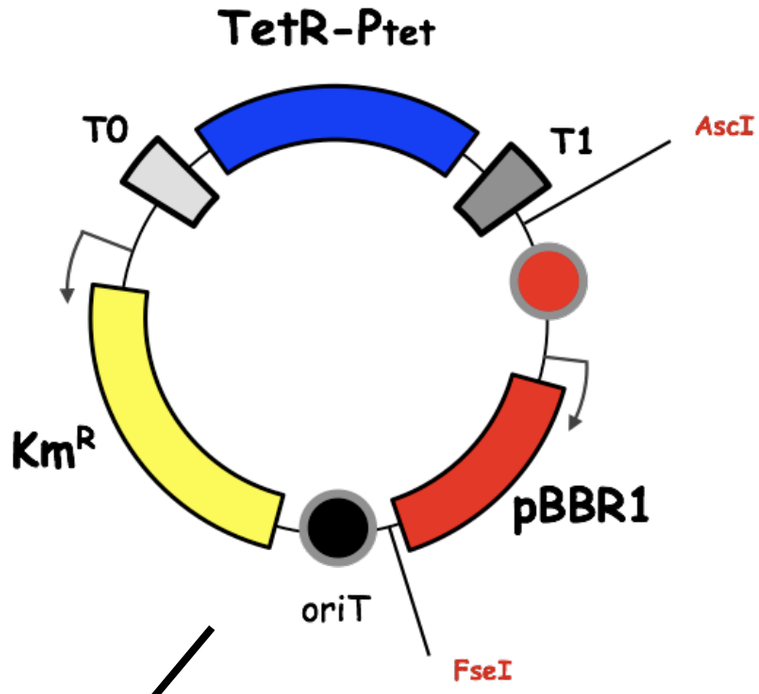


pStandardEuropeanVectorArchitecture

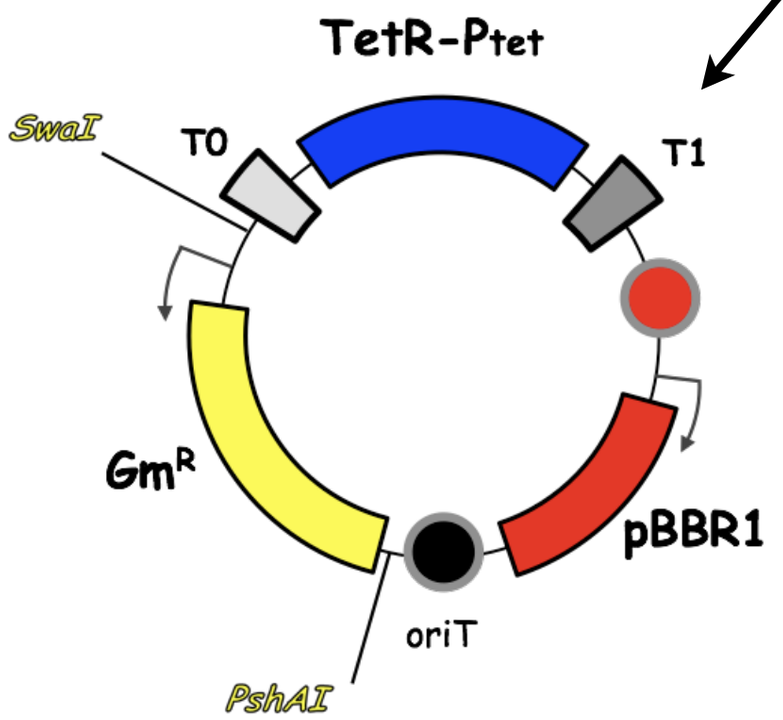


Ptet promoter, KmR, R6K origin

Origin of replication exchange



Antibiotic marker exchange



EMERGENCE WP4

1- Re-design of biological functions

2- Planned activities (Meetings)

3- Deliverables & Financial status

Planned activities (Meetings)

1- Evolution and Design of Biomolecular Systems

(concepts and strategies for systems and synthetic biology)

2- European Workshop for young SB students

3- SB Summer School

Evolution and Design of Biomolecular Systems

Concepts and strategies for systems and synthetic biology

October 18-20 (2009) Illetes-Mallorca (Spain)

Organisers

John McCarthy (Manchester Biocentre, UK);
Victor de Lorenzo (CNB-CSIC Madrid, Spain);
Virginia Cornish (U Columbia, USA);
Yoshi Nakamura (U Tokyo, Japan)

Speakers

Irene Chen (Harvard, USA)
Phillip Holliger (Cambridge, UK)
Paul Freemont (Imperial College, UK)
Martin Fussenegger (ETH, Switzerland)
Rafael Giraldo (CIB, Madrid, Spain)
Tan Inoue (Kyoto University, Japan)
Richard Kitney (Imperial College, UK)
Vitor Martins dos Santos (HZI, Germany)
Steve Oliver (Cambridge U, UK)
Bernhard Palsson (UC, San Diego, USA)
Luis Serrano (CRG, Barcelona, Spain)
Pam Silver (Harvard, USA)
Stenbjörn Styring (Uppsala U, Sweden)
Daniel van der Lelie (BNL, USA)
Peter Walde (ETH, Zurich, Switzerland)
Ron Weiss (Princeton, USA)

21-22 Oct satellite sandpit

Defining transcription standards
(V. de Lorenzo, M. Buck, S. Busby
R. Gourse, H. Aiba, I. Golding, D. Endy)

Information and registration
Inquiries: Lesley-Ann Miller l.miller@manchester.ac.uk
www.manchester.ac.uk/DEBIOSYS

bbsrc
RSC ROYAL SOCIETY OF CHEMISTRY
The Royal Academy of Engineering
TARPOL CONSORTIUM
Emergence
CSIC

Planned activities (Meetings)

2- European Workshop for young SB students

Rafael Silva-Rocha
(CSIC, Spain)

Madrid, Spain

Sometime around 2010

3- SB Summer School

Victor de Lorenzo
(CSIC, Spain)

&

John McCarthy
(Manchester Biocentre, UK)

&

Others

Spetses, Greece

End of 2010

EMERGENCE WP4

1- Re-design of biological functions

2- Planned activities (Meetings)

3- Deliverables & Financial status

Deliverables of WP4

D4.1. (1.4) Database on quantitative prokaryotic performance

Status: 40%

D4.2. Design tools on standardized promoters & Expert group on suitable promoter standardization formats

Status: 80%

Financial status

Spent Status: ≈ 60%

GENEART
THE GENE OF YOUR CHOICE

EMERGENCE Meeting; Zürich April 2009

Workpackage 5: Building the Academia-Industry interface

Frank Notka, Ralf Wagner, 29. April 2009

Overview

ACTIVITIES

Workshops

- Emergence IP
- Emergence Industry
- SB4.0
- DECHEMA

Industry networks

- DECHEMA
- IASB
- SBIA
- Imperial College London

Funding

- DECHEMA

Workpackage 5
WS IP issues (16.06.2008)

Objectives:
- Discuss open source policy
- Provide a basis for discussion in Industry WS

➡ **Provide a recommendation for an IP-strategy that would promote integration of the European industry into the development of Synthetic Biology**

Participants
Experts from different IP related disciplines:

- Technology and innovation management (J. Henkel, TUM)
- Patent - industry (K. Schwander, DSM; C. Ludwig, Geneart)
- Patent - public (B. Rutz, EPO)
- Development (S. Panke, ETH; L. Pasamontes, DSM)
- Technology provider (R. Wagner, F. Notka, Geneart)

Workpackage 5: IP WS
Take-home messages:

GENEART
THE GENE OF YOUR CHOICE

WS results:

- The realization of an European Registry involving the European industry is possible

- IP-relevant parts should not be excluded

International activities:

- as one prominent representative the OECD (Organization for Economic Cooperation and Development) has put this important topic on its agenda.

Workpackage 5

WS Define needs and interests of Industry (25.06.2008)

GENEART
THE GENE OF YOUR CHOICE

Objectives:

- Definition SB
- Attract Industry to European SB
- Link Academia & Industry
- Accelerate progress in SB
- Address IP issues

➡ **Promote the Integration of Industry into the European SB development**

Participants

Experts from leading European industries covering:

- Chemistry (Lonza, Novozymes, DSM)
- Pharma (AstraZeneca, F. Hoffmann-La Roche)
- Environment/Biomaterials (Metabolic explorer, Heurisco)
- Biotechnology (Lifewizz) and

European academic Synthetic Biology exponents (Helmholtz-Allianz Systembiologie, Helmholtz-Zentrum für Infektionsforschung)

Workpackage 5: Industry WS
Take-home messages:

Gain more visibility by presenting successful and relevant applications

Strategic top down approach recommended

Push the buttons of politicians and investors

A clear bias in development

Procaryotic development much more advanced:
Metabolic pathways, Biofuels & fine chemicals, Biodetectors

Big Pharma: Too early for our engagement

Prefer small cooperation strategies
Slow process due to extensive negotiations

Redirect contacts

Address smaller companies
Include regulatory and IP manager
Involve other types of Industries

Open Source policy

Clear tendency towards non-open solutions
IP regulation a major issue

GENEART
THE GENE OF YOUR CHOICE

SB4.0:

Industrial Biotechnology (Chair: Ralf Wagner, Geneart)

George Guo-Qiang - Chen Tsinghua University:

- Application of Synthetic Biology in Industrial Biotechnology

Qingsheng Qi - Shandong University:

- Exploiting the Novel Potential of *Escherichia coli*, an Industrialized Microorganism

Kristy Hawkins – Caltech:

- Metabolic Engineering of *Saccharomyces cerevisiae* for the Production of Benzylisoquinoline Alkaloids

DECHEMA: **W**orking group Systems Biology and Synthetic Biology.

Synthetic Bio(techno)logy Nov 2009

Workpackage 5
Industry/Academic Networks

DECHEMA: Gesellschaft für Chemische Technik und Biotechnologie
is an established NPO, founded 1926. They have more than 5.500 scientists, engineers, companies, organisations as members. The major objective is to support and to guide R&D in technical Chemistry and biotechnology.

→ Activities within the Working group Systems Biology and Synthetic Biology

SBIA: Synthetic Biology International Association
initiated with the help of NY attorneys @FOLEY

Members and Organizations:

Larry Gold, George Church, BIOSEARCHTECH, BASF, flagshipventures, IQT, IDTDNA, Blue Heron, Febit, baincapital, USA.dupont, verdezyne (Coda genomics)

Newly founded Industry association with the main focus on education & collaborations and also on social / political regulation

→ GENEART is a board member as the European representative

Workpackage 5
Industry/Academic Networks

IASB: International Association Synthetic Biology
Small group of providers (Febit, Sloning, Entelechon, ATG)

IASB is mainly concerned with bioethical and biosecurity questions raised by synthetic biology

→ Geneart is considering membership
→ Joint publication on companies' perspective of social implications for the Journal „Systems and Synthetic Biology" in preparation

Imperial College London

Richard Kitney of the Institute of Systems and Synthetic Biology at Imperial College London.

Awarded, £8m over 5 years, to fund a new and innovative research centre with the aim of establishing a strong research base in synthetic biology, coupled to a full educational and training programme.

→ Agreement on educational collaboration:
exchange of students (GENEART ↔ Imperial College)
GENEART scientist invited for lectures

DECHEMA:

One concrete task is to promote the setup of a grant-call by the German authorities in the field of SynBio, which would be the first call in that area

→ Hearing and position paper at the BMBF (Sven involved)

Workpackage 5: Deliverables

Deliverable		Month	Progress
5.1	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	06/07 & 06/08	First report finalized
5.2	Reports on two workshops (associated to industry-relevant scientific conferences) to teach the industry in synthetic biology concepts and tools	12/07 & 12/08	SynBio 4.0 Synthetic Bio(techno)logy
5.3	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	12/08	In progress
5.4	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)	12/07 & 12/09	First report finalized

Workpackage 5: Planned activities

DECHEMA WS Synthetic Biology: **Synthetic Bio(techno)logy Nov 2009**

IASB: **Position paper on industrial perspectives on SB**

Special Issue on societal implications of synthetic biology, including governance and regulation, BioSecurity and intellectual property rights

SBIA: **planned activities**

Committees to be established:

Quality / Standard / Safety / Government affairs

Internet portal:

Education, IP-regulation, BioSecurity, collaborations, providing services

Financial Status: **45.000 € expended until Dec. 2009**
9.000 € remaining

Workpackage 5: Industry Involvement
Take-home messages:

SynBio in Europe is in a developmental status

Confirmed by industry appearance or better non-appearance of companies at International SB sessions regarding industrial applications (SB4.0)

"Applied industrial Synthetic Biology in Europe" conference April, 16th:

Of 6 companies present, 4 were from the gene synthesis field, 3 of which members of the IASB, one was Amyris as the only but non-European User and finally Lonza. Lonza shows really interest, but their comment was that they expect to use SB not before 2020.

→ Before the European Industry gets involved, issues like standardization and IP-regulation, as the most prominent ones need an acceptable solution