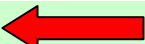


**The Bi-Annual Critical Assessment of Artificial Chemical Cells
(CRAACC)**
**A First International Workgroup Meeting for the Systematic Measure of Success
in Artificial Chemical Cell Research**

Date: 20st, 21nd & 22rd of July 2006  note the correct dates

Place: European Center for Living Technology, Venice, Italy

Sponsor: ChellNet (www.chellnet.org)

Organization Team:

Dr. N. Krasnogor (U. Nottingham, UK), Dr. L. Cronin (Glasgow University, UK), Dr. B. Davis (Oxford University, UK), Dr. M. Bedau (Protolife Srl., IT)

Contact Points:

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Prof. M. Bedau mark@reed.edu

Brief Description of the Workgroup Goals & Context: Various research groups around the world are attempting to engineer *artificial chemical cells*—that is, chemical systems with important life-like features, such as the ability to assemble themselves and repair damage, the ability to grow and reproduce by harvesting raw materials and energy from their environment, and ultimately the ability to evolve. Noteworthy, this work is happening in the face of significant uncertainty about the exact nature of life. The definition of ‘life’ has invoked innumerable seemingly interminable discussions, ranging from the religious to the philosophical and metaphysical. Still today no definition is universally accepted, and the advisability of even proposing definitions is controversial. So, in the absence of an accepted definition, there is a need for a practical ‘operational procedure for recognizing whether synthetic systems are living or have the potential to become living.

The workgroup meeting goal is to design an artificial chemical cell ‘imitation game’, similar in spirit, but not necessarily in implementation, to Turing’s imitation game for AI. The test for artificial chemical cellularity should be an empirical, operational, repeatable, incremental, and (ideally) quantitative procedure for measuring how closely a chemical system’s behaviour captures the essential hallmarks of primitive living systems. Our ultimate goal is to implement a biannual competition somewhat analogous to the highly successful CASP programme on protein structure prediction.

We hope that the *Critical Assessment of Artificial Chemical Cells* (CRAACC), the provisional name for the imitation game, will help galvanize the research community in fields as diverse as computer science, chemistry, biology, physics and astronomy and constructively focus research on achieving tangible community-wide milestones along the route to creating artificial cells in the laboratory.

Our ultimate aim is to create a bi-annual artificial chemical cell imitation game competition. Submissions will be judged by an independent panel of experts and ranked accordingly to the test criteria. The competition will seek partial funding from

sponsors and will aim to award €7K to the winner, and €15K from the British Engineering and Physical Sciences Research Council (EPSRC) funded CHELLnet (www.chellnet.org) budget is already allocated to prime pump CRAACC (thus the first two CRAACC prizes are already partly funded). The bi-annual results of CRAACC will be published as special issues of high impact journals.

We thus seek to formally establish CRAACC, its functioning, scientific objectives and long term goals; by attending this first meeting you'll be part of the founding board.

Operational Matters:

The 1st workgroup meeting will take place the 21st,22nd,23rd of July at the European Centerl for Living Technology (ECLT), Venice, Italy.

The workgroup meeting should seek to deliver:

- Roadmap for the implementation of CRAACC, including identifying international advisory board (in addition to the founding board), extra sources of funding and plan of action for the following twelve months (including a follow up meeting of the executive committee for CRAACC, to be formed by Krasnogor, Cronin, Davis, Bedau and other participants to this first meeting).
- Draft protocol for the implementation of the artificial chemical cell imitation game.
- A brief co-authored paper describing CRAACC, to be submitted to *Nature/Science* within 1 month of the end of the meeting. The CHELLnet partners have already sent a “commentary” paper to Nature Biotech that is under revision. We intend to extend that commentary into a full blown paper with technical details and rules for participating in the first CRAACC and the date of its implementation.

To produce these deliverables we have provisionally timetabled the following agenda:

Time	Day One	Day Two	Day Three
09:00	Arrival at ECLT	Presentation: David Harel (50' talk/ 10' Q/A) : <i>“Comprehensive and Realistic Modeling: A Challenge and a Test for Systems Biology”</i>	
10:00	<u>Introductory meeting:</u> • Introductions • Krasnogor/Bedau presentation: <i>“CRAACC concept, goals overview, admin matters”</i>	<u>1st Brainstorm Session:</u> <i>“Milestones towards Artificial Chemical Cells”</i> Deliverable: List of agreed Milestones	General Session: <i>“Practical Matters”</i> • Funding opportunities • Task allocation to funding board • Outreach activities • Other administrative, managerial issues arising from roadmap and protocol • Follow up meeting Deliverable: action plan
11:00	Break	Break	Break
11:30	<u>Split up sessions:</u> • 10 minutes “teaser” presentation by Bedau/Krasnogor • Subgroup discussions addressing <i>“ functional definitions of container, metabolism, information & computation in the context of cellularity”</i>	<u>2nd Brainstorm Session:</u> <i>“Measurable Milestones towards Artificial Chemical Cells”</i> Deliverable: Refined Milestones’ list tagged with measurable objectives	Continuation General Session: <i>“Practical Matters”</i> • Funding opportunities • Task allocation to funding board • Outreach activities • Other administrative, managerial issues arising from roadmap and protocol • Follow up meeting Deliverable: action plan
12:00	Subgroups input collection & general discussions		
13:00	Lunch @ ECLT	Lunch @ ECLT	Lunch @ ECLT
14:00			

15:00	<u>Split up Sessions addressing:</u> <ul style="list-style-type: none"> • <i>Container-Metabolism Interface</i> • <i>Container-Information & Computation Interface</i> • <i>Metabolism-Information & Computation Interface</i> 	Presentation: Alfonso Valencia (35' talk/ 10' Q/A) : <i>“Organization, observations, complications, and outcome of the protein structure prediction (CASP & EVA) and text mining (BioCreative) experiences”</i>	Round up and end of 1 st CRAACC workgroup meeting
		Short Break	
16:00	Break	General Session: <i>“Roadmap to CRAACC”</i> Deliverable: Roadmap draft integrating concepts from day 1, refined measurable milestones list, Gantt chart, technical, scientific, financial, admin and other challenges.	Workgroup chairs Bedau & Krasnogor to initiate drafting of Science / Nature paper reporting outcomes for 1 st workgroup meeting. Deliverable: circulate first draft to board within 1 week of meeting. Submit to journal within 1 month of meeting.
17:00	Subgroups input collection & general discussions: <i>“Addressing the Interface Container-Metabolism-Information & Computation”</i>	General Session: <i>“CRAACC protocol”</i> Deliverable: A technically focused draft protocol for the 1 st CRAACC	
18:00			
19:00	Any other Business, agenda changes for 2 nd day & break for the day	Any other Business, agenda changes for 3 rd day & break for the day	
20:00	Dinner at to-be-announced	Dinner at to-be-announced	
21:00			

Administrative Matters:

Your participation in CRAACC is being financed by the ChellNet consortium, funded by the British Engineering and Physical Sciences Research Council (EPSRC). The latter has rather strict financial transparency procedure we are required to follow:

ChellNet will cover:

- 1- your air/train/coach tickets
- 2- your hotel accommodation for the duration of the meeting
- 3- your meals (lunch, coffee breaks, dinners)

Please note:

- 1- We kindly ask you to find out the cheapest available air/train/coach tickets as soon as possible. The later you book your ticket the more expensive they will be. Once you have decided on an itinerary, please send its details (e.g. air lines company, cost, arrival/departure times, etc) to Dr. N. Krasnogor (Natalio.Krasnogor@Nottingham.ac.uk) . As soon as Krasnogor approves your itinerary please buy it.
- 2- Your hotel accommodation will be sorted out by ECLT, hence it is imperative that you confirm your arrival/departure times as soon as possible to Prof. M. Bedau (mark@protolife.net) with CC to Natalio.Krasnogor@Nottingham.ac.uk
- 3- Lunches and coffee breaks will be held at ECLT. We will all go together to dinners. Dinners will be paid by Krasnogor (ChellNet).
- 4- At the meeting you will be furnished with an expense claim form. Once you are back at home please fill the form, sign and date it, providing all the original transport receipts and boarding cards (photocopies are not valid) and send these to Dr. Krasnogor's address. It normally takes between 2 and 4 weeks to process expenses (counting from the time we receive them). You will receive, at the address you specified in your form, a cheque in Sterling Pounds.
- 5- Dr. Krasnogor's postal address is:

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We very much look forward to meeting you at the First International Workgroup meeting for the Systematic Measure of Success in Artificial Chemical Cell Research. Shall you have any queries please do not hesitate to contact either Dr. Krasnogor or Prof. Bedau.