Research Infrastructure and Support

Session IV

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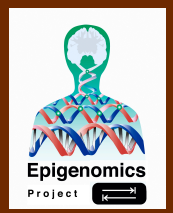


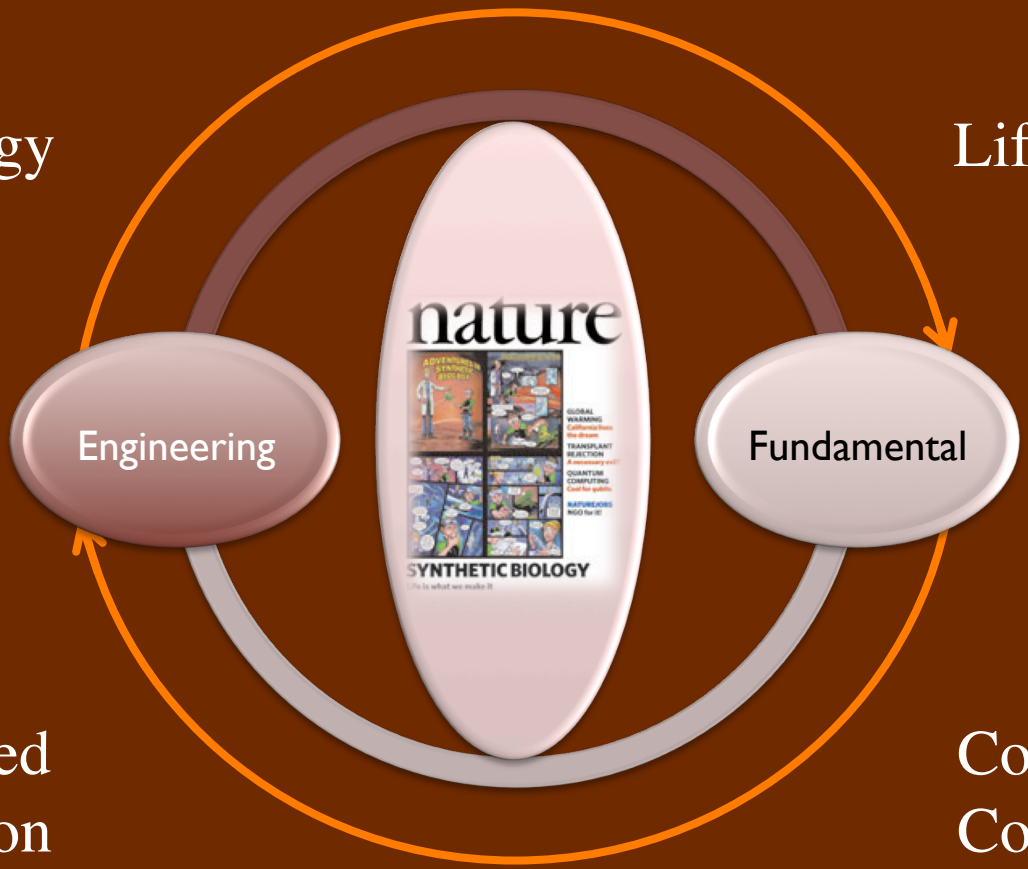
Opportunities and Challenges in the Emerging Field of Synthetic Biology

Washington, July 10th, 2009

Scope

Biotechnology

Life Sciences



Rationalized Conception

Constraints *vs.* Contingencies

Research & Development activities

- A vigorous basic research

- Well-funded blue-sky projects

« Foundational studies » (Smolke)

- Most calls for proposals NOT involving the industry

«But biotechnology will ultimately and usefully be better served by following the spirit of Eddington, by attempting to provide enough time and intellectual space for those who want to invest themselves in exploration of levels beyond the genome independently of any quick promises for still quicker solutions to extremely complex problems. »

(Strohman RC (1997) Nature Biotech 15:199)

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- A close contact between academia and industry
  - Some (increasing) calls for proposals involving small/medium companies
  - Diverse modalities of cooperation

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- Industry stand-alone
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« Intergenerational cooperation » (De Lorenzo)

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  - Diverse modalities of cooperation
- Industry stand-alone
  - Big companies already positioned on contributing fields
- Yet a capacity of the academia to retain IP
  - Commercial pipelines comprising academic solutions !
  - Capture IP positions?
  - Technology transfer units within academic laboratories

Research & Development: Fostering transnational cooperation

- Co-supervisions across borders
  - of doctoral students, postdoctoral fellows…

- Small focused meetings (decided bottom-up)
  - Start or maintain a collaboration
  - Prepare joint proposals

Limited travelling funds are sufficient

Technological Platforms (1)

- Possible Services:
  - DNA synthesis on order
  - Robotized DNA assembly
  - Center of Biological Resources
  - Repository for biological models, knowledge bases
- Reference Centers:
  - Good, safe, (confidential) practice
  - Standards application & elaboration
  - Laboratory Information Management Service (LIMS)

Technological Platforms (2)

- Customers:
  - ✓ Academia
  - ✓ Small or Medium Industry
- Financial support:
  - ✓ Initial investment (local, national, transnational)
  - ✓ Fees for services

    —> *mostly self-sustaining in the long run*
- Preferred location:
  - ✓ Near or in a center of excellence for synthetic biology
  - ✓ Networking at the continental level

Standards (1)

- Measurements, —omics
  - ✓ existing standards maintained by consortia
- DNA parts
  - ○ design & assembly
  - ✓ characterization & annotation

Standards (2)

- Ontologies
  - ✓ existing standards maintained by consortia (Bioinformatics / Systems Biology)
  - ○ progressive adaptation to the standards of Engineering Sciences
- Mathematical modelling
  - ○ formalisms
- Computational simulations
  - ○ tools
  - ✓ exchange formats

Community

Towards Research Networks in Synthetic Biology?

- In America:
  - SynBERC;
  - …
- In Europe:
  - European Commission:
    - ERASysBio, TESSY, EMERGENCE, SYNBIOSAFE …
  - National:
    - 7 BBSRC/EPSRC Nets in UK;
    - 9 DFG Nets in Germany;
    - 1 Genopole® Net in France reaching beyond borders;
    - …

Scientific animation

- Master degree
- PhD programme
- Postdoctoral programme
- « Senior » programme

A curriculum in Synthetic Biology?

- « Senior » programme in Synthetic Biology

Advanced Introductions

Shared teaching material

- absence of a textbook on Synthetic Biology
- Prepare and share materials for both under- and post-graduate levels
- organize a network of teachers

Contribution by Marko Dolinar:

- *We see our first problem in the absence of a textbook on SB. It is a very formal backdraw as it is hard to promote a new topic that should be included in the curriculum without having a proper book on it - it just sounds 'too new' for colleagues who teach well established subjects. I see an urgent need to prepare materials that could be used at both under- and postgraduate levels.*

- *It might be a good idea to have a network of teachers on this topic so we could share ideas and eventually organize visiting lectures of teachers from other universities. A wiki and/or a mailing list for sharing ideas (like seminar topics, problem-based learning themes etc.) would certainly be a nice addition as well.*

Thank you!

Please feed back