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Open innovation and citizen engagement – some examples

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Forms of collaboration and engagement

1. Open Source (Drug Discovery)
2. Crowdsource
3. ‘Gamification’
4. ‘Citizen science’ in genomics
5. Social-economic infrastructure

Requirements

1. Data sharing policy (Bermuda Principles +)
   - data release policies
2. Participative infrastructure & technologies
3. Funding/exploitation model

OSDD

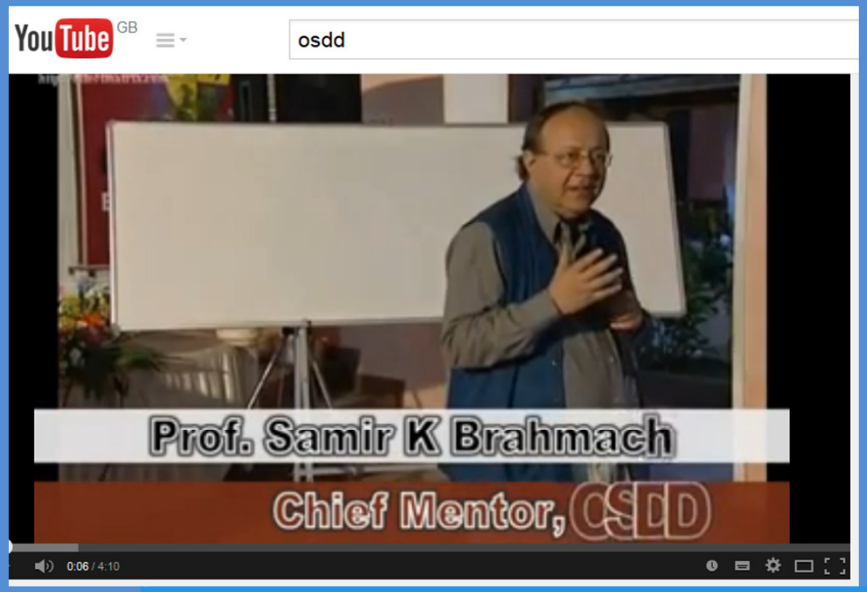
‘OSDD is a *mission*, to make people in marginalised parts of the world, to have a hope, to make drugs affordable’

‘it’s a movement, it’s- done with passion, it’s full of love, and it is voluntary’;

it ‘won’t work in the Western world because it has to match the ethos of the society’ ‘socialistic principles’ ‘It will work with those students who are hungry to learn, not those who have been given plenty’

‘transform education to the web’ ‘problem-solving learning’

(Brahmach, https://www.youtube.com/watch?v=L806P3CsxGE)


YouTube GB
osdd
Prof. Samir K Brahmach
Chief Mentor, CSDD
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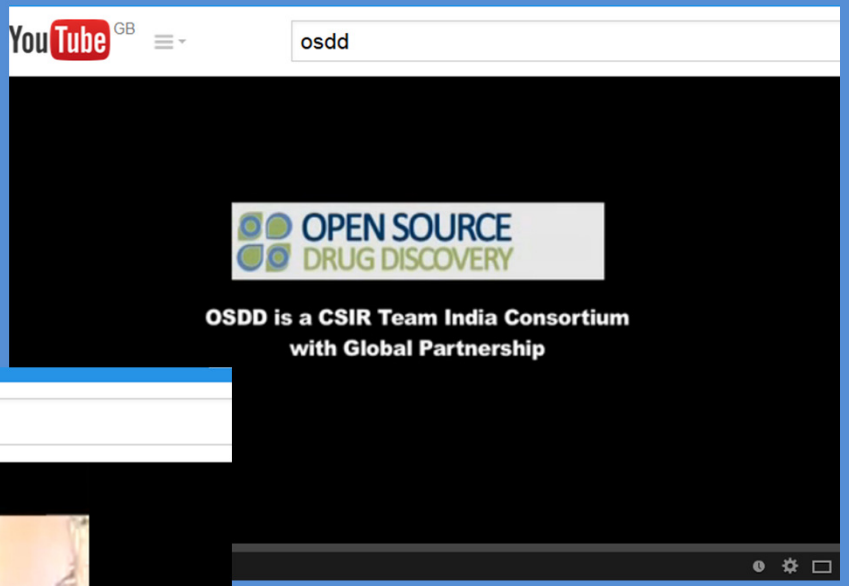

YouTube GB
osdd
OPEN SOURCE
DRUG DISCOVERY
OSDD is a CSIR Team India Consortium
with Global Partnership


YouTube GB
osdd
We shall start a new song ... ever more
1:21 / 7:15

OSDD

- Support: Council of Scientific and Industrial Research (CSIR), Department for Biotechnology.
  + Tata-CSIR Fellowships
  'one of the world's largest publicly funded R&D organizations..'
- Claimed as one of world's first (2008) attempts to apply open source/participative innovation model
- Scientists from 130 countries
- Achievements: 're-annotation of the *Mycobacterium tuberculosis* genome and the generation of 11 models for prediction of anti-tuberculosis activity' (Årdal and Røttingen, 2012).

OSDD model of engagement and ownership

- students ‘volunteer’ as parts of classroom assignments
- ‘The drugs that come out of OSDD will be made available like a generic drug without any IP…’
- ‘use a protective license system and in effect a ‘gated community’ mode of access’ (Årdal and Røttingen, 2012).

Crowd computing game – *'Phylo'*

'Phylo: A Citizen Science Approach for Improving Multiple Sequence Alignment'

Conclusion:

'…an [NP-hard] computational problem can be embedded in a casual game that can be easily played by people without significant scientific training. This suggests that citizen science approaches can be used to exploit the billions of "human-brain peta-flops" of computation that are spent every day playing games'.

-Centre for Bioinformatics, McGill;
-Nokia connected authors

Kawrykow et al *PLoS One* 2011

'..ultimate goal of this work… is to identify the origin of genetic diseases and to identify functional patterns in DNA.' (Curtis, 2014)

Crowd computing game for protein folding: *Foldit*

'*Foldit* is an online game in which humans try to solve one of the hardest computational problems in biology: protein folding. You don't need to know anything about biology to play the game, although a little background will help'

(http://foldit.wikia.com/wiki/Foldit_Wiki)

'The current series of Science Puzzles, the Grand Challenges, are meant to generate the evidence needed to prove that human protein folders can be more effective than computers at certain aspects of protein structure prediction.'

(http://fold.it/portal/info/faq)

‘active playing community is in the hundreds rather than the thousands’

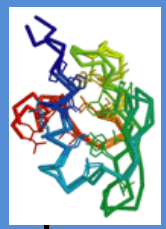
Some claims for novel scientific approaches from *Foldit* etc

Curtis, Vickie (2014). Online citizen science games: opportunities for the biological sciences. *Applied & Translational Genomics*, 3 pp. 90–94.

‘Volunteer computing’ networks – predicting protein structures

Rosetta@home:

‘By integrating Robetta (a server) and *Rosetta@home*, volunteers, like you, will not only help our efforts, but will directly help the efforts of scientists from around the world doing critical research on biomedical issues such as cancer, SARS, HIV/AIDS, malaria, and much more.’ (U of Washington, https://boinc.bakerlab.org/rosetta/rah_about.php)



‘I have been crunching for *Rosetta@home* for a few years, and based on the information I have, it is the best project for those interested in making medical science and computational biology move forward’. Michael Graham Richard Nov 4, 2009

Citizen science in online genomics

‘motivations and benefits for users are diverse and complex, including the quest for entertainment, playful engagement with information, unspecified curiosity, and the desire to contribute to something meaningful (McGowan et al. 2010; Vayena et al. 2012)’.

‘contributions to generating scientific knowledge by non-professionals is typically neither a discrete nor an isolated activity but it is interwoven with other kinds of engagements, such as learning, gaming, passing time, and sometimes also profit-making’.

Cited by:

Prainsack, B. Understanding Participation: The ‘citizen science’ of genetics. In: Prainsack,B., Werner-Felmayer, G., Schicktanz, G. (eds). Genetics as Social Practice (in press).

Social-economic infrastructures: (non)participative technology

Practicality of open access regimes? ‘Data poverty’?

- infrastructures and cultures required to benefit in low- and middle income (LMIC) countries.
- range of skills, resources, equipment, institutionally-granted autonomy and cultural dispositions required

-does data-driven research meet local genomic research priorities.

(L. Bezuidenhout, research presentation at Genetics, Genomics and Global Health conference, University of Sussex July 2014)

Questions/issue arising….

1. Who sets the agendas in which citizen/learner participation appears?
2. Who can participate on what terms?
3. What are the emerging connections to bioeconomy and health – private & public – organisations?
4. Who is steering governance and how, in local national and transnational contexts?
5. Who benefits and how?