THE WITS SOUTH AFRICA TEAM IN THE iGEM COMPETITION

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University of the Witwatersrand, Johannesburg

CSIR

our future through science

www.wits.ac.za

ORIGINS OF THE iGEM COMPETITION

- Derived from Synthetic Biology
- From classes run at MIT in 2003
- Started in 2004 at MIT with 5 teams
- In 2009, there were 110 teams and 1200 participants
- This year there are 180 registered teams
- First team from an African University comes from Wits!

International **G**enetically **E**ngineered **M**achines

COMPETITION CRITERIA

- Teams are composed of under graduate students
- Students are responsible for:
  - designing the project
  - undertaking the research
  - fund raising
- The team needs to construct / characterise at least one aspect of the machine
  - Focused on engineering not discovery
- Data needs to be documented and added to the team WIKI site
- Time frame – February to November.

TEAM WIKI PAGE

Home | Project | Team | Online | Notebook

- The Problem
- The Machine
- Modelling
- Philosophy
- Safety
- Parts

Synthetic biology

Synthetic biology is a revolutio… …the fusion of engineering and molecular biology that has the potential to impact m… …inter-disciplinary field involving chemists, biologists, engineers, physicists, mathem… …even philosophers.

This dynamic field can also be … …olecules to reproduce emergent behaviour from natural biology, with the goal of creating artificial life forms or otherwise to seek interchangeable biological parts with the intention of assembling them into devices or systems that function in a manner not found in nature. Because humans are living, biological entities - the greatest benefits of synthetic biology may result from its application to medicine.

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UNTIL 2010 IGEM JAMBOREE

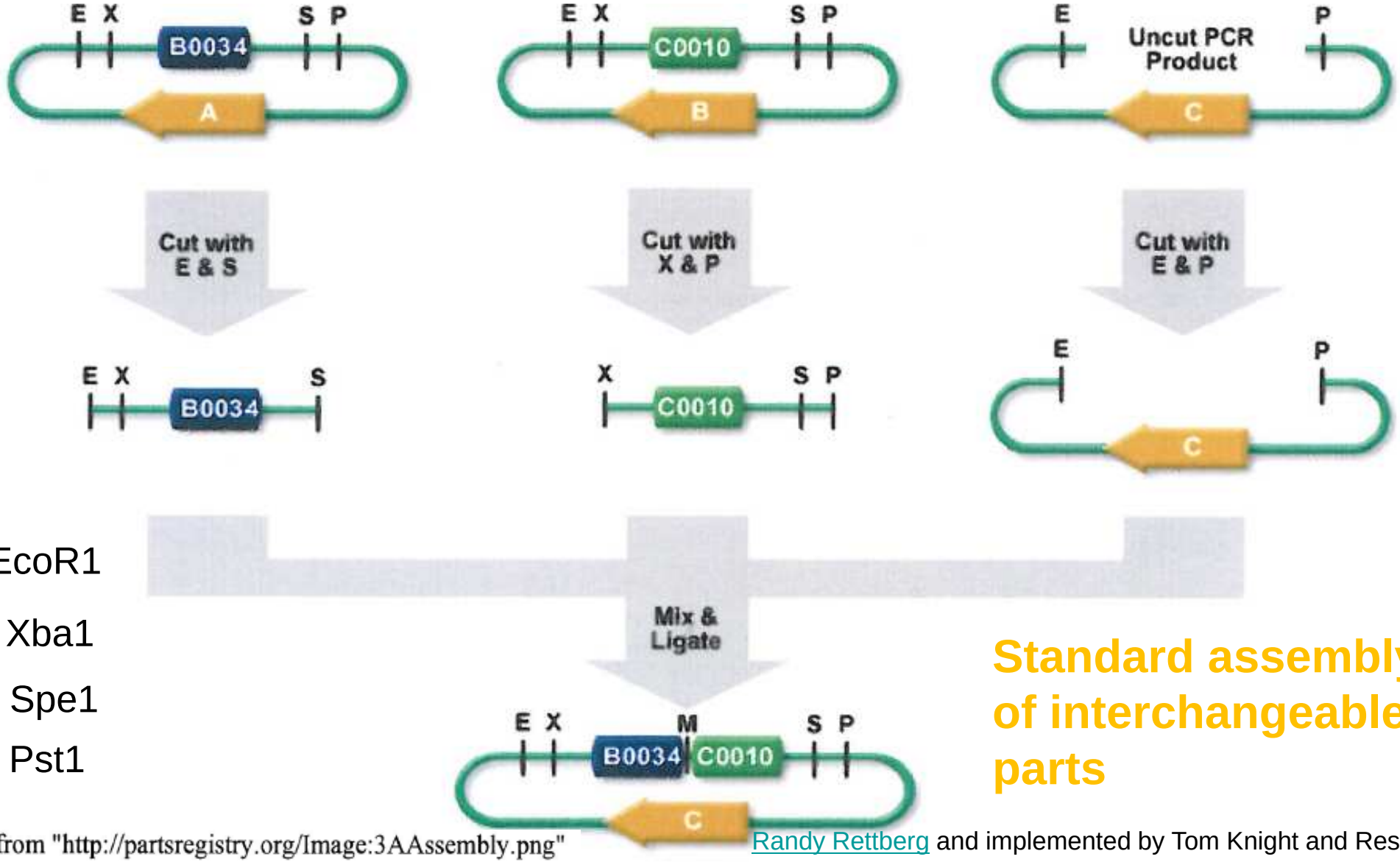
COMPETITION CRITERIA

- Teams present their project at Jamboree at MIT in November 2010
- Each team needs at least 1 supervisor
- At least one supervisor from each team is sent to attend one of the regional iGEM spring workshops in:
  - America
  - Europe
  - Asia
- Most importantly, students must have fun!

KEY IDEAS OF PROJECT DESIGN

- Leave strong impression on Judges and other teams (strong visual data / images) by keeping an up to date WIKI site!
  - Other social networking sites (eg Twitter and Facebook) can be used in conjunction with the WIKI
  - Interacting as a functioning member of the scientific community.

- Build systems of standard parts using standard techniques for assembly
- Parts can be interchangeable
- Couple functional design with physics design
- Modelling the machine: measure and characterise
- Whole machine does not need to work but parts must be well charcterised and built



E= EcoR1

X = Xba1

S = Spe1

P = Pst1

Standard assembly of interchangeable parts

Retrieved from "http://partsregistry.org/Image:3AAssembly.png"

Randy Rettberg and implemented by Tom Knight and Reshma Shetty

RECRUITMENTING THE TEAM

- Wits – CSIR collaboration
- 6 Departments provided 1 student and 1 supervisor each
- CSIR acting as administrative support to Wits team / supervisors
- Brochure produced advertising the competition and for students (Jan. / Feb.)
- Late Feb. 2010 student nominations were received
- March 5th first team meeting
- By 31st March team registered as: WITS – SOUTH AFRICA

THE WITS SOUTH AFRICA TEAM

THE SUPERVISORS

Wits University

Dr Karl Rumbold: Molecular and Cell Biology

Dr Robert Kowalenko: Social Sciences

Mr Ezekiel Madigoe: Chemical and Metallurgical Engineering

Dr Marco Weinberg: Pathology

Prof. David Rubin: Electrical and Information Engineering

Prof. David Sherwell: Mathematics

CSIR Biosciences – Synthetic Biology ERA

Dr Musa Mhlanga

Dr Raymond Sparrow

FUND RAISING AND PROMOTION

- The Dean of Engineering (Professor B. Lacquet) is the lead donor, Deans of Health Sciences, Science and Humanities have contributed
- CSIR sponsored the team registration
- CSIR sponsored attendance of one supervisor to the iGEM spring workshop (Europe)
- Corporate Sponsors include Inqaba Biotechnical Industries (Pty) Ltd and others

PROJECT - Topic to address local and global challenge

- Develop *in vivo* biosensor to detect and neutralise Human Papilomavirus (HPV) - carcinogenic + asymptomatic
- To produce a coloured signal as positive test for virus detected in urine
- Molecular biologists , chemists and engineers construct the machine and provide experimental data for characterisation
- Engineers and mathematicians model the performance of individual components and the integrated device
- Social sciences provides the ethical framework for development and deployment of the device – Employing the ethical theory of UBUNTU

JUDGING

- Put parts into the parts registry – giving the team the credit for the parts
- Copy data from team WIKI pages and transfer to registry parts - Important Fun is part of the Judging criteria!
- WIKI freeze about 1½ weeks before Jamboree
- Documents on WIKI get judged – medal decisions are based on information on WIKI site ahead of Jamboree
  - An up to date WIKI is essential for success

THE JAMBOREE

- Teams present their projects in tracks / themes
  - Time slot of 30 minutes = 20 minutes presentation and 5 minutes questions
  - A 5 minute change over time is provided
- Presentation at the jamboree at MIT are not critical to judging decision
- Posters are set up and there is opportunity to dry run the talks – Friday
- Talks – Saturday + Sunday
- Sunday evening – Social event
- Prize giving where the finalists talks to all attendants – Monday.

FUTURE OF THE JAMBOREE 2011 / 2012

- Changes due to increased participation and costs in holding a single Jamboree at MIT
- Regional Jamborees will be held in October 2011
    - Europe / Asia / North America
- Top 30% of teams at regional level will go to global championship
- These teams should be sponsored regionally

- Africa may be considered as a region in future years – possibly with Australia and South America
- iGEM to make tour of South America – open to visit South Africa

THANK YOU