# Introduction to Synthetic Biology

Topic 1 | Topic 2 | Topic 3 | Topic 4 | Topic 5

## Foundations for Synthetic Biology

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## Standard for Physical DNA Composition

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## Standards for Functional Composition

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## Biological Part Characterisation

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## Designing a Biological System from BioBricks

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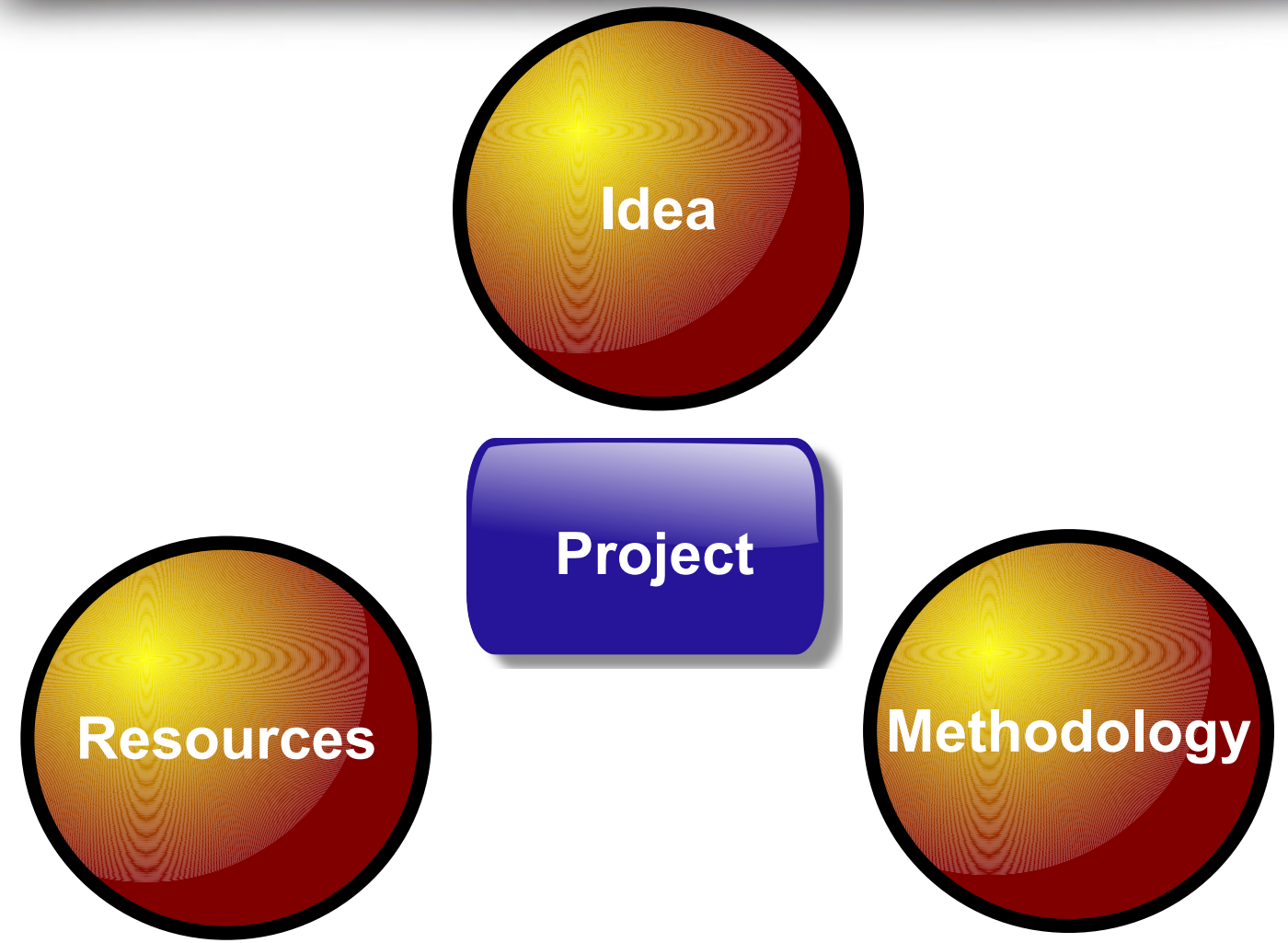
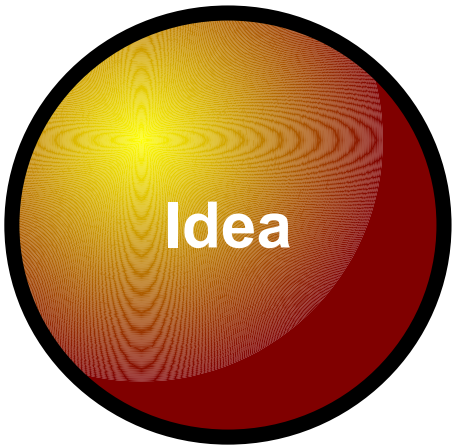
# Where to start ?

Project

# Where to start ?



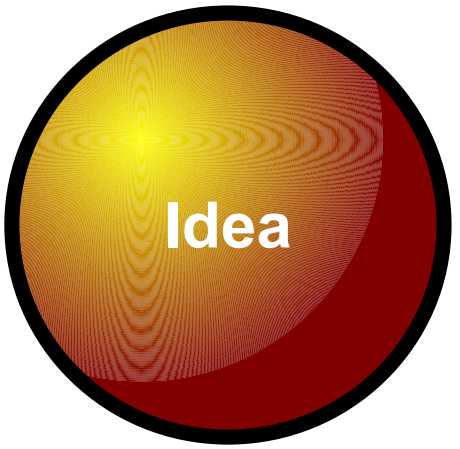
# Where to find an idea ?



# Where to find an idea ?

Areas of application

News




Publications

iGEM projects

Patent applications

Other engineering fields

# Available Resources

# Available Resources

Registry of parts

Literature


Public Databases

iGEM projects

Other engineering fields

# Project Management

# Engineering Development Cycle

Specifications

Design

Modelling

Fabrication

Quality Control

# Engineering Development Cycle

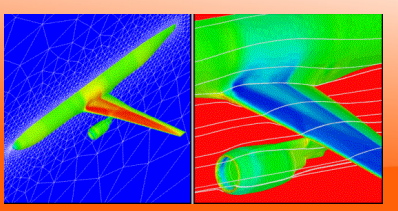
Specifications

Design


Quality Control

Project Management
Traceability
Quality assurance

Fabrication



Modelling

# Engineering Development Cycle

## Specifications

- High-level description of the system

- Expected performances + tolerances

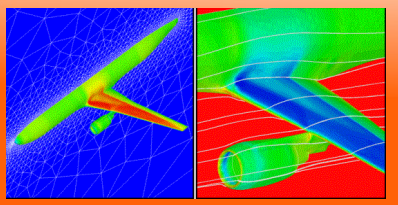
- Design constraints ?

# Engineering Development Cycle

## Design

- Top-down description of the system
- Definition of all sub-systems + interfaces
- Design to promote modularity / re-usability
- Actual Parts / Devices / Chassis selection
- Take into account that things have to be tested at the end.

# Engineering Development Cycle



## Modelling

- Model Parts / Sub-Systems / System

- Define assumptions used

- Run simulations to check if the Design has a chance to comply with the Specifications

- if not, back to Design, or even Specifications

# Engineering Development Cycle

## Fabrication

- Define how Parts / Sub-Systems / System will be built.

- Are all parts BioBricks ?

- Standard DNA assembly, or DNA synthesis

- Build packaging, Chassis

# Engineering Development Cycle


## Quality Control

- Checking DNA , Chassis, Growth Environment

- Validating Parts / Sub-Systems / Systems performances (reliability / robustness)

- Does it comply with the Specifications ?

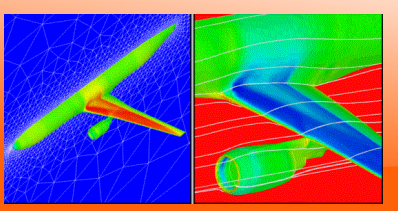
# Engineering Development Cycle

Specifications

Design


Quality Control

Fabrication

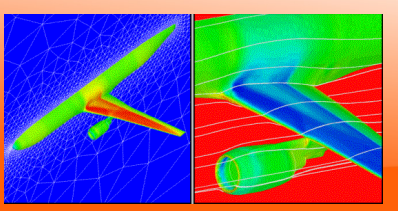


Modelling

# Engineering Development Cycle

Specifications

Design



Modelling

Fabrication


Quality Control

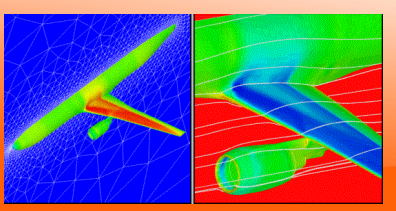
# Engineering Development Cycle

Specifications


Quality Control

Design

Fabrication



Modelling

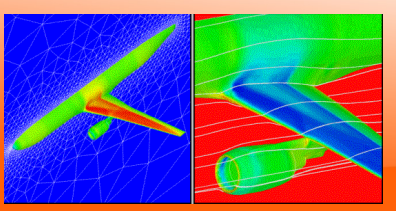
# Engineering Development Cycle

Specifications


Quality Control

Design

Fabrication



Modelling

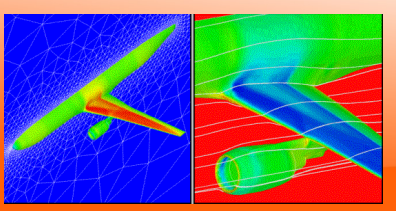
# Engineering Development Cycle

Specifications


Quality Control

Design

Fabrication



Modelling

# Engineering Development Cycle

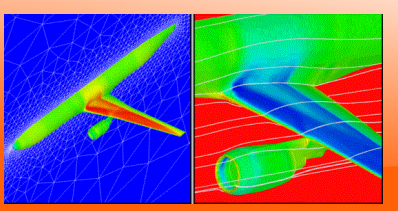
Specifications


Quality Control

Good documentation is key

Design

Fabrication



Modelling

# Engineering Challenges



# Engineering Challenges




**How will it impact the traditional engineering development cycle ?**

# iGEM Project

Let's have a look at

Imperial iGEM 2006 Project

(presentation available on OpenWetWare)

# References


> iGEM Imperial 2006/2007
> OpenWetWare
> iGEM Competition