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FRENCH GOVERNMENTAL APPROACH FOR SYNTHETIC BIOLOGY- RELATED BIOSECURITY

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Implementation of biosecurity

- OECD definition : Biosecurity is intended to deter or detect the loss or theft of dangerous biological materials for illicit or malicious purposes.
- General tools :
 - regulation (law, control organisms, etc.),
 - recommendation (guidelines, harmonization, codes-of-conduct, etc.),
 - sensitization (seminar, training, education, etc.).

Potential risks

- Biological :
 - *De novo* synthesis of known biological threat agents.
 - *De novo* synthesis of new biological agents.
- Others :
 - *De novo* synthesis of known chemical threat precursors.
 - Hybrid organisms with nanotechnologies.

Recommendations to improve biosecurity

- Origin of the recommendations to governmental authorities :
 - Academies of sciences,
 - National advisory boards,
 - 6th FP.
- Selected recommendations :
 - Adapted regulation to limit malicious application,
 - Control of gene synthesis,
 - Guidelines, harmonization and codes-of-conduct,
 - Sensitization, education and training,
 - Committee to check and control synthetic biology research.

Adapted regulation to limit malicious applications : existing frame

- National regulations for biological risks at work.
- National regulation to follow and control whole or part of listed micro-organisms and toxins.
- European regulations for biological risks at work.
- European regulation for export control (Australia Group).
- International regulation (United Nations resolution, chemical weapons convention, the biological and toxin weapons convention).

New adapted regulations need to identify complete applications and risks of synthetic biology

Control of DNA synthesis

- Sensitization of gene synthesis industries :
 - Communication to industries of the illustrative Australia group's list of indicators to identify suspicious orders* of synthetic nucleic acid sequences.
 - National points of contact list.
- Control of DNA synthesis :
 - Uncommon use in research laboratories.
 - Need appropriate database.
 - Need international control to be effective (purchase in different companies).

Control DNA synthesis must be international to be effective

* unidentified client, discrepancy between client and usage, abnormal amounts...

Sensitization of scientific community

- Sensitization by security civil servant in each research institution.
- Conference by governmental agency (health, feeding).
- Seminar from the internal information central direction (DCRI).
- Education with specific university degrees in biosecurity.
- National forum.

Sensitization of scientific community is considered as very important approach to improve biosecurity concern of scientist

Monitoring and control Committee for synthetic biology research

- To be initiated in the framework of UN (the biological and toxin weapons convention).
- National advisory scientific committee on emergent scientific fields (French academy of sciences).

In Summary

**Synthetic biology promises powerful applications.
Regulations without discrimination could handicap research.**

- Biosecurity can be improved by sensitization of the scientific community.
- Tools for education or training are welcome.
- Control of suspicious order for gene synthesis industries is supported.
- Analysis of biorisks induced by synthetic biology is still ongoing.
- Guidelines of good practices to improve biosecurity of synthetic biology are welcome.