



INFO DAY
SESSION D'INFORMATION
RETOUR D'EXPÉRIENCE / TÉMOIGNAGE

PROJET ERC CONSOLIDATOR
« BIG MAC »
2017-2022

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INSTITUT DE CHIMIE DE LA MATIÈRE CONDENSÉE DE BORDEAUX



ERC GRANTS

- **Gros budgets**
- **Indépendance scientifique pendant 5 ans**
- **Monter votre (sous)-groupe**
- **Ne pas se brider !**
- **Idées novatrices / multidisciplinaires (High risk/ High gain)**
- **Un excellent CV avec un mauvaise idée ne passera pas mais: un bon CV avec une excellente idée peut passer!**
- **Attention au % d'implication !**

ERC CoG (CONSOLIDATOR GRANT)?

Consolidator Grants

Also available

(FR) FRENCH



Actuellement, l'Europe n'offre pas suffisamment de possibilités aux jeunes chercheurs de se lancer dans une carrière indépendante passant ainsi d'un emploi sous la responsabilité d'un superviseur au statut de chercheur indépendant. Ce problème structurel se traduit par un immense gaspillage de talentueux chercheurs en Europe. En outre, ceci entrave ou retarde l'émergence d'une nouvelle génération de chercheurs de haut vol susceptibles d'apporter des idées et une énergie nouvelle incitant les chercheurs les plus doués à partir en début de carrière sous d'autres cieux pour leur développement professionnel.

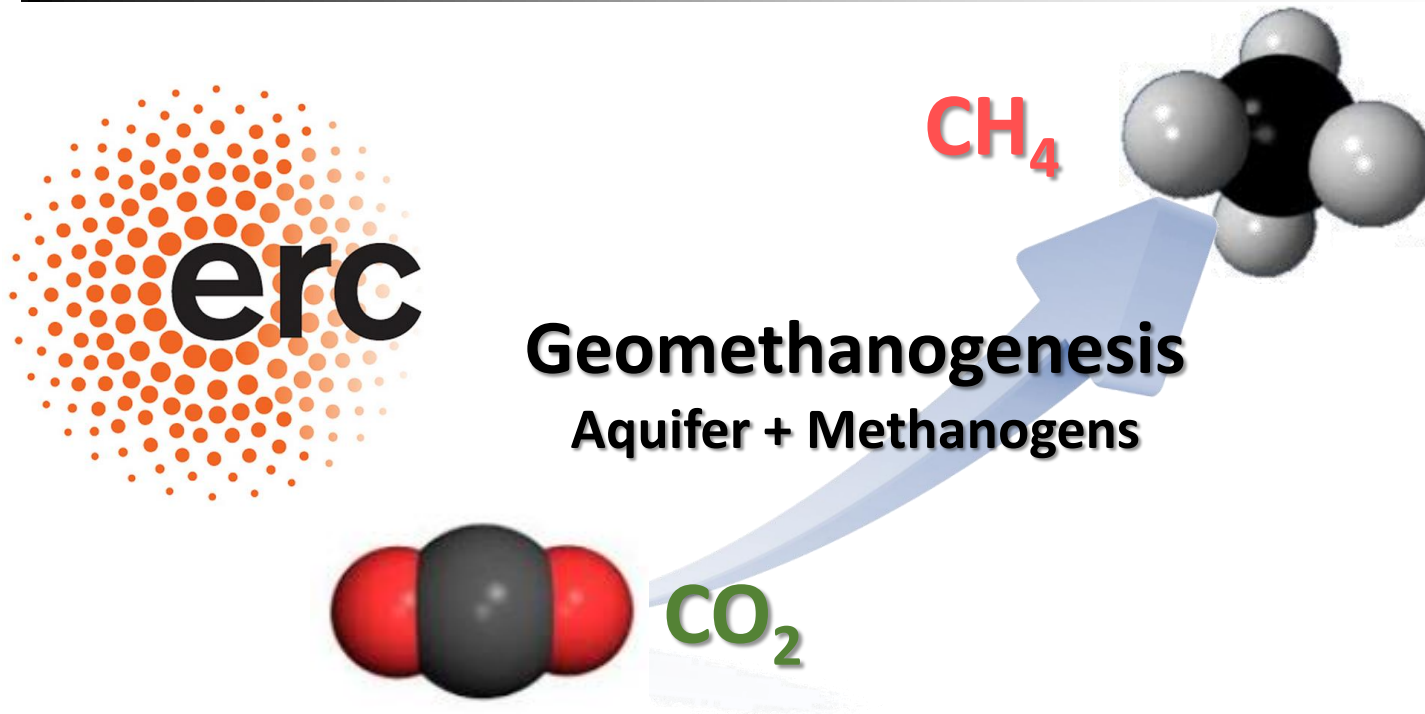
ERC Consolidator Grants in brief

- subventions destinées aux chercheurs de toute nationalité possédant entre 7 et 12 ans d'expérience depuis l'obtention de leur doctorat (ou **diplôme équivalent**) avec un parcours scientifique très prometteur,
- un excellent sujet de recherche.
- Les recherches doivent être menées dans un institut de recherche public ou privé (appelé «institution d'accueil») situé dans un **État membre** de l'UE ou un **pays associé**.
- Montant par subvention: jusqu'à 2 million d'euros
- Durée: jusqu'à cinq ans
- Critère d'évaluation: excellence scientifique.
- Appels à manifestation: publiés une fois par an

Mon projet

THE Big Mac project

MICROFLUIDIC APPROACHES MIMICKING BIOGEOLOGICAL
CONDITIONS TO INVESTIGATE CO₂ SUBSURFACE RECYCLING



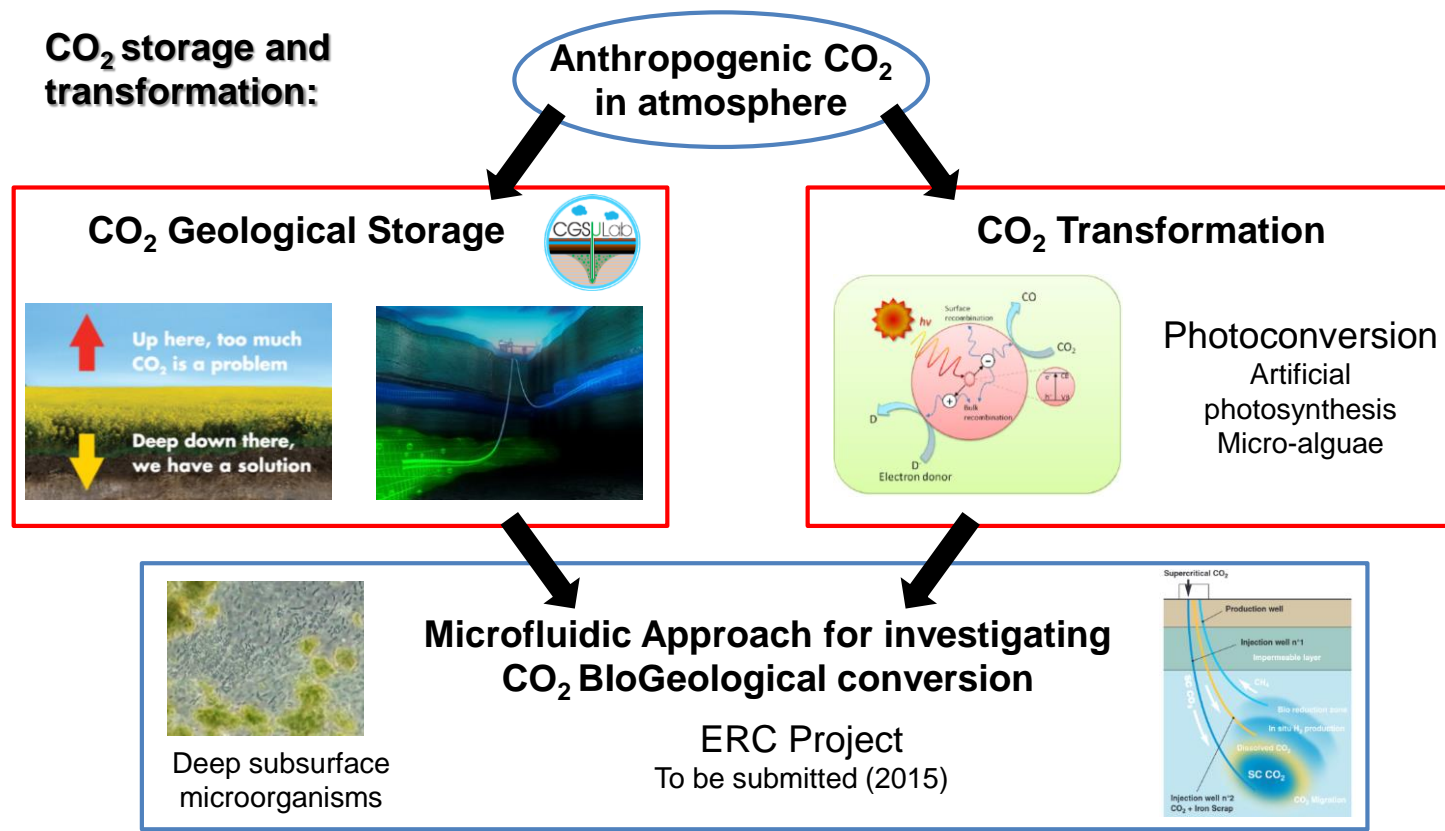
MY PROJECT : BIG MAC / HOW DID I GET THERE ?

Slide of my HdR (Oct. 2014)

III – RESEARCH PROJECT

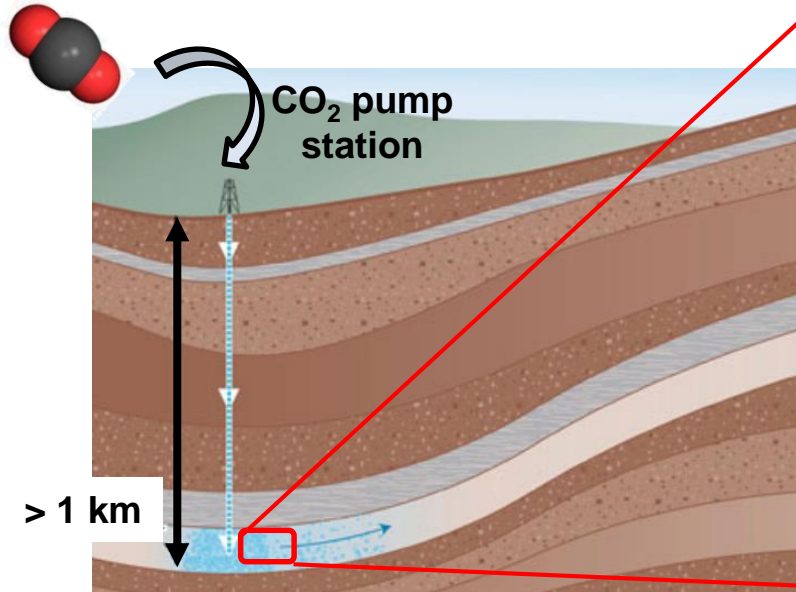
THERMODYNAMICS / HYDRODYNAMICS / CHEMISTRY / BIOLOGY

CO₂ storage and transformation:

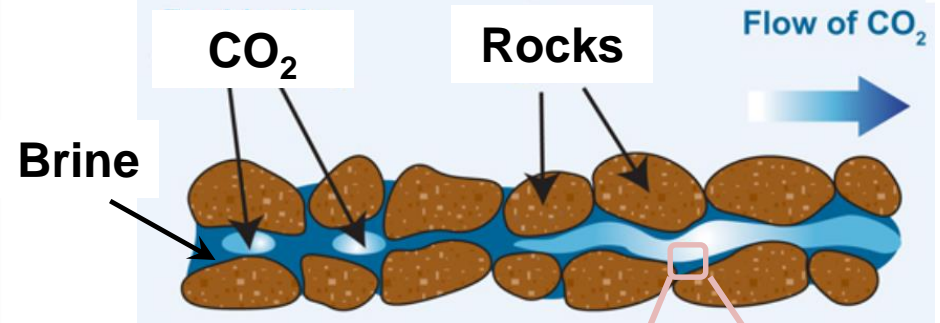


PROJECT MOTIVATIONS

CO₂ Geological Storage (CGS)

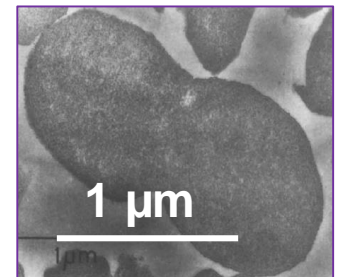


Deep Saline Aquifer



$0.5 < \text{Porosity} < 30\%$
 $10^{-1} < \text{Permeability} < 10^3 \text{ mD}$
 $30 < T < 100^\circ\text{C}$
 $60 < p < 150 \text{ bar}$

Micro-organisms
(up to 10^8 mL^{-1})

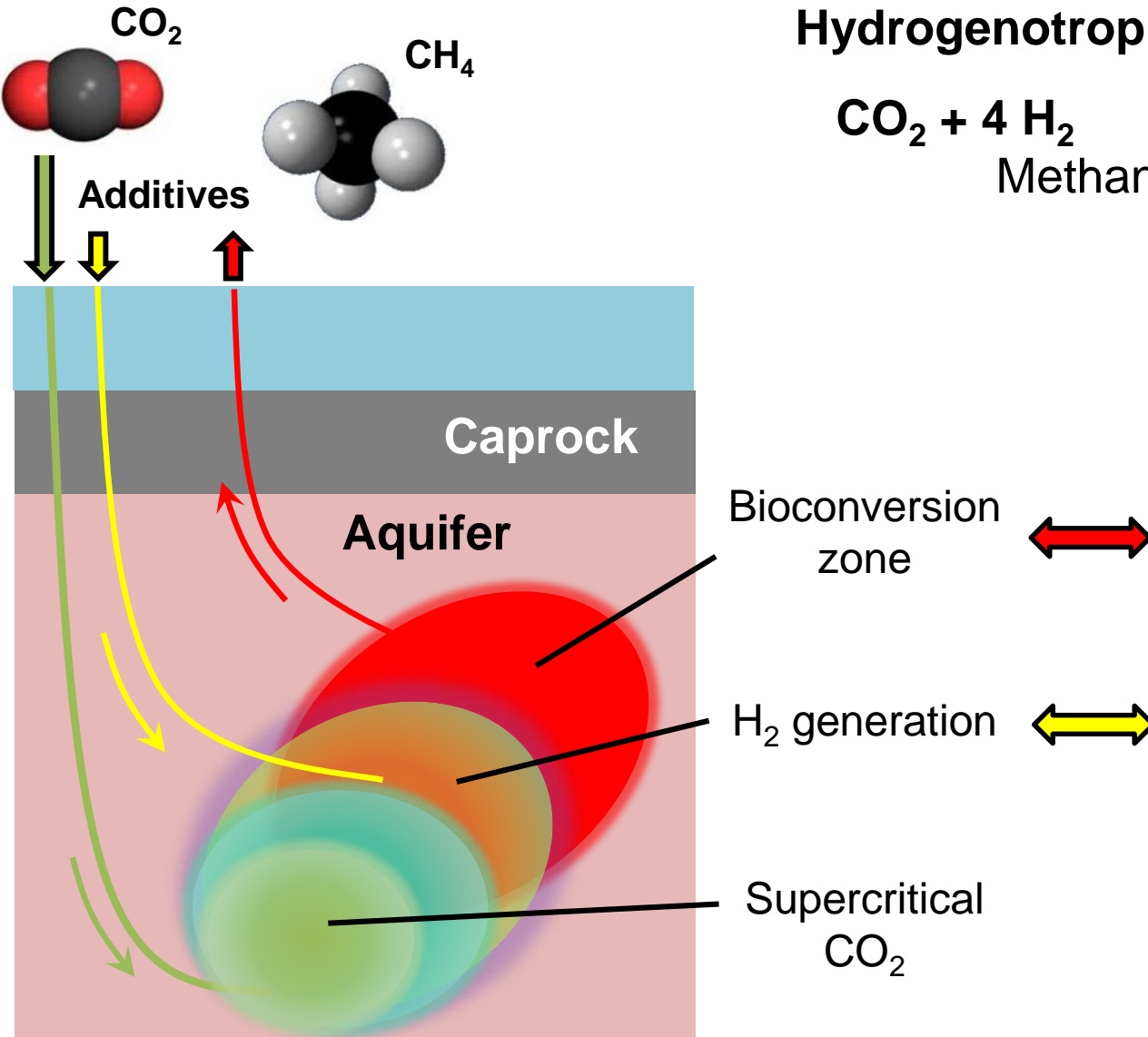


→ CGS / micro-organisms interaction ?

→ Use the geo-micro-organisms to transform CO₂ to valuable product ?

BIOGEOLOGICAL CO₂ TRANSFORMATION TO METHANE

Hydrogenotrophic methanogenesis:



Current challenges:

- Uncomplete Geomethanogenesis data* (p > 20 bar)
- Artificial H₂ *in situ* generation
- Need for new HP high throughput tools at the pore scale

THE MICROFLUIDIC APPROACH OF BIG MAC

- Flexibility in design / HP capability
- *In situ* characterization
- Fast screening
- Safety

BioGeological Labs on Chip Platform

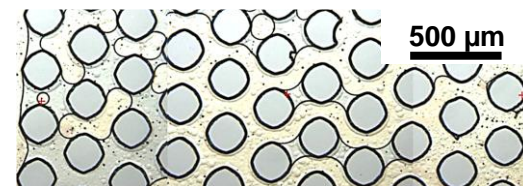
New opportunities to investigate
(bio)geological reactions at pore scale

(2016)

Geological Labs on Chip

(2010)

Porous media on chip

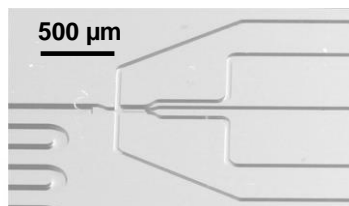


2 PhD thesis 2010 – 2015
Lab Chip 2016

High pressure microfluidics

(2007)

450°C – 250 bar capability

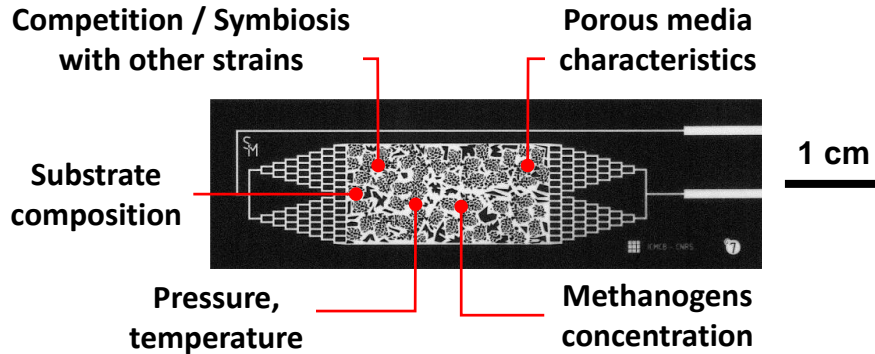


4 PhD thesis 2008 – 2015
Chem. Soc. Rev. 2010

WORKPLAN

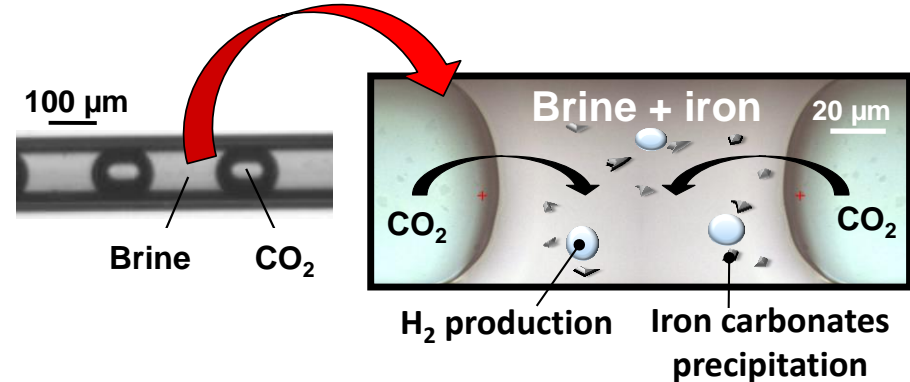
Task 1: Methanogenesis process

(PI, PhD1, BioEng.)



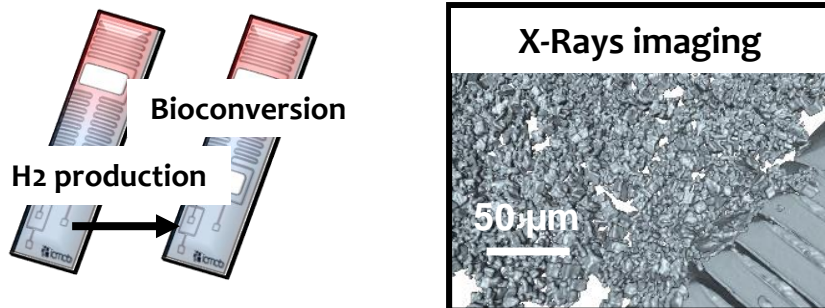
Deliverables: Development conditions / Production rates

Task 2: H₂ generation (PI, PhD2)



Deliverables: Feasibility / kinetics data

Task 3: Full process investigation in 2D & 3D reactive BioGLoCs (PI, PhD3, PD1, BioEng.)

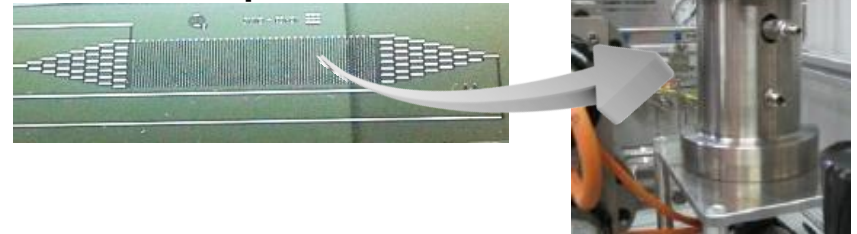


Deliverables: First study of the full geomethanogenesis process including geochemical effects

Task 4: Demonstration at the liter scale

(PI, PD2, BioEng.)

Pore scale - μL



Deliverables: Determination of scale-up criteria / Production rates / Process benchmarking

EXPECTED OUTCOMES

- Thermo-hydro-biogeochemical processes on chip
- Feasibility of artificial *in situ* H₂ generation
- Database on methanogens development in deep geological settings
- Fundamental mechanisms associated with a biogeochemical transformation

IMPACT

- New approaches for biogeosciences
- Knowledge for other deep underground-related processes



1 cm

STAFFING / SKILLS

	Skills	Supervision	Secondments
PhD 1 – Task 1	Microfluidics Biogeochemistry	S. Marre (ICMCB) S. Dupraz (BRGM)	/
PhD 2 – Task 2	Microfluidics Chemical engineering	S. Marre (ICMCB) C. Aymonier (ICMCB)	R.L. Hartman (NYU – USA)
PhD 3 – Task 3	Microfluidics Biogeochemistry	S. Marre (ICMCB) A. Ranchou-Peyruse (EEM-Pau)	/
PhD 4 – Task 4 ?	Microfluidics Geochemistry	D. Bernard (ICMCB) S. Marre (ICMCB) / M. Azaroual (BRGM)	BRGM (40%)
Postdoc 1 – Task 3	Chemical engineering Bioengineering	S. Marre (ICMCB) S. Dupraz (BRGM)	/
Postdoc 2 – Task 4	Microfabrication X-Ray tomography Biogeochemistry	S. Marre (ICMCB) D. Bernard (ICMCB) A. Ranchou-Peyruse (EEM-Pau)	/

L'écrit

Avoir les idées bien claires

- **Le temps de rédaction peut (doit) être court...si le projet est mûr!**
- **Ne pas se lancer sur un coup de tête**
- **Pas de formalisme particulier imposé (part B1 et B2 avec quelques sous parties)**
- **Trouver un bon acronyme et un bon visuel**

Ecrit difficile... chute facile !

L'écrit

2 parties:

B1 (12 pages) → résumé du projet + CV du candidat

B2 (15 pages) → Détails du projet + Partie financière

- **L'ordre de rédaction importe peu (chacun sa méthode!)**
- **Faites vous aider! (collègues, consultant, etc.)**

La soumission

Bien choisir son panel

Attention au cross panel review !

ERC: HOW DOES THE SELECTION PROCESS WORKS ?

→ 2 steps:

STEP 1:

Selection at step 1 by a panel of experts based on the project excellence and the candidate CV

Then, you are (or not) allowed to move towards step 2.

Dear Dr. MARRE,

Subject: Initial information on the outcome of the evaluation of proposals submitted to the Call for Proposals ERC-2016-COG - Proposal n° 725100 Big Mac

I am pleased to inform you that the ERC evaluation panels, composed of independent experts, have favourably reviewed your proposal in Step 1 of the evaluation process. We cordially invite you to attend an interview with the evaluation panel.

Date:	The interviews for your panel will take place from 19 September to 23 September. Please make sure to keep these days free.
Place:	Brussels, Belgium
Interview content:	Interviews will last between 20 and 30 minutes. They will include a short presentation by the applicant and time for questions and answers.

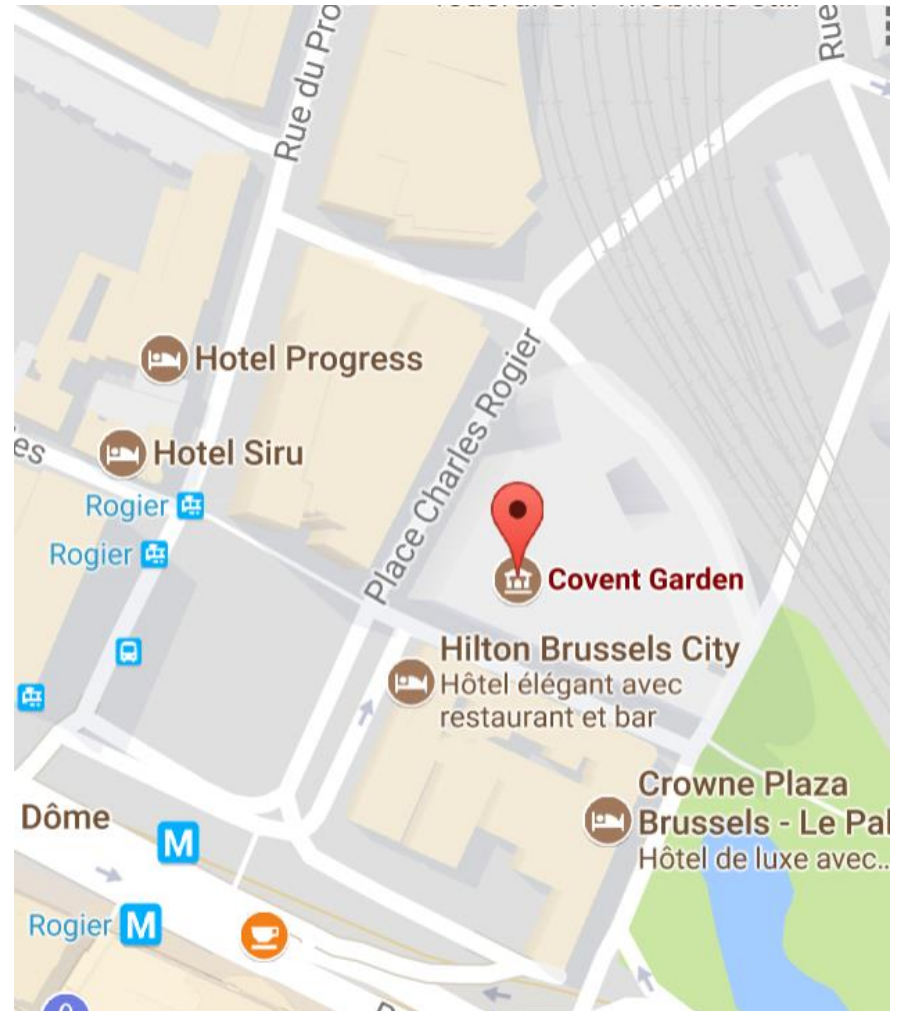
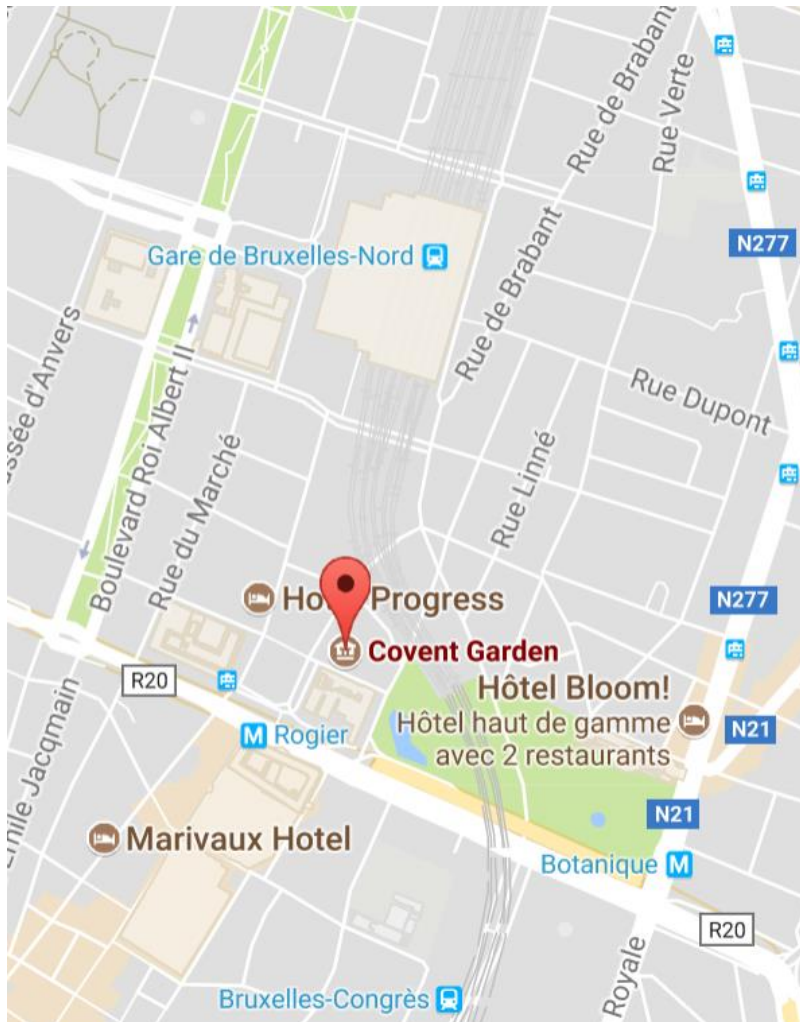
L'oral

Préparez vous !

- **Demandez les avis de collègues**
- **Faites des répétitions avec plusieurs personnes de domaines différents**
- **N'hésitez pas à faire des oraux blancs – ex: CNRS**
- **Maitrisez votre présentation 1 mois avant l'échéance**
- **Préparer les questions ! (science + autres)**

L'oral

Le Lieu



L'oral

Le Lieu



L'oral

Arrivez la veille et prenez possession des lieux !



L'oral

Le jour J

**Arrivez au moins 1h avant
l'horaire prévue**

- **Procédures d'enregistrement
et contrôle d'identité**
- **Vérification et chargement
des présentations**
- **Salle d'attente avec d'autres
candidats**



L'oral

Attention, ce n'est pas une conférence mais un examen !



L'oral

Le panel / la disposition

14 à 18 membres – 1 rapporteur



- Pas tous experts du domaine
- Etre convaincant, persuasif mais...humble !

L'oral

Le panel / la disposition

2 écrans – 1 ordinateur (?)



L'oral

Le panel peut être amical...ou non!

- Critiques fortes du projet / 1 membre joue souvent le mauvais rôle
- Applaudissements

Questions / commentaires en vrac

- You will hire a biologist for this work, how will you make sure he/she's the right person, based on your expertise?
- Microfluidics does not account for real large scale process, so is this approach relevant?
- Are you sure that the data generated from this project (at microscale) will be relevant and similar to the real size problem (km scale)?
 - Why people never did this before?
 - I do not trust this project. It will fail for sure !
- Do you have any competitor for this project?
- What if some task fails? How will you deal with that?

ERC: HOW DOES THE SELECTION PROCESS WORKS ?

STEP 2:

In the second step, your proposal is sent to 6-8 external international reviewers, who give advices and comments on whether you should be funded.

You have to present your proposal in front of the panel members in Brussels, who mostly ask questions in link with the comments of the external reviewers. Then, you can (or not) be funded.

2015:

Dear Dr. Marre,

Subject: Outcome of the evaluation of proposals submitted to the Call for Proposals ERC-CoG-2015 - Proposal n° 682828 BIG MAC

The ERC evaluation panels, composed of independent experts, have carried out their review of the proposals submitted to the above-mentioned ERC-CoG-2015 Call. This included your proposal entitled: *"Microfluidic approaches mimicking biogeological conditions to investigate subsurface CO2 recycling"*.

Your proposal was reviewed in Step 2 against the evaluation criteria published for the call. I regret to inform you that, after careful consideration, the evaluation panel has decided that your proposal meets some, but not all of the ERC's evaluation criteria, and has recommended that your proposal should not be retained for funding. For your information, only the top 34% of the proposals evaluated in panel PE8 in Step 2 were funded.

ERC: HOW DOES THE SELECTION PROCESS WORKS ?

STEP 2:

In the second step, your proposal is sent to 6-8 external international reviewers, who give advices and comments on whether you should be funded.

You have to present your proposal in front of the panel members in Brussels, who mostly ask questions in link with the comments of the external reviewers. Then, you can (or not) be funded.

2016:

Dear Doctor/Professor MARRE,

I am writing in connection with your proposal for the above-mentioned call.

We are pleased to inform you that your proposal has been **favourably evaluated** and that you will be contacted soon, to be invited for grant preparation.

FEEDBACKS ON THE PROPOSAL

The evaluation of the proposal by the panel members (mostly on the oral presentation) and the external reviewers (writing part) gives many feedbacks to improve the proposal.

The comments are generally detailed and constructive.

Reviewer 4

Research Project
Ground-breaking nature and potential impact of the research project
The project aims to investigate the management of anthropogenic CO ₂ , one of the key challenges for our generation. The proposal aims to provide methodologies to speed up the biological conversion of CO ₂ in rational framework guided by the scientific knowledge that will be acquired in this proposal. The proposal goes well beyond the state of the art, and it is of limited risk and of potential very high gain.
Scientific Approach
The proposal aims to use microfluidic devices in a systematic way so as to investigate fundamental processes of CO ₂ in geological formations at pore scale. The PI will develop suitable databases that will allow others to access his findings. The PI addresses also issues of scaling from the experimental front to larger systems. A drawback of the overall approach is the non-inclusion of theoretical and simulation studies in the design of the labs on a chip. They could have complemented the well laid out experimental efforts and may have accelerated the design cycle.

Principal Investigator	
To what extent has the PI demonstrated the ability to propose and conduct ground-breaking research?	Outstanding
To what extent does the PI provide evidence of creative independent thinking?	Outstanding
To what extent have the achievements of the PI typically gone beyond the state of the art?	Excellent
To what extent does the PI demonstrate the level of commitment to the project necessary for its execution and the willingness to devote a significant amount of time to the project (min 40% of the total working time on it and min 50% in an EU Member State or Associated Country)?	Excellent

Après le succès...les problèmes !

- **La phase de préparation est longue. Le démarrage du projet intervient généralement ~ 6 mois après la notification.**
- **On peut négocier avec l'ERCEA un (léger) report de la date de démarrage du projet.**
- **Dans mon cas, c'était bénéfique car pas de place au labo !**

Trouver de la place dans son labo...il faut négocier !



BIG MAC LAB @ ICMCB – 66 M²



Acheter les équipements: Un parcours du combattant

Ruma PRM

Cuguar

Promis

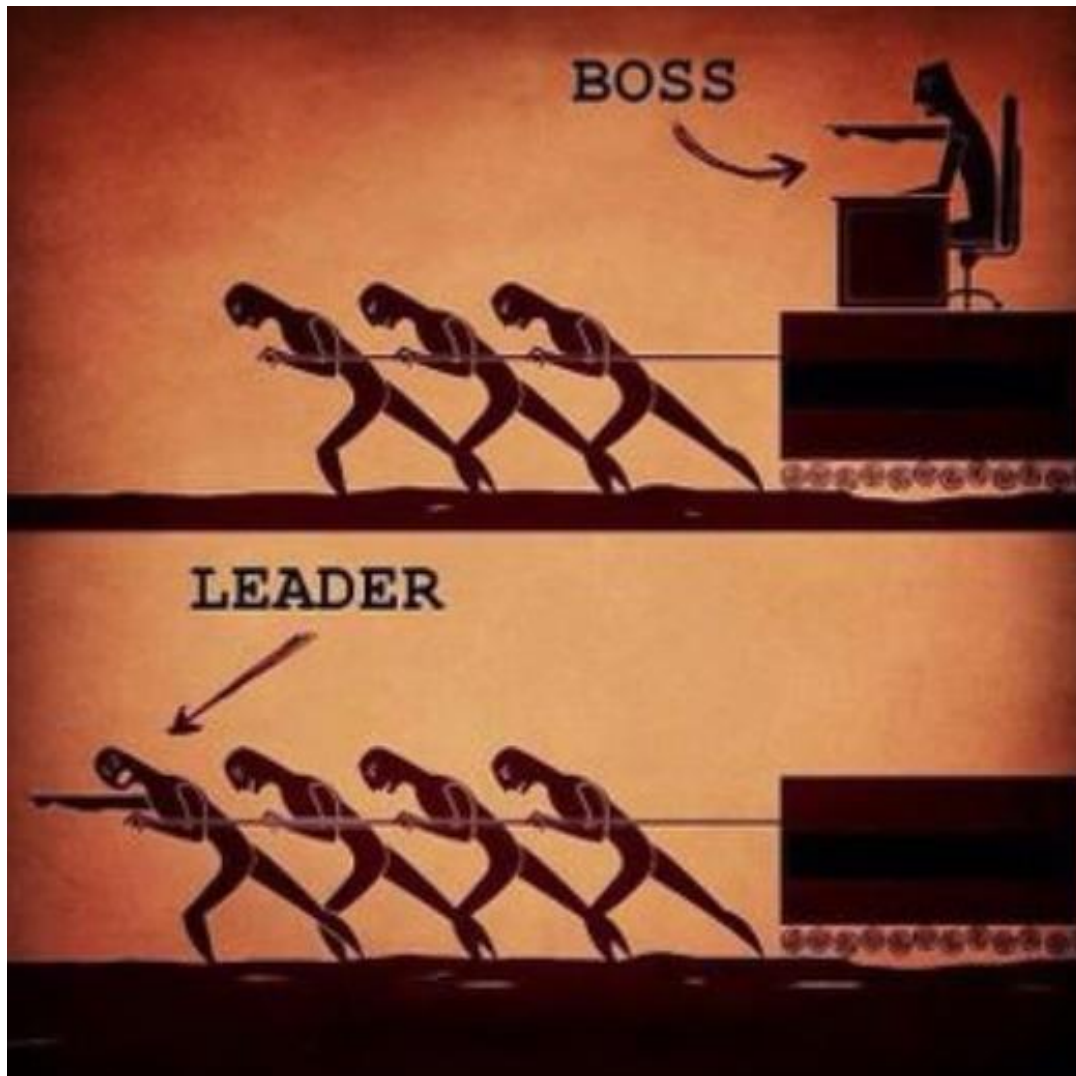
Reca

ARno

Rop



Recruter les bonnes personnes et gérer les ressources humaines



Attention au contrats de recherche !



Loi Sauvadet



RETOUR D'EXPÉRIENCE TÉMOIGNAGE



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