

One way ticket to hell (and back!)

The path toward your next ERC grant -my €0.02!

Francesco Topputo

22 February 2021

Introduction



- Associate Prof. (Polimi), Visiting Prof. (TU Delft)
- **DART** group at Polimi (3 PostDocs, 8 PhD, 5 RAs)
- PI in 14 projects, managed €4.1M grants
- 50+ journal papers, 1.3k+ citations, h-index: 22
- Co-funder and CEO of Dinamica Srl (2008-17)

erc

EXTREMA

Engineering Extremely Rare Events in Astrodynamics for Deep-Space Missions in Autonomy

LUMIO

esa

Lunar Meteoroid Impacts Observer

m-argo

esa

Miniaturised Asteroid Remote Geophysical Observer

esa

hera

esa

Hera's Milani

Overview of EXTREMA project

Engineering Extremely Rare Events in Astrodynamics for Deep-Space Missions in Autonomy

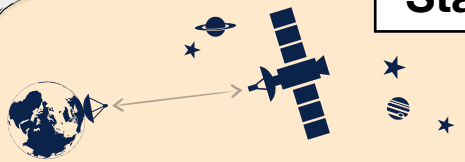
Context



New *era* for *outer space* approaching

Moon, Mars, Asteroids ***missions trend***

State of the art



Deep-space probes piloted from ground

Significant ***human-in-the-loop*** *involvement*

To what extent can we navigate the solar system free of human supervision?

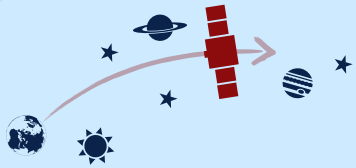
Motivations



Ground control expensive, unsustainable

Autonomous deep-space probes *needed*

Miniaturisation



Interplanetary CubeSats bound to thrive

Scaled ***system*** *cost, but same* ***operation*** *costs*

Goal and impact of EXTREMA

Goal

To enable self-driving spacecraft

Hypothesis



Environment

Information

Spacecraft

Navigation

Determine the position

From the *environment*

Actuation

Position → Guidance

Plan the trajectory

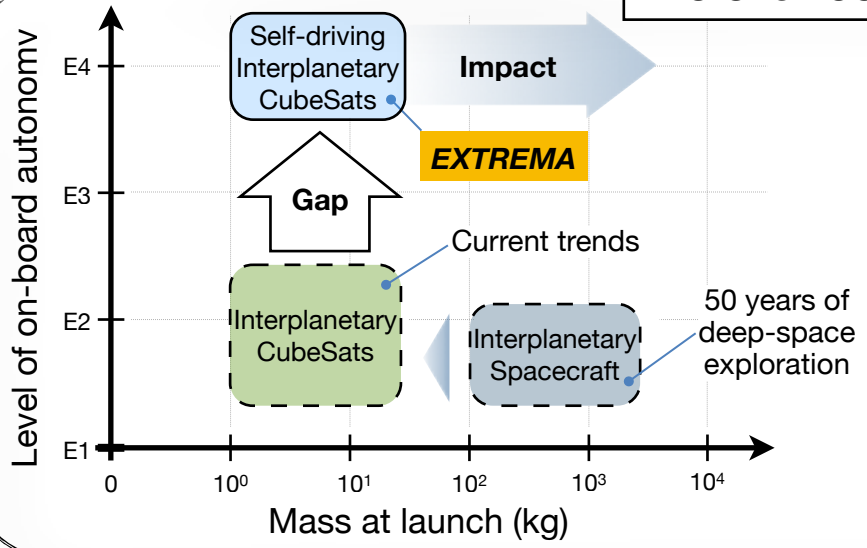
On-board *computer*

Trajectory → Control

Control the motion

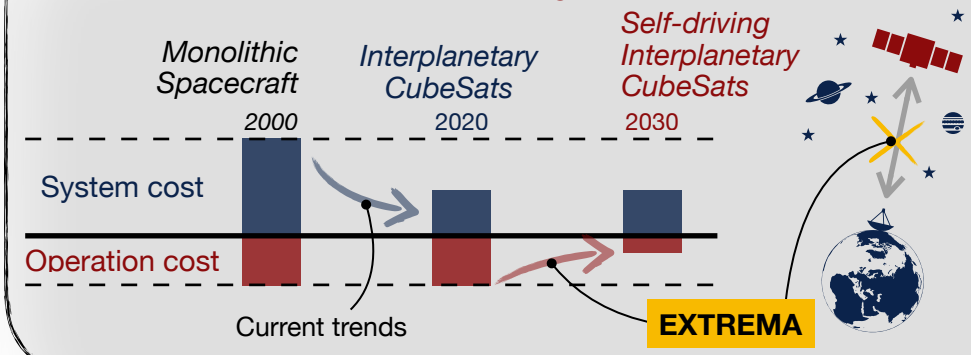
On-board *propulsion*

Relevance



Impact

Full mission cost scalability



Why to go for an ERC Grant

Crystal clear reason to apply

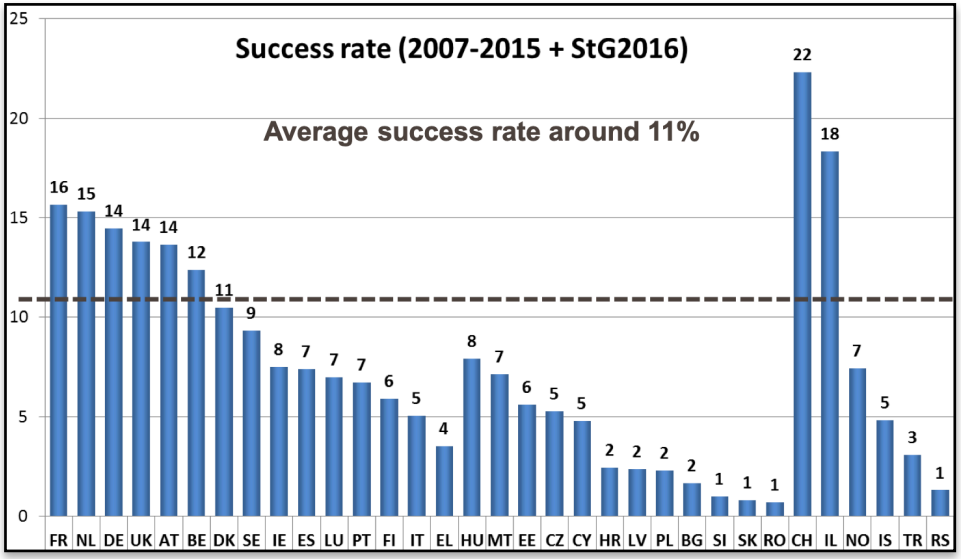
- Most prestigious grants worldwide
- Support bottom-up research
- Fund big, multi-year projects
- Boost one researcher's career

	Submitted Proposals	Selected Proposals
Life Sciences	707	89
Physical Sciences and Engineering	1072	134
Social Sciences and Humanities	674	78
Total	2453	301
Success rate ~ 12.3 %		

Outcome of 2019 CoG call (source: ERC)

But

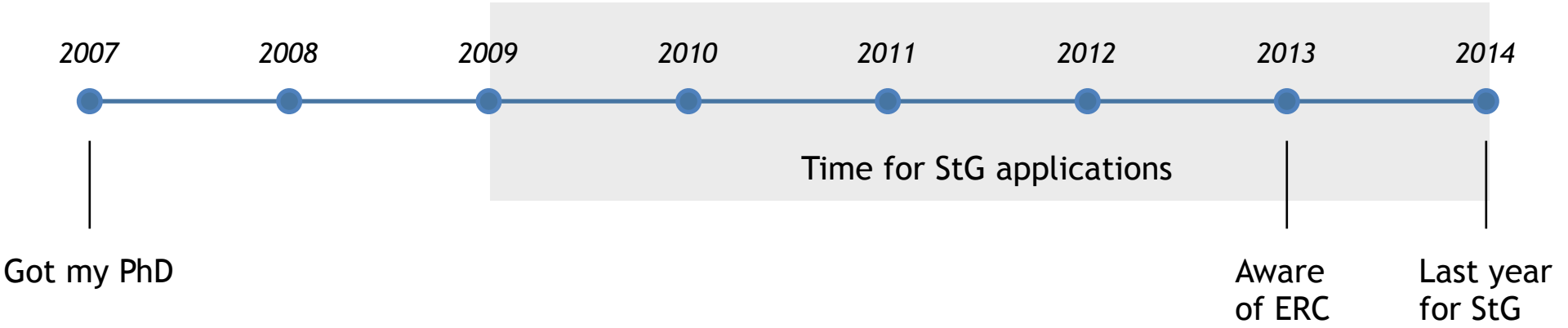
- Extremely low success rate
- Overall painful process
- Is this really worth it?



Success rate of StG calls 2007-2016 (source: ERC)

The “try”

In 2014 I *tried* an ERC Starting Grant



- At 7th year since PhD, I decided to *make an attempt* for a StG

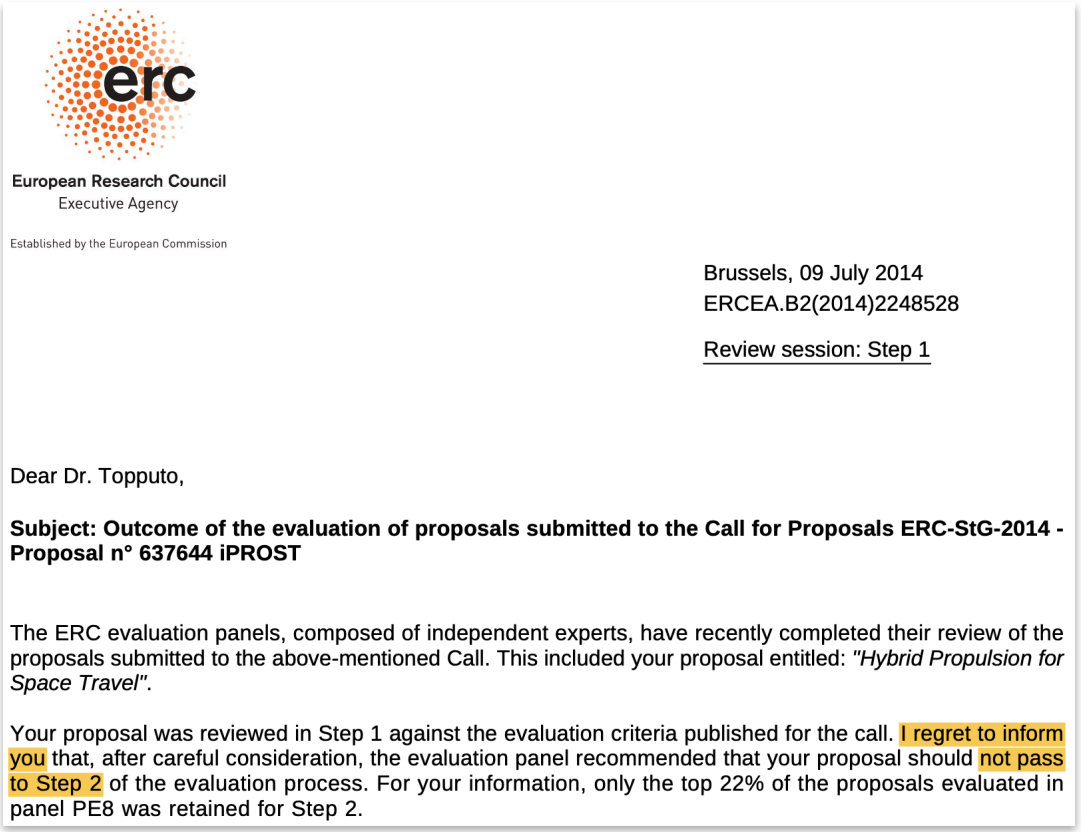
The 2014 StG proposal

The cv

- Assistant professor
- PI in 2 projects
- 25 journal articles
- h-index of 8
- Founder & CEO of SME
- 2 awards

The proposal

- Conceived in ~1 month
- Written in ~2 weeks
- Many parts too generic
- Weak in many parts



European Research Council
Executive Agency

Established by the European Commission

Brussels, 09 July 2014
ERCEA.B2(2014)2248528

Review session: Step 1

Dear Dr. Topputo,

Subject: Outcome of the evaluation of proposals submitted to the Call for Proposals ERC-StG-2014 - Proposal n° 637644 iPROST

The ERC evaluation panels, composed of independent experts, have recently completed their review of the proposals submitted to the above-mentioned Call. This included your proposal entitled: *"Hybrid Propulsion for Space Travel"*.

Your proposal was reviewed in Step 1 against the evaluation criteria published for the call. I regret to inform you that, after careful consideration, the evaluation panel recommended that your proposal should not pass to Step 2 of the evaluation process. For your information, only the top 22% of the proposals evaluated in panel PE8 was retained for Step 2.

Evaluation letter of the 2014 StG proposal

Proposal graded B (did not make it to Step 2)

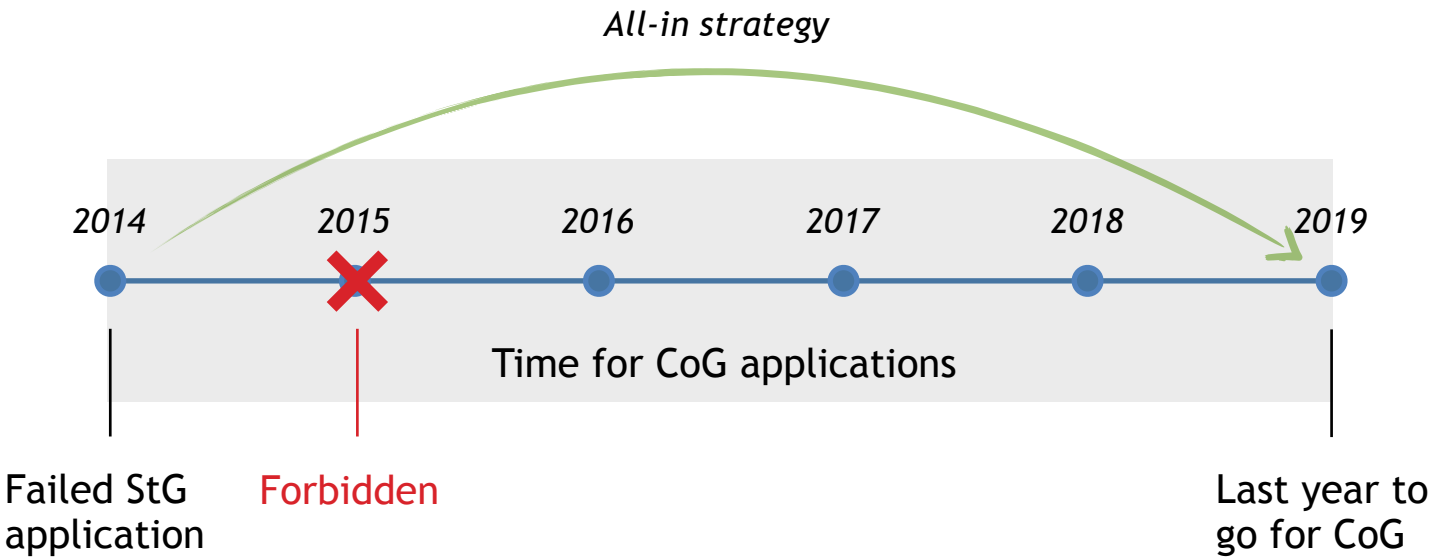
"Do. Or do not. There is no try."

Yoda

The *all-in*

Instead of keep trying, I decided to go for an *all-in*

- The later, the stronger
- But no chances left
- Riskier than a poker hand



Road to success: the cv

Since there were some years to go, I decided to strengthen the cv

- Got a regional grant (Regione Lombardia + Fondazione Cariplo)
  - For ERC applicants graded B or higher
- Got multiple competitive grants (Polimi, ESA)
  - By writing rock-solid proposals
- Improved my international experience
  - Became visiting researcher at TU Delft, The Netherlands
- Served my community through the membership in societies
  - Acquired visibility within the community
- Published few, high-quality articles
  - Proof-of-concept works for the later application
- Got promoted to Associate Professor

Road to success: the proposal

Meanwhile, I never stopped thinking of *the* project to propose

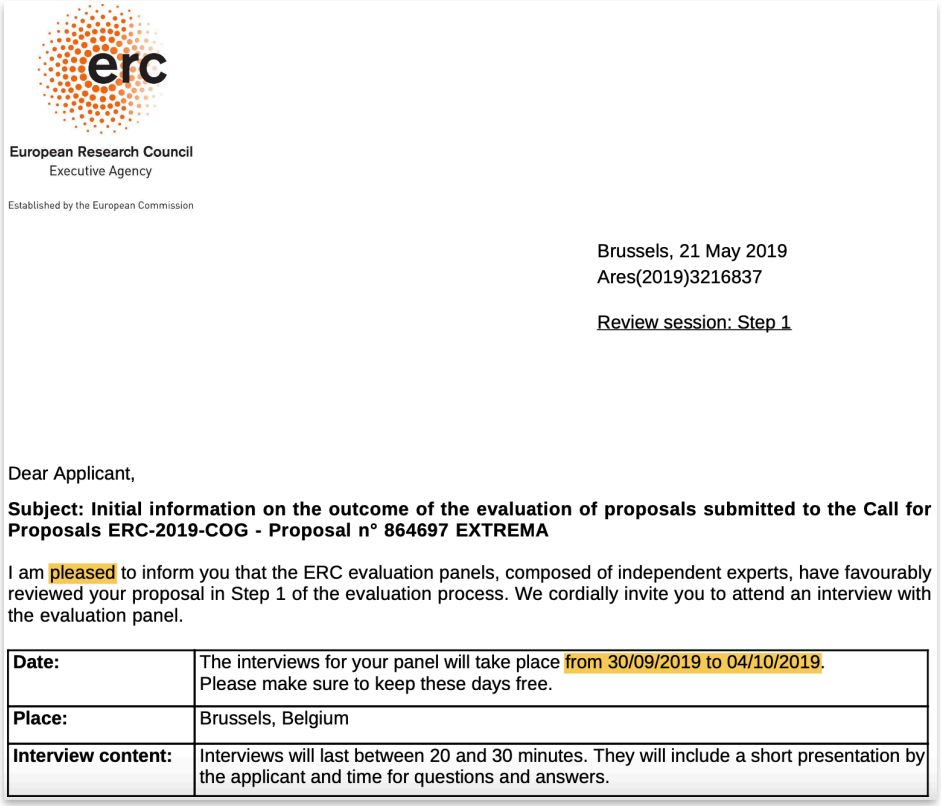
- Started to brainstorm one year before the target
- Exposed idea to my collaborators ~5 months before deadline
- Got valuable feedback, which was elaborated further
- Put pen on paper ~3 months before deadline
  - Started from B1 (cv first; then, extended synopsis, 5 pages)
  - Wrote, read, deleted, re-wrote (only ~10 lines/day!)
  - Changed fontsize of empty spaces to have elegant periods :)
  - Produced clear, high-quality illustrations
  - I *loved* my proposal

Eventually, the proposal shined!

The submission

The cv

- ~~Assistant~~ Associate professor
- PI in ~~2~~ 8 projects (€1.3M)
- ~~25~~ 45 journal articles
- h-index of ~~8~~ 20
- Founder & CEO of SME
- ~~2~~ 6 awards
- Visiting researcher at TU Delft
- Leader of a research team
- Associate editor for 2 journals



European Research Council
Executive Agency

Established by the European Commission

Brussels, 21 May 2019
Ares(2019)3216837

Review session: Step 1

Dear Applicant,

Subject: Initial information on the outcome of the evaluation of proposals submitted to the Call for Proposals ERC-2019-COG - Proposal n° 864697 EXTREMA

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 30/09/2019 to 04/10/2019. 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.

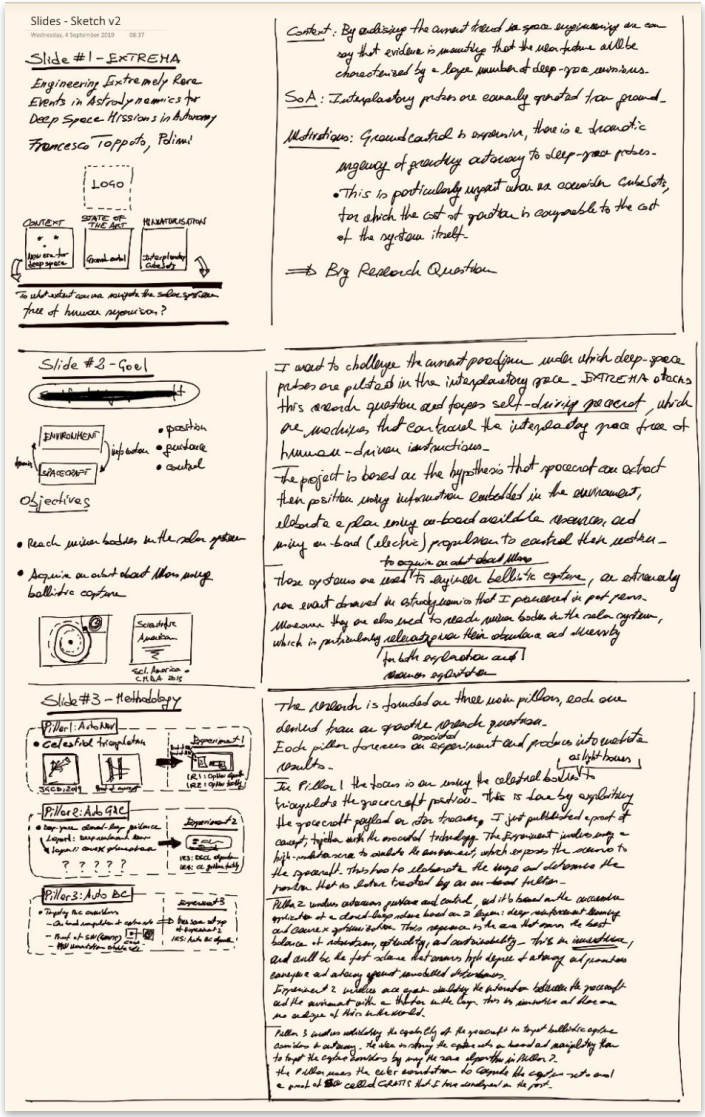
Evaluation letter of the 2019 CoG proposal (step 1)

Admitted to step 2 (interview in Brussels)

The interview

6-min pitch + 19 min of Q&A

- One-shot chance for applicants (part 2)
- Paramount time management
- Clarity, conciseness are a *must*
- Q&A management tricky
- Madness in waiting room :)
- Everything meticulously planned
  - Started working 1 month before
  - 6 crystal clear slides
  - 3 mock interviews



Overall, I felt I delivered

The evaluation

Then, 1.5 months later you get an email out of the blue

ERC-2019-COG call – Step 2 results - Proposal N° 864697 - EXTREMA - Panel PE8 - PI name: TOPPUTO

E

ERC-2019-COG-APPLICANTS@ec.europa.eu <ERC-2019-COG-APPLICANTS@... Friday, 15 November 2019 at 10:36

To: Francesco Topputo

This message is high priority.

Dear Applicant,

Following the Step 2 panel meetings of the ERC-2019-COG call, the review panels have concluded their work and identified proposals to be recommended for funding for this call.

We are pleased to inform you that your proposal has been retained for funding, subject to confirmation by the ERC Scientific Council of the final ranked list of proposals recommended for funding in this call and finalisation of the evaluation process by the ERC Executive Agency.

In 3-5 weeks the official communication will be placed in the F&T Portal containing all information related to the evaluation process together with an evaluation report (providing reviews and an overall panel comment summarising the panel decision). The full evaluation results will consist of an Evaluation result letter, a letter from the ERC President and an Evaluation Report.

See full story on Twitter thread on LinkedIn article

Behind the scenes of my ERC grant

Published on December 26, 2019 Edit article | View stats

Francesco Topputo
Associate Professor at Politecnico di Milano

Overall lesson learnt

There are no free meals.