



APASOS

A Physics approach to sociotechnical systems: from theory to data analysis



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A PASOS = STEPS AWAY, CLOSE



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APASO: Asian Pacific American Student Organization (Michigan State University)

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Plan Nacional: 2021 Call «Proyectos de Generación de Conocimiento» Proyectos de investigación no orientada Physical Sciences



“Coordinated” project: IFISC (UIB) + IFISC (CSIC)
Coordination: administrative more than scientific

IFISC (UIB): PID2021-122256NB-C21

IFISC (CSIC): PID2021-122256NB-C22

Single scientific proposal

Starting date: September 1st 2022

Ending date: August 31st 2025

Natural follow up of PACSS (Physics approach to complexity in sociotechnical systems)
1-1-2019/30-9-2022

UIB Research Team



Raúl Toral
(PI1, coordinator)



Maxi San Miguel (PI2)

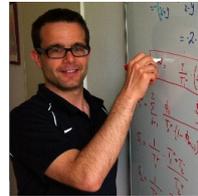


David Sánchez

CSIC Research Team



Sandro Meloni (PI1)



Tobias Galla (PI2)



Jose Javier Ramasco



Pere Colet

Work Team:

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 Konstantin Klemm (Denmark)
 Erjian Liu (Beijing)
 Marco Pangallo (Santanna School)

Budget:

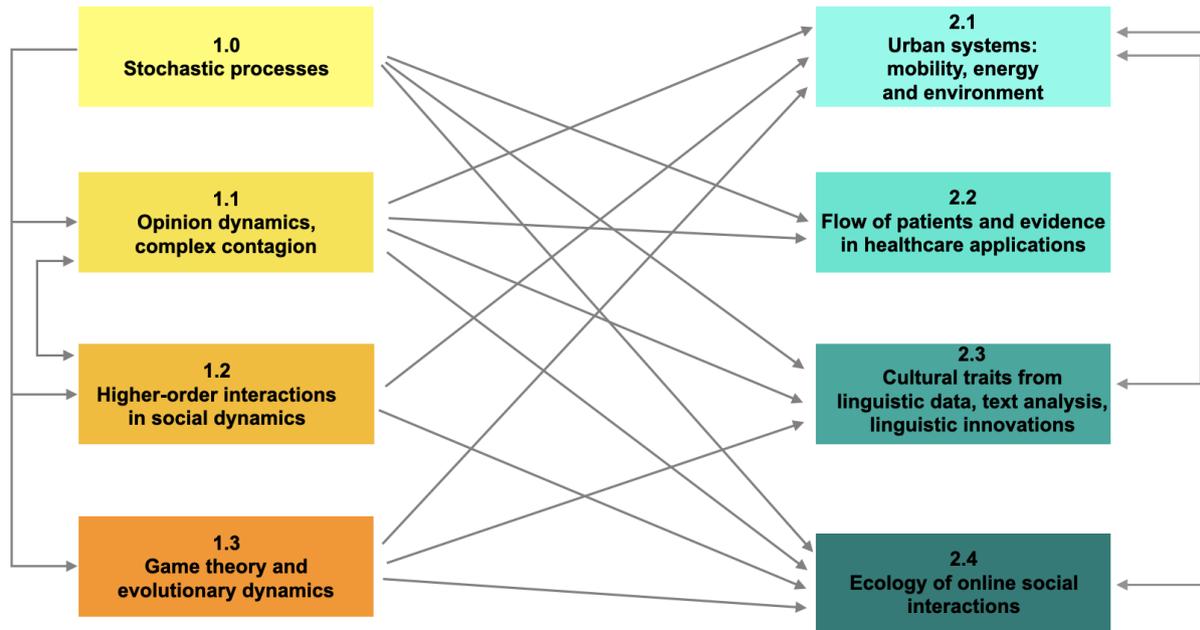
- We asked for 2 postdocs+2 young researchers+1 technician+2 PhD students
- Conferences, schools, short stays, invitations to researchers, publication charges, PC's, books, etc.
- Data acquisition.
- Upgrade of Nuredduna.

Nº	REFERENCIA	PROPUESTA DE FINANCIACIÓN (en €)				
		Presupuesto TOTAL concedido	Por concepto de gasto		Por tipo de financiación	
			CD Costes directos	CI Costes indirectos	Anticipo reembolsable	Subvención
88	PID2021-122256NB-C21	193.600,00	160.000,00	33.600,00	0,00	193.600,00
89	PID2021-122256NB-C22	181.500,00	150.000,00	31.500,00	0,00	181.500,00

375.100,00 €

- There is probably money for a 2 years of full time postdoc+2 years graduate/master
- 1 PhD student (FPI) has been awarded to UIB subproject

WP1: Methodological questions in modeling social behavior



WP2: Applications and data driven research

Researcher/Task	1.0	1.1	1.2	1.3	2.1	2.2	2.3	2.4
R. Toral	R	X		X		R	X	
M. San Miguel		R	X	X				
D. Sánchez	X	X		X			R	
S. Meloni		X	R	X	X	X		R
T. Galla	X	X	X	R		X	X	
P. Colet					X			X
J.J. Ramasco		X	X	X	R		X	X

WP1: Methodological questions in modeling social behavior

Task 1.0 Analysis of stochastic processes

- Aging.
- Multi-step processes and indicators of non- Markovian dynamics.
- Numerical methods for non-Markovian processes.
- Complex systems with extrinsic noise.

Task 1.1 Opinion dynamics and complex contagion processes

- Multi-state opinion dynamics
- Complex Contagion: Simple vs. Complex contagion, Homophily, Mechanisms of decision making
- Coevolution dynamics

Task 1.2: Higher-order interactions in social dynamics

- Detecting higher-order structures from pairwise interactions.
- Nonlinear group interactions arising from dyadic interactions vs genuine higher-order interactions.
- Noise and aging in higher-order consensus dynamics.
- Modeling super-spreading events with higher-order interactions on contact networks.

Task 1.3: Game theory and evolutionary Dynamics

- Delay and aging in evolutionary game theory
- Social dynamics, segregation and equilibrium selection in game theory.
- Game learning and level of agent cognition
- Learning, evolution and social dynamics in changing environments.

WP2: Applications and data driven research

Task 2.1: Urban systems: mobility, energy and environment.

- Understanding the organization of cities.
- Relation between quality of life, health, environment and urban mobility structure.
- Cities and infectious disease propagation.
- Power grid stability in scenarios of increased demand and high penetration of renewable energy sources.

Task 2.2: Flows of patients and evidence in healthcare applications

- Flow of patients in hospital emergency departments.
- Network meta-analysis and evidence synthesis in medical statistics.

Task 2.3: Cultural traits from linguistic data. Text analysis. Linguistic innovations.

- Cultural regions.
- Language patterns.
- Linguistic innovations.

Task 2.4: Ecology of online social interactions

- Macro-ecological patterns in information ecosystems.
- Neutrality breaking in information ecosystems during exceptional events.
- Speciation and competition in memes dynamics.

