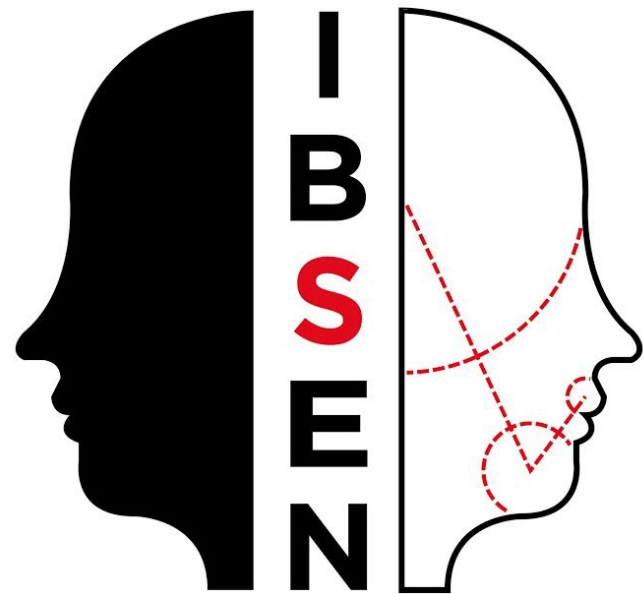


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Bridging the gap: from Individual Behavior to the Socio-technical MaN



<http://www.ibsen-h2020.eu>

Future and Emerging Technologies
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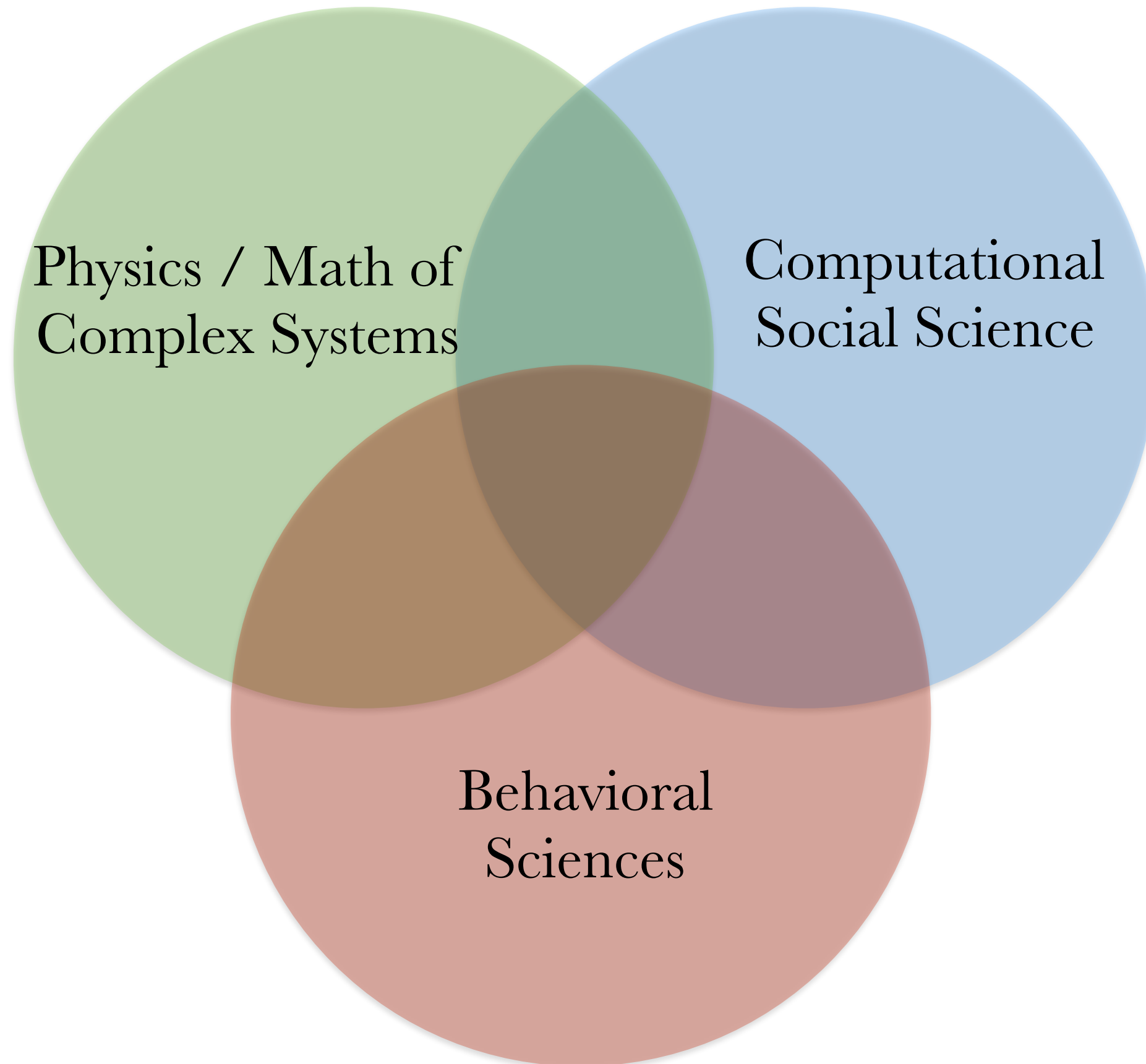


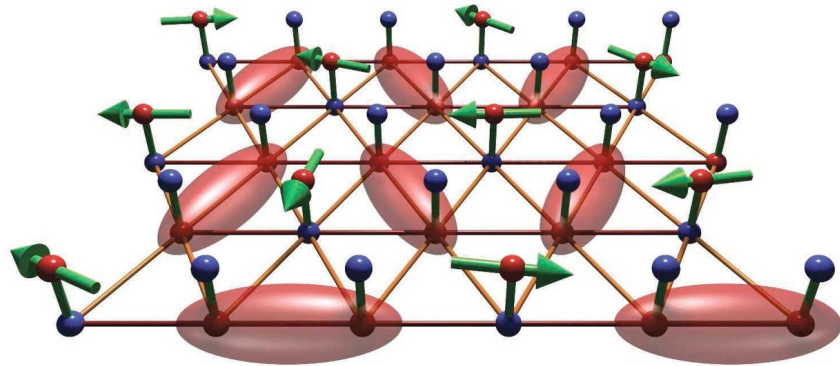
Grupo Interdisciplinar de Sistemas Complejos (GISC), Departamento de Matemáticas &
Institute UC3M-BS of Financial Big Data (IfiBiD), Universidad Carlos III de Madrid

Instituto de Biocomputación y Física de Sistemas Complejos (BIFI), Universidad de Zaragoza



My research





Systems with many components
in interaction



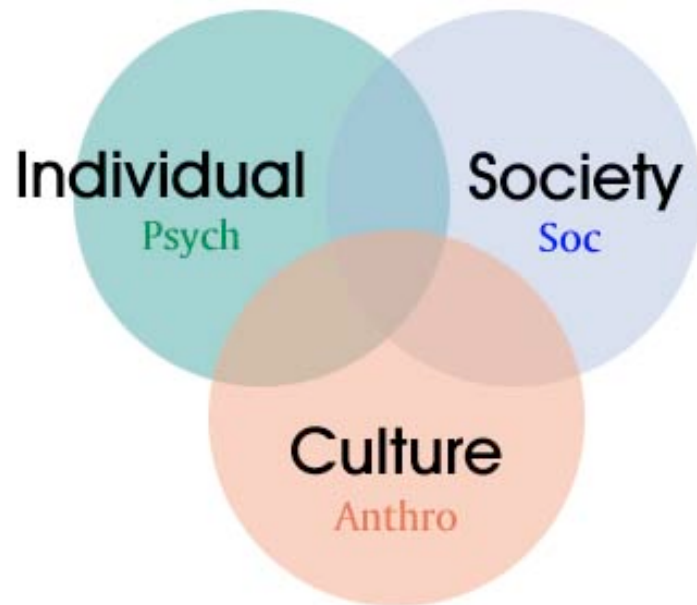
Emergent phenomena that is not
simple extrapolation of the individual



Aimed to favor and take advantage
of massive ICT data



A [computer] model-based science
yielding predictive and explanatory
models



Systematic analysis and investigation of human behavior through controlled and naturalistic observation, and disciplined scientific experimentation



Effects of psychological, social, cognitive, and emotional factors on economic decisions; bounds of rationality of economic agents

**How do we interact in
complex socio-technological
contexts?**

**How do interaction and
context shape each other?**

Starting point: Large experiments

1229 players (625, lattice; 604, heterogeneous)

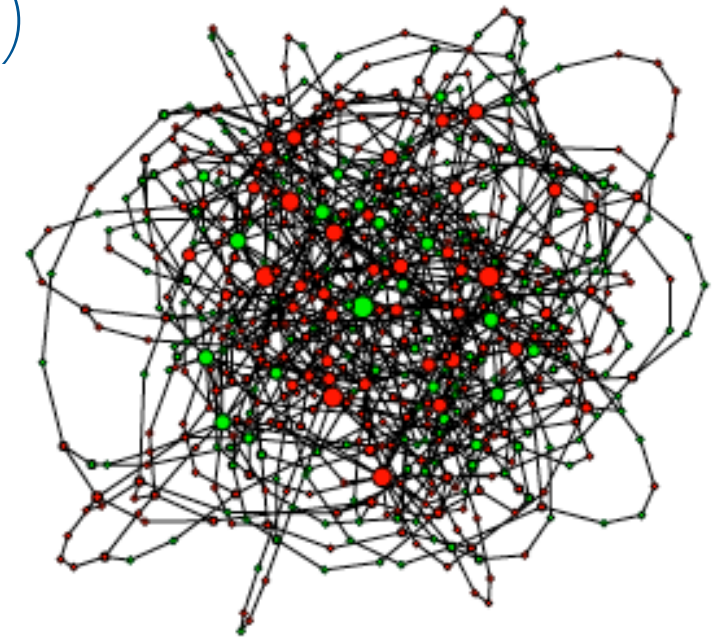
Last year high school student

44% male, 56% female

42 high schools in Aragón

From 10 AM till noon

10 000 €, on December 20, 2011; **largest** size ever



Expertise needed

- Physics (of complex systems)
- Mathematics
- Computer science
- Economics
- Sociology
- Social psychology

- Universidad de **Zaragoza** (long-time collaborator in large scale experiments, computer center)
- Universidad de **València** (best economics lab in the world, ample expertise in recruitment)
- University of **Cambridge** (microeconomics, particularly of networks, mostly theory)
- Universiteit van **Amsterdam** (macroeconomics, particularly market dynamics, theory and experiments)
- **Aalto** University (big social data [e.g., phones] analysis, opinion models, physics and computer science)
- University of **Oxford** (evolutionary psychology, social structure)

Success rate is extremely low:

Run your idea by friends, colleagues, NCPs,...

Take it as a way to learn more about your own work and about its place in research, as well as about writing proposals

Be prepared for failure



Rejected in last FP7 FET Open Call
(two-stage process, anonymous, five pages)

Same team without València

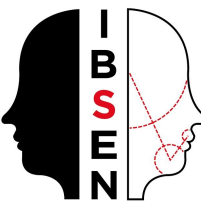
Foundations for a radically new line of technology, by providing proof-of-principle of experiment-driven social simulation as a tool for societal studies and policy making.

Social and behavioral science has been very effective in turning knowledge into technologies.

Examples include polling, marketing, management, insurance, and public health. These technologies dominate so much of our everyday life that they have become invisible. IBSEN has the vision to lead to similarly important impact in terms of new technologies in the long-term.

Technology is understood in a very wide sense

H2020 proposal: long-term vision



We envisage that, following IBSEN footprints, researchers will build a human behavior simulator.

A system of artificial human beings reacting and behaving as actual people, with variability related to cultural specificities and other requirements can be the basis for economic and socio-technological simulations that would radically change and impact many fields, from robotics to economics.

IBSEN will not build the simulator: 10 years horizon

H2020 proposal: breakthrough



IBSEN will pave the way by providing the relevant breakthrough.

The corresponding S&T target is to design a reliable experimental procedure, suitable management and analysis tools and a first collection of behavioral rules focused on cooperation, opinion diffusion, group and identity formation, and expectation-driven phenomena.

A way to routinely obtain information for the simulator in relevant (socio-technological) contexts

H2020 proposal: foundational



IBSEN is foundational as we will kick start a new way of doing social science for the problems of a highly connected, technological society.

By superseding current paradigms of experimental economics and social psychology, and by meeting the scientific and technological requirements for experiments, IBSEN will immediately benefit other researchers and an active community on these issues will arise, allowing cross-fertilization of social sciences with computer science and physics and mathematics of complex systems.

Research starts a new sub-field or a field across disciplines

IBSEN is novel because current experimentation is either extremely small scale or uncontrolled in one way or another

Study size effects at an unprecedented scale looking for rules behind human behavior and for novel socio-economic phenomena arising in large systems. To date, theoretical results are deemed sufficient, even if some of their assumptions (perfect information, for instance) cannot possibly hold in such cases.

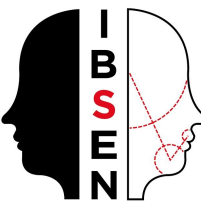
Not done or tried before (except possibly preliminary or proof of concept works)

IBSEN is a high-risk project because of quite possible technical and conceptual difficulties.

The project is technically challenging as it is difficult to work with thousands of subjects simultaneously. Conceptually, behavior can be either very heterogeneous (no general rules) or uninterpretable (no discernible rules)

Risks are high but not prohibitively so

H2020 proposal: interdisciplinary



- Physics (of complex systems)
- Mathematics
- Computer science
- Economics
- Sociology
- Social psychology

As many fields as needed, but only those

Describe the impact arising from your breakthrough in terms of “now” and of your long term vision

Plan accordingly the measures to maximize such impact (e.g., conferences with practitioners, stakeholders, possible technological partners, etc.)

Plan for the future; role of SMEs

Make publicly available everything you can

Disseminate for the general public

Impact is important: you can't lose points here

Implementation: Work Packages

WP Number ⁹	WP Title	Lead beneficiary ¹⁰	Person-months ¹¹	Start month ¹²	End month ¹³
WP1	Design and implementation of experimental setup	7 - UVEG	73.40	1	24
WP2	Large scale micro- and macro-social phenomena	6 - AALTO UNIVERSITY	142.00	6	36
WP3	Models for social phenomena	2 - UNIZAR	117.00	9	36
WP4	Coordination, management, dissemination and exploitation	1 - UC3M	20.00	1	36
Total			352.40		

Implementation: Deliverables

Deliverable Number ¹⁴	Deliverable Title	WP number ⁹	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D1.1	Volunteer database	WP1	7 - UVEG	Other	Confidential, only for members of the consortium (including the Commission Services)	12
D1.2	Experimental protocol	WP1	7 - UVEG	Report	Public	12
D1.3	Experimental infrastructure	WP1	7 - UVEG	Demonstration	Public	12
D1.4	Validated experimental platform	WP1	7 - UVEG	Other	Public	18
D2.1	First reports on case studies	WP2	6 - AALTO UNIVERSITY	Report	Public	24
D2.2	Final reports on case studies	WP2	6 - AALTO UNIVERSITY	Report	Public	36
D3.1	Generic model	WP3	2 - UNIZAR	Report	Public	21
D3.2	First version of specific models	WP3	2 - UNIZAR	Report	Public	27
D3.3	Final version of specific models	WP3	2 - UNIZAR	Report	Public	36

Implementation: Deliverables

Deliverable Number ¹⁴	Deliverable Title	WP number ⁹	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D4.1	Data management plan	WP4	1 - UC3M	Report	Confidential, only for members of the consortium (including the Commission Services)	6
D4.2	Project website	WP4	1 - UC3M	Websites, patents filling, etc.	Public	2
D4.3	First check report	WP4	1 - UC3M	Report	Public	14
D4.4	Final check report	WP4	1 - UC3M	Report	Public	36
D4.5	Final data management plan	WP4	1 - UC3M	Report	Public	36
D4.6	Periodic workshops	WP4	1 - UC3M	Other	Public	6
D4.7	Open access to results	WP4	1 - UC3M	Other	Public	36
D4.8	Ethics approvals	WP4	1 - UC3M	Report	Confidential, only for members of the consortium (including the Commission Services)	6

Implementation: Deliverables

Deliverable Number ¹⁴	Deliverable Title	WP number ⁹	Lead beneficiary	Type ¹⁵	Dissemination level ¹⁶	Due Date (in months) ¹⁷
D4.9	Risk management plan	WP4	1 - UC3M	Report	Confidential, only for members of the consortium (including the Commission Services)	6

Implementation: Milestones

Milestone number ¹⁸	Milestone title	WP number ⁹	Lead beneficiary	Due Date (in months) ¹⁷	Means of verification
MS1	Volunteer pool ready	WP1	7 - UVEG	12	Volunteer pool ready with a minimum of 10 000 volunteers ready to participate in experiments from different countries members of the consortium and with its corresponding database for handling them
MS2	Experimental protocol ready	WP1	7 - UVEG	12	The validation of the experimental protocol will include its test in practice and a Workshop with practitioners to evaluate and try our approach
MS3	Project website ready	WP4	1 - UC3M	2	Project website running with information on IBSEN accessible to a general audience
MS4	Experimental software ready	WP1	7 - UVEG	18	The experimental software will be validated by means of a workshop with practitioners to evaluate and try our approach and by a practical test

Implementation: Milestones

Milestone number ¹⁸	Milestone title	WP number ⁹	Lead beneficiary	Due Date (in months) ¹⁷	Means of verification
MS5	Model template ready	WP3	2 - UNIZAR	18	The generic model that will account for the specific cases will be defined in terms of possible heuristics and it will be ready for continuous update
MS6	Experiments for the case studies	WP2	6 - AALTO UNIVERSITY	24	At least 1 experiment for each case study in a large group will have been carried out successfully
MS7	Behavioral rules for the case studies	WP2, WP3	2 - UNIZAR	24	At least 1 set of parsimonious behavioral rules for each case study will have been proposed
MS8	Models for case studies	WP3	2 - UNIZAR	30	At least 1 qualitatively correct model for each case study partially validated through comparison with experiments

Implementation: Risks

Description of risk	WP(s) involved	Proposed risk-mitigation measures
Withdrawal of partner(s) (note there is no critical partner in the project).	All	Create open atmosphere between partners and management to get early indications of withdrawal. Prioritize remaining work and re-allocate resources.
Non performance of partners.	All	Get partner to focus or replace people. Failing to comply implies that its budget will be shifted from the defaulting partner to another one that provides the competencies.
Loss of internal communication or awareness issues.	All	Setup project communication plan, and appropriate tools. Reassess and monitor results regularly.
Designing experimental protocols that work and produce meaningful results with thousands of people. This has never been tried as a routine procedure.	WP1, WP2, WP3	We have already shown that we can do this with more than 1000 people. We can restrict ourselves to this limit and run several groups for the same type of experiment.
Not enough subjects can be recruited for of the experiments.	WP2, WP3	We will setup a task force in the team to work on all aspects of the recruitment so the goal can be reached
Making sense of the experimental data. Finding that, e.g., "people cooperated more in such and such context" is very different from assessing what made people take the decisions, needed to make meaningful, predictive models.	WP2, WP3	We can pick subsets of participants to which it is possible to identify some pattern of behavior and model others as similar with some stochastic component, checking the model subsequently with the experiment.
Behavioral patterns are too heterogeneous, i.e., there are no discernible groups of people that can limit the conductual repertoire to a few sets of rules.	WP2, WP3	This would not be a problem for modeling a large group, as what matters often is the aggregate result, but it is a serious hindrance for a model of individual behavior. We could then select a few patterns among the most often found ones at least for demonstration purposes.
Payment to participants / bureaucratic problems. No automated procedure is found that can handle these many bank transfers, or it is too expensive.	WP4	We can resort to pay only a percentage of the participants (stating that in the conditions for participation), which is an standard practice in behavioral economics

Key points (I believe!)

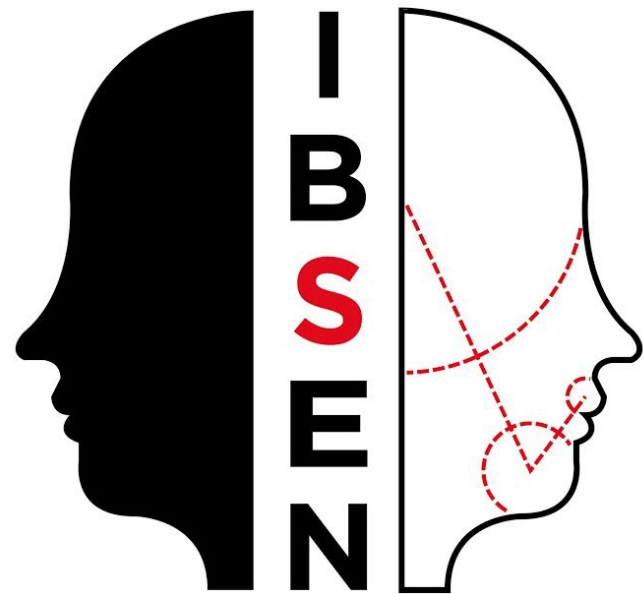
- Project about something you really want to do
- One clear overall objective for the team as a whole
- Exciting but realistic possibilities in the long run
- Articulate clearly how what you can achieve in three years opens the way to your vision while being itself novel and relevant
- Consortium: interdisciplinary but only to the extent required for the task with well-known parties
- Think and plan carefully about impact
- Keep implementation structure simple
- Take time and help to write the proposal; abstract requires extra work
- Success is very unlikely, so take writing the project as learning about your own work in earnest

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