

**INVITATION TO SUBMIT EXPRESSIONS OF INTEREST  
TO IDENTIFY KEY TOPICS FOR  
THE MULTIDISCIPLINARY NWO RESEARCH INITIATIVE  
GRIP ON COMPLEXITY  
2016**

**In its Strategy 2015-2018 NWO identified 'Grip on Complexity' as one of six challenges connecting science and society. NWO Physical Sciences is taking a number of initiatives to strengthen the development of the challenging multidisciplinary field of Complexity.**

**It does so together with its partner TNO<sup>1</sup>, and in cooperation with a number of Topsectors.**

**The 'Grip on Complexity'-initiative has a solid foundation in earlier NWO activities in the field of Complexity, notably the 'Dynamics of Complex Systems' theme in the NWO strategy 2007-2010, and the resulting multidisciplinary programme 'Complexity', which started in 2009.**

**NWO and TNO want to build on this solid foundation. In the next few years, they aim to launch three or more calls for proposals. For two of these the themes have been selected (Logistics and AgriFood). In order to assess the potential of other themes, the Complexity Programme Committee is calling for Expressions of Interest to identify key topics for (a) future call(s) for proposals.**

**The deadline for receipt of Expressions of Interest is 1 March 2016.**

Complex systems research studies phenomena which result from the collective behaviour of a set of interacting agents (objects, parts). Complex systems consist of a large number of components that all react to each other. Although these mutual reactions are simple and predictable, 'new' and sometime unpredictable behaviour can occur at the scale of entire systems. Furthermore, due to external influences, a complex system can adopt a new phase, sometimes suddenly. Complex systems are all around us: consider our climate, the internet and the world economy, for example. Or smaller systems such as local transportation networks and our own bodies and brains.

A better understanding of complexity can teach us to recognise the harbingers of tipping points in complex systems earlier, and yet still influence unpredictable systems in smart ways. It will also enable us to design complex systems with extremely useful applications, such as more intelligent materials or stable electrical networks with thousands of small and unpredictable producers.

The 'Grip on Complexity' initiative of NWO focusses on three fundamental processes of complex systems: emergence, transition and resilience. More details and discussion can be found in the paper "*Grip on Complexity. How manageable are complex systems? Directions for future complexity research*" (downloadable from <http://www.nwo.nl/complexity>).

Previous discussions within the community and NWO have resulted in a tentative list of themes that could fruitfully be addressed in (a) future call(s). Through this call for Expressions of Interest, the Complexity Programme Committee is seeking research topics ...

- ...that could fit one or more of the themes in the tentative list, and
- ...that have already reached a level of development with respect to e.g. community building and/or industrial involvement, or
- ...that have such promising prospects that they should be added as a theme to the list.

The Programme Committee will discuss all submitted Expressions of Interest, resulting in an advice about the next call(s) for proposals to the NWO Council for Physical Sciences, and all other interested Councils.

---

<sup>1</sup> 'Complexity' is one of the seven Early Research Programmes of TNO.

If you are interested in sharing your views, please submit an Expression of Interest to [complexity@nwo.nl](mailto:complexity@nwo.nl) not later than **1 March 2016**. All submissions should be prepared using the template provided (see Appendix).

Please be aware that submitting an Expression of Interest is no guarantee, but also no prerequisite, for receiving a subsidy in a future 'Grip on Complexity' call.

For more information, please contact dr. Mark Kas, [m.kas@nwo.nl](mailto:m.kas@nwo.nl), tel. 06-205 93 207, or Marieke van Duin MSc, [m.vanduin@nwo.nl](mailto:m.vanduin@nwo.nl), tel. 070-3440 921.

**TENTATIVE LIST of themes for (a) future call(s) within the NWO initiative 'Grip on Complexity'**  
(in no particular order):

- Health and the Biological Clock: synchronising complex systems
- Preserving Ecological Diversity: variety and stability
- High Tech Complexity: programmable self-organisation
- Efficient Transport: smart self-organisation
- Medical Patterns in Gene Expression
- The Financial Biotope: how to govern and supervise the complex system
- Circular Economy
- Smart Industries
- Personalized Medicine
- Connectivity
- A Resilient Society
- Food Security
- Dealing with Unpredictability
- Urban Farming
- Complex Interests
- (Chemical) Selforganisation
- (Imaging and/or modelling of) Neurodegenerative processes
- Inclusive development

**OVERVIEW of current initiatives to further develop the field of Complexity**

- The NWO Physical Sciences Council has made a reservation of M€ 5 for the years 2015-2019 (5 x M€ 1). It will be used to finance a number of calls for proposals, preferably together with and financially supported by other councils.
- The first call to be developed in this way, is 'Complexity for transport and logistics', expected to be launched in January or February 2016. The call is initiated by the NWO Social Sciences Council and NWO Physical Sciences, is supported by the Topsector Logistics, and is being organized in partnership with TNO. The NWO budget is M€ 3.5. TNO supports TNO participation in projects. Participation of societal (non-scientific) partners is required. These partners will contribute 15 per cent of the total budget in cash and/or in kind.
- The second call under development is in the area of AgriFood, expected to be launched in 2016. This call is prepared in partnership with TNO and the Topsector AgriFood. The budget is not determined yet. Participation of societal (non-scientific) partners is required. These partners will contribute to the total budget in cash and/or in kind.
- The call 'Grip on Complexity - Logistics' is preceded by a call for preparatory grants ('prep grants'). These prep grants assist researchers from academia and TNO to find each other and societal partners to form research teams that are well prepared to submit a proposal to one of the calls. For the prep grant call a budget of k€ 70 is available.
- The General Board of NWO has made a reservation of M€ 1 for 'Grip on Complexity' from resources in the framework of the new innovation contract with the Topsectors
- The NWO Innovation Fund Chemistry is continuously open for innovative research proposals in molecular research. Consortia of researchers and one or more companies can apply for four types of projects, with varying degrees of NWO funding and financial contributions of the participating compan(y/ies). See [www.nwo.nl/innovatiefondschemie](http://www.nwo.nl/innovatiefondschemie).
- On 27 November 2015 a kick-off meeting was held for the Netherlands Platform Complex Systems (NPCS) for academia, industry and policy makers. The NPCS aims to organise, structure and facilitate researchers in complex systems in the Netherlands, and to promote education and societal and industrial use of complex systems tools and knowledge. For more information see [www.npcs.nl](http://www.npcs.nl).

**EXPRESSION OF INTEREST  
TO IDENTIFY KEY TOPICS FOR  
THE MULTIDISCIPLINARY NWO RESEARCH INITIATIVE  
GRIP ON COMPLEXITY  
2016**

**Person/research group(s)/discipline(s) involved**

*(Please mention name, affiliation, and email address)*

**Preferred theme (see the tentative list; max 250 words; max three themes; repeat for each theme)**

- a. Name of theme and short description;
- b. Why is this theme important; which topics do you deem necessary/urgent to address;
- c. Scientific and/or societal relevance, e.g. development with respect to community building and/or industrial involvement;
- d. Link with research agendas of (a) Topsector(s).

**Promising theme (not included in the tentative list; max 250 words; max one theme)**

- a. Name of theme and short description;
- b. Why is this theme promising; How is the theme related to the topic of Complexity? What specific contribution may be expected from this theme in our efforts to enlarge our grip on complexity?
- c. Scientific and/or societal relevance;
- d. Indicate which parties have shown interest or could potentially be interested in this theme.

Please send this form to [complexity@nwo.nl](mailto:complexity@nwo.nl) (deadline 1 March 2016)