Summary - KüNO Online Workshop
'Predictability in Natural and Social Sciences'

3 May, 2022, 9 am to 1 pm

Organization: Jochen Hinkel & Franziska Schmacka

Participants: Achim Schlüter, Andrea Wunsch, Anja Singer, Arne Knies, Birgit Hünicke, Carsten Lemmen, Christian Winter, Daniel Lincke, Fausto Favero, Franziska Schmacka, Gary Polhill, Geronimo Gussmann, Gesche Krause, Irit Eguavoen, Jan Conradt, Jochen Hinkel, Johanna Schumacher, Joshua Kiesel, Kai Wirtz, Katja Uhlenkott, Marie Pierce, Maysa Ito, Miriam Püts, Nane Pelke, Oliver Bothe, Paul Müller, Philipp Gorris, Sarah Rabe, Sascha Hokamp, Serra Örey, Shubham Krishna, Vanessa Völz, Wiebke Homes

Schedule

9:00 Introduction to predictability. Jochen Hinkel (Global Climate Forum)1

9:20 Predictability of coastal morphology. Christian Winter (Kiel University)1

9:40 Predictability of ecosystem dynamics. Kai Wirtz (Hereon)2

10:00 Predictability of economic behaviour. Andrea Wunsch (Kiel Institute for World Economy)2

10:20 Predictability of institutional change. Achim Schlüter (Leibniz Centre for Tropical Marine Research)2

10:40 Keynote: Predictability in complex adaptive systems. Gary Polhill (The James Hutton Institute)2

11:30 Discussion in breakout groups3

12:30 Wrap up Jochen Hinkel (Global Climate Forum)3

13:00 End of the workshop3

9:00 Introduction to predictability. Jochen Hinkel (Global Climate Forum)

- Keywords of the talk: Scope, definitions of predictability & probability distributions, relation to sciene-policy interface
- Discussion whether we can expect convergence of probability distributions when forecasting risks? Timescale and robustness depends on the question you ask. E.g. Antartica can be predicted much better in the long run than in the short run.

9:20 Predictability of coastal morphology. Christian Winter (Kiel University)

- Keywords of the talk: Morphodynamics and its modeling, hindcast & forecast, calibration, dependence on described system, descriptor, model, communication, client etc.
- Discussion: Trace protokoll by V. Grimm may be useful for developing/communicating model results with stakeholders; greater advancements in

reducing uncertainty of morphodynamic forecasts possible? No, the morphodynamic community is not there yet.

9:40 Predictability of ecosystem dynamics. Kai Wirtz (Hereon)

- Keywords of the talk: models misbehave if they miss behavior, e.g. modeling primary production, behaviorally controlled trophic cascading, influence by behavior e.g. vertical migration of phytoplankton, same in epidemiological & social sciences
- Discussion: Adding processes increases uncertainty, tradeoff between new processes to add and uncertainty; predictability of the models on COVID: which processes to be included, more COVID modeling: work of Niki Popper, Frank Dignum at Umeå (https://link.springer.com/book/10.1007/978-3-030-76397-8), Jason Thompson (https://doi.org/10.1101/2021.01.11.21249630)

10:00 Predictability of economic behaviour. Andrea Wunsch (Kiel Institute for World Economy)

- Keywords of the talk: cost-benefit analysis of coastal adaption measures, willingness to pay, prediction of reactions by asking, uncertainty
- Discussion: Critique asking for willingness to pay - people might feel extorted (but can also opt-out), way of accounting for ecosystem services, can be used for policy-making that then should increase overall welfare i.e. by at least integrating ESS valuations.

10:20 Predictability of institutional change. Achim Schlüter (Leibniz Centre for Tropical Marine Research)

- Keywords of the talk: Institutional change & example from the marine realm, risks and uncertainties, power asymmetries, emergent & continent process, context dependent, easier predictability of what will not work, complex models required
- Discussion: equity included in power asymmetries; institutional change for the sake of institutions: What kind of institutions do we have to develop and change to solve the climate crisis? Institutions as key explanator or just a single proxy, complex SES require multiple perspectives and disciplines to understand the system dynamics; Understanding institutions in a broader context than simply looking at “laws”; Social sciences tries to understand institutions to explain behavior and vice versa.

10:40 Keynote: Predictability in complex adaptive systems. Gary Polhill (The James Hutton Institute)

- Keywords of the talk: Prediction in complex systems theoretically possible, pragmatically infeasible, Asynchrony adds exponentially to the infeasibility; Wickedness renders prediction largely irrelevant where it entails terminological transformation; Kinds of predictability: invariably/ omissively predictable, asymmetrically /symmetrically unpredictable; Example: Turing machine
- Discussion: Integration of non-expert knowledge into modeling (Reference https://psycnet.apa.org/record/1957-02914-001, https://en.wikipedia.org/wiki/The_Magical_Number_Seven,_Plus_or_Minus_Two), workshop methods like backcasting to make intersubjective predictions, might not be accepted among sociologists;

Bottom up processes necessarily lead to infeasibility, Gaian internal optimization of the system towards growth, evolution (genetic or in behaviour) makes the problem more challengin; simpler models are effectively making (unknown and unstated) assumptions; Complex systems theorists talk about partial predictability, possibility of intersubjective predictability.

11:30 Discussion in breakout groups

- Breakout group 1: In which disciplines/fields can scientific progress increase predictability?
  - Consenus: scientific progress can increase predictability in individual behavior
  - Dissensus: upscaling to society, no valid models to predict changes in social structures (institutions), complex behavior; Combination of big data/big thinking, process understanding not considered
- Breakout group 2: How can limits of predictability be communicated to policy and decision makers?
  - Scale dependent modeling, resolutions, misunderstandings related to communication, how do we trust our models ourselves
  - Important to communicate what the models were built for
- Breakout group 3: Limits of predictability and public discourse (e.g. with regards to Corona)
  - People just accept knowledge in line with their beliefs/views/politics, important to be clear with assumptions, limitations, scenarios – suggestion to communication more positive about confidence than about uncertainty
  - Confidential qualitative messages are more important than communication of precise quantitative data

12:30 Wrap up Jochen Hinkel (Global Climate Forum)

- Reports from the breakout group discussions (see above)
- Conclusion/final discussion: Communication of predictablity & uncertainties can work. Public discourse at large is more and more difficult – nowadays differentiated messages and not-knowing is difficult to communicate; simple messages are dominating;
  Our role in that game where everything is open access (democratisation of knowledge): we need to realigne ourself; humanities hasn´t changed, the voices that are emphasized changed, we should trust in stakeholder communication & have confidence in the intelligence of our counterparts,
  Need to tailor communication to the audience, use other communication channels, facts speak not for themselves, engaging with people is needed.
- Call to send suggestions of topics for further workshops or feedback to the organizers.

13:00 End of the workshop