4 - A visualization tool for AMPL using MDDB features
Ansuman Swain, Gautam Mitra, Christian Valente

Optimization based decision support systems (DSS) and business intelligence (BI) systems are usually constructed using algebraic (optimization) modelling languages (AMLs). In the earlier generation of software systems such DSS/BI applications were created using external connectivity with database management systems (DBMS). In order to enable AMPL users to create DSS/BI applications we have developed a framework for AMPL in the following way. This framework can take a generic decision model created in AMPL and map the entities of the model to an MDDB. This MDDB representation, in turn, leads to two useful features. First it provides access to all the features of online analytic processing (OLAP). Second many visualization features can be used for the target applications. Our generic approach has the advantage that DSS/BI applications for multiple domains can be created easily by analysts who are experts in their own specialized application areas.

■ TB-50

Tuesday, 10:30-12:00 - Mason Hayes & Curran

Methodological and practical contributions of Soft OR/PSMs to Policy Making - I

Stream: Soft OR, Problem Structuring Methods
Invited session
Chair: *Ine Steenmans*

1 - Countering stereotypes: Including people in complex technology policymaking
Kruakae Pothong

The complexity of emerging technologies, such as the IoT, distributed ledgers and AI, makes it easy for people to be left behind, excluded in development of these technologies and policies shaping them. Science and Technology policies are known for their reliance on objective evidence, often excluding subjective evidence. Many people, already disconnected from politics, are resigned to this condition despite their requirements for aspects of technologies and the way technologies are used to change. Addressing this disconnection, this paper examines approaches to engage and include people in complex technology policy development. Based on deliberative theory, this paper explores scenarios in which people can equally, respectfully exchange values and preferences, understand their differences and collectively work out common grounds about how emerging technologies should work. The paper reports on drama and simulation based techniques, successfully used to enable people to draw on their experiences, as resources, deliberate on and make collective decisions regarding aspects of emerging technologies that affect their lives. The value of combining these techniques and deliberation lies in the resulting authentic problem definitions and approaches to address them, accounting for the diverse thoughts, capabilities, needs, demands of emerging technology users.

2 - How to design alternatives?
Alexis Tsoukias, Alberto Colorni

Alternatives are an essential primitive for any decision model, but are never "given" as such, but rather constructed through an interaction between the client and the analyst. We suggest a general framework on how to model this process and how to help conducting the alternatives construction activity. We use policy design examples to support the presentation.

3 - How to support policy decisions by combining public and private interests. The resuse of abandoned cultural heritage in Northern Italy.
Rossella Moioli, Stefano Capolongo, Leopoldo Sdino, Marta DellOvo, Alessandra Oppio

Built cultural heritage (BCH) preservation has to be based on rigorous methodological frameworks able to find a balance among protection instances, economic development and urban quality. The research is focused on the definition of decision aiding process for the reuse of an abandoned healthcare facility with several historic buildings. Public and private different needs have been taken into consideration, since both play an important role for the development of the analysed area and for definition of urban regeneration policies. Given the complexity of this issue, the evaluation process has been structured by combining different methodologies to support the policy cycle: i) the Stakeholder Analysis, that has allowed to identify actors engaged and to prioritize their needs (Social sustainability), ii) the Nara Grid for the values elicitation of the BCH (Cultural and environmental sustainability) and the subsequent definition of different sustainable scenarios; iii) Discounted Cash Flow Analysis (Economic sustainability). Four alternatives, in addition to the business as usual scenario, have been evaluated with the support of a Multicriteria Analysis aimed at defining the most balanced between heritage significance retention and urban regeneration. This work contributes to the literature on soft OR by exploring the interactions among different stakeholders and addresses policy instances by providing a transparent methodology based on the value elicitation.

4 - Soft OR for policy design - trends and emerging practices
Ine Steenmans

Decision aiding methods and processes have a long history of development for the spheres of public policy analysis and design. The prominence of soft operational research methods as a set of analytic tools within these spheres has waxed and waned since their initial development in the 1970s. Recent needs-centric, design-driven trends in the field of policy analytics appear, however, to be driving a period of revived, adaptive experimentation with those methods.

This paper traces the historical evolution of soft OR for policy, as well as highlights its emergent design science influenced formats. It finishes with grounded speculation on its future forms. Its focus is on UK practices, though observations on similarities and differences with experiences in other international public administrations will be made. Data collection comprises interviews with government analysts and active participant observation in systems mapping workshops (in which soft OR methods were blended with design techniques) with the UK Policy Lab. Analysis used a critical realist evaluation of longitudinal influences in the analytic paradigms used in policy design. Finally, the paper closes with reflection on the activities that the UK's Operational Research activity could engage in to maximise collective learning in this period of experimentation.

■ TB-51

Tuesday, 10:30-12:00 - William Fry

Optimal Control Applications 2

Stream: Optimal Control Theory and Applications
Invited session
Chair: *Gustav Feichtinger*

1 - Scientific Production vs. Obsolescence of Knowledge over the Life Cycle
Andreas Novak, Gustav Feichtinger

According to Way et al. (2017) four different research patterns can be observed during the career of a scientist. This phenomenon can be dealt with either in an only descriptive way, but in the literature also normative approaches can be found (see, e.g. a recent paper by Feichtinger, Grass and Kort, 2019). In our model we concentrate on the obsolescence of knowledge and follow the approach of McDowell (1982), but we correct a mis-specification of the production function to human capital and use the original function proposed by Ben-Porath (1967). An optimal control model is presented and the results are compared to other results found in the literature.