

STRATEGOS Technical Workshop

Strategic Decision Making in Complex Problems by the Analytic Hierarchy Process (AHP)

9.00-13.00, January 20th, 2019, Aula DIME MIG, via Opera Pia 15, 16126 Genova, Italy
POC: Prof. Antonella Petrillo, Parthenope University, antonella.petrillo@uniparthenope.it

The workshop presents Fundamentals & Applications of AHP to improve Decision Making process in Complex Systems without any pre-requisite for sophisticated mathematical background, giving a quick & intuitive understanding of this method



Il Decision Making ed i Sistemi Decisionali Multicriterio in ambienti complessi: L'Analytic Hierarchy Process

Le nostre vite sono la somma delle nostre decisioni, sia nella sfera personale che in quella degli affari. Spesso, il quando decidiamo, è tanto importante quanto ciò che decidiamo. Decidere troppo in fretta può essere pericoloso, rinviare troppo a lungo può significare perdere l'occasione giusta.

Alla fine, è fondamentale, in ogni caso, "decidere". Il processo decisionale è, quindi, uno degli elementi "chiave" su cui si basa il successo o l'insuccesso delle nostre azioni. Tuttavia, proprio perché ogni decisione è, di fatto, soggettiva, non sempre sappiamo da dove iniziare per cercare di migliorare il modo in cui vengono gestite le nostre scelte.

L'assenza di una struttura ben definita nei processi decisionali costituisce una delle possibili cause di errori nel tempo. E' cruciale quindi comprendere sempre in che modo si arriva a decisioni importanti e come un processo strutturato possa migliorare i risultati in maniera decisiva.

Spesso la complessità dell'ambiente esige una logica strutturata, un processo definito e controllato per tener conto opportunamente degli innumerevoli fattori che influenzano il raggiungimento degli obiettivi e per garantire la coerenza dei giudizi nel trarre valide conclusioni.

In questo contesto, l'obiettivo specifico di questo modulo formativo è quello di fornire una panoramica sulle tecniche e sui modelli decisionali basati sulla metodologia dell'Analytic Hierarchy Process (AHP), in grado di esaminare i "problemi complessi non organizzati", identificando le alternative di scelta e misurandone la priorità. Spesso ci capita infatti di dover decidere in mancanza di dati storici numerici in quantità sufficiente, pur in presenza di nostre preferenze acquisite nel tempo o basate sul giudizio di esperti. In molti di questi casi le alternative sembrerebbero chiare e "certe" (come il dover decidere sull'acquisto di una automobile, o sull'affidarsi ad un fornitore piuttosto che ad un altro), eppure garantire la consistenza delle nostre scelte relativamente ai differenti criteri decisionali – e quindi legittimare la coerenza e la razionalità della nostra azione finale – è tutt'altro che banale o scontato.

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Scopo della metodologia sviluppata in questo workshop è quello di affrontare, attraverso un'analisi scientifica rigorosa, un problema decisionale del tipo appena descritto, proponendo semplici domande cui dare risposte basate sulle conoscenze e preferenze. A differenza di quanto si pensa, per risolvere problemi complessi non necessariamente abbiamo bisogno di modi di pensare complicati. E ciò in linea con quello che la nostra mente naturalmente fa quando istintivamente semplifica un problema complesso in tanti quesiti più "facili". L'approccio proposto non è semplicemente una "tecnica", ma un metodo generale per affrontare problemi che possiamo definire appunto "non organizzati".

Nel workshop Verranno fornite informazioni di base sulle metodologie del problem solving e dei sistemi decisionali multicriterio con particolare riferimento come detto alla metodologia dell'Analytic Hierarchy Process.

Tali tecniche di supporto decisionale saranno impiegate per la risoluzione pratica di problemi complessi "destrutturati" scelti come esempi o case study da svilupparsi nel corso del workshop.

I partecipanti al workshop saranno chiamati, in collaborazione con il docente, a:

- Valutare la probabilità soggettiva di eventi di interesse;
- Riconoscere i più importanti tipi di errore di carattere psicologico in ambito decisionale;
- Strutturare un problema decisionale con il supporto di metodologie multi-criterio.

Nel workshop verranno condotti gli esercizi con il **SUPERDECISIONS Software**, sviluppato dall'inventore della metodologia AHP, Prof. Saati, con cui la Prof. Petrillo, main speaker, ha lavorato a Pittsburgh negli Stati Uniti su queste tematiche.

La versione free di SUPERDECISIONS Software sarà rilasciata ai partecipanti.

Sulla base dell'attività svolta verrà fatto un assessment che permetterà di rilasciare un Certificato di Successful Accomplishment del Workshop

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Chair(s) & Teacher(s)

Prof. Antonella PETRILLO
University of Napoli "Parthenope"
Department of Engineering
antonella.petrillo@uniparthenope.it

Duration of the Workshop

4 hours on January 20th from 9.00A to 13.00A

Workshop Access

Technical Workshop, free access for Companies, Industries, Scientists & Professionals

Aim of this Workshop

This Workshop aims to offer an introduction to the fundamentals and applications of the Analytic Hierarchy Process (AHP) to improve the decision making process in complex systems without a pre-requisite for a sophisticated mathematical background. It provides a quick and intuitive understanding of the methodology.

Description

AHP is an intuitive and mathematically simple methodology in the field of multi-criteria decision making. However, AHP simplicity suggests that decision makers from all disciplines can take advantage of the methodology without struggling with the mathematics behind it. To fulfill this need, this Workshop delivers a quick and practical understanding of the method that can be useful for young engineers and corporate executives. In fact, AHP can help to combine all strategic information and make informed decisions. By reducing complex decisions to a series of pair-wise comparisons, then synthesizing the results, AHP enables decision-makers arrive at the best decision with a clear rationale for that decision. Thus, the main goal of this Workshop is to help how to make complex decisions in complex systems using the Analytic Hierarchy Process. The basics of the theory will be described in a clear, non technical manner with many examples.

Workshop Program

Learn how to make high-impact decisions that are reasoned, defensible, and will lead to having greater success in both making these decisions and in justifying them by individuals and organizations. Most complex decisions involve many interested parties with conflicting interests and objectives and many factors, especially intangible ones like social, environmental and political influences alongside economic ones. All these factors need to be prioritized and integrated under common goals. Such complex decisions have benefits, opportunities, costs and risks that need to be addressed.

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How to put this together to make the most effective decision is the object of this Workshop on the Analytic Hierarchy Process (AHP) and its generalization to dependence and feedback, the Analytic Network Process (ANP). The subject provides a new way of thinking about decision problems. Attendees will be exposed to a variety of applications and will get hands-on practice with the very usable *SuperDecisions* software that facilitates this way of decision-making. You are urged to bring your own laptop computer to class during this Workshop. The software will be provided.

The main topics that will be addressed in the Workshop are following:

- Need for a Structured Approach
- How to Structure a Decision
- Understanding the Analytic Hierarchy Process
- Building AHP Models Using Super Decisions
- Sensitivity in AHP models
- Creating an AHP Ratings Model
- Changing from AHP to ANP thinking
- Complex Negotiation by AHP

Teaching Organization

The Workshop will combine experiential lessons with theory and experiments and group work where Attendees will role-play with decision problems in their research domains and apply the Workshop's tools to discover effective solutions to the key traps associated with strategic decision-making in complex systems.

Technical & Scientific References

- Thomas L. Saaty Fundamentals of Decision Making and Priority Theory With the Analytic Hierarchy Process. Ed. RWS Publications, 2000.
- Enrique Mu, Milagros Pereyra-Rojas, Practical Decision Making: An Introduction to the Analytic Hierarchy Process (AHP) Using Super Decisions V2. Ed. Springer, 2017.
- Petrillo, A., De Felice, F., Petrillo, L., 2016. DATA model for a multidimensional decision making in healthcare. Ing. Journal of Multicriteria Decision Making, Volume 6, Issue 2, 2016, Pages 138-156.
- Fabio De Felice, Thomas L. Saaty and Antonella Petrillo. Applications and Theory of Analytic Hierarchy Process - Decision Making for Strategic Decisions. Ed. InTECH. ISBN: 978-953-51-2561-7
- Bruzzone A., Massei M., Agresta M., Tremori A., Longo, F., M.G., De Felice F., Petrillo A., 2015. Human behavior simulation for smart decision making in Emergency Prevention & Mitigation within Urban & Industrial Environments. Proc. of the Int. Workshop SESDE2015, pp. 66-74, ISBN 978-88-97999-61-4

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Educational Materials

- [Free copy of SUPERDECISIONS software for decision making with the AHP and ANP](#)
- Course Slides

Certificate

Based on the activities, an Assessment will be finalized in order to deliver the Certificate of Successful Accomplishment to the attendees

Main Speaker Biography

Antonella Petrillo is a Mechanical Engineer and completed her PhD on Multi-Criteria Decision Making based on Bayesian Neural Networks Process within Cassino University, while she received her habilitation as Professor during his service at Parthenope University. She has long experience in Industrial Applications including Industry 4.0, Decision Support Systems, Sustainability, Quality, Safety & Security and Human Factors. She has worked in cooperation with many Companies (e.g. MBDA, IBM, TNT, Arin spa, Tecnosistem, Videocolors spa, Studio Zeta srl, Flexcon srl) as well as Scientific Responsible and Senior Scientists in Projects (e.g. Governance Models, Reconfiguration and Monitoring in Port & Logistics, Crisis & Disaster Management in Industrial Facilities). She developed R&D activities in cooperation with International Organizations (e.g. Institute for Sustainable Leadership at University of Cambridge, School of Business and College of Business Administration at University of Pittsburgh, Polytechnic Valencia, SUPSI, Politecnico di Milano, Univ. of Genoa, Univ. of Cassino, Rome and Napoli). She serves as International Reviewer for over 50 International Journals and she is member of Scientific Committee for PhD Programs, International Conferences and Proposal Evaluations. She has over 160 Scientific Publications on International Journals and Conferences and she is author of 5 books on Innovation and Decision Making in Industrial Applications and Engineering. In relation to AHP, Prof. Petrillo cooperated directly with Prof. Saati, inventor of this innovative methodology used extensively in international and business negotiations, both in terms of R&D activities and Educational Courses and Seminars in North America and Europe; indeed she is co-author with him of a book on this topic plus several scientific papers.

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