**Haibin Zhu**

**Lecture 1:**

**Title: E-CARGO/RBC: Enabling Research Innovations in the Era of AI**

**ABSTRACT**

In the tie of AI (Artificial Intelligence), many AI tools, such as LLMs (Large Language Models), can help people accomplish many low-level intelligence tasks, such as coding and reporting. Many low-level routine jobs have a high potential to be replaced by such LLMs. Researchers and practitioners need to master powerful high-level modelling tools to meet these new challenges. E-CARGO/RBC (Environments - Classes, Agents, Roles, Groups, and Objects /Role-Based Collaboration) is a modelling methodology, which helps people deal with complex problems by designing systematic strategies other than using low-level algorithmic skills.

RBC is a computational methodology that uses roles as the primary underlying mechanism to facilitate collaboration activities. It consists of a set of concepts, principles, models, processes, and algorithms. RBC and its E-CARGO model have been developed into a powerful tool for investigating collaboration and complex systems. Related research has brought and will bring in exciting improvements to the development, evaluation, and management of systems including collaboration, services, clouds, productions, and administration systems. RBC and E-CARGO grow gradually into a strong fundamental methodology and model for exploring solutions to problems of complex systems including Collective Intelligence, Sensor Networking, Scheduling, Smart Cities, Internet of Things, Cyber-Physical Systems, and Social Simulation Systems.

E-CARGO assists scientists and engineers in formalizing abstract problems, which originally were taken as complex problems, and finally points out solutions to such problems including programming. The E-CARGO model possesses all the preferred properties of a computational model. It has been verified by formalizing and solving significant problems in collaboration and complex systems, e.g., Group Role Assignment (GRA). With the help of E-CARGO, the methodology of RBC can be applied to solve various real-world problems. E-CARGO itself can be extended to formalize abstract problems as innovative investigations in research. On the other hand, the details of E-CARGO components are still open for renovations in specific fields to make the model easily applied.

In this lecture, the speaker examines the requirement of research on collaboration systems and technologies, discusses RBC and its model E-CARGO; reviews the related research achievements on RBC and E-CARGO in the past years; illustrates those problems that have not yet been solved satisfactorily; presents the fundamental methods to conduct research related to RBC and E-CRAGO and discover related problems; and analyzes their connections with other cutting-edge fields. This talk aims to inform the audience that E-CARGO is a well-developed model and has been investigated and applied in many ways. The speaker welcomes queries, reviews, studies, applications, and criticisms.

**Keywords:** Collaboration, Methodology, Model, E-CARGO, Role-Based Collaboration, Object, Agent, Role.

**Audience**

Decision-makers, researchers, practitioners, graduate and senior students of computer science, computer engineering, information systems, systems engineering, industrial engineering, management, and computational economics and social science.