The notion and theory of Information introduced by Claude Shannon’s in 1948 have served as the backbone to a now classical paradigm of digital communication. Unfortunately, that formalization of Information hardly captures all of the needed nuances, and the accompanying theory has not lent itself to non-trivial applications outside the native context. Information is still the distinctive mark and arguably the basic commodity of our era, so that the need for deeper reflection and study is intensifying.

On the occasion of his ninetieth birthday, J. A. Wheeler came up with five big scientific questions that he predicted will shape the future of scientific endeavors. The fifth one was about Information that he phrased as follows: “It from bit”. Wheeler argued that Information is physical and needs to be studied like energy. While physicists have made some progress in extending Shannon Information beyond its original goal (e.g., see C. Brukner, and A. Zeilinger, Conceptual Inadequacy of the Shannon Information in Quantum Measurements, Phys. Rev. A 63, 2001), we still lack a meaningful extension of Shannon Information to microscopic systems.

The recent 50-th anniversary issue of JACM opens with an essay by Frederick P. Brooks, jr, entitled “The Great Challenges for Half Century Old Computer Science”. The author gives a list of outstanding problems. Problem Number 1 is as follows: “Shannon and Weaver performed an inestimable service by giving us a definition of Information and a metric for Information as communicated from place to place. We have no theory however that gives us a metric for the Information embodied in structure... ...this is the most fundamental gap in the theoretical underpinning of Information and computer science. A young information theory scholar willing to spend years on a deeply fundamental problem need look no further.”

Some of the challenges we face today are:

- We still lack measures and meters to define and appraise the amount of structure and organization embodied in artifacts and natural objects alike, a deficiency that antagonizes the development of many useful theories and applications, notably, in the biomedical sector.

- Information accumulates at a rate faster than it can be sifted through, accessed and digested by humans, so that the bottleneck, traditionally represented by the medium, is drifting towards the receiving end of the channel.

- Timeliness is an important dimension of Information. Time and space varying situations are hardly touched by Shannon Information (in Shannon theory one bit of Information sent over a network is received as one bit whether it arrives within a second or withing a day and we know it is not the same Information; similar situations arise in business, biology, life science, etc).

- In a growing number of situations, the overhead in accessing Information prevails over that of fruition, which makes information itself practically unattainable or obsolete.
• Capabilities akin to contents addressing and semantic access and transmission are not even in sight, while computing and communication infrastructures of the new Millennium induce drastic mutations on the conventional notions of Knowing and Learning, Guessing and Discovering.

• Microscopic systems seem not to obey Shannon postulates of Information. In the quantum world and on the level of living cells traditional Information often fails to accurately describe reality.

These and additional issues shall be debated at the Workshop on “Information Beyond Shannon”. Unlike the typical scientific meeting, this Workshop is not convened to showcase past accomplishments as much as to identify and discuss future directions. The participants will be invited to take an active role at all stages, by proposing subjects and methodologies, possibly with an interdisciplinary orientation.