Pennyworth philosophy

WHAT IS INFORMATION?

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Information is any quantity of knowledge in any form that is shared between or among agents. In my opinion, inert knowledge that is not shared should not be ranked as information. In this respect, information is like money that in order to be of any value must either change hands or otherwise productively used. Money paid to the milkman, saved in a bank, or invested in a business has a value. Money stored in a strongbox has no value, as long as it is not used.

Knowledge in various forms is stored in nature, and in human products of every sort, and in human minds. Whether it is stored in the annual rings in a tree trunk, or in a new scientific theory, it becomes information only when made available in a form understandable to the party receiving the information. That "party" may be any human being, my computer, an animal, or a robot. We all live in an age when distribution of information, because of the accumulating knowledge and its growing availability, and because of its ever-increasing accessibility, plays a tremendous role in all aspects of life. While this explosion of information creates technical, operational, and mental problems, it is a great blessing to education and sciences.

One, and in my opinion, a major problem of our time is the tendency of information to evolutionary speciation, due to increasing numbers of ever narrowing fields of knowledge, and due to the language it is using. The swelling knowledge keeps splitting in an evolutionary process into more and more disciplines, with rifts between them deepening, and the people specializing in them developing more and more exclusive terminologies and styles. Thus, we have intra-disciplinary information, (physicist to physicist, sociologist to sociologist, etc.), which we sometimes bunch together creating multi-disciplinary information. But, we are at our weakest where it comes to inter-disciplinary information, which I understand also as trans-disciplinary. I witnessed this weakness on several workshops and conferences intended to be inter-disciplinary, but only managed to be multi-disciplinary. People were talking in parallel, rather than to each other, and as we all know, parallel lines meet, if at all, only in infinity. It seems that true inter-disciplinary exchange of information is still rather scarce than common. So let me extend this essay's title by adding the question:

What is inter-disciplinary information?

Inter-disciplinary scientific information ought to be presented in a sort of scientific Esperanto in terms of both, style and terminology, even more so where intended for education and training. However, the speciation of knowledge and, hence, of the whole scientific/academic system, has led to the evolvement of specific intra-disciplinary jargons, fully understandable only to insiders. This creates also semantic problems: different disciplines using the same words or expressions to describe different things, or different words or expressions to describe similar or identical things. Misunderstandings occur. Another problem is the lack of effort on the part of many specialists to make their information "friendly" and understandable to specialists coming from other disciplines. Opinions persist that in many cases this lack of effort or even professional obfuscation are deliberate, to keep outsiders out and to boost the image of the insiders. So, here, we come to the next question:

Why inter-disciplinary information?

Many problems we are faced with require inter-disciplinary information and some, inter-disciplinary treatment by multi-disciplinary teams. There are such things as ***"inter-disciplinary disciplines",*** which require and often miss inter-disciplinary information***.*** The various branches of ecology represent only one example, as the one I'm involved with: fisheries ecology.

Fisheries ecology is the science that deals with marine ecosystems modified by human interference. This interference is quite significant, considering that close to100M MT of marine organisms worth over US$100 billion, are annually extracted from the world's seas and oceans. Since fisheries ecology supplies the scientific basis for fisheries management and marine resources conservation worldwide, it can be classified as an applied science.

Understanding and description of marine fishery ecosystems require input from at least: marine and fishery biology, genetics, physical and chemical oceanography, marine geology, geography, climatology, meteorology, and socio-economics of fisheries (people and markets), as well as marine research and fishing technologies that in turn involve, among others, electronics, hydroacoustics, and hydrodynamics.

One of the reasons, if not the main one, for recurring failures of institutional fisheries science to provide right advise, is ignoring the role of any of these disciplines by many of the scientists, whose job is to recommend to the

authorities in charge the management means and ways concerned. Such disregard is probably caused by the complexity, and insufficient data and knowledge of the marine systems on one hand, and the inappropriate character of the information flowing from the different disciplines, on the other. People, scientists included, tend to deal with things they know of, and stick to the knowledge acquired from their own particular studies and experience. They find it difficult to absorb information, however relevant, from other disciplines, all the more, if such information is presented in an ***intra-disciplinary*** style.

This, consequently, leads to linear or two-dimensional concepts and paradigms that try to explain complex systems in simplified terms. Let me continue with this, fishery example: for several decades, now, fluctuations in catches have been explained in terms of fish population dynamics only, as if the only or main cause for fish abundance is fishing pressure. Such approach neglects environmental influences. For instance, ENSO (ElNino Southern Oscillation) alone may reduce the landings of pelagic fish (fish that inhabit off-bottom waters) in SW America by some 4-6M MT, that is by 60-80%. ENSO's climatic dynamics in atmosphere and the ocean affect in a roundabout manner not only the abundance and availability of Peruvian anchovetas in the Pacific Ocean, but also other fishery resources throughout the World Ocean, as well as various crops on land.

More recently, ElNino events have gained a lot of popularity and may have impressed people whose only tool to look at fish resources has been for years only the discipline of population dynamic. This may help, hopefully, also in other oceanic areas where environmental influences are not as strongly expressed as in the case of ElNino. Now, why this change of attitude, if any? Because the ***information*** about ElNino has been produced and widely broadcast in a manner that was accessible and understandable not only to all scientists concerned with fishery ecosystems, but also to administrators, and fishery operators concerned, and because it spurred the latter to start asking questions about the reliability of the population dynamics models.

Popular science has long been in circulation. It is directed as a rule at the wide public. It cannot replace scientific and technical information, but it has demonstrated how complex concepts can be presented in a "reader-friendly" or a "viewer-friendly" manner. I think that the scientific community should develop a "scientist-friendly" ***art of scientific information,*** so that we can write and talk across disciplinary boundaries, understand each other, and work together, so that while producing the latest picture of the world, less efforts would be required to take into consideration information from all pertaining disciplines.

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