# Six responses to the question: From your point of view of engineers, what is IEML?

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The authors of the following short texts are all involved in IEML research.

## 1. Andrew Roczniak. Receive "your" information from any Web 2.0 site that uses tags

IEML is an artificial language that allows users to express themselves by specifying the semantics of both the information structure and its contents. Because it is a finite regular language, it is conducive to fast processing by algorithms.

IEML is also an enabler that permits to create a truly interactive internet, where each user can encode information that it produces or wants to consume, and let the "cloud" take care of the rest.

More specifically, IEML will allow to match users' specific interest with all kinds of information, and will enhance modern application-layer routing based on XML. Expressing information in XML allows new applications to route messages based on their content in addition to their destination address. IEML will additionally enhance this concept by providing a semantic dimension. A natural application of IEML that comes to mind is to be able to receive "your" (in the sense that it is of interest to you) information from any Web 2.0 site that uses tags.

## 2. Christian Desjardins. IEML makes the implicit, explicit.

The web is a global manifestation of collective intelligence. Groups of people can collaborate like they never could before and suddenly because of their activities on the digital medium of the web, new information emerges. How to derive intelligence from all this new information is what web engineers are preoccupied with theses days.

Unlike explicit information like dates, ratings or even tags, implicit information presents many problems for computers to map. Mapping or making implicit information explicit requires intensive data mining and complex natural language processing. In many way it is not efficient or even realistic to derive intelligence using these methods.

IEML is an elegant and computationally economical solution. It is a machine-readable artificial language that enables us to map meanings created by natural languages. When natural language expressions are translated into IEML, computers can manipulate each instance both independently and systematically. Powerful semantic search engines, semantic web browsing, quality automatic translation and even intelligent drafting are applications we will see emerging in the very near future. IEML enables computers to seemingly understand our information and help us evolve to think collectively. IEML enables computers to seemingly understand our information and help us evolve to think collectively.

## 3. Candide Kemmler. IEML is a bridging technology for humans to collaborate accross disciplinary boundaries and language barriers.

To begin with, IEML is a language in its own sake; one of its own kind, too, however, since it has a universal scope. It stems from a long philosophical ambition to conceive of a language that is the language of the mind.

Foremost, it is also a script through which we can not only describe ideas, things or concepts, but, as we are doing so, it gives us the power to understand and to discover more about the reality we are trying to model. This process, in which we are constantly re-evaluating our own assumptions about our personal ideas, is what makes IEML a bridging technology for humans to collaborate accross disciplinary boundaries and language barriers, almost without us ever noticing it.

As a software engineering tool, IEML is the technology for IT experts to create systems that are not only technically interoperable, but whose functionality will be expressed in the most generic way and which will allow for a whole new level of reusability. It has the potential to create a breakthrough in design pattern engineering as well as in SOA software design.

Imagine a world where Web Service descriptors not only expose method signatures but also the true meaning and scope of these methods in a way that is understandable by machines. IEML is the empowering technology for software engineers to exponentially grow our ability as a species to think collectively and, ultimately, to better understand the world we are living in.

## 4. Michel Biezunski. IEML is like a map representing all semantics of the world

IEML is like a map representing all semantics of the world, on which the knowledge of where things are positioned gives us information that helps us find other information related by structural rules. Relations between concepts, often implicit, or hidden, are made visible through IEML, therefore empowering us to discover and reveal phenomena that were there, without being necessarily expressed.

IEML is expressed with a notation, called the "Star language", that lets us express concepts independently of any given natural language, therefore enabling communication, at a deep level, between participants who may use different languages. The Star language can be parsed and the parser yields a computer representation for use with various applications using XML as well as a binary represnetation used for computerized operations.

In addition, a Semantic Architecture Language is being designed, that will describe rules by which concepts can be expressed and calculated via a set of predefined operations.

## 5. Steve Newcomb. IEML research program wants to answer this question: "How can organizations and civilizations look into a kind of mirror, and see themselves accurately?"

In order to understand the answer to a question, it is first necessary to have asked that question. When teaching about IEML, the chief difficulty is to bring the learner to the point where he or she can ask the question to which IEML is an answer. The learner must already be motivated by a high level of curiosity, and already inwardly liberated by hope that learning can turn out to be worthwhile even (and perhaps especially) when the learner cannot know the reason for the learning until after some learning has already occurred. People who do pure research are powered by their internal conviction that learning is always good, and by specialized convictions – hunches – that whatever work they are doing is going to lead to new knowledge. People who don't have such convictions simply don't do pure research.

Right now, everything about the IEML work is pure research. It is comparable to other leading-edge research areas, such as /epigenetics/ in biology, or maybe /string theory/ in physics: all are new approaches to the explanation of very old, very fundamental mysteries. Human beings are attracted to research work by curiosity; for some reason (or even for no reason) they make the initial investment of learning enough about an area of research to decide whether to stay or move on to something different. If their curiosity is replaced by fascination, they may stay and learn more. Later, if they find their fascination

has been rewarded with new insights, or public recognition, or money, or even simply the experience of going where no one has ever been before, their fascination is replaced by dedication, and they become the leaders and teachers of whatever the field is. The best and most useful thing that a fine education can provide is a basis on which it becomes possible to ask good questions. The IEML initiative seeks to provide a basis on which some questions will become askable for the first time in history. Some of the questions that IEML makes askable may well be vital for human beings, their cultures, and their economies, both now and in the far future. And IEML may help /answer/ those questions, too.

Nobody knows where the IEML work will lead, or how risky it may turn out to be, personally, professionally, culturally, or economically. There is, of course, some risk that IEML will lead nowhere, perhaps for reasons that we cannot even imagine. I have been re-evaluating the risk of investing my time in IEML often for several years. I keep asking myself questions like, "Is IEML nothing more than an extraordinarily elaborate fantasy?" and, more fundamentally, "Do I understand, yet, exactly what IEML is, and how it works?" My answers to these questions are still evolving. There have been moments when I thought I understood IEML to be crazy, or naive, or impractical. But whenever I have confronted Professor Lévy with such understandings and criticisms, he has shown me that my understanding of IEML was still incomplete, and therefore that my evaluation was ill-informed. Somehow, he has always managed to correct my misunderstandings in a way that has converted my skepticism into increased enthusiasm. It's an unusual situation, to say the least.

Right now, I do not know any reason why IEML will definitely not work. (Yes, there are two "not"s in the preceding sentence. That sentence says exactly what I mean, and it is the most positive statement I can make.) I cannot claim that IEML definitely works, because I have not yet seen a convincing marketplace demonstration. Such a demonstration is still in the future. The uncertainty surrounding IEML is the price I pay for the privilege of exploring previously unexplored intellectual territory. Currently, the price seems reasonable to me. In any case, all research carries a similar price. If we already knew what the results of research would be, there would be no need to do research. The exploitation of hunches is a risk management strategy.

Why do I find IEML so fascinating, and the risk of working on it acceptable? The answer has to do with a question that has been central to my entire career, and about which I am extremely curious, and about which I have developed some hunches from time to time:

"What do we mean when we say that something 'exists' in a human mind? What is the nature of that kind of 'existence'?"

I haven't always asked this question in exactly this way. The first way I can remember formulating it (around 1977), it was something like this:

"What is music? What is the substance of whatever it is that is present in both a musical score and in a performance of that same score?" (I was taking a Ph.D. in Music Theory at the time.)

Later, after I was introduced to SGML, and in the still in the course of

attempting to answer the above question, I reformulated my question as follows (around 1989): "How can a corpus of information describe itself?"

In those days, I was fond of a thought experiment in which a message is sent by humans on Earth, and it is received by aliens on some distant planet. How can the message be formulated or packaged in such a way that the aliens will definitely understand it? Ultimately, I decided sadly that, in the absence of knowledge that was already known to be shared by both the senders and the recipients, no such packaging is possible. But that disappointing conclusion led to another question (around 1992):

"How do human beings share knowledge, and what can be done to make knowledge more sharable?"

...and my current formulation is merely a refinement of that question. It asks the underlying question, which is "What are the things that exist in more than one human mind, such that human beings can communicate with each other?"

When I learned that Prof. Lévy was working on an even broader question, he immediately had my attention (and my skepticism). Prof. Lévy's motivating question appeared to me to be something like,

"How can the propagation of information (and kinds of value) among human beings, and their collective behaviors with respect to that value, be studied and learned from, with a view to making our collective behavior more informed and more rational, and all human beings more prosperous and secure?"

Or, more simply:

"How can organizations and civilizations look into a kind of mirror, and see themselves accurately? How can such mirrors be made to exist?"

It is hard for me to imagine a more important question, or one that has received less attention, especially considering its overpowering importance. For me, IEML is nothing more or less than a way of making the above question the subject of *quantitative* (hard science) study, as opposed to merely *qualitative* (soft science). IEML (or, rather, the key insights that have informed the design of IEML) are also extremely relevant to all of my earlier questions.

To IEML novices I would say these things:

- IEML is very different from anything you've ever seen or heard about. If you think it's the same as something else, or that it's crazy, or impractical, or otherwise dismissible, you probably don't understand it yet.

- I have not found IEML easy to understand, although I can now see that it's fundamentally pretty simple.

- Pioneers are welcome in IEML-Land. Non-pioneers are welcome, too, but the IEML initiative is so young that pioneers are likely to be more interested than non-pioneers. Not everybody likes pioneering. Successful pioneers adapt rapidly and easily; they can be part of something that changes whenever something new is learned. Most of us enjoy that very much, although it's often inconvenient, unpredictable, and offers little if any security.

- My gut feeling is that the IEML work will be transformational, and that there is more than enough meaningful work for everybody for centuries, at least.
- Having learned about IEML, you will be better able to consider the questions that motivate *you*, and what relevance, if any, your own motivations may have to IEML, and vice versa.

## 6. Samuel Szoniecky. Thank to IEML, we can not only model meaning but also the mechanisms that process meaning.

Thank to IEML, we can not only model meaning but also the mechanisms that process meaning. There is still a lot of experimentation to do in order to find the best balance between particular points of view and universal semantics. However, to manage the complexity of the next internet revolutions (including the semantic web and the web of objects) we need a language like IEML to design the interactions between all the components of the Web ecosystem and to offer to the future informations architects the knowledge engineering tools they need to express their creativity. As a knowledge engineer, I find in IEML a metalanguage for the design of new tools allowing the manipulation of the internet ecosystem. IEML allow writing code while giving to to the whole cycle of information processing a strong consistency. In addition, thank to IEML, this processing cycle can be made independent from natural languages and from subjective interpretations. The challenge is to find user interfaces easily manipulable by users and developers in order to help the knowledge of everyone participate to the collective intelligence.