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## ATG Interviews Ruggero Gramatica, Founder and CEO, Yewno, Inc.

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## Founder and CEO, Yewno, Inc.

by **Tom Gilson** (Associate Editor, *Against the Grain*) <gilson@cofc.edu>

and **Katina Strauch** (Editor, *Against the Grain*) <kstrauch@comcast.net>

**ATG:** *Yewno is a fairly new enterprise. What is Yewno and why should information professionals want to know?*

**RG:** **Yewno** is the developer and provider of a new inference engine that gives people in literally every walk of life and business an entirely new way of uncovering previously undiscovered knowledge and insight. With our distinctive ability to make associations in unstructured data, we aim to facilitate the emergence of knowledge as it's never before been perceived. We give information greater meaning by using advanced computational semantics, neural networks, and machine learning, all presented in a highly visual, contextual way that makes inferences across concepts.

**ATG:** *We always wonder how entrepreneurial efforts like Yewno get their start. Can you tell us where the idea came from and how it evolved? Why the name Yewno?*

**RG:** The germination of **Yewno** came from the need to make sense of ever-increasing data sources that are continuously fragmented and dispersed.

I first applied our concept to econophysics as a proof of concept in the economic and financial domain. Then, a biotech company in Switzerland asked me how they could repurpose existing biological molecules to cure rare diseases, and I realized that an algorithmic approach could add scale to the research dramatically. The original idea was then converted into an analytical framework to ingest and process 23 million medical documents and create a dense biomedical knowledge graph. From there, a stochastic algorithm uncovered biological pathways pertaining to drug repurposing.

That idea evolved into the current **Yewno** Education product after **Stanford University** approached me in 2013 suggesting to build a pilot for an *inference engine*. They were interested in a new way for faculty and students to find previously undiscovered connections within a massive amount of unstructured and cross-disciplinary information.

The name **Yewno** is a play on words: "You Know." It actually has special meaning for me based on the English *Yew Tree* and its mystical significance. In addition, there are many parallels between trees, growth, structure (roots, trunk, branches, leaves), and knowledge, which is the epistemological mission of **Yewno**.

**ATG:** *You say that Yewno enables "faculty and students to find previously undiscovered connections." Can you give us some examples of such "undiscovered connections" from your own search experience?*

**RG:** The search of "Room 40" is a perfect example. This was a British cryptanalysis effort during the First World War. The information



about that historical project is currently spread and dispersed across many different sources. But **Yewno** is able to display a highly visual contextual and conceptual map of the topic, and make it possible to discover the relationship amongst the most important concepts related to espionage efforts and events connected to that historical moment.

A more recent example is an important lead which emerged through **Yewno**. We were interested in finding the connection between the extended use of the molecule Benzodiazepine and its relationship with Alzheimer's disease.

**ATG:** *What initial challenges did you face? How did you overcome them? What hurdles are immediately in front of you now?*

**RG:** What we are doing is nontrivial. The technology framework is quite unique and our field of knowledge discovery is very different from traditional information services and search tools. It's one of those things that is best seen to realize its power and to realize the full extent of what is possible via our solution. The minute people see **Yewno**, the design immediately makes sense and they recognize the enormous potential behind this idea.

Having key institutions like **Stanford** and **MIT** as early beta users helped us establish credibility in the sector, but the product isn't just for large research universities. In the beta trial, we have a full range of institutions: large, small, public, private, teaching and research, and we are committed to making sure the service works for all of these customers.

**ATG:** *Aside from having the initial difficulty of explaining Yewno to potential users, it sounds like the key challenge now is ensuring that Yewno will be of value to libraries, both large and small. How are you progressing in meeting that challenge?*

**RG:** We're making great progress and already have some of the world's most prestigious universities collaborating with us. Like any disruptive technology or business model, it takes time. People need to see **Yewno** to understand the enormous potential of our inference engine and its knowledge discovery capabilities. **Yewno** is remarkable and idiosyncratic. Correlating concepts and building an inference is sometimes compared to traditional keyword-based search engines, but it's not the same thing. It's not even in the same galaxy. In fact, we envision a day when people fully understand the difference and will use both our inference engine and traditional search engines in complementary ways. That's when we'll know that **Yewno** has arrived!

We've discovered that the best approach is always hands-on exploration, letting librarians, researchers and students try **Yewno** and give feedback on their experiences. The feedback has always been consistent and everyone agrees on the difference between searching for answers and exploring for fresh and unexpected, undiscovered knowledge. We also made sure that in our beta-trial all types of academic libraries were represented.

**ATG:** *We understand that at Yewno you are building the next generation knowledge engine. For those of us who are less familiar with the concept, what exactly is a knowledge engine and how does it differ from a search engine?*

**RG:** I first need to make a quick clarification. What we've built here at **Yewno** is an inference engine that is designed specifically for knowledge discovery. We like to say that we're providing people entirely new paths to uncovering the undiscovered. The issue is that information is ever growing, as is its dispersion and fragmentation. **Yewno** isn't merely a searchable directory of information or a repository or archive which a reader accesses, digests and connects with other findings by chance. It provides a cognitive pre-mapping of knowledge which enhances the inferential investigation process across concepts, while also delivering an easy way to extract data and make connections.

**ATG:** *Yewno's use of graphics in the search display is a unique feature. Can you talk a little bit about that? What advantages does it give the searcher over more traditional displays?*

**RG:** Graph-based visualization has been around for a long time. That by itself is not new. But at **Yewno**, the way we extract concepts and contexts linking them with other concepts is in fact quite unique. It's distinctly new and different and innovative because we combine

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the graphic representation of knowledge with semantic references to these concepts alongside the opportunity to drill down to the raw source of data (i.e., a book, a journal, an article, etc.). We call it an *Induced Knowledge Graph*.

Furthermore, each concept can be expanded and this action leads to other clusters of concepts creating a chain of intercorrelated concepts mimicking an inferential process. Basically, we're mimicking the human brain. That's why we say our solution simulates *lateral thinking*. In fact, our brain absorbs information by associating abstract concepts similarly to a graph, meaning concepts are linked to one another just as human intuition is all about finding new links.

**ATG:** *This seems to involve more than finding information. Yewno appears to offer an element of information creation and evaluation that then leads to useful results. Are we on target? Can you give us an example?*

**RG:** Yes, acting as an inference engine means providing ways to interpret existing knowledge. But our technology doesn't blindly present links between concepts. Rather, it explains the rationale linking two concepts with each other. Whether you're interested in examining a hypothesis or discovering new information, you'll find amazing results. And these are relationships, associations, inferences that weren't possible to derive previously with traditional tools.

**ATG:** *We understand that Yewno uses leading edge computational semantics, graph theoretical models as well as neural networks to tackle the information overload problem. Sounds pretty complicated. How do you explain these concepts in language a novice can understand?*

**RG:** The best way to simplify what we do is to say that we help people know more. And that's something everyone wants! In the simplest form, we extract meaning from text. Buried amongst mankind's endless lines of text, images and unstructured information, are concepts, and **Yewno's** framework eases the discovery of concepts and their correlations by utilizing advanced computational linguistic techniques and neural networks training algorithms so that emerging ideas can be better anticipated and unveiled.

**ATG:** *Broadly speaking, it sounds like Yewno is using some form of artificial intelligence and, in a sense thinking, and then inferring connections and relationships. Is that a fair observation? Or is there more to it? Are we missing something?*

**RG:** No, you've got it, you're not missing anything. Our mission is to empower people who want to know more. Our approach is inspired by the way we humans process information across multiple sensory channels. We are building the next-generation inference engine which will help people to overcome the information overload problem, to research and understand the world in a more natural manner, to discover more knowledge.

So far, we have focused on the static data. But we're working towards the continuous ingestion of high quality data which adds an additional dimension to our system: time. Indeed, our approach extracts insights by analyzing not only the nature of the interconnected concepts, but also their temporal evolution. This enables us to quantify the evolution of meaning and to establish a link to other concomitant real-world phenomena that might be analogous. And this capability will grow exponentially as we continuously ingest more data and information sources.

Finally, our framework is in line with certain theories from the cognitive sciences. At the neural level that conceptual knowledge corresponding to objects with similar properties is stored in adjacent neural areas forming a network of interrelated concepts. So we treat the semantic representation of knowledge by projecting similar objects (concepts) and linking them through something we call synthetic synapses (e.g., a logic function correlating two concepts).

**ATG:** *Yewno's discovery technology is essential to the Education product as well as other verticals such as Finance? Can you tell us more about it?*

**RG:** Discovery in **Yewno** features knowledge extraction, but can also be applied to vertical subject matter such as finance, biology, and other areas. It enables users to intuitively explore a topic by navigating through correlated concepts as well as to find information across disciplines and links to topics. Finding connections, or inferences, that they didn't know existed enables users to hunt for emergent knowledge. And this can happen in a supervised way, meaning that the user manually explores connections, or in an unsupervised way, the algorithms hunt for inferences and generate hypothesis.

**ATG:** *Have your two products been fully launched? Are they currently in use? Is there a beta site to go to view them and experiment?*

**RG:** **Yewno Discover** was launched in June at the **ALA Annual Conference** in Orlando. Our financial service has successfully passed the Proof of Concept stage and it is now in advanced testing, fed by a multitude of information in the field of economics, finance, politics, and sociology and will be launched soon.

**ATG:** *Who is your intended market? Where do academic institutions and libraries fit in? How about individual researchers? Who are your main competitors?*

**RG:** Our market is defined within the *Knowledge Economy* which includes students, lifelong learners, business people and professionals. Within that world, we are addressing a number of vertical markets. For example, in the education sector, our product is designed for academic institutions, especially libraries serving students and faculty. We can reuse a library's existing content subscriptions and holdings to maximize the value of their current spend and our service is complementary to whatever "search" interface they might currently offer. Our inference engine and its

use of artificial intelligence enhances the research experience by providing a completely different lens to view information.

**ATG:** *Is Yewno available via a subscription? What is your pricing model? What type of financial commitment are we talking about?*

**RG:** The **Yewno Education** product pricing is structured in the same way as traditional discovery services using FTE ranges. We want the product to be within reach to all types of institutions so we've priced it to be accessible to all parts of the market. Institutions can opt for a variety of term contracts and different discount structures apply to these.

**ATG:** *This seems to be a tough time to be breaking into the market. What has been the response so far? Is there anyone besides MIT and Stanford currently using Yewno? Do you have active subscribers?*

**RG:** Yes, we have a growing community of active users around the world. **Stonehill College**, **Harvard**, the **Bayerische Staatsbibliothek** and **NYU** are all connected besides **MIT** and **Stanford**. We also provide users with metrics on what concepts their community is searching for, what content they are finding, and how they are transitioning across different disciplines of information in their discoveries. We also run product demonstration webinars on **Yewno Discover** which include full metrics and if anyone is interested they can sign up via our website.

**ATG:** *Starting a new company, while exhilarating, has to be draining. How do you recharge your batteries? Are there any non-work related activities that help you re-energize?*

**RG:** With three children and a dog, I don't have much spare time! But our time together is incredibly energizing. I enjoy spending time with friends and planning my next sailing adventure. I'm also an avid reader.

**ATG:** *We're always interested in what people are reading. What books are on your tablet or nightstand now? Have you read any titles recently that you'd recommend?*

**RG:** My nightstand always has at least three books on the run. Currently, I'm reading a book by **David Lindorff** about **Wolfgang Pauli** and **Carl Jung** entitled *The Meeting of Two Great Minds*. I'm also reading **Wolfgang Pauli's** *Atom and Archetype: The Pauli/Jung Letters*.

On a more lighthearted subject, I'm an avid sailor and have always been fascinated by charismatic explorers and their voyages. I'm now reading a biography of **Sir Francis Drake** and his voyages, and just finished a book called *Sailing Alone Around the World* by **Joshua Slocum**.

**ATG:** *Ruggero, thank you so much for taking the time to describe Yewno and explain its value to researchers.* 🍷