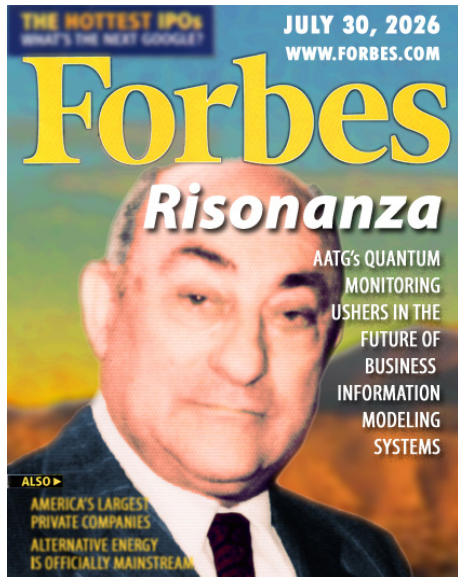


## White Paper — 21<sup>st</sup> Century Technology Series

*This is one of the series IDEAS CEO Peter Baston calls “Future History,” a Forbes interview that we imagine will take place in 2026 with an executive from a company that doesn’t yet exist, in which we project the future of rule-based business information modeling technologies. We’re not sure about tachyon communication, but everything else mentioned in this “article” could be realized today.*



### **Risonanza™: AATG's Quantum Monitoring Ushers in the Future of Business Information Modeling Systems**

*On the 20th anniversary of the founding of AATG, Forbes interviewed Valfredo James Segre, one of the founding partners. The growth of this company is the stuff of legend, but Segre tells us the company is not resting on its laurels.*

**Forbes:** Val, AATG is known as one of the most innovative companies in your industry, commanding the lion’s share of a \$70 billion dollar market. Tell us how your company reached the success level that it has today.

**Segre:** Where we are and where we came from is a story in itself. Way back in 2005 we took a long hard look at the industry we were in, which was primarily a General Contractor in the

construction and maintenance industry.

Year after year, our profits became harder to maintain in a very competitive industry. Ours was then one of the few professions where you could bring a guy by time travel, say a mason building a temple in the 12th century BC, to a current-day construction site and he would have no problem using most of the equipment. The specialized materials and handling equipment had changed — for example, steel in place of wood — but the what, why and where had remained basically unchanged for thousands of years. Basically you would design it, build it and maintain it in 2005 according to the same principles you used in 1105.

**Forbes:** Wow that’s pretty hard to believe.

**Segre:** Yes, it was, and when we looked at the future, we saw no real change, especially in the light of the high standards of safety and efficient operations that our company had always maintained. We recognized that we were locked into the paradigm that cost and time had to escalate in lockstep with quality and scope. In other words, while other industries were delivering better quality and more scope at continuously decreasing cost and faster turnaround, in our industry the only way to cut our customers' costs without sacrificing quality seemed to be to cut our margins.

We tame \$10 elephants.



Well, we did that, but there's only so far you can go with that and still stay in business. So we thought: we have to find a completely new paradigm for doing business, one that allows us to do what every other industry is doing in the 21st century — deliver more, faster, with better quality and at lower cost.

**Forbes:** What did you do then?

**Segre:** We looked at other industries where disruptive innovation totally changed the status quo of the business. Primarily we studied Wal-Mart and Southwest Airlines, which still today are classic cases in how to get it right and totally dominate an industry with innovative thinking by just rearranging the obvious.

**Forbes:** Are they not totally different industries? What could they possibly have to do with your problem?

**Segre:** No, quite the contrary, when you study innovation in other industries it opens the horizons of your own current narrowly specialized focus. You keep saying: wow, that's really simple, why didn't someone see this, that process is very similar to what we use, etc. You sometimes miss the obvious because you are too close. In our case, it led us to ask who our real customers were and what they really required in the long term. What is it that they are really trying to accomplish, where do they want to be in 5 – 10 – 25 years time? Then, we asked ourselves: how can we really improve our customers' ability to get where they want to be? It leads you to reanalyze all your processes to look for hidden value.

**Forbes:** Sounds easy. Can you illustrate that?

**Segre:** Sure. Let's consider how any project is designed: A customer makes a request to us for, let's say, a computer chip manufacturing facility. We would bid this from the client's architectural and engineering drawings, frequently making change recommendations for more efficient installation. We also have to keep in mind the cost of maintaining the facility. The client obviously is looking at his budget and balancing his total original construction costs against the cost of future operations.

One of the biggest challenges that the customer faces is that the better the design, the more the upfront investment to support that design, the less they pay in continued maintenance and operation — and, of course, the opposite applies. The problem is that the expense ratio of additional maintenance costs due to poor design choices is very high: remediation costs for fixing poor design can sometimes be 10 times higher than original fixed cost. The major hurdle that we saw to intelligent design was that up front costs are tangible, but future maintenance and remediation costs are not readily obvious.

It dawned on us that the real purpose of this exercise to actually give total value to the customer was to somehow close this loop and guarantee that no matter what happened in the future, we could take care of it. In other words, we wanted to present proactive design linked to the actual installation with continual feedback. The paradigm shift with respect to our industry was to look at the customer's Total Cost of Ownership (TCO) rather than to define cost as the sum of our bills of materials and labor hours. This, of course, had been routinely done in other industries - for example, in valuing information technology installations - from the early 1980s.

The exceptional breakthrough that I believe we brought to our industry was the inclusion of the building's success in supporting, even improving the customer's workflow as a measurable cost factor. In fact, when we analyzed some test cases, the success of the design in that sense had double or more

impact on the customer's bottom line than all other TCO components (initial capital outlay plus operational costs plus maintenance costs) combined.

**Forbes:** What did that lead to?

**Segre:** We made this “what if” statement: “If we could continually upgrade the project design information in real time to counter any future problem, what would the value of that be to any client?” That’s when, in 2006, we founded the AATG subsidiary because we realized that we needed a completely new launch platform from which we could set out to create an entirely new way to look at a building, from design through operation, so that our customers could really see their TCO, both projected and actual, from ideation through 20 years of operation.

We gradually refined our use of 6-dimensional modeling to the point where we could show the operational workflow of our clients through the building design. That led to optimization simulations, where we could adjust the building design on the fly to improve the efficiency of the operations taking place inside it. Then we took the modeling one step further by adding budgetary parameters, so that the efficiency improvements could be quantified in bottom line dollars.

The first time we did this for a client, we found the value of the operational optimization that emerged from the simulation was greater than the complete cost of the design-build project and building maintenance for the first ten years! In other words, by increasing the efficiency of what went on inside the building by 15 percent, we had recovered the entire cost of construction and operation of the building. It was a real eye-opener, both for us and for the client, and we went on to develop this process into a robust standard that could be applied to all of our contracts.

**Forbes:** Are you not talking about Resonance Model Imaging™ linked to Real Time Structures™?

**Segre:** Yes, but you must remember that this was nearly unheard-of in the first part of this century. The standard design system was always subordinate to the construction process, as nobody foresaw how to use it any differently. Then we had Computer Aided Design and, in some cases, Parametric modeling with crude simulation. By introducing RMI™/RTS™ we could have a working rule-based model in the virtual world that is linked to its big brother structure in the real world, with feedback between them on the status of operations. RMI™ also has the ability to run “what if” improvement scenarios constantly and check feedback from the real world. This, of course, led to the creation of the famous AATG Optimal Structure Model Set™: perfect designs that recommend upgrade improvements in the real world.

**Forbes:** So it was AATG who developed the RMI™/RTS™?

**Segre:** Yes, indeed. In fact, our designs became so popular that we now make most of our money building and selling the RMI™ – more than we ever did building the real thing. AATG, once an experimental subsidiary, has become our core business. The focus on RMI™ also opened up whole new markets for us, such as insurers, who have a very direct interest in having access to reliable information about how well the real world structures and facilities are working because this decreases their risk tremendously.

We also found an emerging need for a major independent trusted player to handle the entire data verification infrastructure of everything that was being collected, and we said: heck, why not us? The data alone is worth 50 to 100 times the normal contract fee, and when you then look at who needs it,

the value expands exponentially. The true turning point with this type of information came when the foremost designers and architects discovered that if you could improve what really happens inside of the building or structure—hospital, factory, whatever—by  $\pm 15$  percent, that would pay for the full cost of design, construction and its lifetime maintenance

**Forbes:** Give us some more examples of your customers and services that you supply today.

**Segre:** We are the primary contractor for all SCADA (System Command Control and Design) and data transmissions and operations for the North American power grid. We supply rapid deployment data collection maintenance systems (RPDMS) to all the fossil, nuclear and renewable power plants. We provide monitoring capability and power availability and operational license compliance services to the US and Canadian government as well as the major power purchasing markets and all the secondary compliance services such as the International Atomic Energy Agency (IAEA), the International Energy Agency (IEA) and, of course, the utilities themselves and their insurance companies.

We have duplicated these services to all major petrochemical plants as well as other industrial infrastructures such as bridges and offshore oil platforms and many more. The engineering and R&D equipment companies in all these markets are also primary customers. Our design sets are a standard requirement for major re-insurance and insurance companies and, as a result, it's a good bet that if you look at any major mechanical infrastructure system, there is an AATG model template in there somewhere.

We really operate the entire North American Grid Infrastructure Monitoring independently from NAOC (North America Operations Control) in Toronto, but we have mirror and back up and disaster recovery primaries in Seattle, Phoenix, Atlanta and Charlotte. In the Far East, we work closely with Fujitsu technologies and in Europe with ABB and Siemens.

We are also the central source for all educational performance data in the US, Europe and other continents, as the human performance data of the students — and remember, behavior patterns are different worldwide — is correlated with our building performance data. The building system information is always sending design upgrades to our central systems to develop **real** best practices infrastructure patterns for educational excellence. We also control and lease total turnkey education packages so that schools and colleges can forget about design, development and construction of schools and colleges and concentrate on making all their clients (students from Pre-K to 12th grade and beyond) TRULY learning-empowered. Again, the insurers and all the administrators support our system because the building success rate is over 95 percent, which we guarantee, and no company or system in the history of education has ever done that.

We're very proud of the educational performance division. It's a truly totally human-centric and not building-centric infrastructure system whose logic can be traced back to Christopher Alexander's *Pattern Language*. His work described building usability patterns in narrative form; we've just translated the description of successful educational buildings into parametric form.

**Forbes:** Wow! That's quite a handful. Anything interesting on the horizon?

**Segre:** Well, yes. We are just about to announce that *Risonanza™*, our new family of quantum monitoring systems, is ready for deployment. A dozen modules have been under field test for about six

years and have now reached what we call peak interface intelligence level, making them ready for full-scale deployment.

**Forbes:** Quantum systems — isn't that the technology where the data models are now powered with artificial intelligence and inherently aware of the real world infrastructure, and they are constantly communicating and updating their needs with tachyons?

**Segre:** Yes, indeed. Before the models were really working from rule sets that the designers incorporated, so even after simulation, recommendations would still be a human endeavor. Now we have introduced self-learning genetic algorithms, which capture the patterns of operation that drive the models and learn from the feedback loops into the real world, enabling the model to directly make recommendations for optimization and, in certain cases, to automatically optimize systems without waiting for the human interface.

We named this family of models *Risonanza™* because it establishes and maintains a resonance between the real and the virtual world based on patterns of activity; that is, it continuously seeks to harmonize the patterns of activity in real and virtual worlds. Like a human being, it continues to learn from experience, targeting emergent disharmonies revealed by the feedback monitoring and working to eliminate them. We conservatively expect it to treble our potential markets and open up many new avenues of business.

**Forbes:** Didn't you also conduct successful experiments with the communications taking place across the fourth dimension (time) using tachyons?

**Segre:** [Smiling and blushing] That, I am afraid, is proprietary information until our next version release of *Risonanza™*.

**Forbes:** Val, thank you very much for this brief glimpse into a fascinating company. If you could think of a catalytic moment in your company's metamorphosis, what would it be?

**Segre:** Funny you should mention that: it all goes back to one of our senior partners who calls it "Bleep and the Rhodesian and the Rubber Boat" ... but that's another story for another time.

*Interview ends with much laughter.*