

**Title: Overview of BakerSCI Capabilities**



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### **OBSERVATION: INNOVATION VELOCITY AFFECTS SOCIAL VISCOSITY**

What happens when an unstoppable force meets an immovable object? It's a paradox that has stumped many thinkers throughout history and, now more than ever, it is approaching yet another crossroads where its enigmatic philosophy will once again play the conscientious observer to the collision of its latest two victims: technological innovation and societal perfection. While innovation in its ubiquitous sense continues to outpace the rigorous expectations thrust upon it, society continues to find more ways to try to shove that technology into obsolescence for the sake of their insatiable pursuit of perfection. There must always be a way to make it harder, better, faster or stronger because the pervasive thought driving us forward is that if you're not growing then you're backsliding. Thus, within that context there can exist no happy medium and, therefore, society is forced into a state of perpetual evolution on the back of, guess who, technological innovation. Within this information age, we are now fully operating within the greater knowledge economy (Roberts, 2009<sup>i</sup>). In light of these circumstances, the challenge that today's thinker faces is that they must stay ever vigilant to make sure that a particular technology's point of diminishing returns does not suddenly become society's point of no return. The questions they must keep at the forefront of their mind are, "At what point will innovation velocity irreparably affect social viscosity?" and "If that point were to come, *would we even recognize it early enough to sound the warning bells?*"

There is no way to avoid it. Technology continues to shape our lives in more ways that we could have ever imagined. While our intentions for pushing innovation forward may sometimes straddle ethical and moral fences, the fact is that as innovation continues so must our ability to assimilate the intended and unintended knowledge that is created during that process. "Global, political, and social boundaries are being altered in the knowledge economy, and people with diverse backgrounds, values, and perspectives are increasingly populating all levels of organizations. The obligation for organizations and their features to transform in this environment has often centered on an interaction with new technologies" (Gavin & Bernadette, 2005<sup>ii</sup>). While it may be said that organizations must find a way to adapt to these changes in the knowledge economy to stay competitive and relevant, it is not the organizations that are doing the changing per se. *It is the people within the organizations who, through their conscious and subconscious interactions with these evolving new technologies, are forcing them to adapt.*

For example, in a webinar delivered by the ACFE entitled *Social Media Investigations in Fraud Evidence*, highlighted how the rapid advent of social media has not only changed the landscape of how individuals communicate with each other, but also how that communication method has forced the legal profession to address how that information can and cannot be used within a court of law. The wealth of information volunteered to these social platforms has become such a treasure trove of potential evidence, that the American Bar Association's (ABA) Ethics 20/20 Commission recognized that "technology has irrevocably changed and continues to alter the practice of law in fundamental ways" (Browning, Patzakis, & Botta, 2012<sup>iii</sup>). So much so that the ABA, an organization that has played a formative role in the development of the profession of law in the United States since 1878, proposed changes to their Model Rules of Professional Conduct so their members would "stay current on the benefits and risks associated with technology" (Browning, et al., 2012).

### **IMPLICATION: WHY A CYBERSHIFT IS NECESSARY FOR INNOVATION TO OVERCOME LEGACY**

With this new world economy hyper-focused on the ever quickening and evolving digital manifest destiny, it is clear and readily apparent that those who can adapt, deploy and integrate with consistency and authority will be the very same ones who will stake their virtual claims on the new binary battlefield upon which we now vie. Ones and Zeroes have become equally, if not more, important to national security interests today as the

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swords and shields of yesterday; for what once was overtly decided by brawn, can now be stealthily achieved by brain. Which begs the question: In a cyber race with this much riding on it, where second place is first loser and to the victor go both the digital and physical spoils, why then are we still allowing the latency of legacy to dictate the pace of proficiency?

The bottom line is this: *Everything related to cyber is FAST*. Speed is paramount to dominance. Decisions must be made quickly, decisively, and, in many cases, without human-delayed interference. This means that the decision support systems that associate, calculate, and articulate threats must be able to initiate planned and impromptu responses at the speed in which they are being identified, or pre-identified, for maximum countermeasure and/or retaliation. The response must be comprehensive in form and function, rapid across all facets of the decision-making process, and supplied by a hybrid team of governmental and commercial (G&C) experts commanding a suite of best of breed technologies. It is critical that G&C planning, preparation, acquisition, deployment, response and evolution all be in sync and readily adaptable or the threats to our national security, both home and abroad, will expand well beyond our ability to prevent, react, and respond to them.

To achieve the desired level of cyber readiness requires a wholesale cybershift whereby our collective foci effectively address the burgeoning vulnerabilities below that are beginning to impair, and if left alone will ultimately cripple, our critical response time:

Ones and Zeroes have become equally, if not more, important to national security interests today as the swords and shields of yesterday; for what once was overtly decided by brawn, can now be stealthily achieved by brain.

### **Narrow Analyst Pipeline**

While our nation's cyber tools may be stealthy and robust enough to run silently and autonomously in the background of our daily lives, critical decisions are still being made at the human level. Human decisions require talented analysts who have both the requisite experience and technical wherewithal to be the front line in the analysis process. True, machine learning is making advances, but until it can efficiently and consistently deliver front line analyses at acceptable confidence levels, this issue will remain one for the procurement and, more importantly, the retention of knowledgeable, capable and trainable human resources.

### **Protection Constraints Upon Near Real Time (NRT) System Adaptation**

Situational Awareness (SA), by definition, is the being aware of a situation and all its environmental pressures, influences, and catalysts through which a situation can be altered. As the environment changes, so does the situation. The key is, when changes do occur, how quickly you become aware dictates how rapid you can respond. Time is truly of the essence and while decision makers may desire "real-time" information, frankly, real-time data acquisition and analysis is very hard to come by. Thus, we are forced to operate kinetic engagements with Near Real-Time information. For decision makers, NRT intel may be the best they can get and, by virtue of its inherent latency, while the tactical team is operating in RT, the strategic team is forced to make decisions with already out-of-date SA. So, why does this matter?

Analytic systems at the strategic level *must not add* to the data latency burden. The system itself must be capable of keeping up with rapidly changing variables so as not to add increased delay in reaction to a vital

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change in the SA. Therefore, if analysis speed is critical to mission success, then the systems that are used to process information for decision makers must be allowed to function at the speed of thought.

### **Antiquated Compliance Standards**

Advances in technology allow for enhancements in analysis and response time. However, in many decision support environments, antiquated compliance standards muddy up rapidity of response due to the many hoops one must jump through to act on new intelligence. A loosening of the inhibitive standards could lead to increased reaction time should an incursion take place. Many times, what's written in the policy narrative as standard operating procedure is *not necessarily* the standard nor the procedure. As such, the policy should be updated for the new operating environment. New technologies that increase capabilities are hamstrung by legacy compliance standards. To maximize their effectiveness, their managing documentation must reflect new techniques.

### **Inadequate / Untimely / Out-of-Date Education of Technical Oversight Personnel (TOP)**

In similar fashion with the updating of the technical compliance standards, so must we strengthen the abilities of the technical oversight personnel who are tasked with creating, managing programs within these decision environments. TOP are in the unique position of deciding what technologies will or will not be allowed to enter department/agency/organization decision environments. Thus, when TOP are ill-prepared the contracting efforts they oversee experience crippling inefficiencies, and sometimes suffer outright roadblocks. Increasingly slowing contract movement due to inadequate FAR provisions for circumstance-driven speed as well as inadequate updated training of contracting/procurement personnel are both reasons why it *feels* like onramping new and innovative technologies is akin to endlessly rolling a boulder uphill. If TOP cannot understand how new innovation fits into the big picture and they are the gatekeepers deciding its adoption, then we must either change the TOP or find a way to minimize their role in the onramping process.

All of these implications are real threats to an agency's nimble critical decision making. Mitigating them is necessary. With the right tools, it can be achieved.

### **RECOMMENDATION: BAKERSCI'S APPROACH TO DATA ENGAGEMENT**

Baker Street Scientific (BakerSCI) is a Georgia-based commercial entity that exists to detect and reveal intelligence through relevance in data. BakerSCI's primary physical offices are located in Rome, GA with satellite offices in Denver, Atlanta and Arlington.

BakerSCI's foundations to its solutions were conceived by a fellow doctorate-level member of the Academy whose academic area of research is centered upon behavioral accounting and competency-based information analysis. BakerSCI's RITR<sup>™</sup> solution, at its basic level, is to discover and reveal relevant, actionable intelligence within gathered data that presents in BakerSCI's ATLAAS<sup>™</sup> in a readily digestible format for the purpose of high-level, critical executive comprehension and decision execution when time is of the essence; and subsequent data scientist deeper dives, interaction, navigation and modeling. ATLAAS is fast, data agnostic and self-improving while allowing for initial unbiased analyses that enable heightened acuity on mission critical decisions, and then enabling users to apply either their own bias or bias suggested through RITR itself. RITR (the Revealing Intelligence Through Relevance<sup>™</sup> system) is an analytics tool that discovers and renders intelligence from complex known and previously unknown data associations for the purposes of identification and analysis of not simply the conventional static connections between data points across x and y axes, but rather the dynamic interaction of both surface-level and deeper data associations across n-ary planes. ATLAAS

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(the Advanced Topographical Layout for Associative Analytic Synthesis™) is the visual presentation of RITR's results in a high-contrast, easy to interpret format.

BakerSCI's tech, based primarily on deep and broad data associative discovery and presentation, pushes the envelope in the areas of science and technology. It is important to note that this tech was ***intentionally*** conceived and developed outside of formal academic and research-oriented organizations. One of the main reasons for doing so is that while these organizations are heavy in R&D, they tend to silo their efforts leading to minimal to modest cross-silo interaction which presents adverse challenges in later stages of analysis.

### **WHO IS BEHIND THE SCIENCE?**

Baker Street Scientific has amassed an intellectual group who has contributed to the evolution of the resulting science and technology. This cadre has nearly 500 years of cumulative experience in:

- Artificial Intelligence
- Data and Intelligence Analysis
- Forensics
- Fraud Investigation
- Homomorphic Encryption
- Human Behavior
- Machine Learning
- Machine Vision
- Mathematics
- Neural Networks
- Neurosciences
- Pattern Recognition
- Physical Networks
- Physical Sciences
- Semiconductor and Processor Design
- Sensor Design and Data Formation
- Software Application Auto-Creation
- Software Language Design
- Software Product Development and Commercialization

### **HOW BAKERSCI PROCESSES**

***\*\*\*NOTE: Due to the nature of the propriety of the BakerSCI systems and science, any discussion that further explores in more detail the Company and its technologies will be reserved for an in-person presentation during which the Company may provide example substantive results.\*\*\****

### **High-level Technical Overview**

BakerSCI's solutions address and mitigate/circumvent various hindrances of conventional algorithmic, statistical, and data analytic methods and systems. BakerSCI's solutions are the elegant combination of 1) specific functionalities from multiple processing methods AND 2) a whole new processing method invented by BakerSCI, therefore, resulting in a novel and next-generation processing method, Integrated Multi-Paradigm Processing (IMPP) The new processing method created by BakerSCI brings to the solutions the abilities for IMPP to both auto-optimize process components and self-improve its metacriteria and metaconnections.

### ***Math and Science within BakerSCI's Solutions***

Math and science employed in this amalgamation includes but is not limited to:

- Fusion of integral and differential calculus; statistical and non-statistical analysis; qualitative and quantitative analysis
- $n$ -dimensional analysis
- $n$ -linear dynamics – both linear and non-linear dynamics
- Natural and physical sciences laws, math and logic
- Algorithmic-based, logic-based, rules-based, and custom-based functions
- Emergence analysis

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### **Example BakerSCI Result Types**

Associative Analysis is the process of assessing how data behaves, relates, etc. within both known and previously unknown associations, thus providing analysts with additional intelligence of, including but not limited to:

- Hows, Whys, Whats... of a decision, activity... at a data node and along a data path.
- Identification of tendencies, outliers, anomalies and gaps in relatedness and relevance
- Likelihood of an assimilation or a divergence
- Strength, volume, consistency, and homogeneity of data associative attributes
- Catalyst cause and effect in real and model data
- Identification of internal and external influencers
- Effect of analyzed data's metadata
- Signature and signature component evaluation and viability
- Signature component order optimization
- *n*-order signature creation
- Velocity, momentum and trajectory of:
  - decisions, travelers, products, equipment, energy, fluids, communication, ideologies, etc. (travelers)

### **WHERE BAKERSCI PROCESSES**

#### ***Image Analysis***

- Working in Optical (panchromatic and color), Hyperspectral, SAR,, IR and other image rendering IMINT specific to revealing "unknown unknowns", false negatives and the DEEP indiscernible context of the knowns and unknowns in the data.;
- Surface and Sub-Surface Feature Identification, Extraction and Analysis; Multi-frame analysis within MRI/CT/PET/Ultrasound within Healthcare; Hyperspectral stacks/cubes in agriculture, defense, oil & gas, etc.
- FMV analysis of Afghanistan cliff face looking for incoming points of fire;
- Working with chip manufacturers who excel in high-throughput FMV transfer and analysis;
- Identification and subsequent mitigation of system and/or sensor artifact (i.e. compression, forming, degradation);
- Seismological analysis within Energy exploration;
- "Noise Appreciation" within image analysis;
- Sensor Graduation.

#### ***SIGINT and other Linear and Tabular Analysis***

- Working in advanced associative analytics whereby unbiased data visualization renders data story in consistent behavioral model(s);
- Simultaneous multi-sensor analyses (not to be confused with post production data fusion);
- Revealed "hidden" pings within communication packet data thick with self-generated camouflaging AWGN;
- Revealed significant behavior associations within multi-magnetometer analysis;

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- Associative analyses of double-blinded financial information looking into financial anticipatory intelligence.

### **BAKERSCI USE APPLICABLE USE CASES**

IMINT; SIGINT; MASINT; HUMINT; Healthcare Research, Diagnostics and Compliance; Financial Intelligence, Transactions and Compliance; Energy Management & Distribution; Social Media Analytics; Ideological Impact & Modeling; Human Performance; Logistics & Transportation; Tourism & Travel; Marketing & eCommerce

### **BAKERSCI EXAMPLE SUCCESSES**

- Revealing stationary surface and subsurface objects dozens of feet below the water in SAR.
- Revealing compression and forming artifact in panchromatic satellite imagery.
- Revealing heat trails behind missiles in panchromatic satellite imagery without heat sensor tech.
- Revealing unknown unknowns within high-res algorithmic based imagery.
- Revealing previously unknown financial behavioral associations in financial market transactions.
- Revealing contextual features within LiDAR-like imagery for advanced third-party analysis.
- Revealing invisible grid lines w/in results that could confuse change detection systems.
- Revealing unknown naval activity and unseen hydrodynamic influencers in surveillance photos.
- Revealing ship wake (water dispersion not returned to normal) in high-res satellite imagery.
- Revealing features in satellite imagery smaller than a pixel; showing behavior of data in photos.
- Revealing time captured movement in 2D static imagery in space, on land, in water, in air.
- Revealing physiological effects on the human brain from non-imageable cancers.
- Revealing differentiation in flood waters identifying surface-level oil & gas pools.
- Revealing system and sensor artifact within satellite captured hyperspectral data.
- Revealing differentiation in land-based features in aerial surveillance.
- Enhancing sensor acuity by revealing unknown SIGINT/IMINT data in captured data.
- Revealing astronomical bodies behind nebula clouds
- Revealing previously unknown and unseen faults in seismic data.
- Revealing previously indiscernible feature activity in magnetometry.
- Revealing dominant influencing algorithm within multiple algorithm analyses.
- Revealing instances of anomalous signals within network communication packet data.
- Revealing data behavior within multi-sensor analyses.
- Revealing previously unseen propellant material from mortars fired from cliff faces in FMV.

### **FOR MORE INFORMATION**

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<sup>i</sup> Roberts, J. (2009). The global knowledge economy in question. *Critical Perspectives on International Business*, 5(4), 285-303. doi: <http://dx.doi.org/10.1108/17422040911003033>

<sup>ii</sup> Gavin, M. S., & Bernadette, M. W. (2005). The influence of perceptions of social identity on information technology-enabled change. *Group & Organization Management*, 30(3), 289-318. Retrieved from <http://search.proquest.com/docview/203372106?accountid=40833>

<sup>iii</sup> Browning, J., Patzakis, J., & Botta, B. (2012). *Social media evidence in fraud investigations: case studies and new best practices* [PowerPoint Slides]. Retrieved from <http://memberwebinars.acfe.com/webcast/login.php?type=s&id=14321&p=fM6Hz2hZ>