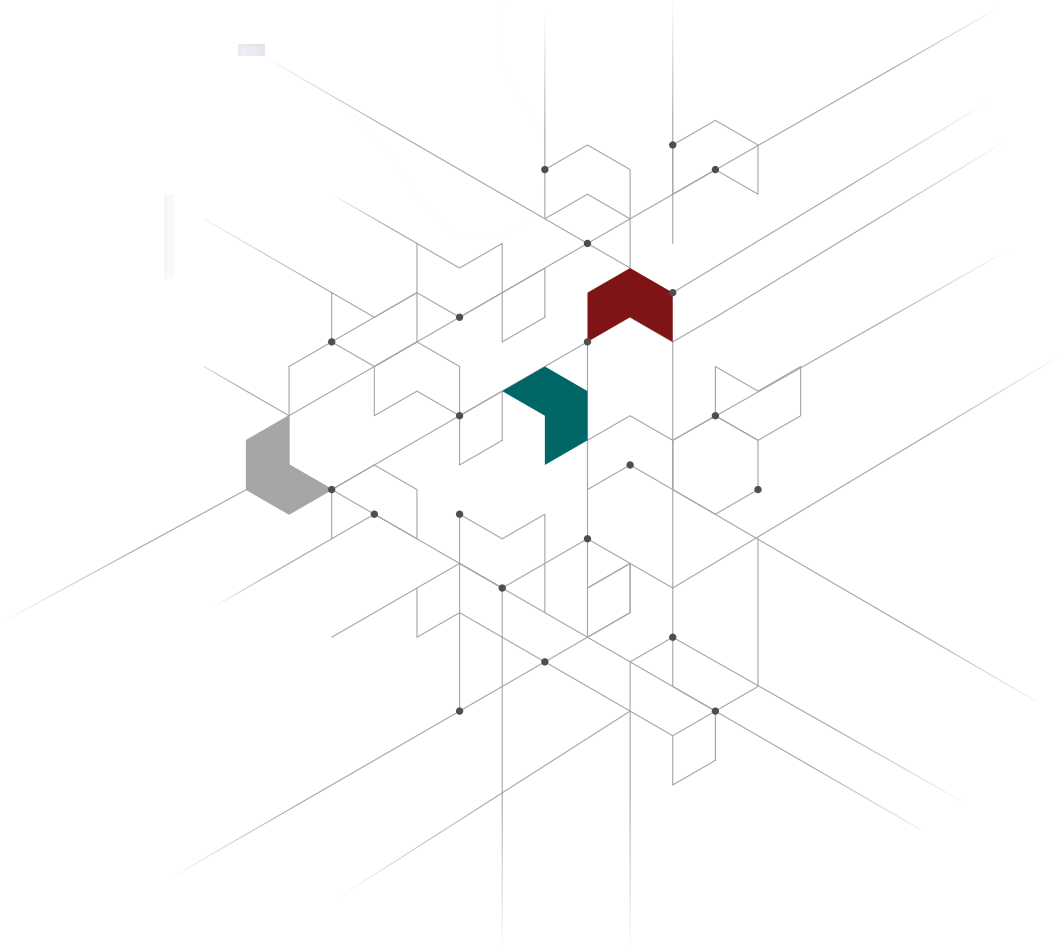
Mu Sigma

THE ART OF PROBLEM SOLVING SYSTEM™

A GUIDE TO YOUR DECISION SCIENCES JOURNEY



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Introduction

Mu Sigma's Approach to Modern Decision Making

Mu Sigma presents a novel methodology, the Art of Problem Solving, designed to help Fortune 500 companies prepare for a world of algorithms. We first delve into the contemporary shifts in the business environment, pinpointing areas where strategic problem-solving is crucial. Subsequently, our Art of Problem Solving System™ (AoPSS) is introduced, helping enterprises operate at the interaction of Math, Business, Technology, Behavioral Sciences and Design Thinking. Our discourse culminates with guidance on orchestrating and steering these continual efforts, intending to bolster your decision sciences trajectory through the use of complexity science (systems thinking, graph theory and networks).

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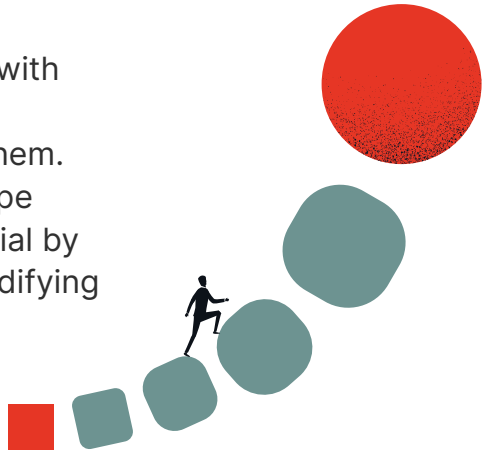
Understanding the Essence of Change

While the surge in available data and how to harness it remains a top concern for businesses, it's essential to discern that the underlying catalyst is the inexorable force of change, perpetually accelerating and thereby generating increasing data in condensed cycles. The acceleration of change and evolution is evident in business timelines too, from the century it took for aviation to establish itself to the mere decade for a college network to become a global interaction hub.

Mastering Change in Business

Every industry's business models are rapidly mutating. Leaders grapple daily with the complexities that come with such swift changes. But true evolution emerges when businesses adapt to these changes and capitalize on them. The question for leaders is whether they will merely cope with the looming sense of change or harness its potential by comprehending the broader problem spectrum and modifying their solution approaches accordingly.



> “The big 'D' is our world is actually not data, it's decisions. When you think about it from a purpose, it's all about helping either individuals or organizations make better, faster and more useful decisions.”

Dhiraj Rajaram
Founder & CEO, Mu Sigma

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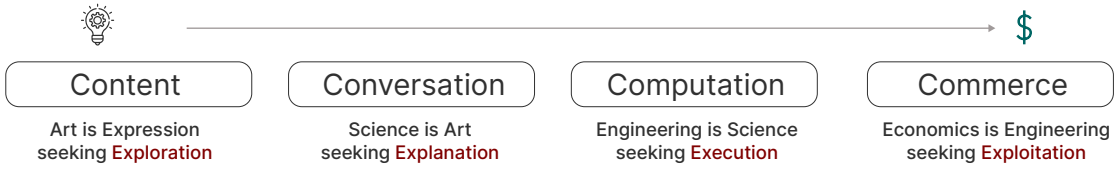
The River of Reasonable Return

Decoding the Decision Supply Chain in Business

Today's digital age, characterized by an unprecedented surge in signals and the rapid transmission of information worldwide, has shifted the paradigm. Data emerges as the core currency, outstripping the importance of physical supply chains. The challenge facing businesses is discerning - where to focus amidst this overwhelming noise. Two critical dimensions guide this focus: the frequency of problem occurrence and the impact of the solution. These metrics help organizations determine optimal resource allocation for problem-solving.

A Strategic Perspective

As business ideas are explored and described, they become content. This content enables questions and conversations that help define, refine, and bring more energy to the idea. As it matures through this process, the Art becomes Science – an explanation of the idea. Art becoming science is an iterative process that requires experimentation and structured learning. The science of an idea finds its way to execution through engineering. Engineering is more than technology – it happens through people, processes, or platforms. When thoroughly engineered, an idea becomes computation with a tremendous density of truth. Exploiting these computations results in commerce – the fullest expression of an idea and realization of the organization's purpose.



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Over time, the journey of an idea to commercialization slows down in large organizations as undealt complexity increases. The slowness results from a lack of transparency in content, persistence in conversation, and cumulativeness in computation. By favoring entities (i.e. functions, departments or business units) over interactions and not addressing the transparency, persistence, and cumulativeness (TPC) problem, the organization impedes its ability to adapt, solve, and innovate.

The source of the TPC problem is undealt complexity. There is tremendous energy in undealt complexity that, if tapped into, can help the organization build a higher curiosity quotient, lower the cost per question, and accelerate commercialization.

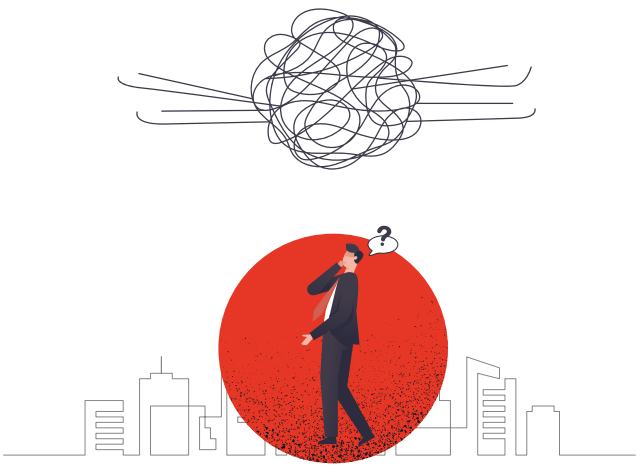
So, what is complexity? Is it a product of our times, or has it been a constant since the beginning? Is it a by-product of technology that otherwise promises to simplify our lives? Is it an unwanted foe or a misunderstood opportunity?

Complexity is neither good nor bad. It is part of our business ecosystem. The to key to successfully managing complexity, is to embrace and understand it.

Complex problems are heterogeneous, nonlinear, probabilistic, dynamic, interdependent, adaptive, and emergent – a state wherein the properties manifest themselves as the result of various system components interacting and working together, not as a property of any individual component. Acknowledging and understanding emergence is the starting point to understanding complexity.

Characteristics of Complex Problems

- Heterogeneous
- Nonlinear
- Probabilistic
- Dynamic
- Interdependent
- Adaptive
- Emergent



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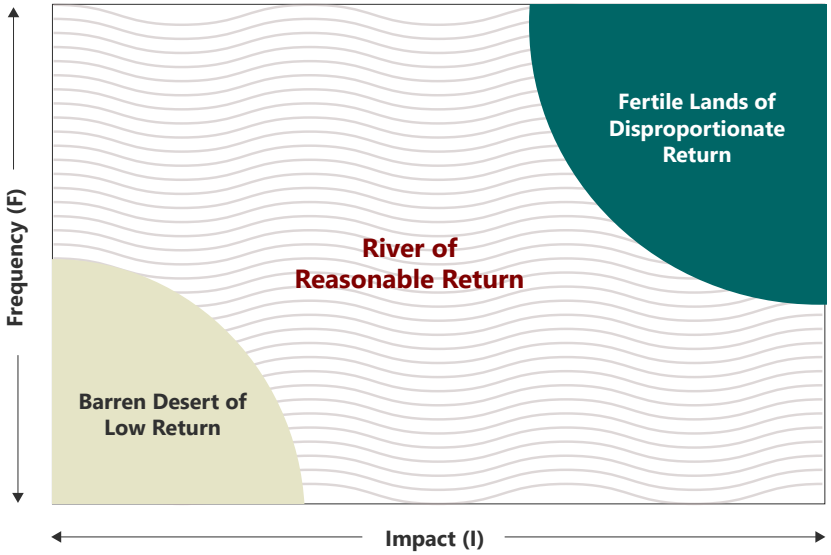
Understanding the Problem Space

We begin analyzing the problem space by mapping the problems based on two dimensions – the Frequency and Impact of the problem. In doing so, three distinct zones of opportunity become visible: the Barren Desert of Low Return, Fertile Lands of Disproportionate Return, and the River of Reasonable Return.



The Barren Desert of Low Return is what you'd expect from its moniker, a place where one addresses low-value, low-frequency problems – like finding a spelling error in a product manual. There may still be a viable market for solving such problems, but it's not where the excitement, intellectual challenge, or meaningful business returns are. In the Fertile Lands of Disproportionate Return, you will find opportunities to solve high-value problems. Select businesses and venture capitalists want to focus here, where the combination of payback and frequency seems the highest. These are big, shiny, challenging, and time-consuming problems. These problems are extremely hard to solve, like global warming, but the potential impact is very large.

Most problems occupy the middle of the graph, in what Mu Sigma calls the River of Reasonable Return. And that's also where the richest opportunity lies. Think of an effort to clear a river to increase its flow. Imagine a choice between removing one or two massive boulders versus dredging millions of smaller pebbles. Exploding the big rocks sounds impressive, but removing the smaller stones will generate

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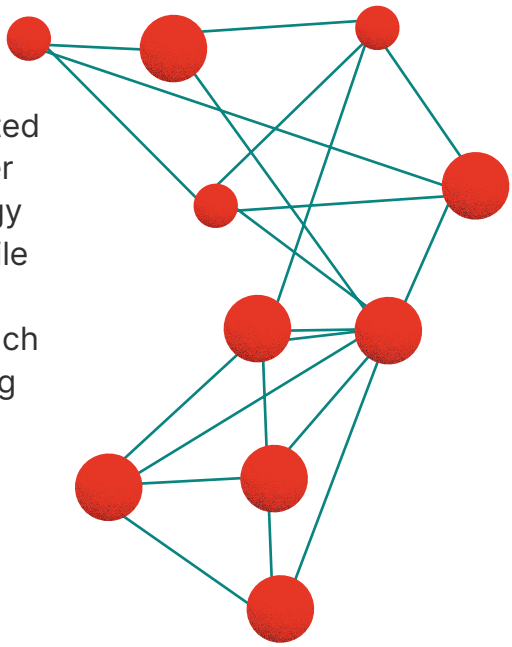
In this river, we find many problems awaiting creative solutions like fraud detection, SKU analytics, credit scoring, price optimization, campaign effectiveness, multi-channel attribution, marketing mix, store profitability, and many others. Imagine a steady and unlimited flow of small problems. That's the River of Reasonable Return.

There is a potential solution for each of those small problems, but the impact of any single individual solution is too small to make it worth the time or effort required to figure it out. Now imagine looking for common themes in groups or clusters of small problems in the River of Reasonable Return instead of individual problems. When you look for common themes, you aggregate the smaller problems and roll them into a bigger problem worth solving. Frequently, a solution that can be applied to many small problems is more valuable than a solution to a small, solitary problem. In a sense, you are "socializing" the problems, recognizing their interdependence, and creating solutions for networks of problems instead of just trying to solve big apparent problems. And that's why the River of Reasonable Return represents the richest opportunity – because of its problem density and the myriad interactions between those problems.

Unlocking Value Through Interconnected Problems

The River of Reasonable Return teems with interconnected problems. Questions like rising fraud in specific customer segments or the ineffectiveness of a discounting strategy might seem isolated, but they are often interrelated. While addressing these singularly might not yield significant results, the cumulative impact of solving a network of such problems is substantial. This intertwined problem-solving approach often yields more profound results than solely targeting prominent, standalone issues.



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What does this mean for Today's Solution Space

Organizations today grapple with interrelated challenges in decision making, which are further complicated by the evolving platforms, fragmented analytical processes, and a significant talent gap. While traditional solution providers offer some navigation aids, their singular models fall short in rapidly changing environments. Therefore, questions become more important than answers. While organizations are now increasingly adept at building signal engines that analyze huge volumes of data and generate answers, they desperately need a robust enquiry engine to 'industrialize exploration'.

The organization must be able to ask more questions at scale, increase the speed at which questions are answered, operate in a sustainable manner and not remain in a sandbox, while providing slack so that teams have the bandwidth to be responsive to new questions as they emerge. This form of disproportionate and continuous focus on exploration requires building a new business exploration system that facilitates seamless communication and better collaboration between problem solvers (practitioners) and solution consumers (business). The ontologies they use to implement such a system allows you to:

- **Dream** about the problem space as a connected network
- **Detail** individual problems for granularity from a bottom-up perspective
- **Describe** transformative programs for outcomes from a top-down perspective
- **Deploy** a complete decision supply chain

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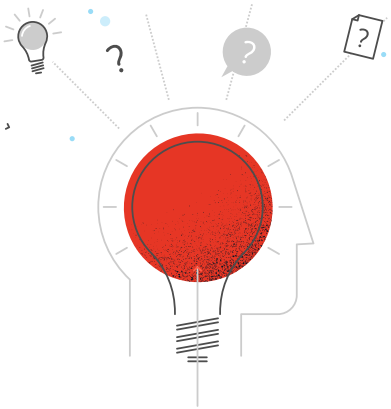
New Paradigms are Needed



The traditional data analysis and problem-solving paradigms are proving inadequate in the face of rapid change and complex challenges. Current methods, including knowledge hoarding, reliance on traditional expertise, and overly protective intellectual property practices, limit innovation and adaptability. In contrast, we believe forward-thinking enterprises should embrace three fundamental principles:

1. **Learning Over Knowing:** Prioritize continuous learning and capability building instead of relying solely on existing knowledge.
2. **Extreme Experimentation:** Emphasize broad experimentation over narrow expertise.
3. **The New IP:** Shift from closed intellectual property models to embracing "interactions property," promoting openness, transparency, collaboration, and integration of diverse ideas.

These three guiding principles underpin all we do and believe at Mu Sigma. They are the bedrock on which the New Art of Problem Solving System™ is built.

> “Organizations of today were built at an earlier time where execution was the differentiating factor. Today, we are living in a world where exploration is the differentiating factor.”
>
> Dhiraj Rajaram

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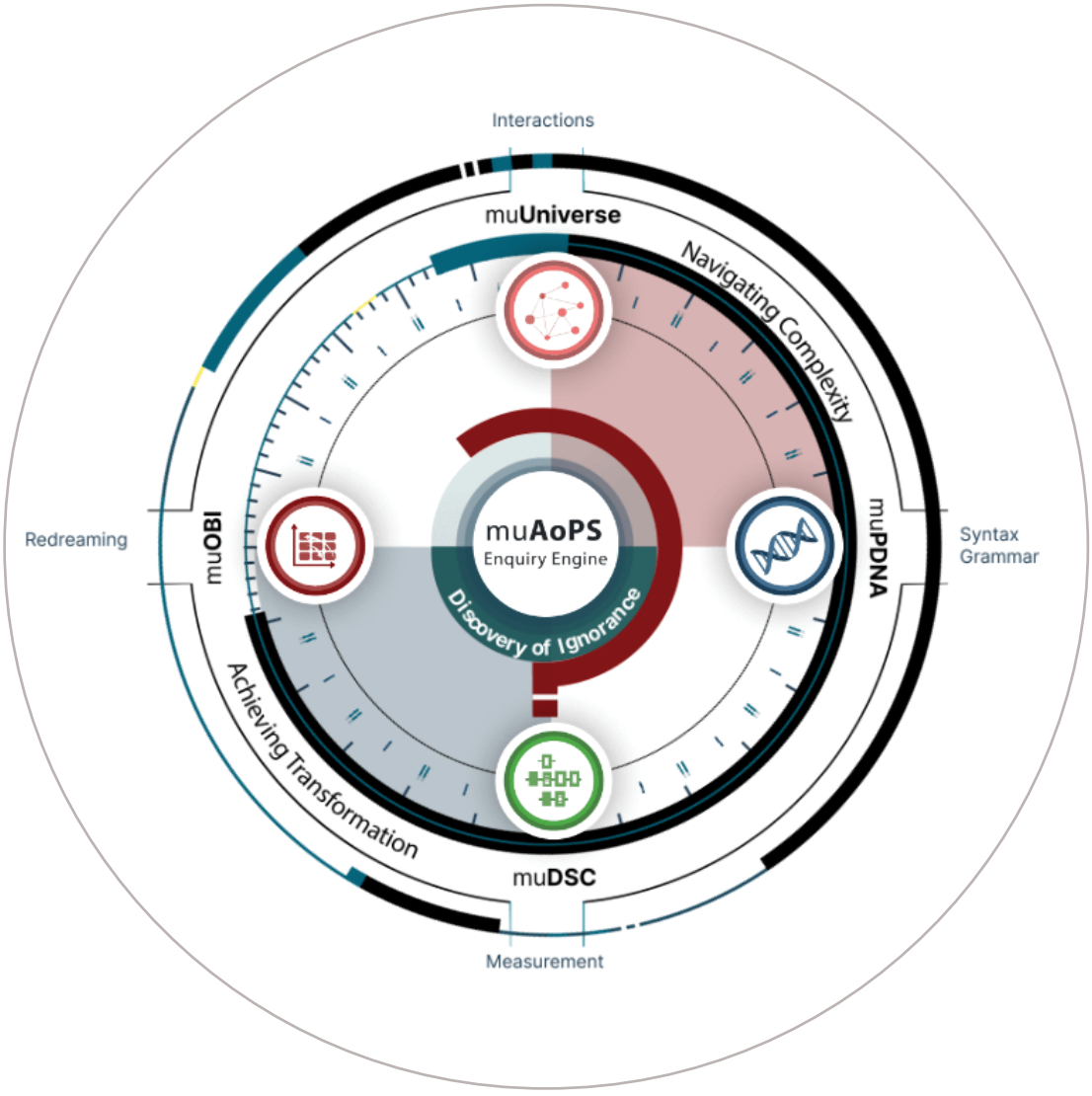
The Art of Problem Solving System™

The Art of Problem Solving System™ (AoPSS) offers more than just a systematic approach to problem-solving; it provides an ontology, a structured framework that enhances understanding and decision-making. This ontology is crucial for analytics centers of excellence (CoEs) and governing councils, as it aids in defining and categorizing complex problems, thereby facilitating more effective problem-solving strategies. Whether in a centralized or decentralized governance model, AoPSS adapts seamlessly, creating a conduit for clearer communication and more aligned decision-making processes.



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While the progression of AoPSS may appear linear, starting from a broad planning phase and moving towards specific execution, it is more accurately depicted as a spiral. This spiral represents a continuous cycle of thought and action, where feedback is not just an end-stage process but an integral part of every phase. This cyclical nature ensures that each element of the problem-solving process is revisited and refined, allowing for a deeper understanding and more nuanced solutions.

At its core, AoPSS isn't a mere project with a start and end date; it's a comprehensive system that integrates a series of habits, artifacts, and software. These components need to be continuously sharpened and applied in daily problem-solving scenarios. The ontology provided by AoPSS plays a pivotal role here, as it lays down a structured path for understanding complex issues, categorizing them effectively, and approaching them with a refined perspective. This structured approach not only makes the problem-solving process more efficient but also enhances the decision-making capabilities of the organization, allowing it to not just manage risks but to capitalize on them for greater benefit. In embracing AoPSS and its ontology, companies empower themselves with a toolset that is both dynamic and foundational, ensuring they are equipped to handle the complexities of the modern business environment.

> *"The future of solutioning for problems is going to be interactions between math, business, technology, behavioral science, design thinking and a whole host of new things that we may not even know."*
>
> Dhiraj Rajaram

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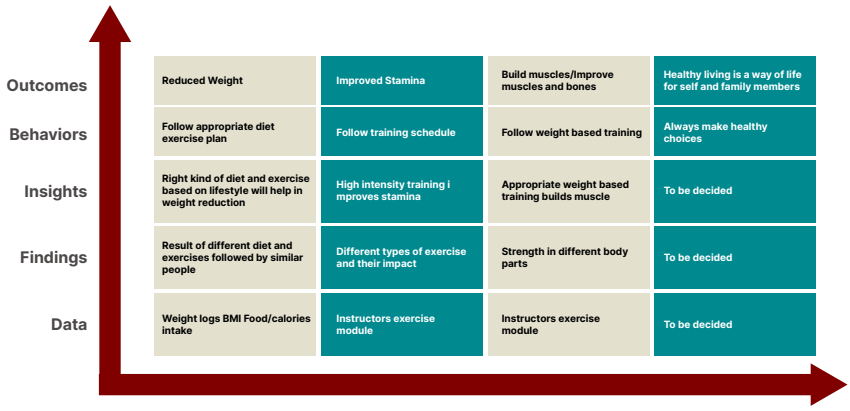
1 Plan for Outcomes and Transformation in Harmony

Mu Sigma artifact: **muOBI**

The first habit, underscored by the muOBI (Outcomes, Behaviors, Insights) artifact, emphasizes a clear problem-solving objective, focusing on tangible outcomes and transformative change. Instead of the common data-first approach, planning should commence top-down, beginning with desired outcomes, effectively using a "decision design" process. Concurrently, the traditional notion that outcomes stem from actions is challenged; instead, understanding that human choices are influenced more by behaviors than logic, the muOBI approach identifies key behaviors and insights to guide them, emphasizing the importance of human-centric insights.

The muOBI grid's horizontal axis signifies a continuum of individual outcomes, behaviors, and insights, reflecting maturity and impact. It encourages a more programmatic and strategic problem-solving approach, emphasizing the journey toward transformation through incremental steps. Instead of focusing solely on the extremes, it highlights the significance of the middle ground in creating the most value.



Planning (deductive) and execution (inductive) activities managed together

The muOBI framework promotes balanced progress in both realization and transformation. While a linear approach focuses on immediate outcomes or data collection for transformation, neither ensures comprehensive progress. Instead, the ideal method alternates between realization and transformation, creating a balance between order and innovation. This "Goldilocks state" strategy ensures continuous movement toward current goals while laying the groundwork for future transformative results.

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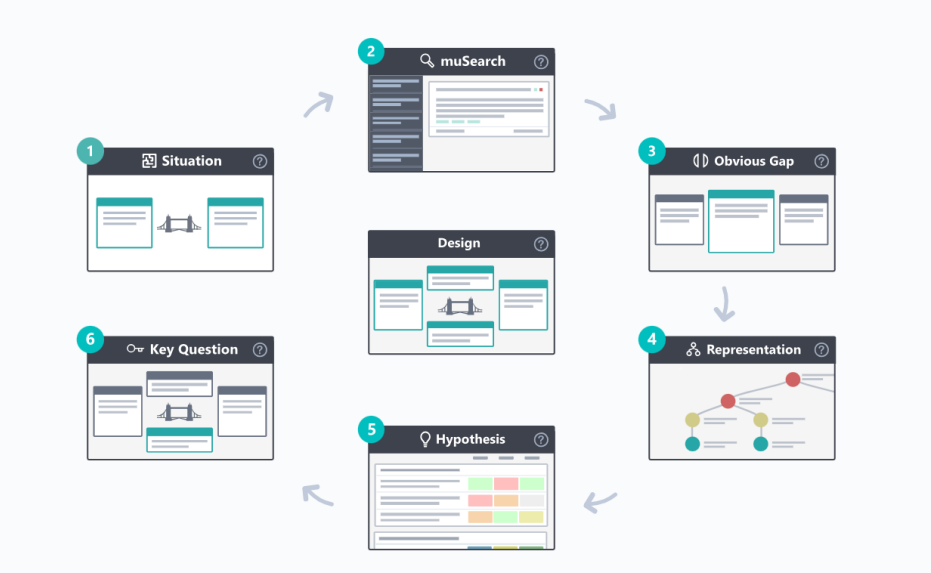
2 Encode Problems to Promote the Best Design

Mu Sigma artifact: **muPDNA**

Organizations, amidst the complexity of the business landscape, grapple with multifaceted problems that initially appear ambiguous but gradually gain clarity. Establishing a uniform language to define and articulate these problems is pivotal. Mu Sigma emphasizes the importance of seeking answers and framing the right questions, a skill often overlooked in traditional systems.

To this end, the muPDNA, short for "Problem DNA", is introduced as an innovative tool. It encodes the essence of business problems, transforming them into a standardized construct that fosters communication and future retrievability. This encoding system bridges problem identification and its solution, ensuring that every problem is tackled with precision and clarity.



The encoding comprises three critical components: the design element, which emphasizes preemptive thinking to identify the optimal problem configuration; the representation element, which ensures a comprehensive visualization of the problem's facets; and the hypothesis element, which evaluates the potential solution strategies. Altogether, muPDNA champions a meticulous approach to problem-solving, focusing on framing accurate, valuable questions and ensuring a strategic, top-down design process.

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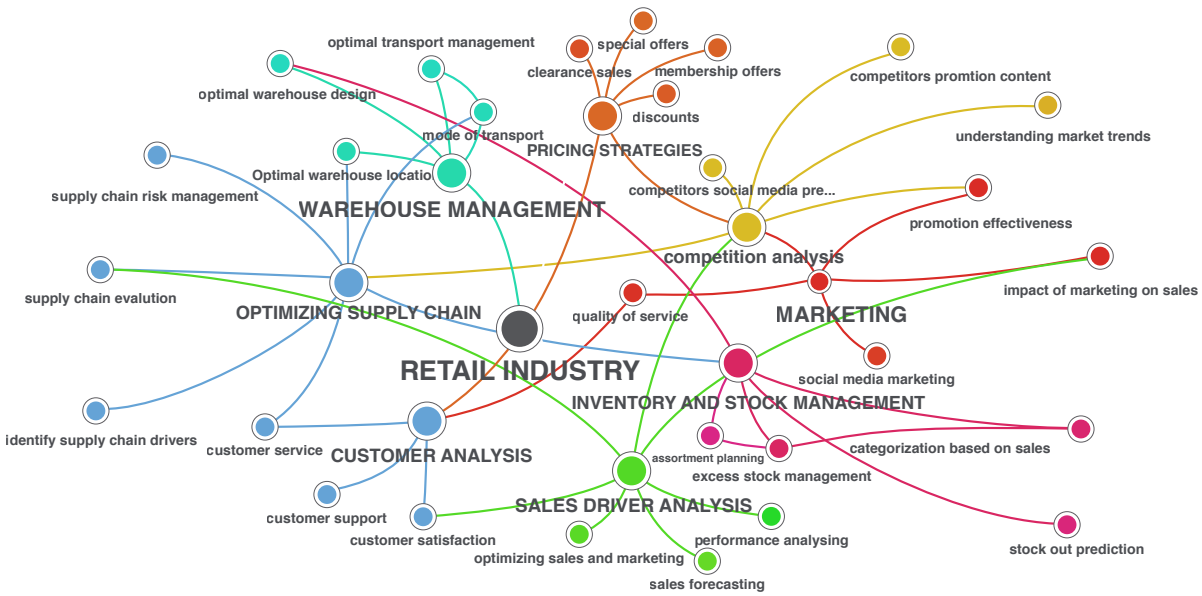
3 Map the Interactions Across the Problem Universe

Mu Sigma artifact: **muUniverse**

In their pursuit of addressing business challenges, analytics professionals frequently tunnel into specific issues, potentially sidelining the intricate web that connects various business problems. This myopic view can hinder the potential of deriving holistic solutions that address the root causes and have far-reaching impacts. By recognizing the interwoven nature of challenges, especially in the dynamic business landscape, professionals can preemptively tackle cascading issues, making their solutions more robust and adaptable.

The muUniverse tool, recognizing this need for a holistic view, utilizes a knowledge-graph-like principle to offer two distinct methodologies for understanding the interactions between problems. The bottoms-up approach delves into a specific business issue's immediate relationships with other challenges. For instance, an issue in email marketing might be intertwined with aspects like messaging relevance or customer retention. Understanding these links can lead to a richer, more comprehensive solution to the primary problem. Conversely, the top-down method visualizes the broader "universe" of problems, mapping out how they relate to one another and revealing potential data-driven opportunities. This approach allows teams to prioritize their problem-solving efforts based on these interconnections strategically.



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By merging the insights from both these methodologies, the muUniverse application serves as a catalyst for informed decision-making. It helps visualize the proximity and intensity of relationships between different problems and promotes a consistent problem-solving language across teams. This unified approach ensures that solutions derived are not just piecemeal fixes but are holistic strategies that address a broader spectrum of interconnected challenges.

4 Harmonize the Creation and Consumption of Analytics

Mu Sigma artifact: **muDSC**

Organizations today treat data as the "new oil," necessitating the management of the decision supply chain with the precision found in manufacturing. Decision supply chains resemble physical supply chains in their structure and demands, requiring the collection of raw data, adjusting to demand shifts, distributing insights, and aiming for continuous improvement. The ultimate goal is to make better decisions more rapidly. Mu Sigma's muDSC artifact emphasizes balancing analytics creation with its consumption. For example, a retailer might develop a solid Customer Relationship Management framework through analytics but falter in integrating these insights with campaign technology, leading to underutilized investments. Properly managing the decision supply chain ensures the effective creation of analytics and its meaningful consumption.

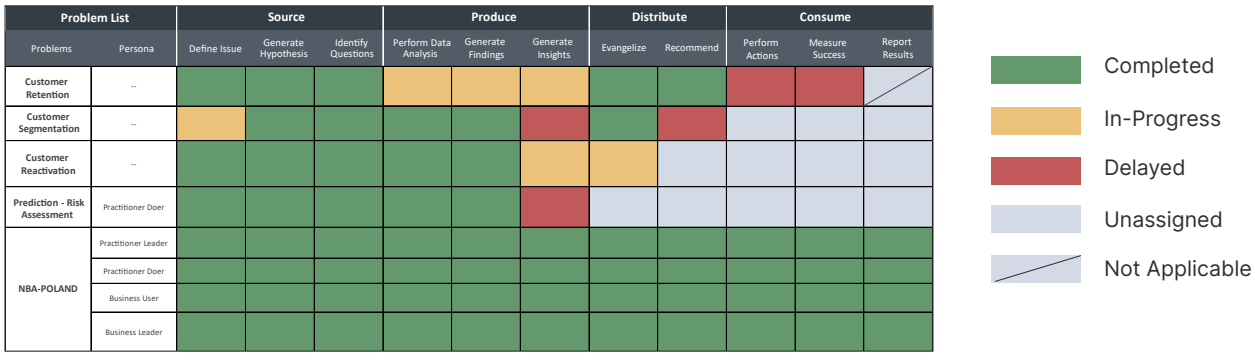

Illustration from muDSC artifact, showing an emphasis on Creation activities

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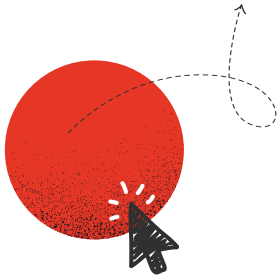

Pursuing a New Art of Problem Solving System™

The Art of Problem Solving System™ is more than another technique in a corporate toolbelt. Instead, it should be viewed as a holistic platform that profoundly influences the daily problem-solving process and continuously refines the quality of decision-making in an organization. Rather than seeing it as a mere methodology, perceiving AoPSS as a distinct entity that occasionally intersects with routine problem-solving endeavors is imperative. This delineation ensures that a higher-order system is at play while everyday challenges are addressed, refining the overall approach.

Drawing parallels from nature offers clarity on this relationship. The survival and prosperity of a species depend on its adaptability and capacity to flourish. Three primary factors dictate this: scale, which relates to the sheer volume; diversity, indicating the range and variety; and symbiotic interactions, denoting the harmonious relationship a species shares with its surroundings. These principles can be directly applied to organizational problem-solving. Organizations constantly strive to address a myriad of issues at scale. However, the challenge lies in maintaining the diversity of problem-solving approaches as they scale, which is often conflicting.

AoPSS is a solution to this conundrum. It's designed to amplify diverse problem-solving while ensuring scalability isn't compromised. Furthermore, it fosters a symbiotic relationship between the two facets, like the interaction between species and their habitat. In the corporate landscape, routine problem-solving tasks can be likened to the species, while the AoPSS represents the habitat. The tools and artifacts are the links that enable these two to coexist, interact, and mutually benefit, ultimately leading to evolutionary growth in the problem-solving domain.

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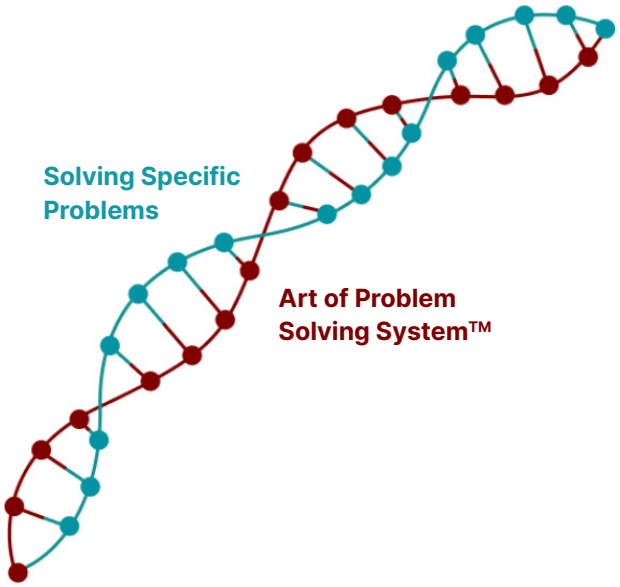
To make it more tangible, here are some examples.

The Art of Problem Solving System™ (AoPSS) framework within organizations acts as a nurturing habitat that enhances the health and effectiveness of tackling specific business problems – the species in this metaphor. For instance, an AoPSS group working alongside frontline teams can significantly improve problem-solving approaches. By collaboratively creating problem DNAs for each business challenge, these teams are prompted to delve deeper, asking more insightful questions and uncovering the root causes of problems. This approach refines the problem-solving process and leads to more innovative and effective solutions.

Consider the case of an internal analytics team employing the decision supply chain construct at the problem level. This strategic move ensures that all necessary activities are in place to drive the consumption of analytics within the business. By doing so, the team enhances the relevancy and applicability of the data, leading to more informed decision-making processes across the organization.

Furthermore, when a project team consults a muUniverse early in the problem definition stage, they ensure the involvement of the right stakeholders. Stakeholder involvement is crucial as it accounts for downstream relationships and impacts, leading to a more holistic view of the problem and a targeted approach towards the desired outcomes.



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Improving AoPSS through Specific Problem Insights

On the flip side, addressing specific problems within an organization can significantly contribute to the health and robustness of the AoPSS ecosystem. For example, when a project team identifies first and second-order problem dependencies, they uncover areas that the analytics group may not be adequately addressing. This discovery can feed into developing a new roadmap, leading to an improved and more comprehensive problem-solving framework.

In another scenario, an analyst examining multiple decision supply chains may identify common attributes of projects that significantly drive the consumption of analytics. When fed back to the central team, these insights can lead to refinements in the decision supply chain model, enhancing its effectiveness and relevance across various projects.

Through this analysis, patterns may emerge, indicating that one aspect of the DIPP framework (Descriptive, Informative, Predictive, and Prescriptive analytics) is consistently underutilized. The analysis could point to a potential skill-set bias within the team, such as a tendency for the BI team to focus predominantly on creating Tableau reports. Recognizing this pattern allows the organization to address and rectify these biases, leading to a more balanced and comprehensive approach to data analytics.

> “Modulating your fear comes through a mindset which orients yourself towards learning more than knowing. If that's your why - learning over knowing - your what must orient towards experimentation over experts.”

Dhiraj Rajaram

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Charting the Course

To harmoniously integrate the Art of Problem Solving System™ (AoPSS) with routine problem-solving activities, adopting the right governance structure is essential. An optimal decision sciences program could be structured in one of three ways:

1. **Centralized:** Here, a unified team oversees the data and meets the analytical requirements of all business divisions. It offers an integrated data framework and economies of scale but may lack the agility to keep analytics timely and pertinent.

2. **Decentralized:** Each business unit manages its own data and analytics team in this setup. Although it promotes agility and swift initiation into decision sciences, it can result in overlapping tools, methodologies, and the creation of isolated analytical domains.

3. **Federated:** This model combines the strengths of both centralized and decentralized approaches. Business segments maintain autonomy in deploying analytics for daily challenges, yet a supervisory council ensures overarching alignment on data norms, infrastructure, and AoPSS practices. Although complex and demanding strong leadership commitment, this model offers the most collaboration potential and aligns best with the AoPSS approach.

Choosing the right model is crucial as it influences the efficiency and efficacy of the problem-solving process within the organization.

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The Right Culture

An environment conducive to the New Art of Problem Solving System™ , and an ability to capitalize on change rather than fear it requires certain cultural characteristics or practices. We highlight five here, all of which are interdependent, and some of which we readily pull from prior art:

Growth Mindset: Emphasizing the importance of adaptability and learning, as Carol Dweck outlined, organizations should adopt a "problem-solving mindset" like a growth mindset, emphasizing continuous evolution over static capabilities.

Feedback Loops: Organizations should establish regular, high-quality feedback mechanisms for faster evolution and better results. Ineffective feedback can result in overlooked issues and hinder performance.

Continuous Work Streams: Rather than viewing analytics as isolated projects, organizations should see them as ongoing activities. Continuous approaches, as opposed to discrete projects, are more suited to the interconnected nature of modern business problems.

Constant Prototyping: In the dynamic world of analytics, solutions should be agile and adaptable. Recognizing that not all solutions will follow a linear journey, be prepared to iterate and refine based on changing conditions and requirements.

Monitoring Dysfunctional Behavior: Leaders should be vigilant about team dynamics, especially in diverse decision science groups. Recognizing signs from Lencioni's five dysfunctions can guide interventions to ensure optimal team performance.

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About Mu Sigma

Mu Sigma is a pure-play decision sciences company that believes the big D is Decisions, not data. Our integrated ecosystem of products, services and cross-industry best practices, Mu Sigma enables better decision-making for more than 140 Fortune 500 clients. Mu Sigma's unique interdisciplinary approach and application of AI, ML, computer vision and more drive innovation in solving high-impact business problems across sales, marketing, finance, operations, and supply chain. With over 3,800 decision scientists and experience across 12 industry verticals, Mu Sigma has been consistently validated as the preferred Decision Sciences and Analytics partner.

To learn more, visit: www.mu-sigma.com

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