# A Novel Mathematical Powerset Guidance System enabled by Human-AI Collaboration for Risk Mitigation of Complex Innovation Opportunities

by David Mroczka 10/11/2023 updated 1/12/2024 w/ Use Case Addendum (see page 11)
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**Abstract:**

This paper is a presentation of a novel powerset guidance system that is leveraged to identify and mitigate risks by integrating the powerset guidance structure with human-AI collaboration into a repeatable process. After being used as a guidance process within real-world technology environments since 1999, the system has been built into a software platform and launched into the public commercial cloud environment in July 2023. It is the first software platform to comprehensively drive more success into technology investments and development, directly attacking the "Valley of Death". The system focuses on innovation management by managing risks and success, not just schedules and resources in a project management format. The system is a novel patent pending[1] platform that combines project management, talent management, collaboration and knowledge management with AI enhancement and human insight to bring technology projects more success while capturing critical institutional intelligence for future use.

**Technology and Innovation Development Challenges:**

A novel comprehensive approach to risk assessment and mitigation referred to as 9-HI™ is presented in this paper that is specifically designed to address complex problems such as those that have caused the "Valley of Death" for technology development, the low success rate for technology investment, and crippling performance within manufacturing supply chains, as well as, potentially many other problems encountered by businesses and other organizations.

Technology investment, development and subsequent supply chain delivery can pose very challenging problems. But why have we as scientists, researchers, engineers, inventors, managers and investors across the world been stuck at a 10% success rate for developing new technologies to solve these problems?

A chief contributing reason for this lack of success is that we don't retain and effectively utilize institutional intelligence when it comes to capturing learned knowledge from both successful and failed efforts. We learn a lot from burning down or attempting to burn down risks. But the intelligence gained is siloed and incomplete and intelligence is lost over and over again as people move to new roles, retire, forget or just don't know why successful actions lead to successful outcomes. Silos are not just created by "fenced" organizations but even by people sitting at desks right next to each. Many of these silos are unintentional but they are real impediments. This means new teams are doomed to repeat the errors of prior generations. They too will not identify risks and mitigation actions properly, not plan properly, and will run out of time and budgeted resources before reaching their objectives.

[1] USPTO Patent Application Pub. No.: US 2021/0012288 Al, METHOD AND SYSTEM FOR GUIDANCE OF ARTIFICIAL INTELLIGENCE AND HUMAN AGENT TEAMING, MROCZKA

Significant problems also stem from conventional Decision Matrix Analysis (DMA) tools used in government and industry that are often overly focused on just the technology and related development processes or on technology roadmaps. Selection criteria and development milestones and objectives are often subjectively or even spontaneously derived in isolation. Human biases are intertwined throughout acquisition and development of new technologies and standardization of efforts across different technologies and application categories doesn't exist in any industry or government organization. Consequentially, it's no wonder the "Valley of Death" derails 90% of new technology development efforts.

**Prior Technology and Innovation Development Tools:**

Historically, there have been incomplete and incompetent innovation and risk guidance systems used by managers in every industry that are still commonplace today. The shortcomings of these tools reinforce flawed development activities and processes with inherent low probabilities of success. Examples of these are "Strength Weakness Opportunity Threat" (SWOT) Analysis, the "Balanced Score Cards", and other Risk assessment and tracking techniques. These prior systems for project guidance fall well short of the capabilities of the 2-tier powerset guidance system described later in this paper. For example, there are major flaws with a SWOT analysis. First, SWOT never prompts the team to even address why a customer would want a technology that is being considered. Second, SWOT also assumes that a "strength" of the manufacturer or of a product or technology is something that can convert to a competitive advantage in the marketplace or application. These assertions are not always true. These critical flaws of SWOT were major motivations for the creation of 9-HI.

Issues with Balanced Score Cards and Risk Tracking schemes stem from their inability to be comprehensively applied across any technologies or applications. New balanced cards and risk matrices are frequently derived for new technologies or new application initiatives or new business scenarios. When a new balanced scorecard or risk matrix is reinvented, new processes are applied, and new guiding sets of data are needed for a new project. These actions introduce significant unknowns and risks that cannot give leadership, the (Subject Matter Expert) SME development team or an investor confidence that they will be addressing necessary critical high-priority risks.

**Powerset Guidance Systems:**

The development of a standardized powerset framework and process approach allows human and machine learning to be better organized and methods for capturing decisions and results in context can be formulated. When a comprehensive holistic framework and resulting processes executed from the framework are sufficiently designed, they can account for vastly different risks and mitigation or innovation opportunities. Such a framework can enable guidance for a multitude of technologies, for a multitude of applications and provide a standard method for interfacing with machine learning and AI to sharpen and accelerate delivery of intelligence for enhanced human decision-making.

Powerset guidance systems are not novel. The most common powerset guidance system that is used today, for example, is the XYZ axis-based positioning system. Global positioning systems use similar positioning and guidance systems. While 9-HI has nothing to do with global positioning, it still uses a guidance system to coordinate its activities just like a positioning system can guide movement from one location to another. Guidance systems can be built for multiple needs. While the benefits of the use of a

powerset guidance system should be clear to the reader, here are two examples of historical powerset guidance systems that have had dramatic effects on Commercial and Defense activities.

First, think of the comparison before and after satellite positioning guidance systems were introduced for automotive transportation. Before satellites, drivers used paper maps and would repeatedly get lost, miss exits, and have to start over again to find their way on a road trip. Now they simply use *Waze* or *Google Maps* to guide them every step of the way and update them in real time as to problems like road closures and traffic that can delay arrival.

Second, again, before satellite positioning guidance, our Air Force was relegated to "carpet bombing" targets, but once a reliable universal guidance system was in place, they could deploy missiles and smart bombs to accurately hit a target of choice, from a stand-off position with much greater accuracy and far less collateral damage and at far less total cost.

So, the introduction of an effective powerset guidance system for any particular complex or high-risk effort is of significant importance. By using a powerset guidance system, a team or organization can confidently manage projects for improvements and innovation with a higher likelihood of successful outcomes. With better standardized processes and objectively guided decisions comes greater results and success of technology investment and development activities.

The framework designed and referred to as 9-HI™ has been intentionally constructed as a mathematical powerset to account for broad-ranging technology and application needs. The usage of a powerset guidance framework does not preclude but enhances the organization of many other techniques and methodologies that assist in selection and development of technologies. For example, there are great benefits from the use of DARPA's Heilmeier Catechism[2], and the Air Force and NASA systems for Technology Readiness Levels[3] and Manufacturing Readiness Levels[4]. These techniques can all be utilized successfully when adapted and applied consistently to highly sought after new technologies and high priority application needs.

9-HI has been built with databases that result in the creation of actionable intelligence, actionable planning, and execution for more success with higher-risk efforts. Additional objectives of the powerset guidance framework are to:

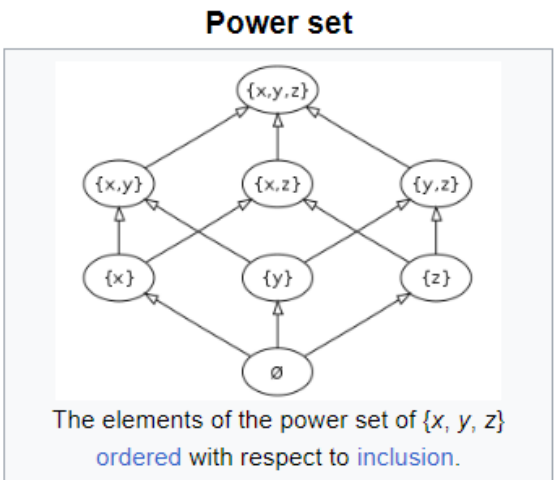
- Quantify objective decision options
- Create a comprehensive technology readiness roadmap
- Provide a simple health assessment picture
- Link Risks to Success Factors and Evidence
- Establish a maturity model for the technology and organization providing the development activity

[2] https://www.darpa.mil/work-with-us/heilmeier-catechism
[3] https://secure.helpscout.net/docs/6227975dc1e53608cf9e61f5/article/6258de7e0ef8984e60e86d87/
[4] https://secure.helpscout.net/docs/6227975dc1e53608cf9e61f5/article/646b96b44c7bda01ff6bd13e/

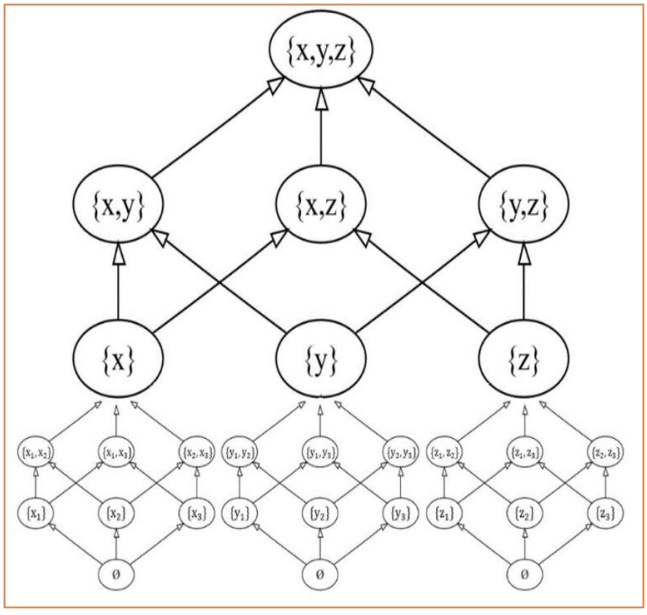
**Powerset Construct Introduction:**

A holistic risk assessment and mitigation framework has been established using a novel mathematical powerset guidance system. In mathematics, the powerset is the set of all possible subsets, therefore it is inclusive of all possible options that can exist. The 9-HI™ powerset is novel due to its multi-tier nature and its application to complex technology, business, and market application problems. The novelty of the presented system has been confirmed by the United States Patent & Trade Office (USPTO) as it has reported that no prior art exists for this invention.

While a conventional powerset is represented as follows:




The 9-HI™ powerset is configured in multiple tiers as follows:




The elements of the top tier are represented by:

X= Product Technology, Y= Team & Stakeholders, Z= Market Application.

The lower tier elements include:

| | | |
|---|---|---|
| X1= Appeal | Y1= Personnel | Z1= Size/Scope |
| X2= Value | Y2=Planning & Processes | Z2= Demand |
| X3= Reliability | Y3= Finances | Z3= Access/Delivery |

Thus, each top tier element is further defined by another powerset represented by its subset elements as follows:

| **Product Technology(X)** | **Team & Stakeholders(Y)** | **Market Application(Z)** |
|---|---|---|
| X1= Appeal | Y1= Personnel | Z1= Size/Scope |
| X2= Value | Y2=Planning & Processes | Z2= Demand |
| X3= Reliability | Y3= Finances | Z3= Access/Delivery |

The 9 lower tier elements are referred to as nine “Fundamental Prime Metrics” (FPMs). The nine FPM categories therefore are inclusive of all possible Risks and the Success Factors that are designed to mitigate those Risks. This encompasses the guidance system elements required to successfully bring a product technology to a market application.

The designation of the three top tier and nine lower tier elements are designated as the structural matrix elements and do not get reconfigured from project to project. They have established a functional pathway for interactions that provide both human guidance and machine learning. They have been established with the following rationale and research.

**Top Tier Elements:** These three elements represent the activity of a Product Technology being developed with a Team and Stake-holders for specific Market Applications, Ie. “Taking a product to market”.

**Lower Tier Elements:** Since the Top tier alone does not provide sufficient granularity or clarity to identify and map out finer points of investigation or the analysis and execution of a development plan, we further defined each top tier element with its own supporting powerset. The objective was to identify the fewest number of elements that could encompass a true powerset of capabilities for each top tier element that would still yield a powerset for guidance of any technology or application. The resulting outcome was a minimum of three sub-elements for each top tier element. This structure results in nine “fundamental prime metrics” that are used for every assessment of developing a technology for an application(s). The identification and validation of these nine elements occurred from approximately 1988 through 2006 by collecting and aggregating Risks and Success Factors associated with product and technology development projects. Successful and failed projects and associated failure modes for aerospace, defense, materials, electronics, automotive, medical, pharmaceutical, consumer, and industrial projects were analyzed to validate that every failure mode encountered, as well as, their precursor Risk or resulting Success Factor could be captured within the nine FPMS of 9-HI.

**The Integrated Solution:**

The 9-HI powerset structure is the basis for the construction of a new software platform that is used to manage problems where Product Technologies are being developed or manufactured by the Team and Stakeholders for delivery to the Market Application. This construct has been and will continue to be used to evaluate and guide any technology for any application. This may be accomplished at the project level for a single discrete technology or product offering, or it may be used for modelling within an entire government or business organization.

Under **Product Technology**, we have the *Appeal* (what is wanted from the product technology), the *Value* (features or capabilities that are provided by the product technology) and *Reliability* (all experiences after the technology is delivered and use begins).

Under the **Team & Stakeholders**, we have the *Personnel* (skills and experience needed to successfully identify and overcome risks and generate evidence), the *Planning and Processes* (all coordinated plans and activities of the organization to meet objectives) and *Finances* (funds for implementing changes and KPIs related to costs, profitability, and sales revenue associated with the project).

Under the **Market Application**, we have the *Size and Scope* (of the market application for all applications targeted), the *Demand* (demand created within that market for the product technology), and the *Access and Delivery* (relates to the team, data, and products to/from the marketplace and customers).

By establishing a holistic powerset guidance system, we establish a framework that helps users to understand every priority aspect that needs to be considered by a business or government organization to pursue resolution of a risk at hand. Project templates have been modeled and built into the 9-HI software platform to support government and/or industry selection of products and technologies for investment. These modules are compatible with the acquisition cycle that the US government and large enterprises typically use to select a product or technology for investment. Likewise, a project module also exists for development or implementation of new products and technologies, or any innovation or risk reduction effort desired by the host organization.

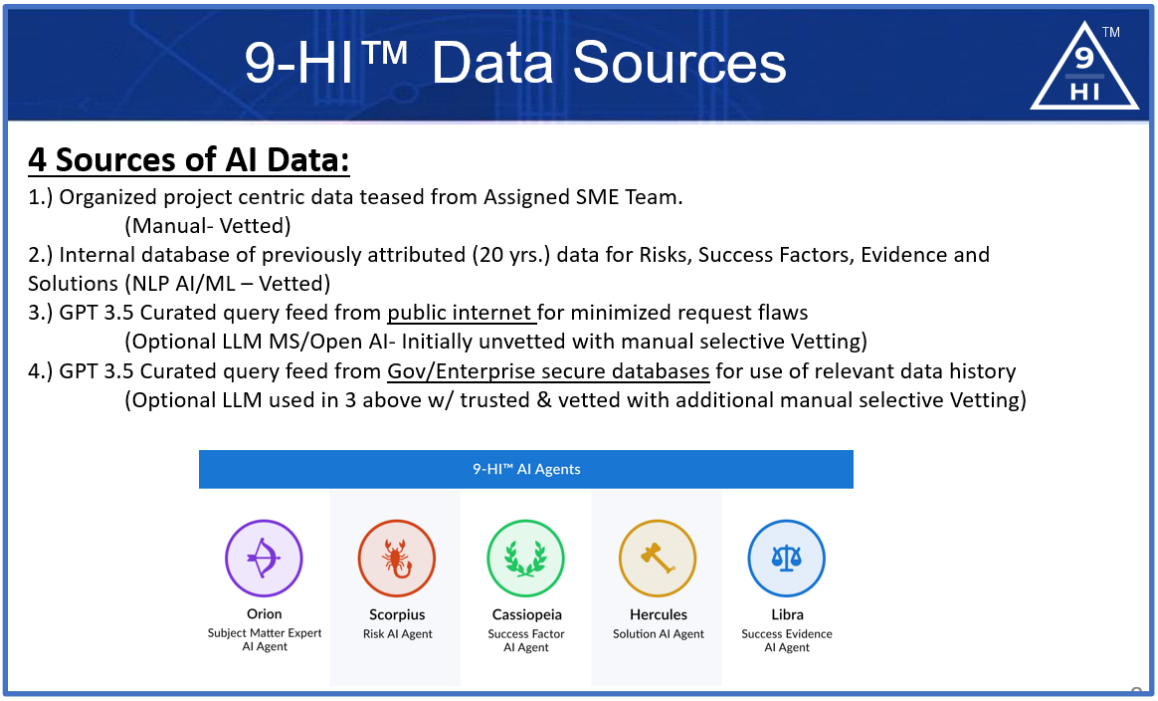
Using the 9-HI two-tier Powerset system, we provide alignment between the features and capabilities of products and technologies under consideration and the application needs of the customers or organizations that they're serving. The Powerset also models the organization that will perform any development activities, and risk mitigation or implementation/integration of that technology for that new application.

**Decision Guidance for Improved Outcomes:**

9-HI strictly provides “decision guidance” it does not make decisions for people. The platform is designed purposefully to be a “human in the loop” software application. It is designed to provide a structured repeatable process to a team of subject matter experts that will be selecting and developing a product technology. It does so by providing recommendations based on the product technology, team and stakeholder and market application in question. In fact, the first step in the process is to assess if the team being assembled has the necessary skills and experience needed to manage the effort. If not, additional personnel can be selected based on profiles of employees and experts that are available. One of the five 9-HI AI agents referred to as “Orion” is designed to assist with this effort. The team make up can be constructed with additional less experienced personnel expressly as a learning opportunity for

them for their desired areas of learning. As 9-HI is deployed to large organizations there are opportunities to profile every member or employee so that greater value can be derived from the existing organization. Outside consultants can also be sought that have profiles on the platform. Next, the resulting Subject Matter Expert (SME) team uses the guidance system and supporting software process to identify and assess the risks in each of the three top tier (tier one) lanes. This is accomplished by systematically tapping SME team knowledge for expert recommendations as well as recommendations from multiple AI agents. Note that the SME team makeup will likely need to change as the product technology progresses.

Five specially designed AI agents draw data from an embedded human-vetted database, or optionally from the public Internet by utilizing a curated GPT pipeline. For government and large enterprise applications, the GPT pipeline can have another alternate source of ML data fed from their legacy databases and selectively can be supplemented with or without the public internet. Thus, there are four total sources of data being fed through various pipelines to the project at hand. So, depending on the user organizations appetite and tolerance for various data sources, it may select how its pipelines to source data will be configured in it's customized enterprise deployment.




The two tier powerset guidance system represents the universe of potential actions and mitigation activities needed to reduce the risks that can potentially cause failures. The two-tier power set guidance system addresses risks to the business or government organization or any specific project conducted by them.

When we define and discuss risks, we use three strict definitions to categorize every type of risk. Every risk that can exist in this powerset can be considered as either a gap, a barrier, or a vulnerability. It's very important to tag each risk with one of these labels. Gaps and vulnerabilities can be overcome with mitigation activities, however, barriers cannot. Barriers are things that limit progress to the point of actually preventing success especially at higher Technology Readiness Levels (TRLs). Barriers are such

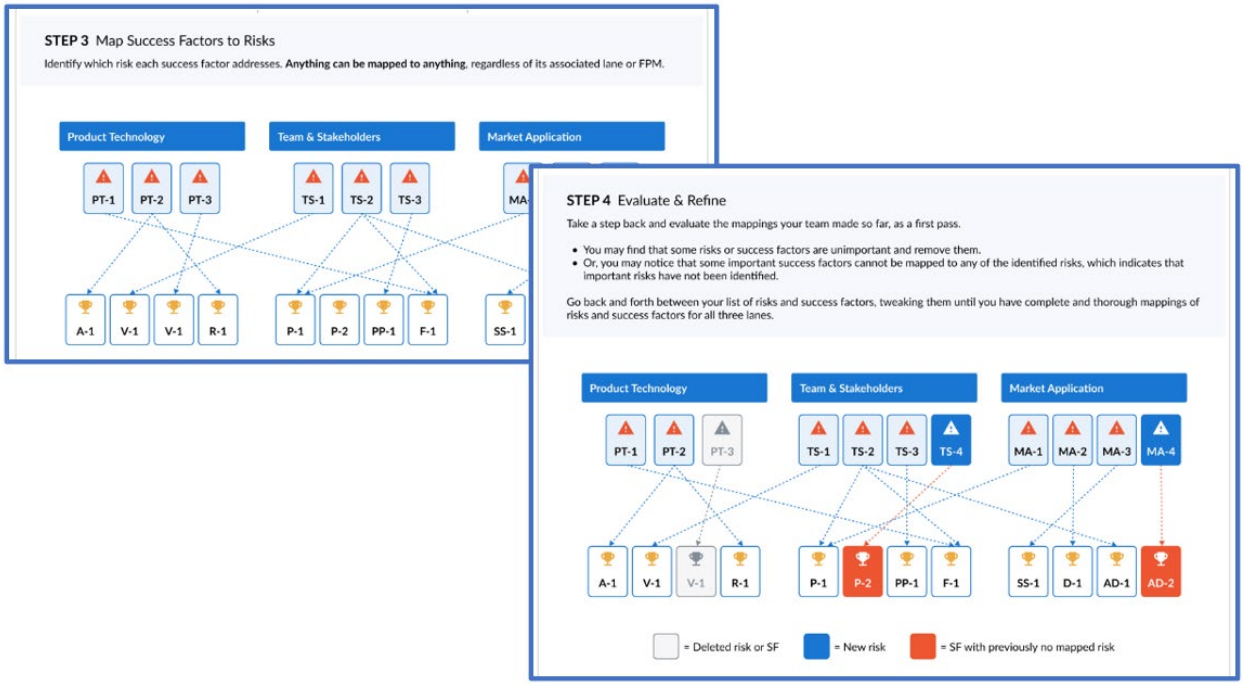
things as laws, restrictions in physics, restrictions in materials, or require things that have not been invented yet. When a barrier is identified, it is much better to find an alternate solution, resolution, or mitigation instead of attempting to find a success factor for that barrier risk. Barriers in low TRLs of 1-3 are more commonplace and it is almost expected that barriers may initially exist that are tied to specific objectives of principal development activities of low TRL projects.

After identifying the risks associated with each of the three top tier lanes for any given problem or scenario, the SME Team & AI Agents collaboratively identify the Success Factors within each of the 9-FPMS that will burn down those risks. Success Factors are the activities that will be required for implementation and risk mitigation. Each Succes Factor is rigorously debated by the SMEs through team collaboration within 9-HI and tailored to the problem at hand.

## 9-HI™ Utilizes a repeatable, structured project format with input from the SME team, and multiple AI Agent data sources. (Vetted & Generative using GPT3.5)



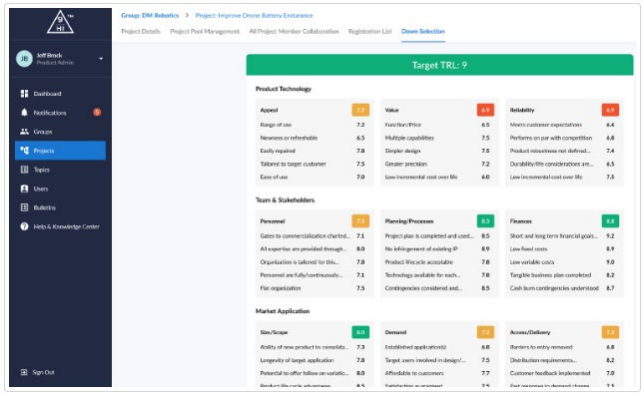
The tailored success factors are then linked and mapped specifically to the risks previously identified to ensure that all risks are addressed and to ensure that the proper and most efficient mitigation activities are being utilized in order to burn down those risks. We don't want risks unchecked, and we don't want too many mitigation activities burning down some risks, but not other risks. This guards against unsuccessful or inefficient mitigation activities or implementation plans that may not be cost and/or time efficient.




When all Success Factor definitions and risk mappings are finalized, the Success Factors are weighted and given initial scores based on the starting body of evidence available for each Success Factor. The final step of deriving the development and/or risk mitigation plan is for the SME team, electively working together with AI agents, to recommend the evidence needed to quantitatively drive up the scores assigned to each Success Factor. During execution of the development or mitigation activities, evidence is captured and made available for review via the software platform and the relevant scores of any applicable Success Factors are increased accordingly. As development proceeds and more evidence is produced, scores continue to advance per 9-HI system guidance.

| | Weight (1.0-5.0) | Starting Score (1.0-9.9) | Current Score (1.0-9.9) | Target Score (1.0-9.9) | Evidence items Submitted | Achieved TRL | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | TRL 7 | TRL 8 | TRL 9 |
| **Product Technology** | | | | | | | | |
| Appeal | -- | 7.0 | 8.4 | 9.0 | 2 | ✓ | ✓ | ○ |
| SF-A1: Consider Alternate Technologies | 4 | 7 | 8.4 | 9 | 2 | ✓ | ✓ | ○ |
| Value | -- | 7.0 | 8.5 | 9.0 | 3 | ✓ | ✓ | ○ |
| SF-V8: Public IP Review | 5 | 7 | 8.6 | 9 | 1 | ✓ | ✓ | ○ |
| SF-V9: Private IP Review | 5 | 7 | 8.3 | 9 | 2 | ✓ | ✓ | ○ |
| Reliability | -- | 7.0 | 8.1 | 9.0 | 3 | ✓ | ✓ | ○ |
| SF-R1: Meets Advertised Requirements | 4 | 7 | 8.1 | 9 | 3 | ✓ | ✓ | ○ |
| **Team & Stakeholders** | | | | | | | | |

When scores reach a level of 9, the Risks have been successfully mitigated. This system provides immediate visibility into both the health of the project, as well as the maturity model for the product technology and the organization that is performing the work.


## Historical Guidance Systems and Future Development of Powerset Guidance Systems

In the past, inferior risk management strategies and measures were used. Before 9-HI our innovation projects or risk reduction projects were only successful 10-20% of the time as evidenced by the 90% failure rate known as the “Valley of Death”. With 9-HI we strive to invert that curve and we will be seeking 80-90% success rates.

With 9-HI we use the same powerset framework over and over again, regardless of domain, industry, or technology. It captures knowledge from prior efforts regardless of the technology and application and feeds related intelligence forward for new cross-referenced efforts. Since 9-HI always uses the same 2-tier framework it is much better suited to deliver consistent decision guidance and to capture learning and intelligence in context with decisions that are made. These benefits of 9-HI are also key drivers for accelerating the learning of the 9-HI AI Agents to enable increasingly better and better decision guidance to the SME team.

When we have a standardized process, we only have one learning curve for its users and the team can focus on high value activities instead. We then allow for comprehensive capture and dissemination of intelligent decisions that have been mapped to outcomes. We will retain institutional intelligence. We then have a real engine for creating greater successes and fewer failures.

Future efforts will focus on improving the AI agent accuracy as more experiences are recorded, and on expanding the breadth of AI recommendations by learning from greater amounts of data and from the decisions made and the actions taken by 9-HI users.

The 9-HI powerset is effective for its intended purposes. But new powersets can be derived and refined for new uses and new benefits realized to help solve high risk critical challenges that are faced in the world today. We have modelled several other scenarios and welcome collaboration with other government and industry leaders, visionaries, and problem solvers.

**Addendum:**

**9-HI Applied to Specific Use Cases**

Due to the expansive holistic scope of 9-HI's two tier powerset structure, 9-HI can be applied in a wide variety of manners. A traditional 9-HI project will seek to analyze risks and build a success factor execution plan that addresses all three tier one lanes. However, a user team may have a desire to focus on a more narrowly defined project. Caution should be taken and it is generally not recommended to run a project for a single tier 1 lane. When a single tier one lane project is executed, changes in one of the three lanes can potentially cause harm or have other deleterious effects on the other two lanes. Generally, the score of any of the nine FPM categories reflects that perspective of readiness or maturity of its Tier one category and thus the higher the score, the more likely that this strength will support successful ability to meet project objectives. This premise holds true for projects with all three tier one lanes and less so with projects only targeting a single lane. Below are use case examples of project types that can be managed within 9-HI.

**At what stage can 9-HI be applied to the below project use cases?**

The short answer is "the sooner the better". It's always preferred and wise to start new projects by first considering a new application need then brainstorming and analyzing potential technology solutions, followed by running a proper selection or investment project and then proceeding to a development project.

***But what if you have existing projects that have already started and already have scopes of effort budgeted and locked in with commitments?***

If you want the confidence of having a 9-HI review and want assistance from the 9-HI guided process and 9-HI AI Agents input, then you should model your current state and current plans. Just do it. There's really no reason not to, and it's simpler to model an existing project than a future project. As a matter of fact, 9-HI may help your team identify alternatives for your plan based on new decision guidance that is recommended. It may provide alternative actions that either help to reduce risk, change the priorities within your development or mitigation plans, or offers efficiency or cost reduction efforts. Generally, it's good to have options and to have a solid plan to mitigate future risks before stumbling upon those risks. The 9-HI process has been used for over 15 years mainly to trouble shoot existing customer development projects that had run into trouble. By systematically analyzing a project that has already encountered failure, 9-HI users can diagnose where the risks reside and what root causes exist. They can also categorize those risks as either *gaps, barriers or vulnerabilities* and then they can properly identify success factor(s) for a gap or vulnerability that needs to be overcome. Moreover, the priority of Success Factors can be re-established so that more immediate Success Factors (those with the lowest scores) are addressed as a priority. Another benefit to running a 9-HI analysis as soon as possible is that it may highlight current risks that require additional budgets or resources, and there may be savings in future stages that can be used to offset costs of more immediate risk resolution needs. The right answer is always, "the sooner the better". Some brief use case scenarios are explained below. Those with a "*" are use cases that will always be "already underway" when initial 9-HI analysis is started. Almost one half of the total use cases are initiated while the activity is "already underway".

A. *Technology solution review for application problems:* This is a great activity to do before a formal acquisition or development activity takes place. It can be run as an IE project with multiple competing technology options as topics.
B. *Expansion of technology/product family for new applications:* This has the opposite flow of the above use case and is where a group wants to evaluate and decide how a technology or product or family of similar products can be applied to multiple applications or adjacent market segments. This kind of activity is normally done to enrich business growth or to standardize a product or technology design for improved market application volume benefits.
C. **Supply chain issues* This use case evaluates a specific existing supplier or prospective supplier for Risks that exist that can result in poor supply health or reduced maturity of a supplier/ vendor. It starts off typically after an existing or potential supplier has been illuminated (ex. use of Exiger illumination technology) for potential supply issues such as Foreign Ownership (FOCI), Environmental, Social & Governance, Criminal & Regulatory, Operational, Financial, Product shipment, Cybersecurity. After analysis a complete mitigation plan can be built in the 9-HI Development module to provide guidance as the Risks are mitigated.
D. *Selection or acquisition of technologies and/or suppliers* This is typically used by Government organizations or medium to large enterprises. It begins with an IE project to determine potential Application, Product Technology and Team & Stakeholder Risks and Success Factors. Then Success Factors are exported through the 9-HI Wizard process to a Selection Project where the Success Factors are used as quantitative Selection/Evaluation Criteria for all proposed RFIs/RWPs/RFPs/Pitches. Down selection, to next stage or award is accomplished with SMEs and AI Agents in the 9-HI Selection Project.
E. **Evaluation and improvement of existing development projects:* Start with an IE project just to confirm that the existing development project has in fact covered all of the high priority Risks that may face your project. Don't just model what you are currently planning to do. This is where you need the AI Agents and additional human SMEs to propose addition Risks, Success Factors and Evidence needed to improve readiness and maturity right through deployment or meeting your completion TRL targets.
F. **Evaluation and improvement of current businesses and government operations:* If you are managing or in leadership of a commercial business or government organization, you can use 9-HI to evaluate how well your existing baseline organization is aligned to the technologies and products you have and the applications that you are involved with or intend to engage with.
G. *Interest group collaboration:* Typically for broad industry problems or to establish guidelines, standards, safety protocols, specifications or broad industry objectives. Ex. an engineering society may want to determine safety standards for a new technology or a group of greenfield thinkers may want to have a think tank style project that sets direction for future industry investments.
H. *Investments:* Similar to D, but typically these have a unique set of Risks and Success Factors for each potential company seeking investment (CSI). An IE project should be initiated by the target investment company that can be supplemented by requirements and evidence needed by the Investor. The CSI will perform a self-evaluation and provide evidence as a proposal to the investor this significantly aligns and simplifies the due diligence and funding cycle.
I. *Education & Training:* There are multiple Training touchpoints with 9-HI. Less experienced SMEs can be integrated into teams with seasoned SMEs to learn first-hand and grow as a SME. Also,

deployment and acceptance of new technologies to customers and users as well as channel partners and other stakeholders is heavily reliant on successful education and training. More novel technologies often need education of entire sectors of customers and users before they can understand and become proficient.

J. *User/customer feedback for new innovation requirements:* This is a significant portion of the "Access" Fundamental Prime Metric (FPM). This feedback is dome at all lifecycle stages whether developing at medium to lower TRLs, preparing for sales or transition or well after launch or deployment in order to know when improvements are needed.
K. **Mergers & Acquisitions:* After modelling your own government organization or business. You can then model potential acquisition targets to see and understand Growth from the perspectives of Risk and Reward.
L. **Business partnerships & Joint ventures:* This is very similar to K above, except that after modelling is completed, the actions taken are often a subset of the actions of K.
M. *Proposal opportunities:* Both Solicited and unsolicited proposals are structured in a 9-HI IE project and Selection project. A proposing company can run their own 9-HI project in order to determine how well they align to a proposed customer or if they have multiple offerings, which of their offerings will best benefit the customer. Even if a proposal is unsolicited, a proposal that is quantitative and evidence based can be very powerful to win over a new customer or investor.
N. *Managing system development with multiple innovations:* 9-HI is structured with IE projects that can have multiple topics. If a system is being developed with multiple component developments required, it's recommended to start with a single system level IE project and create multiple topics for each component needed development. Keep in mind that each development project only has one topic. So, the export wizard from the IE project will be used multiple times to set up a development project for each topic after the IE project has determined Risks and Success Factors.
O. **Improving manufacturing and production processes and capabilities:* Many organizations rely heavily on products and technologies that are already mature and in production. Whether a technology is mechanical, chemical, electronic or software, or a combination of these, innovations of production and manufacturing should always be pursued. Quality, volume, cost reduction and efficiency are often objectives of these activities and can be modelled in an IE project with likely candidates exported to a development project for innovation and continuous improvement activities.
P. *Developing services vs products:* Very simply put, a service is modelled very similarly to a product in 9-HI. Users will want to evaluate whether innovative products or services can be combined to create benefits or add profits to the Group of Team and Stakeholders.