Encourage EVERY Employee to Learn and Utilize Data, Analytics, and Machine Learning (DAML)

A Technical Paper Prepared for SCTE by

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"Wisdom is the power that enables us to use knowledge for the benefit of ourselves and others." Thomas J. Watson, Chairman and CEO of IBM from 1914 to 1956.

1. Introduction

Yes, *another* techie acronym: "DAML." The author chose DAML (data, analytics, and machine learning) from many contenders because it captures a lot of related subjects in one pronounceable breath. Now how you choose to pronounce it is up to you (dám+L vs. dayme+L).

DAML is intended to include a list of terms that are ever-expanding in *both their breadth and depth*—far too many to list here. This is like looking at a wide-field telescope and a powerful microscope *at the same time*. Very few people can keep up with the changes or make sense of the interpretations between these views.

Figure 1: Wordcloud of DAML Technologies and Applications

Keeping up with all DAML subjects is not just impossible for experts: very few employees outside those tasked with these areas know *anything* about these areas.

Since the mass adoption of the internet, our personal and work lives have become deeply intertwined with data and information. Information on user behaviors is collected and analyzed to understand how people (and machines) are using applications and then to optimally create experiences that better meet their goals. DAML will be needed to analyze and draw insights from this data in context to make it actionable.[i] Organizations must become intentional in understanding and applying these critical skills far beyond the technical DAML experts who do not typically share valuable information with other members of the company.

The goal of this paper is for all organizational employees—"from the janitor to the board chairperson"—to better understand, define, contribute to, and improve the DAML vocabulary, methods, processes, potential applications, contacts, roles, responsibilities, collaboration, project updates, and performance metrics. It also will describe how continuously improving organizational DAML success requires all employees to be engaged, enthusiastic, and knowledgeable so that the most positive and efficient outcomes will result.

What this paper is *NOT* is an appeal for everyone to become:
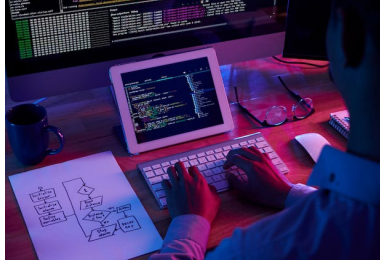
Figure 2: intensely deep programmers on dark screens in dimly lit cubicles,
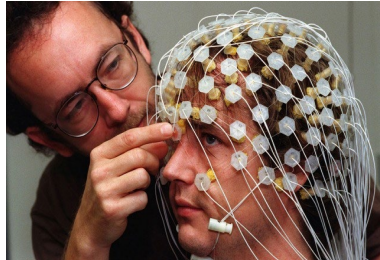
Figure 3: neuroscientists to optimize all learning, behavior, and processes,

Figure 4: or automation executives that desire very few humans doing all complex work with their single push-button fingers;)

Highly skilled experts and visionaries are essential to create *meaningfully unique* products and services. However, by having a much higher level of awareness and collaboration from the rest of the organization, communicating to the expert's "wavelength" is greatly improved. This enables achieving better results on the most important needs faster, more efficiently and with less resource cost.

1.1.   A tale of two CEOs.

The author learned a great deal about the importance of an enterprise wide DAML initiative through two vastly different consulting engagements.

The first was entirely CEO-led at a one-hundred-year-old financial company. It began during a golf game where his competitor suggested he use a particular robotic process automation (RPA) tool and completely plan and implement it with an outside consulting company. Around the same time this CEO's Chairman requested that he implement a specific intelligent document processing (IDP) system used by two sister companies to eliminate manual efforts and errors. Five RPA processes were targeted, but only one was delivered and put into production; one was eliminated far too late in the process because of the high complexity; three others were put on hold when the consultant asked for additional compensation for the second time. The IDP software was eliminated after months of planning and implementation because the cost benefits for the applications considered were extremely poor compared to the sister company's high transaction volume. Sadly, there was another huge effort that targeted AI to transform the call center into

a digital contact center as well. The only people that knew this information in detail was a knowledgeable call center manager who was laid off, a fantastic technical executive that battled valiantly to reduce the weekly management changes, and a two technical contract project managers that were never made full-time employees.

The second CEO was at a software as a service (SaaS) company beginning to utilize DAML in a profound way to improve performance over time once the SW administrators approved the automations. This CEO wanted to completely change the mindset of all his employees by teaching them DAML; the author helped create a strategic organization plan and a potential product roadmap for new applications to be considered in this effort. The results were amazing. Not only did the employees learn these skills but began to suggest new product ideas and help bring them to reality while also looking for ways to use DAML methods in their daily work. This company has continued to evolve, filing several new patents, and being awarded at least two more. All of this helped attract attention from some of the largest multi-national companies in the world.

Much of the HOW information contained below was used from this approach.

1.2.   Paper approach.

This paper will first discuss **WHY** DAML is so critical; next **WHAT** to *initially* teach company employees as the DAML bedrock; then finally **HOW** to deploy this strategy using simultaneous top-down and bottom-up approaches.

2. WHY DAML must become your organizational thinking and "vibe".

In the 2016 motion picture *Hidden Figures[ii]*, Dorothy Vaughan is a mathematician who worked as a 'human computer' for NASA during the 1960s. When NASA installed their first IBM 7090 mainframe computer, Dorothy feared she and her team would soon become redundant, then she correctly predicted NASA's urgent need for a programming team. Instead of worrying or doing nothing, she taught herself about the computer and the FORTRAN programming language, and then taught it to her team who became NASA's very first programming team. Vaughan embraced their undeniable future with enthusiasm, helping not only herself but her colleagues, their families, NASA, and eventually society for their contribution.

Figure 5: Hidden Figures' Dorothy Vaughn Learns New Computer Technologies Before It Replaces Her Team

"No doubt about it, data is now a prized business asset, which means organizations of all kinds will want to employ data-literate individuals. In an average business context, data literacy means being able to access appropriate data; work with data confidently (creating/gathering data, keeping it up to date, etc.); extract meaning from data; and communicate those data-based insights to others. It is also important to question the integrity and validity of any data you are working with, rather than blindly following data"[iii].

2.1. How the world's leading companies are cultivating a new business culture—Case Study JLL.

JLL is one of the largest owners and operators of commercial real estate worldwide with an astounding 4.6B square feet in property and facilities management. Over the past three years, Paul Chapman, JLL's global director of business intelligence and technology, has worked to develop a data culture across every aspect of the company. "Our facility managers can see the data for themselves, from showing them how old air conditioning units are and when they should be replaced, to how much each facility is costing per square foot." Employees at every level of the company have access to this data through a dashboard, helping them to determine the root cause when problems arise and to figure out how to respond.[iv]

2.2. Motivations for making DAML an enterprise wide initiative.

2.2.1. DAML adoption is already exceedingly high.
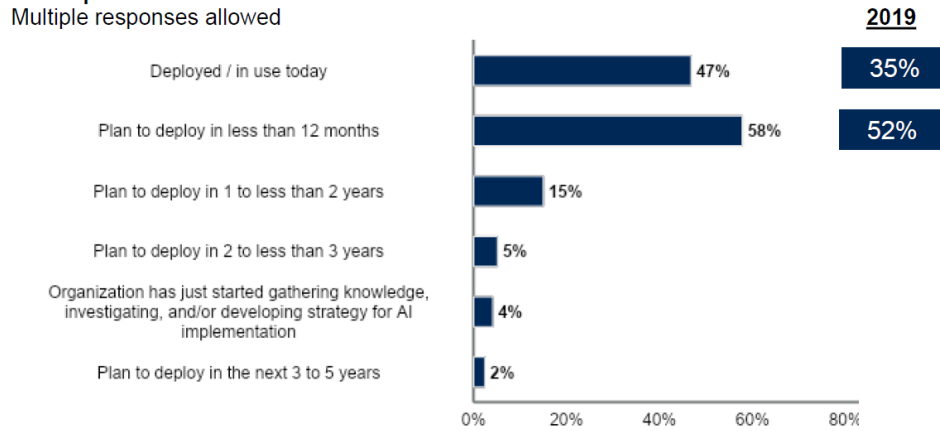
Figure 6: DAML Production Deployments Increased from 35% in 2019 to 47% in 2021[v].

Above figure shows high in-use DAML projects, and they are increasing over 15% CAGR.

2.2.2. New DAML knowledge areas are exponentially increasing.
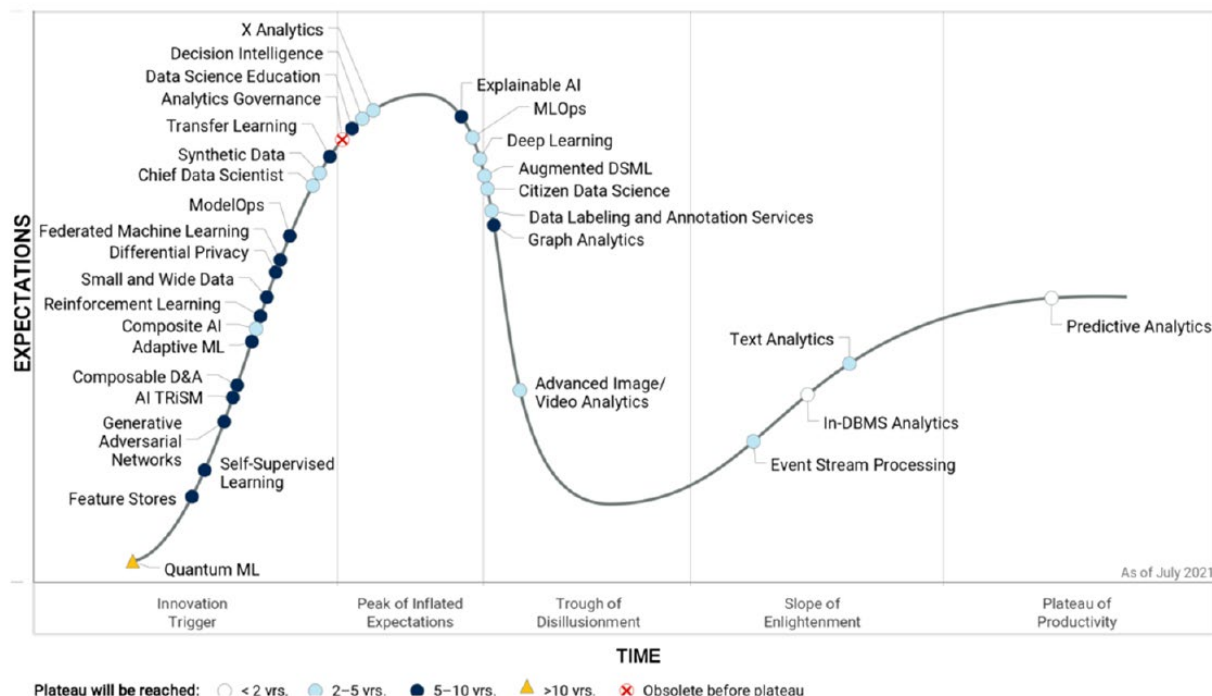
Figure 7: Gartner Hype Cycle for Data Science and ML July 2021

Gartner publishes annually expectations for technologies in specific areas called Hype Cycles where the white and light blue circles depict those knowledge areas advancing the fastest. Organizations implementing these technologies typically must wait for these technologies to advance to at least the 4th

"Slope of Enlightenment" segment for outcomes to change business processes. Beginning a comprehensive DAML program across the entire organization better prepares everyone for the continual change of skillsets, mindsets, and toolsets that these innovative technologies require. One could easily claim these knowledge areas are not simply increasing but *exponentially* increasing.

The time to embrace DAML is *right now*.

2.2.3. Establishing a "data-driven culture" is the biggest contributor to DAML success.

Percentage of respondents

Area	%
Data-driven culture	36%
Advanced analytics capability	29%
D&A strategy development/implementation	28%
Data integration	25%
Data quality program	24%
Information/data governance program	24%
Architect D&A platfrom	19%
Data science program	18%
Master data management program	17%
Operational intelligence/real-time decision automation	13%
Data acquistion	13%
Data literacy program/data skills training	13%
AI program	10%
Enterprise information management program	8%
System adoption/usage metrics	7%
Metadata management	6%
Benchmarking D&A maturity	2%
Other	4%

Figure 8: Areas Critical to DAML Success[vi]

2.2.4. DAML must become EVERYONE'S strategy.

As seen in the figure below, the impacts of enterprise wide DAML initiatives are far reaching.

D&A team strategy components

Component	%
Data-driven culture / change management	81%
Data literacy program / data skills training	68%
Digital business transformation	45%
Other	11%
None of the above	6%
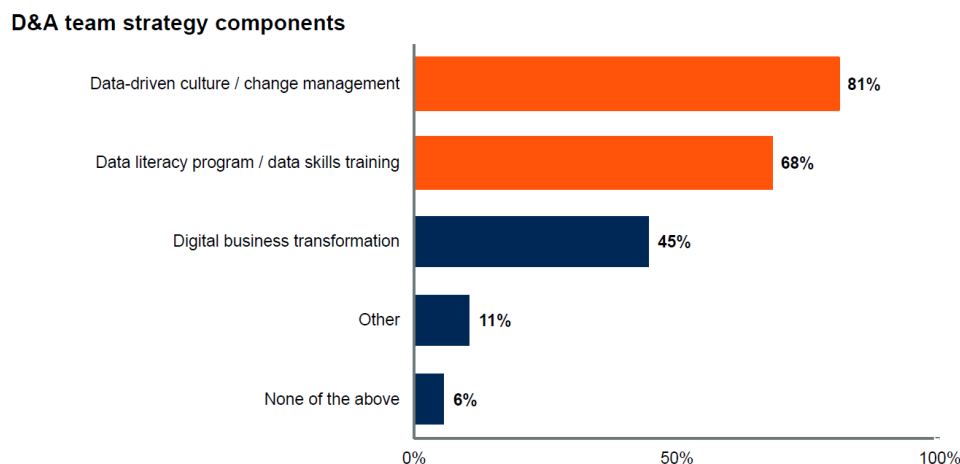
Figure 9: When an Organization Embraces DAML, Various Team Strategy Components Must Be Implemented[vii]

DAML skills are also seen as critical in every department of an organization:

How important are data skills to the following depratments when hiring entry-level candidates?

Department	Percentage
IT	92.0%
Product development	89.1%
R&D	86.5%
Finance	84.7%
Business administration/operations	77.0%
Human resources	76.7%
Marketing	75.6%
Sales	74.2%
Support/customer care	72.7%

Percent of respondents who selected:

■ Very important   ■ Important
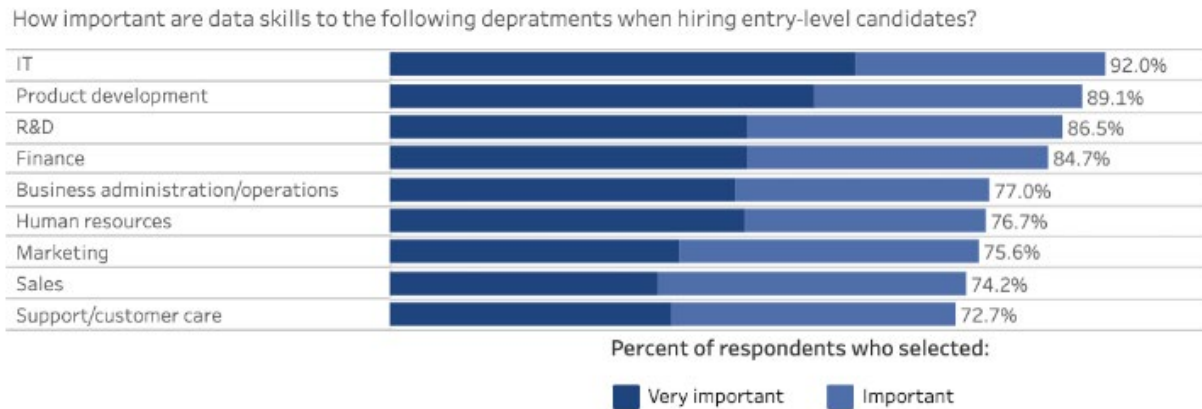
Figure 10: Importance of DAML Skills by Department[viii]

2.3.   DAML value for *me* as an employee, and how will it make my job easier?

The initial outcomes of DAML processes starts by *augmenting* human capabilities, reducing mundane, repetitive, and even dangerous tasks to allow a greater concentration on the unique skills that define us as individuals.

These distinctively human talents are the most difficult to automate and therefore will become the most indispensable:
- Effective communication and collaboration through emotional intelligence,
- Empathy, compassion, and authenticity;,
- Curiosity plus instigation,
- Strategic analysis and analytical thinking,
- Complex, multi-disciplinary judgement, and decision making,
- Adaptability and extensibility,
- Creative thinking leading to real innovation,
- Conflict resolution,
- Cultural intelligence and diversity consciousness,
- Ethical awareness,
- Negotiation and persuasion, and
- Leadership through genuine trust, transparency, inclusivity, and respect.

Can you envision an exemplary, engaged fellow employee NOT wanting to shed monotonous tasks to focus on these critical thinking and empathy skills?

Augment People and Decisions

- Context Enriched Analysis
- Business-Composed D&A
- Decision Driven D&A
- Skills and Literacy Shortfall
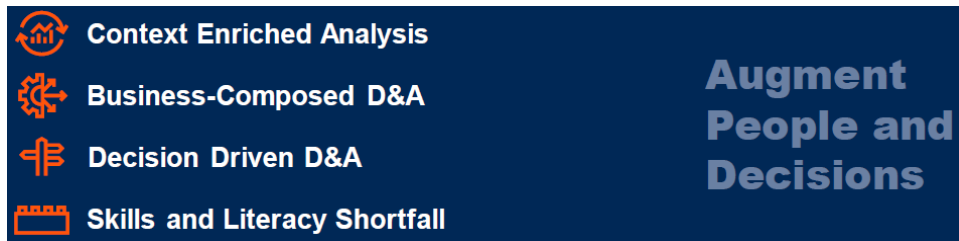
Figure 11: Gartner's Top Data and Analytics Trends for 2022 (Partial)[ix]

The above figure describes the need to help employees where they work currently and to aid in their efficiency and quantity/quality of work output. This means to augment people with a broad array of contextual data, to build up components optimized on how teams really work, to understand how decisions are made (aka "decision engineering") to optimize people and process impact, as well as to build a higher level of DAML competency.

Curiosity and desire for continuous learning, growth, and improvement is cited at the one skill everyone must cultivate. Whatever your age, whatever your industry, if you can spark your desire to learn, you will be giving yourself the best chance of a successful, fulfilling life. Especially in a work context, curiosity and continual learning are fundamental to being able (and willing) to embrace change. It ensures your skills stay sharp, that you can keep up with the major transformations taking place, and that you stay relevant. DAML is a major transformation.

2.3.1. YOUR current job may cease to exist.
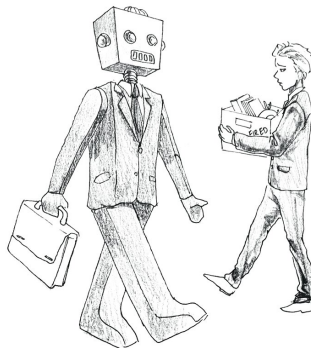
Figure 12: Funny Because it is True[x]

Automation will have a far-reaching impact on the global workforce.
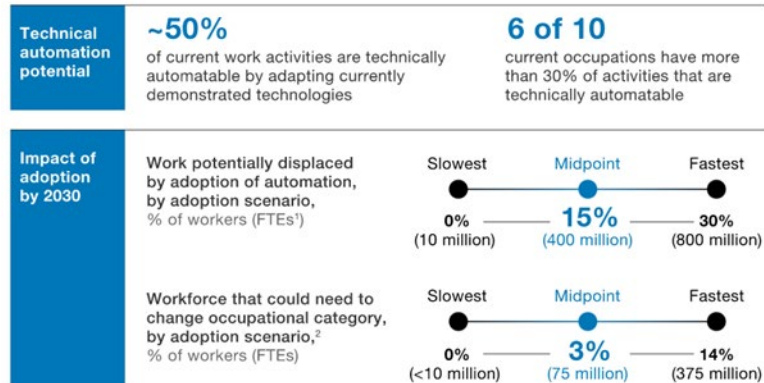
Figure 13: Employment Changes from Automation 2017-2030[xi]

This same McKinsey study continues "…between 400 million and 800 million individuals could be displaced by automation and need to find new jobs by 2030 around the world…Of the total displaced, 75 million to 375 million may need to …learn new skills…". Some respected sources predict over *half of all existing jobs will become obsolete through DAML*—but this can become a source of strength for employees who absorb, employ, and evangelize DAML skills. Every employee must become shrewder in what will disrupt, augment, and improve *every* existing job description, work process, and organizational design.

However, the World Economic Forum predicts that "by 2025, 97 million people will be needed for AI-related jobs, and that doesn't count the numerous other jobs that AI will help produce". As McKinsey noted, "early, innovation-focused adopters (of AI) are positioning themselves for growth, which tends to stimulate employment." Moreover, most companies understand that AI's real benefit is not automating people out of jobs but *enhancing their skills, reducing errors, and freeing up employees to do more important tasks*"(italics added)[xii].

One reason to not despair: DAML will "*result in the creation of many more (new and unforeseen) jobs.*"[xiii] Similarly the Institute for the Future predicts that 85% of jobs that will be available in 2030 *have not been invented yet*[xiv].

2.4.   How can my organization benefit?

The overall benefits of driving an enterprise wide DAML movement are already being embraced by leading corporations across the globe leading to enormous success. The most critical gain from an organizational DAML strategy is to *generate value from information assets* by first improving internal processes, then secondly to increase the value of products and services; both concentrate on efficiency and innovation.

However, the third organizational gain is the wildcard that greatly enhances cultural alignment and cohesion is recruiting and retention. More on this later.

It would be ironic to ignore striking industry statistics that are metricized, collected, and envisioned using DAML processes that themselves indicate the importance of DAML processes:

BY THE NUMBERS: Facts About Training in General

- Companies that offer comprehensive training programs have **218% higher income per employee** than companies without formalized training. These companies also enjoy a **24% higher profit margin** than those who spend less on training.
- A 10% increase in both workforce education level and equipment upgrades led to a **productivity gain of 8.6% vs. 3.4% respectively.**
- **40% of employees** who don't receive the necessary job training to become effective will leave their positions within the first year.
- Recent national survey of over 400 employees spanning three generations (Baby Boomers, Generation X, and Millennials); 1) job-related training and development opportunities influenced **70% to stay at their job**, and 2) a whopping **87% of Millennials say that professional development and career growth are significant to them**. And since Millennials have surpassed Gen Xers as the largest generation in the U.S. labor force, this is a statistic that just can't be ignored.
- In a recent Dale Carnegie survey, **companies with engaged employees outperform those without by up to 202%.**
- According to a study by Capgemini Consulting, **only 10% of US adults** feel that they have sufficient computer and Internet skills to use the digital tools they're responsible for in their daily work.

Figure 14: Impacts of Employee Training Programs

References for Figure 14:
"Companies that offer"[xv]
"A 10% increase"[xvi]
"40% of employees"[xvii]
"Recent national survey" [xviii]
"In a recent"[xix]
"According to a study"[xx]

As stated, the effect of a poor training environment has a profound impact in employee turnover and this impacts recruiting. Employees frequently rank the ability to learn new skills and try different approaches as the key factor in their decision where to work. Intelligent people are also well-connected and talk to others when networking about companies and how employees are treated. The mantra is you tell one person about positive experiences and ten people about the negatives. Therefore, insufficient training impacts recruiting as well as investments in recruiting, hiring, and onboarding a new employee.

Organizational benefits of implementing a comprehensive, DAML-driven, enterprise-wide initiative:
- Connect every aspect of the organization to customers, mission, and vision statements using commonly understood definitions, well-placed metrics, continuous monitoring, and visualization, leading to a reformulation of operating models,
- Use as a valuable tool in cultural change and alignment,
- Create the concept of monetized data; *information* asset values related to actual loaded cost or time value. Also include in values intended/future use, connections to entities/processes/individuals/groups/physical assets, error/believability, security, confidentiality, authenticity, external sales/licensing, update frequency, and expected end of life,

- Improve the prioritization of critical business processes as well as business process efficiencies through elimination of duplicate processes, alignment, optimization, automation, plus continued maintenance, and improvements,
- Combine and accelerate innovation processes to generate new and more meaningful data-driven intellectual property (IP), products, and/or services,
- Focus employees less on tactical execution of repetitive tasks and more on improving the tactical processes. Participating, possibly for the first time, in customer-centric and strategic enhancements,
- Empowers all levels of workers to ask the right questions of data, processes, and machines, build knowledge, make more informed decisions, and better communicate meaning and context to others.

"IDC found that only 36% of their surveyed enterprises succeeded in putting completed (DAML) models into production. Nearly half of the remainder (32%) had not even made it past proof of concept'. By raising the DAML education and experience level of the entire staff, more thoughtful processes will be chosen by the employees that know them best, improved business process flow information will be collected, and more informed visualization and testing will occur leading to higher quantity and especially quality of the resulting information.

2.4.1. How does DAML reduce and eliminate errors?

DAML enables an iterative, experimental approach by personnel closest to customers, opportunities, and obstacles, improving decision speed and *especially quality*, reducing resource waste, and streamlining communications so that all employees can understand and act.

2.4.2. Greater customer insight and retention.

"(DAML) driven companies are twenty-three times more likely to acquire customers thank their peers"[xxi].

The digital world is built on data and information. Information on user behaviors can be collected and analyzed using DAML methods to understand how people are using and even socially commenting on products and services, enabling customized experiences that better meet their needs, styles, and desires. Using extracted information in context is commonly referred to as hyperpersonalization, and further drives customers to purchase, engage and even evangelize because of experiences tailored only for them.

2.4.3. Retention and recruiting

HR frequently is charged with recruiting and retaining the absolute best, however vague, non-metricized statements are always misleading. It is clear recruiting and retaining competent talent with critical thinking skills—and most especially the most coveted DAML skills—leads to a reduced turnover ratio and therefore a higher profit margin that the competition.

The figure below highlights the key skills required by open roles in several industry segments. Communication, analysis, and collaboration are what every employer needs the most, and these are some of the very skills accentuated by an enterprise wide DAML strategy.
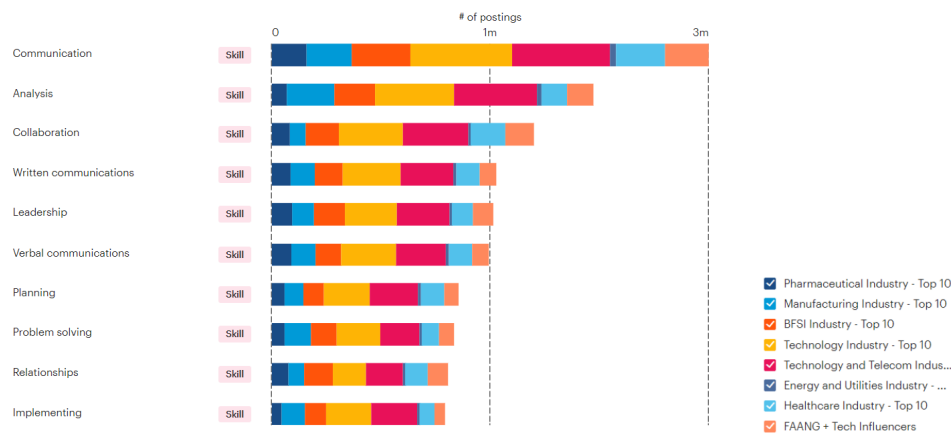
Figure 15: Data Source: Gartner's TalentNeuron, and represents jobs posted between 4/22/2021 4/22/2022

Most companies pursuing DAML will focus entirely on recruiting a team of highly trained technical experts. However, with the exponential expansion of DAML organizational needs comes a serious shortage of potential employees at this level, forcing many companies to live with extremely high consultant salaries, noticeably shorter tenures, and often very remote or offshore resourcing making direct engagement with the business leaders impossible.

By training *everyone* on DAML, the strain of finding increasingly rare and transient experts to completely lead DAML efforts is reduced—but never eliminated. All employees that become aware of the vocabulary, methods, and potential outcomes of DAML can greatly assist a much smaller and integrated pool of specialists. Employees using their existing business knowledge with their new skills will create a cooperation between them and an atmosphere that exudes excitement both inside and outside the company. When a company understands their value, mission, and customers and becomes emboldened to learn and employ the latest DAML skills to create visible outcomes, recruiting becomes *almost* effortless.

DAML processes are rarely siloed into one small area, but rather benefit from the combination of neighboring departments, subjects, and data sets. By mapping "skill adjacencies," employees better understand how their skills and job definition connects with their closest working colleges and throughout the company so that their insights can be extended to other areas by both awareness and cross-training.

Use of DAML skills by human resources (HR) *internally* also has great benefits. "(DAML) can influence and improve how human resources departments manage recruitment. Tapping into data can help companies to headhunt the most promising talent by comparing performance metrics. From here, businesses can retain these valuable staff members through the culture of clarity that data-based working environments foster. Essentially, data-driven human resource strategy has significant short- and long-term benefits, creating a productive, motivated staff team who will increase profit margins.[xxii]"
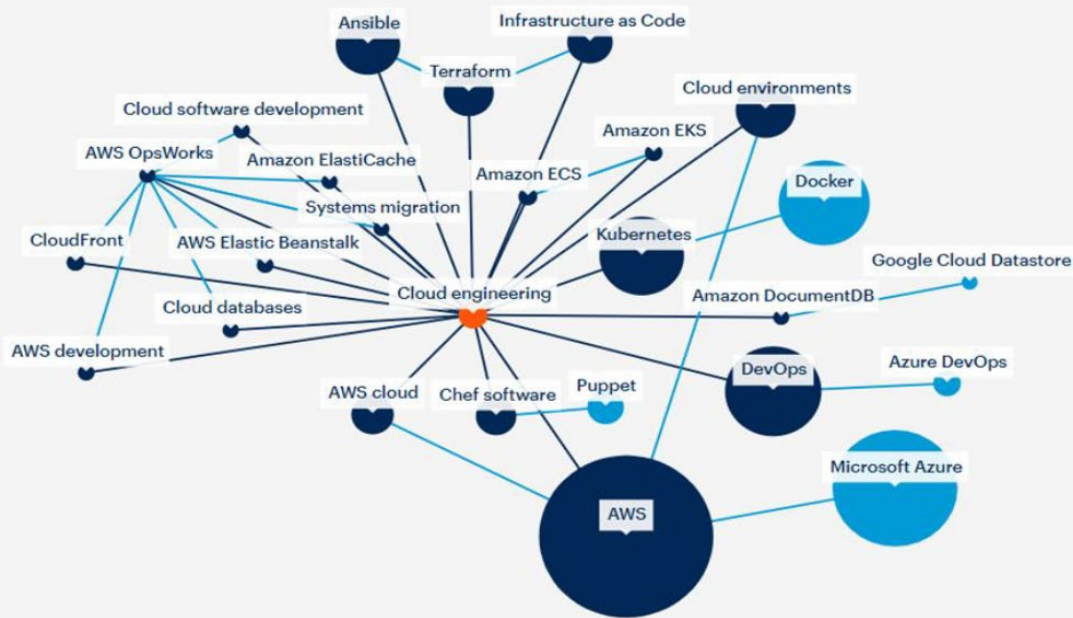
Figure 16: <u>Every</u> Job Function has Adjacent Skills and Roles. Example Shown for Cloud Engineering Skill Adjacencies

2.4.4. *Increased performance through DAML organizational obsession.*

DAML drives workforce productivity by increasing efficiencies—whether individually, in work teams, for departments and divisions, or the entire organization. Data selected by the people that best understand the processes and potential outcomes enables more tangible goals by creating a clearer picture of the overall targets, behaviors, and patterns, allowing an agile approach to enhance productivity. It also allows identification of areas for improvement and promotes transparency and accountability.

In a study of over four hundred businesses, it was confirmed that organizations with the most developed analytics capabilities commanded a larger market share, were twice as likely to be in their sector's top 25% for profitability and were five times more likely to make swifter decisions than competitors[xxiii]. The point being organizations that are not exploiting DAML are certain to lag their competition. Another study confirmed these findings. By analyzing data sets from Fortune 1000 corporations, the impact on profit resulting from DAML was measured. Some notable findings included:

- Companies could increase profit by more than $2 billion a year by making just 10% of available data usable.
- Return on equity increased by 16% by making data more accessible.
- When advanced reporting was deployed, return on investment increased by 0.7% – which is equal to $2.87 million in additional revenues.
- Most importantly, a comparably low investment in data analytics was required to produce these significant gains.
- DAML driven companies are 58% more likely to beat revenue goals than those who are not focused on data,

2.4.5. Collaboration and working in teams.

This is one of those skills that seems obvious for workplace success, so why include it? "Because the nature of collaboration and teamwork will change as teams evolve to include automated processes as well as hybrid workers, fully remote workers, contractors, and other employees from different business units who "float" between projects and teams. With such distributed teams, we need collaborative skills more than ever."[xxiv]

Creating a vibrant DAML program will create or enhance the organization's foundation of cross-disciplinary collaboration and problem solving. More will be mentioned on this later in the HOW section, but employees enjoy brainstorming, goal setting and progressing their own defined initiatives in teams. By composing them of different perspectives and levels instantly adds a diversity element found to be crucial to innovation success, so it is also important for DAML success.

2.5. How can the cable industry benefit?

It is time *the entire cable industry swiftly embraced the implementation of a DAML strategy* to propel it into the future using data-driven initiatives that have been proven by hundreds of leading organizations. DAML is key to not only thrive but exceed the competition and race for the best strategic and forward-looking talent. "Not to decide *is* to decide."

During a recent virtual conference, SCTE CEO Mark Dzuban made several points in a session labelled "Tackling the 10G Challenge". 10G is a CableLabs' series of initiatives to prepare cable operators for symmetric 10Gbit/sec access networks and applications. He described an urgent need to "work with CableLabs to elevate the knowledge base to "bring 10G to life". He continued to describe "Project Wisdom," a CableLabs' training initiative for advanced skills, capabilities, and knowledge through community colleges and universities. "Its goal is to create "unique talents to build 10G" and "AI-driven cable operators" leading to "increased (customer) touchpoints, proactive operations at outages, zero touch for customers, and to connect through all ways (we) communicate".

Mark closed by saying he would like future job seekers to "think of cable as a career path, especially for automation and AI/ML"[xxv]. So "(c)able leaders must not only focus on attracting new employees to the industry, but it is imperative to upskill the existing workforce to support the global expansion of connectivity and technological innovation"[xxvi].

2.6. Ignoring DAML will doom existing companies.

Failure to embrace this fundamental change will doom an organization's competitive ability, potentially taking them out of business eventually. "By 2030, AI will lead to an estimated $15.7 trillion, or 26% increase, in global GDP"[xxvii]. This increase is greater than both China and India's current GDP *combined*! Increased productivity accelerated by DAML will contribute to approximately 40% of this increase in GDP growth.

Educating employees to better understand DAML vocabulary, methods, processes, roles, and metrics for both internal and external projects will increase communication, clarity of thought and actions bringing all departments together to speak a universal language that benefits the company.

Figure 17: What You Don't See Can Kill You (and Your Organization)

3. WHAT DAML areas to initially address.

This section gives three initial areas to consider with the goal to model your approach by balancing strategic and tactical priorities of your organization. These are only a few suggestions among thousands, and the tools your organization selects from this DAML toolchest are entirely determined by process selection and prioritization efforts.
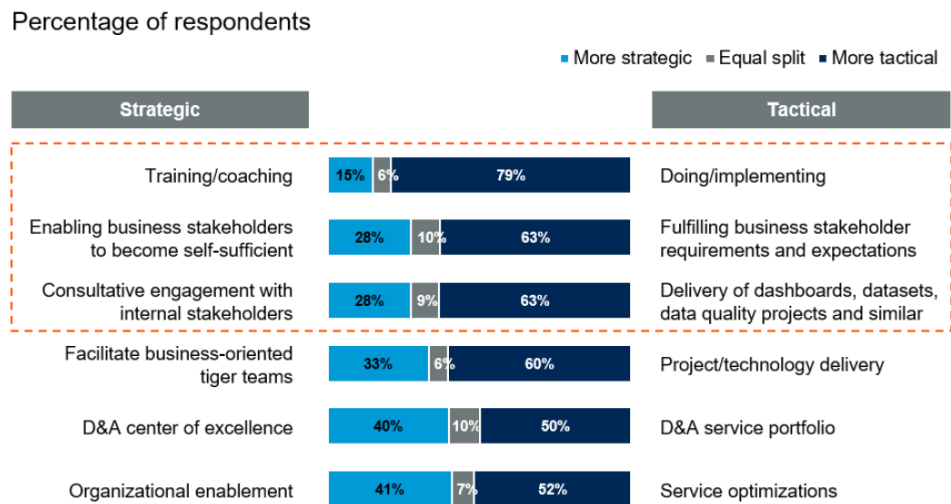

Figure 18: Operating Model of a DAML Organization[xxviii]

3.1. A quick aside on "determinant" vs. "assisted" DAML processes.

DAML is often thought of as determinant, or unsupervised, making complex decisions without any human intervention. Look only to Space Odyssey's Hal 9000 to see this is naïve; the most critical area to begin with is assisted or *supervised* processes.

Figure 19: Always start with assisted DAML processes

People must still be accountable for the business decisions made, and it is not possible to build everything a human business expert can do well. So, recommendations are output for the human to respond, providing a "feedback mechanism" so that the system can learn from the human response to eventually become *almost* unsupervised; but you can never leave "it" completely alone. The world and organizations are always changing, so system results must always be monitored with key metrics. Documentation must also totally describe the "what and how" of the manual process to enable new employees to take over when manual interaction is required, and automated process for future iterations.

3.2. Focus on data literacy.

"Culture and data literacy are the top two roadblocks for (creating a DAML fueled organization) …(b)y 2023, data literacy will become an explicit and necessary driver of business value, demonstrated by its formal inclusion in over 80% of data and analytics strategies and change management programs."[xxix]

Gartner defines data literacy as the "ability to read, write and communicate data *in context*, including an understanding of data sources and constructs, analytical methods and techniques applied, and the ability to describe the use case, application and resulting value…By 2023, data literacy will become essential in driving business value, demonstrated by its formal inclusion in over 80% of data and analytics strategies and change management programs". [xxx]

"Data literacy isn't a nice-to-have — it must become part of your firm's DNA." While most organizations strive to continually enhance decision making for critical tasks, "(t)*he problem is not data availability or tools but lack of skills to use the tools and the data to drive business outcomes*. Technology executives are creating data literacy programs to bridge this gap. These programs must be comprehensive, companywide efforts with executive support, strategic goals, and established metrics"[xxxi].

Tableau rated data skills/data literacy the number one need for Entry Level Skills in three categories: demand, increase in demand, and anticipated importance.

82%
of leaders expect all employees to have basic data literacy

70%
of employees are expected to heavily use data by 2025, up from 40% in 2018

79%
of leaders say departments equip employees with needed data skills, but only...

40%
of employees say they're provided the data skills they're expected to have
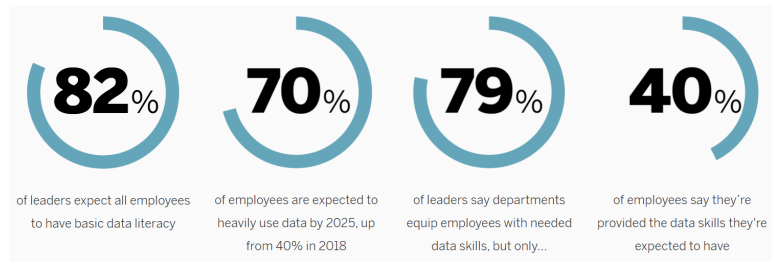
Figure 20: Despite Company Efforts Most Do Not Have Adequate Data Skills[xxxii]

Goals should include basic data awareness, deeper understanding of insights, how to connect insights to decision-making, continued training of experts, and scaling skills across the organization.

› Explore the need for data literacy — *Awareness, Comprehension, Expertise,* and *Scale* — across the entire organization.

› Understand basic data competencies such as recognizing data and its value to the organization, interpreting data visualizations, data storytelling, data hunting, and insights-driven decision making.

› Develop a comprehensive data literacy program to increase awareness of data and its value, improve understanding and data decision making, enrich expertise, and scale the program across the entire organization.

› Identify opportunities for partnerships to expand and enhance data literacy from service providers and data literacy experts.

Figure 21: Forrester Approach to Building a Data Literacy Program[xxxiii]

Data literacy today suggests the concept of an extended understanding of "Big Data": literacy that places awareness and critical reflection of big data systems at its center[xxxiv]. Big data uses extremely large data sets collected from all aspects of a business so that they can be analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions.

3.3. "There is No AI without IA (Information Architecture)."[xxxv]
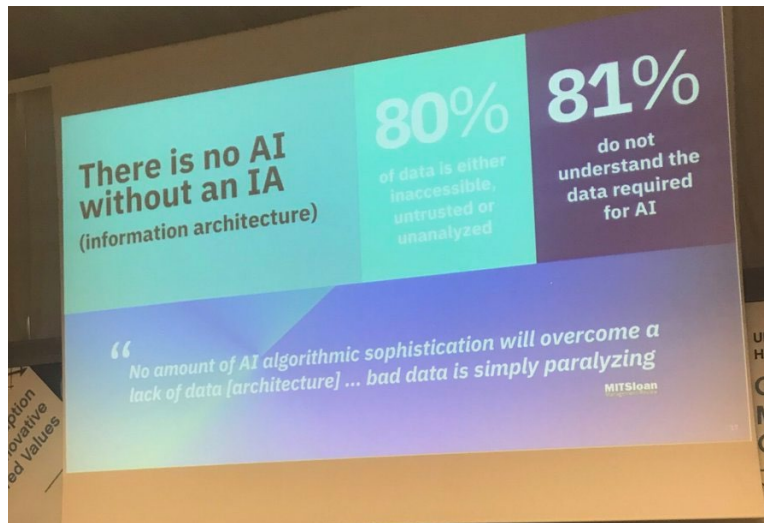
Figure 22: Most DAML processes fail because of data preparation and access[xxxvi]

Data collection and preparation is the most time consuming and difficult part of creating meaningful outcomes from DAML. Everyone must begin DAML training on a few key subjects.

3.3.1. *Create data dictionaries that span the organization and align with industry.*

Enterprise culture has been described as "the collective conversations of an enterprise. So, it is impossible to change the behaviors and belief systems of an enterprise without first altering the conversations within it.

"Change your words, change your life." "Words are containers of power." Many motivational speakers have used these and similar expressions for good reasons. The way we communicate effects everything. Data literacy harnesses the power of organizational words to provide guidelines for making sure our communications are efficient, constructive, and used to achieve superior results. When companies do not begin with a common and maintained data dictionary (aka glossary), DAML efforts will not achieve optimum outcomes.

Figure 23: "Garbage In, Garbage Out" (GIGO)[xxxvii][xxxviii]

3.3.2. Seeking Common Acronyms

Just as an organization must have a common vocabulary with identical definitions, they also must agree on acronyms. Common Acronyms used across an entire organization or even industry is not typically explicitly defined. Because they are not common to everyone, they can confuse and alienate unfamiliar audiences. Even well-intentioned writers and speakers may overestimate an audience's familiarity with abbreviations. Abbreviations should not be completely avoided but using them as a default assuming all agree with meaning and context can be problematic.

3.3.3. Taxono Mies? Taxi please.

A taxonomy is the discipline of classifying information and are typically created in a hierarchical, parent-child structure. They are extremely well organized by all users of this data and are typically published and maintained by an organization.

The "father of taxonomy" Carl Linnaeus was a Swedish botanist that named, ranked, and classified plants and animals in 1761: Kingdom, Phylum, Class, Order, Family, Genus, Species. Do you remember the helpful mnemonic like "King Philip Came Over For Good Spaghetti"?

Figure 24: Insert Some Humor When Content Appears Boring or Irrelevant

Another quite common taxonomy example that most people are familiar with is the Dewey Decimal System used for information organization, especially in library collections.

001-099	Generalities	PREQUEL TO THE DEWEY DECIMAL SYSTEM	Encyclopedias, curiosities and wonders, unexplained mysteries
100-199	Philosophy	WHO AM I?	Books about the self, feelings, dreams, witchcraft
200-299	Religion	WHO MADE ME?	Christianity, Judaism, Buddhism, Hinduism, etc., and Mythology
300-399	Social Science	WHO'S THE GUY IN THE NEXT CAVE?	Customs, cultures, laws, manners, costumes, fairy tales
400-499	Languages	HOW DO I TALK TO THAT GUY?	Dictionaries, parts of speech, sign language, foreign language aids
500-599	Natural Science	LET'S TALK ABOUT THE WORLD WE SEE	Mathematics, earth, astronomy, chemistry, plants, wild animals
600-699	Applied Science	NOW LET'S MAKE STUFF OUT OF WHAT WE SEE	Inventions, robots, transportation, pets, recipe books
700-799	Arts and Recreation	NOW LET'S HAVE SOME FUN	Art, drawing, comics, handicrafts, music, games, sports
800-899	Literature	LET'S TELL OUR CHILDREN HOW WONDERFUL WE ARE	Poetry, plays, classic literature, jokes, riddles
900-999	Geography and History	LET'S TELL OUR FUTURE CHILDREN HOW WONDERFUL WE WERE	Landforms, travel, atlases, exploration, countries
92 and 920	Biography and Collective Biography	FIND OUT ABOUT FAMOUS PEOPLE	Single person: filed by last name of subject **Multiple people: by author**

Figure 25: Dewey Decimal Library Classification System

Having an organizational taxonomy is critical to begin any DAML project. DAML success only results when the entire organization is speaking the same language—using common definitions and a structured way to hierarchically organize all data and information. Think about it: most organizations continually create their own definitions and information organization, and quite frequently these conflict between groups, departments, divisions, functional areas, and acquired organizations. A company's taxonomy must come together to create a common language in the company and throughout the industry so all can more clearly communicate with each other. This heightened communication is the fruit of a well-versed staff in DAML, increasing productivity and thus contentment among employees.

3.3.4. *Aim for INFORMATION CONTEXT.*

Organizations must have a thorough and complete understanding and use of common data assets and derived information to maximize their DAML initiative.

When DAML processes connect inventory, data, resources, and people through common data and information communications, not only does the company benefit but the industry benefits as well. If DAML standards are not "set in stone" at the very beginning with pan-organizational definitions of every term, synonym, alternate term, and acronym list, the information *context* will be quickly lost.

It is impossible to create compelling, meaningful DAML outcomes from a misunderstood and fluid data and information foundation.

4. HOW DAML can be understood, embraced, and utilized by all employees.

DAML can be understood through common vocabulary, embraced through clear and simple methods, and utilized by employees who understand the benefits of DAML to themselves, their career, their company, and their industry. The positive DAML outcomes are clear: collaboration, retention, recruiting, mission alignment, external perception, revenues, and the excitement of being part of the future knowing and understand the tools DAML will provide companies in the future.

This section provides an overview of several suggested tactics to get every single person in your organization to understand, adopt, and engage in DAML. By selecting the DAML process priorities based on outcome values, some but not all these methods may make sense.

4.1. Start both "Fast and Furious" and "Slow and Steady"?

Initially the focus is on common DAML-specific vocabulary, basic concepts, methods, and both alignment to the organizational goals and the ability to begin to derive new goals for employees to teach themselves and their teammates. This approach is "Slow and Steady," involving everyone from the janitor to the board chairperson. This means a tailored agile learning approach for each employee's personal job responsibility, skill levels, learning style, and pace.

And now for the simultaneous "Fast and Furious" win: creating a one-time, company tiger team. A tiger team is a specialized, cross-functional team brought together to solve or investigate a specific problem or critical issue. People need an example of how to act and a good early success story.

A visible way to display DAML skills is to assemble a "tiger team" to help choose one easy-to-understand, visible-to-all, mundane, repetitive task that if automated would clearly save time and money while reducing errors and risk. This tiger team concept will be explained in more detail later.

4.1.1. Create a grassroot-led effort.

Figure 26: Grass Fed Efforts Produce the Tastiest Results

To succeed in instilling a DAML culture, every senior executive must participate by planning the resource capacity reductions on existing projects so that the entire company can learn DAML at the same time. They must work to identify risks to current projects and determine workarounds, hiring consultants, outsourcing, delaying, combining, and possibly reducing overall number and scope of existing projects., (etc.)

The training itself can take many forms. Bigger, more formal training courses can be used to layout universal guidelines—ensuring everyone is aware of which data is private and which is public, and how to handle it. Small, interactive group training can be an effective way to teach workers how to gain a better understanding of the data they work with every day.

4.1.2. Dub DAML development director.

Adding a new executive function for Chief Data Officer (CDO) really sets an enterprise DAML strategy on fire. The CDO generally oversees a range of data-related functions that may include data management, ensuring data quality, and creating data strategy. They may also be responsible for data analytics and business intelligence — the process of drawing valuable insights from data.

Whatever title is chosen, the CEO/President must personally introduce this person and then work with that leader *directly* on all DAML strategy areas to demonstrate the importance of this initiative.. By beginning from executive request and hands-on leadership, the initiative launches from the crucial *financial value of DAML*, then less so on data quality metrics (accuracy, completeness, scale, and usage), and then even far less measures of the key information and data assets impact of on business processes, such as KPIs.

The CDO should *not* report to the CIO but instead the top business executive (CEO, COO, CFO); it is the only way to demonstrate the value of DAML in the context of the organization's business. CIOs have far too much on their day-to-day workloads to either prognosticate/create the overall organizational future (the CTO's role) or to establish a vibrant DAML center of excellence effort. The marketplace mirrors this: in Gartner's 2018 CDO survey, CDO reports to top business executives increased from 45 to 48% YOY, while those reporting to the CIO declined from 23 to 22% for this same period.

Chief Data Officers (CDOs) or the highest lever executive charged with teaching and utilizing the entire organization should intelligently coordinate the creation of competencies across the enterprise, ensure the efficacy and consistency of distributed practices through metrics and scorecards, and build enterprise capabilities that underlie future success.
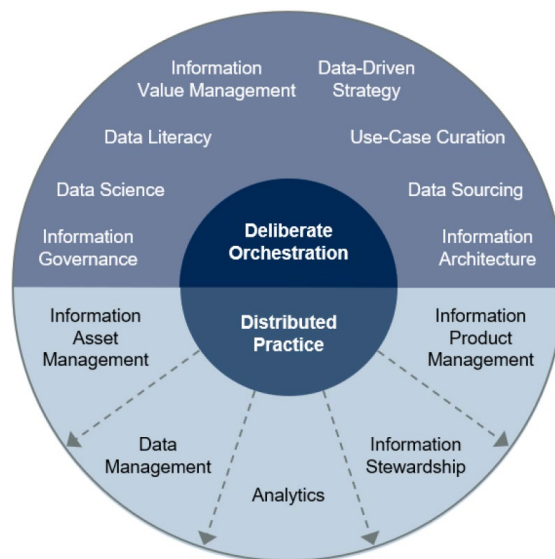
Figure 27: Essential CDO Actions to Create DAML Success Across an Enterprise[xxxix]

Divide all DAML technical staff into groups that either facilitate enterprise-wide or are assigned to one to three groups of cross-functional staff. These group technical leaders should propose potential collaboration opportunities between members of different teams, and then assist as needed. They also should discuss external organizations that could either lead or supplement the training as well as provide expertise in the DAML developments, but they must be *incredibly careful* about consultant or chosen toolset lock-ins.

4.1. Methods to infuse data driven competencies.

Building a data-driven enterprise is not just about encouraging the use of data in decision making. Data and analytics leaders must lead development of the appropriate competencies and align work to be consistent with their enterprise's ambitions for generating information value.[xl]

4.1.1. Publicize DAML program and add participation into job evaluation criteria.

Senior management needs to begin continuous messaging to employees about the urgency for ALL employees to know DAML, and why it will benefit them individually in their current work and career plans, as well as their work teams, departments, the entire organization, and even the industry.

Employees should be encouraged to share their ideas. This messaging effort should support employee conversations that are collaborative, assisting both internal and external DAML opportunities with their inside knowledge, especially in their own jobs and on every company level. Management also must connect DAML to what the organization's business is all about. and new direction the organization is heading through their mission and vision statements; these may need to be revisited to accentuate this push. Wherever possible they should use specific examples of planned and currently released product/service features to frame all DAML explanations of new benefits.

To cement this into the company culture, all job descriptions should be updated to reflect expectations for DAML training, competency levels, participation in ideas and methods for products/services, and how these new skills will be used by them personally. This should begin by management first evaluating their own roles to continuously seek the highest ROI applications and then to prominent and visible in designing, testing, and continuously maintaining their applications.

4.1.2. "Tiger Team" taming.

The term "tiger team" originates from the military but was made famous by NASA who deployed a tiger team during the endangered 1970 Apollo 13 mission[xli].

Here we begin with top-down approach using a *one-time* tiger team composed of top cross-functional staff to help employees understand by visible example how eliminating a routine task using DAML will allow a focus on higher, more strategic functions of their jobs. To create a tiger team approach, choose an important and well-known business process with established metrics, and then automate this process through a DAML demonstration project that greatly improves the metrics. This shows all employees what they are expected to achieve.

This suggested approach should directly impact one or more people who drudgingly slug through this repeatable task. With this is mind, at least one of these employees needs to help clearly communicate the mundane nature of these job tasks and how they personally will change their approach to their role with the extra emancipated time. They become a DAML "poster child," altering their future by learning new skills that will keep them important in their company role into the future.

Carefully choose staff that take part in this tiger team employees known to work hard, are cross trained to think through various roles/perspectives, can communicate to diverse groups very well, and are not perceived to be favored by executives. This is a one-time shot and must derive successful results and excitement.

Figure 28: Choose Your Tigers Carefully or One Might Dominate

4.1.3. "DAML *Academy"?*

Creating a DAML Academy (also known as a Center of Excellence) can become the heartbeat of the DMAL strategy. By establishing this as a central organizational theme, all aspects of the company begin to "spoke" around it forcing all processes and procedures to be seen considering DAML opportunities. This DAML Academy should address naming conventions, standardized teaching methods/materials, describe development phases, enable internal DAML strategy refinement, and publicly "show case" the company's new strategy and positive outcomes.

Figure 29: Make Strange Uniforms and the DAML Salute an Academy Requirement

4.1.4. Form "DAML Translators" to bridge technology and business realms.

"DAML Translators" (or champions) ensure business needs are met and adoption of DAML strategies is smooth Translators are there to expand(s) the typically siloed IT technical role to become a problem-solving collaborator with an enterprise perspective concerning data and analytics. They enable the formation of communities of practice and DAML competency development.

The best fit will be employees who know every aspect of the department and are known by all key staff members. These employees will excel in their understanding of DAML and will be capable of leading or moderating departmental DAML initiatives. Where qualified employees are lacking, find certifications that can transform them then add that to their job evaluation criteria. Executives may also want to

partner with department leaders to provide clear insight from on the ground as to how DAML can assist and benefit each department and employee directly.

These also could be DAML technical professionals that have excellent empathy, emotional intelligence, and communications skills with a good knowledge of the department and possibly paired with a departmental expert that is lacking DAML skills but will benefit from the paired interaction.

4.1.5. Develop communications and training to inform organization and external stakeholders.

The goal of company communication concerning DAML is to explain the extreme urgency of getting every employee not just *thinking about* but intensely *engaged* in the company DAML strategy.

Figure 30: Best to Outsource for this Communications Approach

Choose one key people management leader in each team so they help communicate training importance, expectations, responsibilities etc. That person will be responsible for creating and participating in a team that will design processes, contacts, roles, responsibilities, project updates, and performance metrics.

Company employees need to hear success stories of top companies and especially their competition to better comprehend the importance for their organization. Employees who envision their current job in an entirely unique way will see that applying data skills in their daily work will eliminate boring and routine actions, giving way to higher levels of engagement and greater company contribution that will insure their own personal growth as well as their future success in the company.

4.1.6. A little DAB'll do ya!

Figure 31: DAML! What the Heck is This Guy Doing?

An external DAML Advisory Board (DAB) can provide profound insight that can save extraordinary savings of time and company expense. Organizations commonly benefit from advisory boards with a combination of business, innovation, and technology capabilities. Here, external professionals are assembled that have DAML experience with the specific business processes of the organization. Meet with DAML technical staff and senior execs to determine initial goals, the best approach to achieve these goals and when, etc. Areas such as reduce operational cost 20% in 3 years can then be exploded into the many sub areas and what each one would take to contribute to this entire org goal.

4.2. Brown bag training.

Begin ongoing sessions for the entire staff led by DAML *teaching* pros with/without professional meeting facilitation or hire an organization to lead this training. Organize series of learning events for each organization and/or team, make it fun and interactive, gauge understanding. Focus on the basics of DAML with definitions and use examples. Describe how staff once free from mundane tasks can contribute at a higher level. Goal is to build in-house capabilities without hiring (as many) business savvy external DAML resources.

Figure 32: Critically Observing People Managers "Change the Face" of Brown Bag Sessions

The author helped plan and facilitate a company-wide brown bag learning and development program at a data center product company. All employees were assigned tables to distribute functional responsibilities, and managers were intentionally kept out. Over the course of several months the knowledge on innovation processes (remarkably like DAML processes) increased allowing the teams to conceive product ideas related to the company's areas of highest competency. These ideas were refined into business proposals, voted on, prioritized, and presented to senior management. Several concepts were then presented to a newly formed corporate advisory board and with their input at least 3 new products emerged that captured customer and industry analyst attention. These combined with the current market leadership led to a 9-figure acquisition.

4.2.1. Find mundane and repetitive tasks and prioritize.

Break into groups of 6-8 on round tables. Larger companies may want to have color-coded badges for each department and/or division. Those that are people managers separate and meet in different rooms from the staff and use data available and stated goals to determine the highest operational cost components. In each case have only one "color" at each table. Goal for each table is to determine 3-5 job activities that are important and could be automated, and then prioritize all or at least the top two.

Figure 33: Frequent, Repetitive, and Error-Prone Processes are Where Initial Automation Excels.[xlii]

Gather all ideas from each table and discuss as an entire group, then senior management take the top 5-7 ideas and add data on operational costs, direct and indirect benefits, etc. to prioritize by value.

4.2.2. Create a competition.

Can either use hand-selected cross-functional teams to fill in new tables or the same table groupings. Assign each table one process and have them create flow charts to determine normal and variations with all connected processes, systems, and people. Use available information to gauge ROI for choosing and automating this solution and allow them to determine the best business processes where automation can give an immediate benefit.

4.2.3. Present chosen automation processes to DAB.

Opportunity for select team member(s) from each competition table to communicate select information to external stakeholders to increase their understanding of how the organization is evolving. Also, this method forces the speakers to hone their listening and speaking skills to an audience level they may not have addressed before. DAB selects top three processes then senior execs give associated table participants public recognition and some reasonable monetary award (Amazon gift card, extra day of PTO, etc.). Ensure that employees and other stakeholders are working toward common goals, strengthen operations.

4.3. Constantly sharpen the hard and soft skills of technical personnel.

Begin continuous training for your DAML experts, particularly on data science tools and soft skills to enhance collaboration with their fusion teams. Allow unlimited certifications mean something to their peers, but also require proof of competency. Begin weekly seminars led by each DAML technical staff member on his/her focus area, ideas, and extremely focused discussions on challenges they are facing.

4.3.1. Incentivize technical team participation at local DAML groups and events.

Ask each DAML technical staff to begin attending all local relevant technical meetings and consider this part of their job and not "on their time and dime." Propose and reward speaking at an event on how DAML is changing their organization, and/or taking a visible role in one or more DAML organization.

Figure 34: Try Hard to Actively Network with Meeting Attendees

4.3.2. HOST a DAML event.

Attract like-minded professionals and change the external perception of your organization by hosting a DAML event in the coolest company location. Use this to seed the community for job recruiting, mentors, and other events for the staff to attend. Propose hosting technical group events at the company facility for learning, collaboration and to help get the word out about hiring top talent and changing existing hiring practices.

4.3.3. Crossbow training?

Figure 35: STOP!!! Cross Training NOT Crossbow Training!

Cross training is the practice of training an employee to be able to do the work that another employee does, in addition to their primary job role. Incorporate cross-training initiatives—allow employees to experience the information, processes, methods, and day-in-the-life of 3-5 different departments/divisions, then gather lessons learned feedback.

Cross-Training and significant collaboration lead to increased empathy and awareness that enhance communications leading to meaningfully unique DAML products and services. This improved cooperation between organizational teams also enhances thoughtfully linking their knowledge and datasets to bridge disconnected knowledge and information silos, accelerate cross-training, and improve workforce cohesion.

4.4. Optimizing the learning experience with training and certification programs.

Figure 36: SCTE's Unique Focus on Cable Workforce Development Will Be Key.[xliii]

DAML requires the addition of new skills, and SCTE will continue to serve the cable industry through existing and new agile, individually tailored training opportunities. SCTE's "Workforce 2027" initiative is an industry outreach to attract the future cable workforce and is aligned with CableLabs' 10G messaging. It includes components of DAML and is focused on enhancing cable employees' knowledge and capabilities in all key areas to learn in the individual's best means paired with question analytics (using DAML methods) to measure competency and help each individual grasp every crucial subject area.

Figure 37: Yes, shameless self-promotion here.

Coordinated with this effort is the "CORTEX® VirtuLearn" wholistic learning platform where "learners are getting a clear and concise overview of course content to prepare their minds for training with LightningMods™ in as little as 10 minutes…eBooks provide in-depth content presented at a pace that

suits learners and provides them with
knowledge of how and why…and…correlating games improve knowledge absorption and retention".[xliv]

4.4.1. *Use DAML to optimize DAML training.*

Create an organizational dashboard to track DAML individual progress. Information must include courses that individual employees are enrolled in and answer the following questions:

- What series of courses has been proposed?
- How far within the series of courses at a given point in time?
- How far within a specific course at a given point in time?
- Have they completed the course within the prescribed time or stalled in progress?
- Were there skipped modules along the way
- How long does it take to complete each course's test?
- How many attempts did it take to pass a test?
- What was performance on the final course test and how it compared to the initial test?
- What was performance on the series of courses final test and how it compared to the initial test?
- Which questions were missed and what was the subject matter?
- Which competencies were mastered?
- Which competencies require additional coursework?

4.4.1.1. *Focusing "Fusion Teams" to create breakeven net energy.*
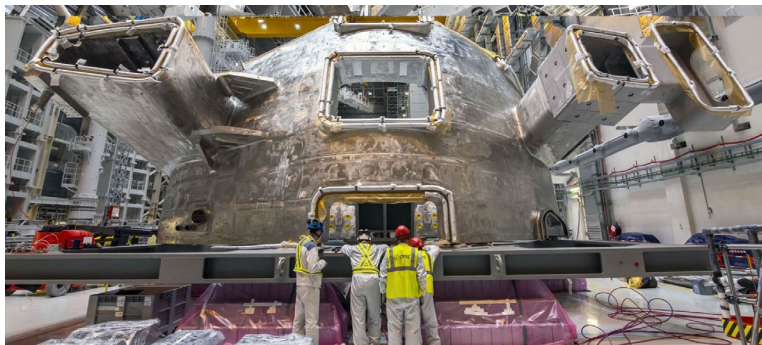
Figure 38: Fusion Teams Must Achieve 100 million Kelvin to Become a Self-Sustaining Reaction

Fusion Teams are " a multidisciplinary team that blends technology or analytics and business domain expertise and shares accountability for business and technology outcomes"[xlv]. This *ongoing* approach, in contrast with the one-time Tiger Team, bridges technology and business areas to reduce failure and improve the value of the DAML project outcomes.
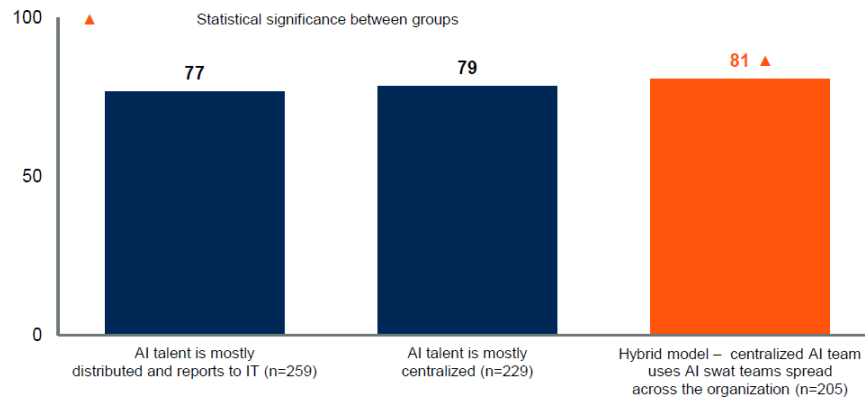
Statistical significance between groups

- 77 — AI talent is mostly distributed and reports to IT (n=259)
- 79 — AI talent is mostly centralized (n=229)
- 81 ▲ — Hybrid model – centralized AI team uses AI swat teams spread across the organization (n=205)

Figure 39: Average value DAML brings to the company based on the organizational model

Fusion Teams overcome the silo effect and finger-pointing between centralized teams, and are typically composed of DAML experts, technical, and business staff working together on a commonly defined, analyzed, and managed problem resolution towards a measurable goal.

One eventual outcome of continuous DAML training and pursuing fusion team projects in every department and division is for every single level of a company to have a 'data champion,' a well-known resource to go to for questions related to the area of interest. This more capable expertise inside each work group further catalyzes idea selections for automated processes.

4.5. DAML big picture ideas.

4.5.1. Showcase individual contributors or teams that are exceeding expectations.

Spotlight individuals who are passionate about using data to solve challenges in their role

Simply feature a prominent employee and how they approached a problem or opportunity to create a positive and measurable outcome. Positive peer pressure pushes others to be in that temporary spotlight.

Business leaders need to ensure that data is being used to inform employees' decisions at every level of the company. An effective way to do this is to routinely spotlight individuals who are passionate about using data to solve challenges in their role. This can be only internal but consider publishing this in your customer newsletter or online current news. This not only celebrates people using data to achieve meaningful outcomes but creates "positive peer pressure" to actively push their peers to do the same.

Figure 40: Gift cards blur tax reporting requirements;)

4.5.2. *Publicize DAML effort to all customers, shareholders, on website, and in press releases.*

Instrument marketing, sales, and product management for external messaging to improve marketing and brand identity. Alter mission and vision statements on how DAML is now part of the organization mindset. Assist marketing, product management, HR, partnerships, etc. to communicate team's intense focus on continually sharpening their DAML skills. For outreach, do not overestimate the sophistication and literacy of the company's market, may need to provide resources, assistance, and training so they better understand how DAML will automatically optimize resolution of their most common issues.

Figure 41: YES, It's Real! Think We Just Made This Ourselves ✌️

4.5.3. *Alter all hiring descriptions to focus on measurable DAML skills and accomplishments.*

"According to a recent survey conducted by leading analytics platform, Tableau, half of all knowledge workers in the UK wouldn't want to work for a business that shows no sign of using data to inform decisions"xlvi.

Equip HR for external messaging to improve recruitment of higher-level candidates and ways to measure job evaluations specifically for DAML accomplishments.

4.5.4. *DAML Program integrates with organizational change management.*

Transforming an enterprise towards broad DAML adoption will require culture change impacting structure, workflows, and ways of working. This is not simply another department. This means to create a buzz by every employee about DAML, how their company leverages data effectively, and how they are

using it in their daily routines allowing them to step up in responsibility. This excitement will translate into a more engaging and questioning culture and necessarily will be felt by customers, analysts, press, and potential employees.

It will also reformulate operating models by enabling an iterative and experimental approach by those closest to the customers, opportunities, and obstacles to improve efficiencies and accelerate revenues.

4.5.5. *Tie DAML program into innovation initiatives.*

Many organizations have a vibrant innovation initiative in place, and DAML can add to this—or kick start it. Employees that use DAML to experiment with data will uncover new insights and opportunities that can lead to new intellectual property (IP), operational or best practices, products, and/or services.

5. Conclusion.

The crescendo of DAML has been building for decades. It has become a pivotal business strategy giving meaningful outcomes from optimizing, interconnecting, and advancing every occupational process and dataset. The goal of digital transformation is automating every reasonable, critical, and/or error-prone process using technologies like DAML. Ignoring DAML for an industry, organization, or personally is using an umbrella for an avalanche.

There are far too many DAML areas to focus on here, but only your organization can decide the tool based on the challenge to overcome. Three key, underlying areas are described to make sure they are not skipped.

By what means DAML is implemented is nearly exhaustively outlined to give your organization a toolbox of methods to begin, continue, and add to what will become your most important asset.

Abbreviations

DAML	data, analytics, and machine learning
AI	artificial intelligence
ML	machine learning
DAB	DAML advisory board
SaaS	software as a service
IoT	internet of things
SCTE	Society of Cable Telecommunications Engineers

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