aiim Industry Watch

Delivering the priorities and opinions of AIIM's 155,000 community

aiim

Leveraging Deep Learning and Machine Learning Capabilities

In Partnership with

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ABOUT THE RESEARCH

As the non-profit association dedicated to nurturing, growing and supporting the information management community, AIIM is proud to provide this research at no charge to our members. In this way, the entire community can leverage the education, thought leadership and direction provided by our work. We would like these research findings to be as widely distributed as possible.

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About AIIM

Here at AIIM, we believe that information is your most important asset and we want to teach you the skills to manage it. We've felt this way since 1943, back when this community was founded.

Sure, the technology has come a long way since then and the variety of information we're managing has changed a lot, but one tenet has remained constant — we've always focused on the intersection of people, processes, and information. We help organizations put information to work.

AIIM is a non-profit organization that provides independent research, training, and certification for information professionals. Visit us at www.aiim.org.

About the author

John Mancini
Chief Evangelist and Past President of AIIM

John Mancini is the Chief Evangelist and Past President of AIIM. He is a well-known author and speaker on information management and digital transformation.

As a frequent keynote speaker, John offers his expertise on Digital Transformation and the struggle to overcome Information Chaos. He blogs under the title Digital Landfill (http://info.aiim.org/digital-landfill), has more than 11,000 Twitter followers, 6,000 Linkedin followers, and can be found on most social media as @jmancini77. He has published more than 25 e-books, the most recent being:

- GDPR After the Deadline
- Automating Compliance and Governance
- How does the Office 365 Revolution Impact Governance and Process Automation?
- Enhancing Your RPA Implementation with Intelligent Information
- The State of Intelligent Information Management: Getting Ahead of the Digital Transformation Curve

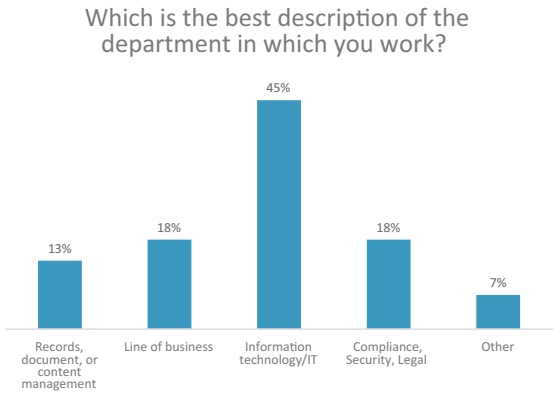
ABOUT THE SURVEY

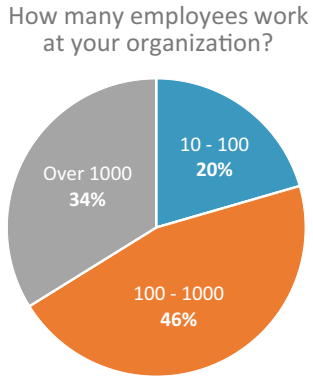
We value our objectivity and independence as a non-profit industry association. The results of the survey and the market commentary made in this report are independent of any bias from the vendor community.

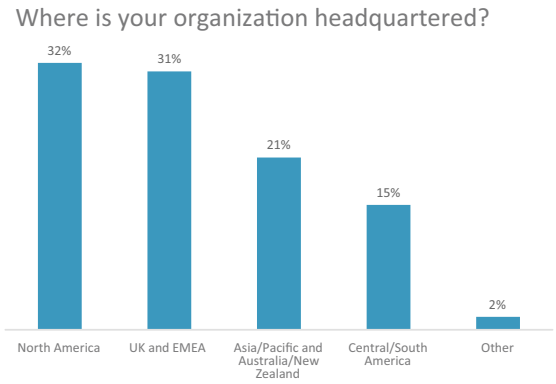
The survey was taken using a web-based tool in late November 2018. The survey participants were NOT associated with AIIM prior to taking the survey.

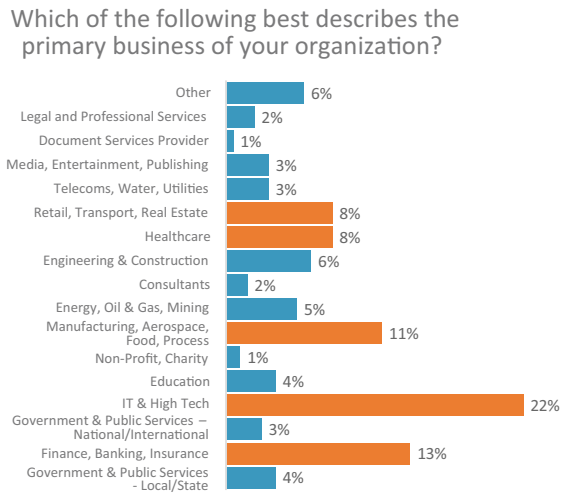
A total of 195 individuals participated in the survey.

- The core areas of responsibility for the survey participants were: 45% Information technology/IT; 18% line of business; 18% Compliance, security, legal; and 13% DM, CM, RM.
- 80% of participants from organizations with > 100 employees; 34% from organizations with > 1000 employees. Organizations with less than 10 employees were excluded.
- 68% of the participants were from outside North America.
- The largest vertical industries in the survey were:
  1. Technology
  2. Financial Services
  3. Manufacturing, Aerospace and Food
  4. Healthcare
  5. Retail









Some additional data cited in this eBook is drawn from other AIIM end-user surveys conducted this year. Where used, these additional sources are noted with a footnote.

Introduction

During the course of this eBook, we have quoted excerpts from the Artificial Intelligence module in AIIM's Emerging Technologies in Information Management course, created by Alan Pelz-Sharpe, and noted in this eBook as "AIIM Emerging Tech."

We strongly recommend that those who are new to Machine Learning and Deep Learning concepts take this course; it provides a solid grounding in core concepts.

Artificial Intelligence (AI) — and its sidekicks "Deep Learning" and "Machine Learning" — are obviously all the rage. As a result, just about every technology product in the world now seems to have the artificial intelligence "label" attached to it.

Which is ironic, because AI has actually been with us for decades, not months. People have been thinking about the relationship between people and machines going all the way back to ancient times, and process automation goes back to the early 20th century. Frank Chen, a partner at Andreessen Horowitz, does a great job discussing the origins of modern AI in AI, Machine Learning, and Deep Learning: A Primer. He notes that in the Summer of 1956, a group of computer scientists came together as the Dartmouth Summer Research Project on Artificial Intelligence to program computers to behave like humans.

"Expert systems" — a form of AI — emerged in the late 70s and really took off in the 80s. Expert systems allowed a person to create encoded rulesets to automate specific tasks. This core focus of AI — understanding exactly how something is done, turning these steps and actions into rules, and computerizing them — governed the discipline until recently. So what's so different now about AI, and how does it need to be incorporated into your thinking about process automation?

All along, a different variation of Artificial Intelligence — based on emulating the human brain and how it learns, or Machine Learning — co-existed with this rule-based school of AI. But optimizing machine learning struggled for many years from a lack of computing power, a lack of data, and a lack of resources. Obviously, all of that has now changed.

In this eBook, we look at four key questions related to Machine Learning and Deep Learning:

1. Where do organizations currently stand with regards to their Machine Learning and Deep Learning initiatives? Is the interest real or hype?
2. What kinds of processes will be the initial target for Machine Learning capabilities?
3. What do organizations see as the primary drivers for a Machine Learning initiative? What do they see as the primary obstacles?
4. What spending plans do organizations have for some of the key IIM technologies supporting Machine Learning: 1) Multi-channel intelligent capture; 2) Content analytics and semantics; 3) Data recognition, extraction & standardization; 4) PII identification and protection; and 5) Robotic Process Automation (RPA)?

1. Where do organizations currently stand with regards to their Machine Learning and Deep Learning initiatives? Is the interest real or hype?

"Artificial Intelligence (AI) is in practical terms the 'super set terminology' term — in sales, marketing, and in the press, folks talk about 'AI.' Machine Learning and Deep Learning are essentially subsets of AI — different things but often caught up in the broader term of AI. **Machine learning** uses algorithms to find patterns in data, and then uses a model that recognizes those patterns to make predictions on new data. Deep Learning, also known as Deep Neural Learning or Deep Neural Networking, is a subset of machine learning. **Deep Learning** is good at identifying patterns in unstructured data such as images, video, sound, and text." *(AIIM Emerging Tech).*

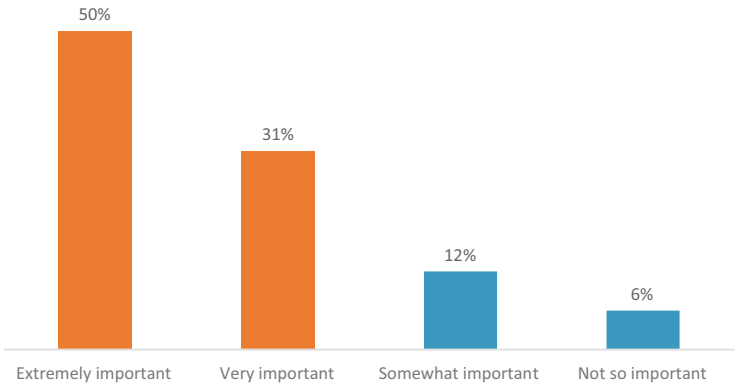
The data suggests that organizations clearly see Machine Learning as a priority moving forward. As with other disruptive technologies — and especially technologies with expansive definitions — it is likely that the actual adoption of Machine Learning technologies in the next 24 months will be less than the 81% that say they are planning adoption.

Key Data Points

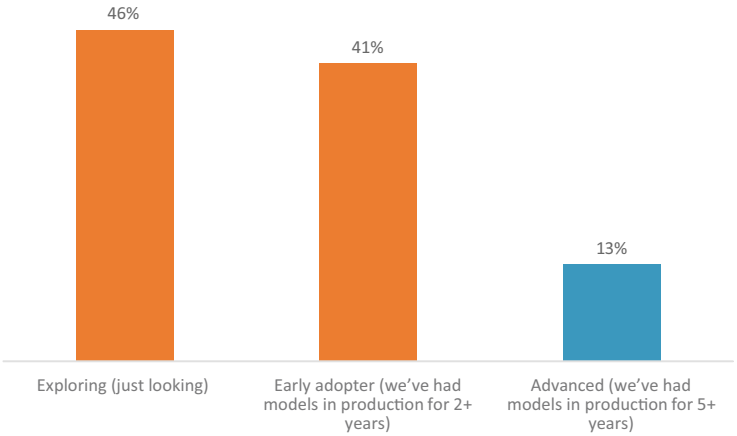
- For 81% of organizations, Deep Learning and Machine Learning are key to their future technology and business planning.
- Machine Learning is still in an early stage of adoption — 87% of organizations are still exploring or recent adopters.

> ***Over the past year, companies have been figuring out where and how to implement AI/ML technologies, and many are still refining the "how."***
>
> *— Ravi Mayuram, CTO, Couchbase*

How important are Deep Learning and Machine Learning to your future technology and business planning (say over the next 24 months)?



What is the stage of Machine Learning adoption in your company?



2. What kinds of processes will be the initial target for Machine Learning capabilities?

Given the high degree of hype surrounding Machine Learning, it helps to think about some concrete use cases in the consumer realm (drawn from *AIIM Emerging Tech*) that illustrate how Machine Learning capabilities can be used to solve real business problems:

Input Data	Machine Learning Outputs	Usage Scenario
Audio recording	Speech Transcript	Speech Recognition
Image / Photograph	Scene Description / Caption	Image Search
Photograph	Name of person	Face Recognition
Short Text	Underlying Sentiment / Emotion	Product Reviews
Transaction Data	Fraudulent Transactions	Fraud Detection
Purchase History	Future Purchases	Shopping Recommendations

> ***As electricity did over 100 years ago, the spectrum of artificial intelligence technologies is rewriting the rules and enabling society to transform. From government to business operations, science to healthcare, customer service and privacy, to cybersecurity, every part of our world is changing.***
>
> *— KPMG*

Key Data Points

- Development of prediction models a top priority for 31%, but a fairly wide distribution of priority use cases.
- Top content-centric Machine Learning applications:
  - Loss prevention through analysis of usage patterns (40%)
  - Text analysis for better content classification and categorization – metadata assignment (35%)
  - Better automatic understanding of the context (for example contract terms) of a document (33%)
  - Automatic identification and indexing of documents (33%)
- 71% of organizations see the concept of "citizen developer" as important to their process improvement plans.[1]
- Five years ago, 48% of organizations said they did not use ANY automated agents in the context of a series of governance tasks; that number is 13% today.[2]
- Over 50% of organizations now see automation of compliance and governance as "highly important" or "a deal changer."[3]

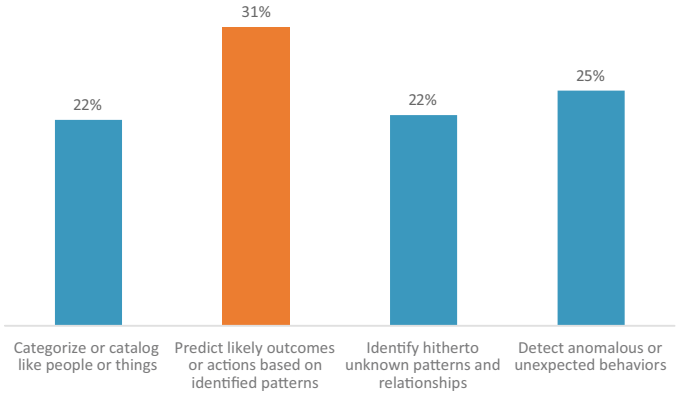
[1] *Integrating Content Services into Low-Code Applications*

[2] *Automating Governance and Compliance*

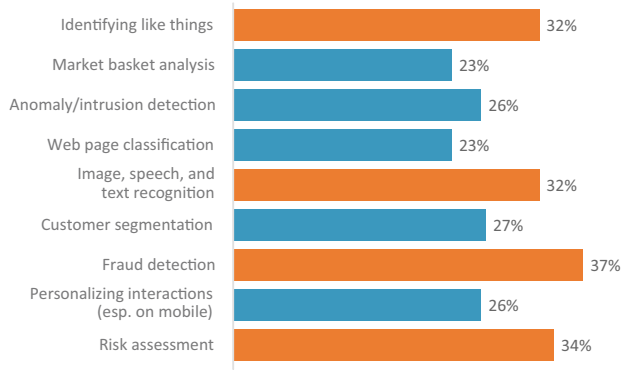
[3] *Automating Governance and Compliance*

LEVERAGING DEEP LEARNING AND MACHINE LEARNING CAPABILITIES

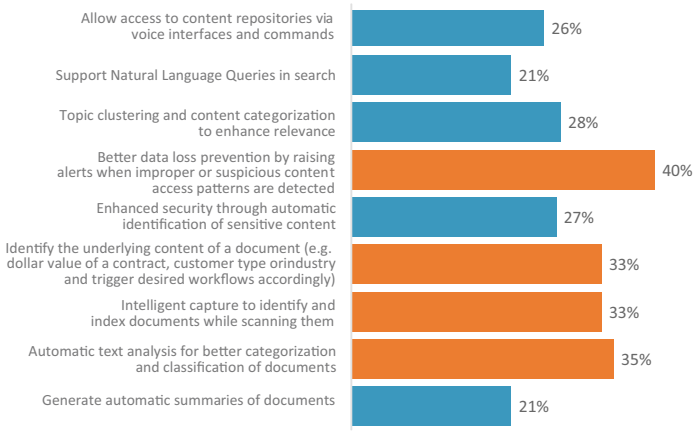
Which of the following potential use cases for Machine Learning is the MOST important to your organization?



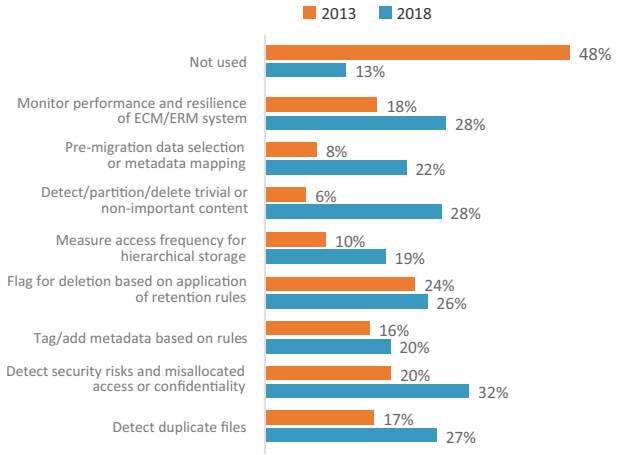
In which of the following application areas is your company CURRENTLY using machine learning technologies? (Please check as many as apply)



Which are the THREE most important content-centric AI/Machine Learning use cases to your organization?



Do you use any automated agents to perform any of the following functions? (Check as many as apply)



3. What do organizations see as the primary drivers for a Machine Learning initiative? What do they see as the primary obstacles?

"At the highest-level Machine learning is essentially learning by example; even so we can consider that there are two main types of machine learning — Supervised and Unsupervised. In **supervised learning,** you develop a predictive model based on both input and output data. In other words, we are describing the examples of what we are looking for. We know what to look for in the training data set – we know the number of buckets into which to classify all data. In **unsupervised learning** there is the discovery of an internal representation (or model) based on input data only. In other words, we let the ML system figure out the categories for itself; the system decides on the buckets for classifying data." *(AIIM Emerging Tech)*

As we've noted in other reports, the effectiveness of Machine Learning rests upon the quality and accessibility of data. Given that the volume of data coming into the organization is increasing exponentially, and that the preponderance of this data is unstructured and semi-structured information (i.e., content and documents), **the ability to transform these inputs into machine-comprehensible form becomes an increasingly core competence.**

Key Data Points

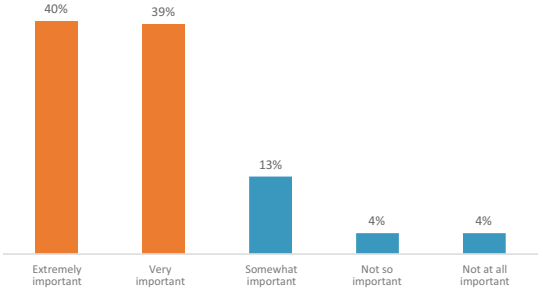
- For 79% of organizations, the ability to turn unstructured information (like documents, images, audio, video, application files) into structured data is key…BUT 87% of organizations find this task challenging.
- There is a huge backlog of "undigested" content — content that is not currently addressable by Machine Learning engines – that must be converted from unstructured information into structured data.
- 87% of organizations believe that exploding volumes of incoming data and content will require the application of Machine Learning technologies to the task of Information Governance.
- Simply finding data and getting data "in shape" is a significant obstacle to Machine Learning initiatives.

> ***One of AI's biggest obstacles has been the disconnect between data science teams and subject matter experts (SMEs) in the business. SMEs play a critical role but the complexity of the underlying tech typically requires a lot of data science expertise. Enterprises will put increasing pressure on their teams to close this gap so that they can get more value from their AI initiatives.***
>
> — *AI and Machine Learning: 9 Predictions for 2019*

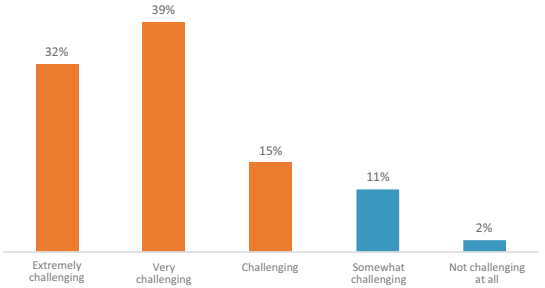
> ***Robotic Process Automation (RPA) has been one of the hottest areas of tech in the last two years — because of its simple, easy-to-understand value prop — process automation, efficiency; freeing resources up to focus on higher value activities, etc. But It has fundamental limits — it's only effective with rote, repetitive processes and it cannot impact workflows involving unstructured content which makes up over 80% of data in most enterprises.***
>
> — *Tom Wilde, CEO and Founder, Indico*

LEVERAGING DEEP LEARNING AND MACHINE LEARNING CAPABILITIES

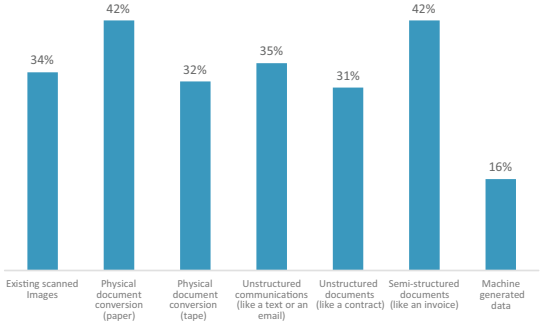
How important is it to the success of your Machine Learning goals to be able to turn unstructured information (like documents, images, audio, video, application files) into structured data?



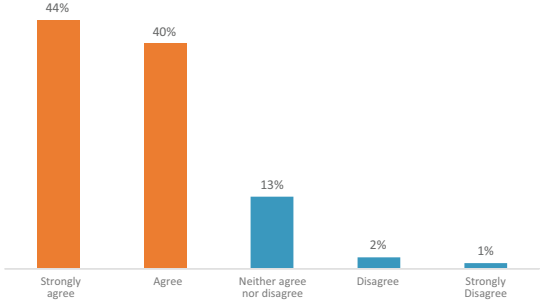
How challenging is it in your organization to turn unstructured information (like documents, images, audio, video, application files) into structured data capable of being analyzed by machines?



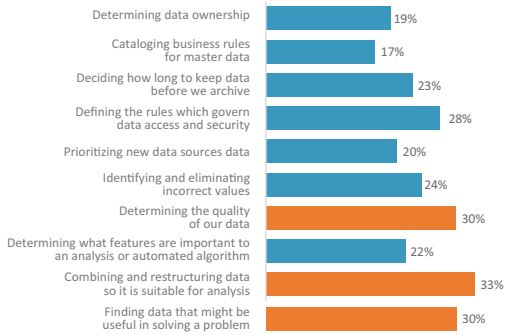
What content types are you targeting for your Machine Language processes (select as many as apply)?



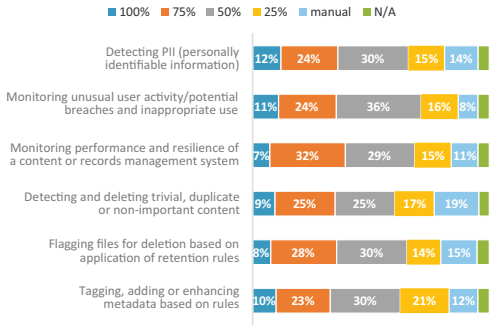
Agree or disagree: "Machine Learning will revolutionize how we approach the task of Information Governance."



Identify the THREE areas that currently consume the MOST time, money, and resource in your organization [5]



How automated are each of the following core information processes in your organization? [6]



[5] *Automating Governance and Compliance*

[6] *Automating Governance and Compliance*

4. What spending plans do organizations have for some of the key IIM technologies upporting Machine Learning?

We believe that a broader strategy than "ECM" is needed if organizations are to achieve their Digital Transformation goals of:

- Enhanced customer experience
- Improved business agility
- Operational excellence
- Automated compliance

We call this **Intelligent Information Management, or IIM.**

Content Services

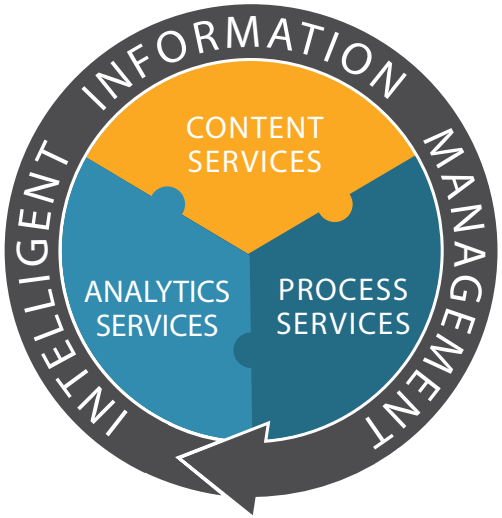
Multi-Channel Capture
Content Migration, Integration, and Collaboration
Document Management
Records Management and Preservation

Process Services

Business Process Management (BPM)
Robotic Process Automation (RPA)
Case Management
Decision Management

Analytics Services

Data Recognition, Extraction, and Standardization
Metadata and Taxonomy Management
PII Identification and Protection
User Personalization



A key consideration in thinking about Machine Learning is the recognition that "Machine Learning" is not an end in itself. In terms of IIM, IIM and ML are a two-way street — each reinforcing the other:

1. How can Machine Learning be used to improve existing Content, Process, and Analytics Services capabilities?
2. How can core Content, Process, and Analytics Services capabilities be used to improve the inputs to Machine Learning processes. In other words, how can capabilities to turn unstructured information into structured data be used to improve ML performance?

Key Data Points

Significant interest in using Machine Learning to improve existing **Content Services** capabilities:

- 71% -- RM and preservation
- 71% -- Content integration migration
- 68% -- Business & collaborative content
- 62% -- Transaction and ECM content

Significant interest in using Machine Learning to improve existing **Process Services** capabilities:

- 70% -- BPM
- 66% -- Blockchain
- 64% -- RPA
- 63% -- Low-code process platforms

Significant interest in using Machine Learning to improve existing **Analytics Services** capabilities:

- 70% -- Content analytics & semantics
- 69% -- Data recognition, extraction & standardization
- 67% -- PII identification
- 67% -- Multi-channel intelligent capture

Spending plans for IIM technologies that are key Machine Learning complements set to rise:

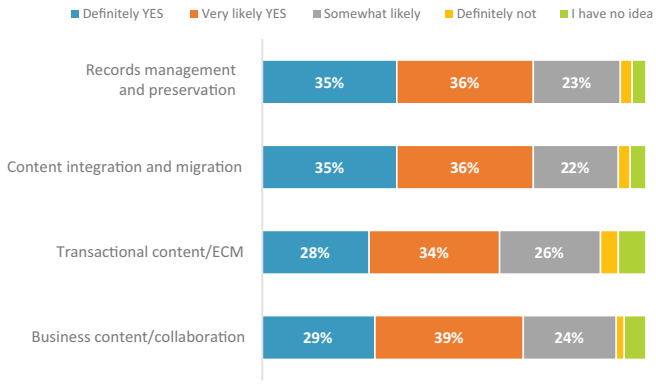
- 63% -- Data recognition, extraction & standardization
- 62% -- PII protection
- 61% -- RPA
- 59% -- Multi-channel intelligent capture
- 56% -- Content analytics & semantics

53% of those planning to spend "more" or "a lot more" on RPA technologies are planning on doing similarly on low-code application platforms.[7]

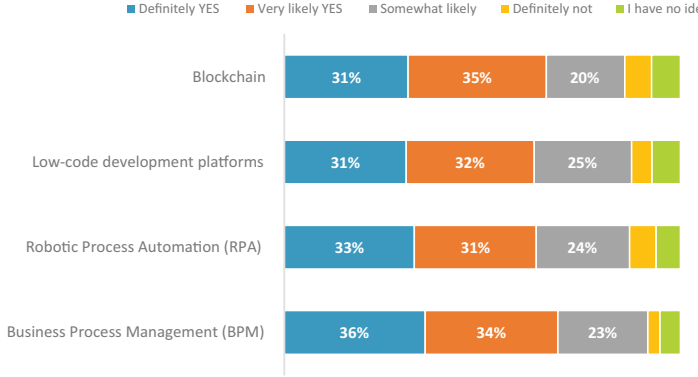
[7] *Enhancing Your RPA Implementation with Intelligent Information, N = 224*

LEVERAGING DEEP LEARNING AND MACHINE LEARNING CAPABILITIES

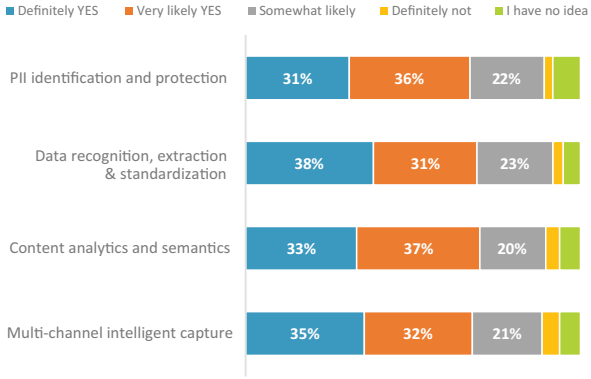
Within the time span of the next 24 months, do you anticipate investing in Machine Learning capabilities to specifically improve each of the following Content Services?



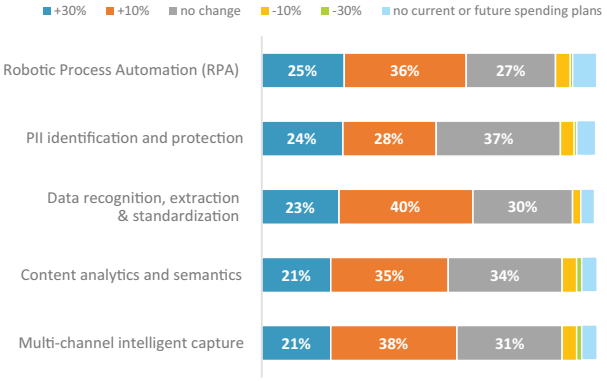
Within the time span of the next 24 months, do you anticipate investing in Machine Learning capabilities to specifically improve each of the following Process Services?



Within the time span of the next 24 months, do you anticipate investing in Machine Learning capabilities to specifically improve each of the following Analytics Services?



How do you anticipate your spending plans will change over the next 12 months for each of the following technologies (vs. what you are currently spending)?



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Artificial Intelligence (AI) and its sidekicks “Deep Learning” and “Machine Learning” have the power revolutionize your business, but it all starts with a solid understanding of its core concepts. AIIM’s Practical **AI for the Information Professional** training course provides real world use cases for this new technology in Information Management. Learn how AI works, methods for implementing it, and how to harness its power!

For further information click here.

LOOKING FOR YOUR NEXT STEP?

Do you have a question about this research? Would you like to discuss these findings with other members of AIIM?

CLICK HERE TO JOIN THE ONLINE DISCUSSION

CERTIFIED
INFORMATION
PROFESSIONAL

What's Next?

The CIP Can Help You and Your Organization Navigate the World of IIM.

Now is not the time to wait on your Digital Transformation initiative. IIM practices and methodologies are critical to your success, and AIIM can help. Digital disruption calls for digital leaders with the skills and experience to optimize information assets and transform business. Become that leader now through AIIM's Certified Information Professional (CIP) program.

AIIM worked with industry experts and focus groups to define the body of knowledge necessary for information professionals understand core IIM practice areas and methodologies, built a certification and test based upon this body of knowledge that is available at locations around the world, and created a set of training courses and materials to help information professionals prepare for the examination.

The path to CIP should be fairly simple for information practitioners who already have expertise and work experience. AIIM has a number of resources that can help practitioners at all levels prepare to become a Certified Information Professional:

- CIP Data Sheet
- CIP Exam Outline
- CIP Study Guide *(free to professional members; nonmember fee is $60 USD)*
- AIIM Training Courses
- Online CIP Prep Course
- In-Person CIP Prep Classes
- Practice Exam

CIPs reflect a more integrated, more holistic view of information management. Changes in one process, technology, or practice invariably affect others in the organization. CIPs are able to see the forest and the trees and understand and plan for these outcomes. Because of this, CIPs will identify and understand changes that could cause compliance issues, thereby reducing liability.

Organizations that manage their information more effectively enjoy reduced costs, faster time to market, increased revenues and cash flow, and increased business agility. CIPs are uniquely positioned to help organizations achieve these benefits because they understand the interactions between different information intensive processes and activities.

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Here at AIIM, we believe that information is your most important asset and we want to teach you the skills to manage it. We've felt this way since 1943, back when this community was founded.

Sure, the technology has come a long way since then and the variety of information we're managing has changed a lot, but one tenet has remained constant. We've always focused on the intersection of people, processes, and information. We help organizations put information to work.

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