Agenda

1. Introduction
2. Learning Objectives
3. Assessing the Risk of Emerging Technologies
4. Intelligent Automation Spectrum
5. How to get started
6. Benefits of Intelligent Automation
7. Critical Success Factors
8. Case Studies
Presenters

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Learning Objectives
Learning Objectives

Provide an overview of how internal audit can assess the risk of implementing emerging technologies

Describe the intelligent automation technology landscape and how these cognitive based tools can provide efficiency gains within an organization

Provide examples of how introducing Intelligent Automation technology into an organization can have an impact on strategic planning

Discuss case studies where companies have implemented intelligent automation and describe the benefits that were provided to those organizations
Assessing the Risk of Emerging Technologies
“By far, the greatest danger of Artificial Intelligence is that people conclude too early that they understand it.” —Eliezer Yudkowsky

“There is no reason and no way that a human mind can keep up with an artificial intelligence machine by 2035.” —Gray Scott
The adoption of cognitive technologies continues to increase across all industries and functions

Implementing automation comes with some exceptional opportunities, but with those possibilities... …comes a responsibility to ensure that the technology “stays on the rails” through proper implementation and frequent monitoring

- RPA, AI, and Machine Learning provide incredible potential for process improvement, error reduction, and creative decisions
- Automation technology involves implementation in the early stages, and a more hands-off approach down the line
- Implementation of these technologies require specific rules and inputs, leading to similar and often more creative solutions with less effort

- AI/ML models are limited by the data used to train them. The limitations of these models need to be understood
  - Model output needs to be continuously evaluated to ensure the statistics describing the model are in line with the design specification
  - Incorrect or subpar inputs can compound over time leading to layered poor decision making by the machines
- Monitoring
  - Machines simply do as they are told, changes in process or company policies will require bots to be re-trained just like their human counterparts
  - Process inputs often need to be tweaked to account for unforeseen changes or missed opportunities in the early stages
  - Legal policy evolution can require changes to bot regulation, which, would require in-kind updates to machine processes
Inadequate controls when deploying these technologies can have reputational and financial risk.

**Company**

- **Amazon Recruiting Tool**
  - Reuters Article
  - October 9th, 2018

- **Wikipedia’s Edit Bot Wars**
  - Wired Article
  - March 1st, 2017

- **COMPAS Recidivism Algorithm**
  - Propublica Article
  - May 23rd, 2016

**Risk & Unintended Results**

- **Amazon Recruiting Tool**
  - Amazon created a candidate search algorithm to rate the quality of job applicants.
  - The input data spanned a 10-year period, over which applicants were predominantly male.
  - This oversight led Amazon’s rating algorithm to discriminate against qualified female candidates.

- **Wikipedia’s Edit Bot Wars**
  - Wikipedia developed programs to search content and correct false information, typos, and other errors on the site.
  - Developers created bots with specific edit rules, yet never dictated their guidelines on interacting with other, similar bots.
  - Given the tireless nature of computer programs, these editors undid each other’s work, sometimes as high as 30x the rate of human editors.

- **COMPAS Recidivism Algorithm**
  - A tool (COMPAS) was employed by judges and parole officers to assess the likelihood of recidivism in defendants.
  - COMPAS results were compared to actual rates of recidivism for 10,000 criminal defendants over a two year span.
  - Aside for showing no material advantages over human analysis, the program exaggerated rates for black criminals, yet underreported rates for white criminals.
## Additional examples of unguarded automation and the potential risks

<table>
<thead>
<tr>
<th>Company</th>
<th>Title</th>
<th>Risk &amp; Unintended Results</th>
</tr>
</thead>
</table>
| Uber | Uber Autonomous Vehicles  | - In March, 2018 an autonomous car operated by Uber struck and killed a woman in Tempe, Arizona.  
- Uber acknowledged the braking system was disabled while the car was in autonomous mode.  
- Several months later, Uber recognized the need for improving object identification and the resulting reactions by their cars |
| Tesla | Tesla Autopilot Crash | - On March 23, 2018 a 38 year old driver in California was killed in his 2017 Tesla Model X while the car was on autopilot.  
- Data from crash vehicle indicates the autopilot increased speed 3 seconds prior to striking a highway barrier.  
- While on autopilot, the vehicle did not attempt to slow down or avoid the barrier before the crash. |
| Microsoft | Microsoft’s Chatbot Error | - A Twitter chatbot, “Tay”, was created to learn from its interactions and engage people through casual conversations.  
- A lack of boundaries on the bot’s progression led to social manipulation as counter conversationalists often tweeted interacted with inciting, hateful comments.  
- Tay began emulating the negative sentiments and developed its own hateful personality before the plug was pulled |
We have a proven approach and methodology to audit AI / ML and RPA

**Key Risks**

<table>
<thead>
<tr>
<th>Area of Focus</th>
<th>Risk Description</th>
<th>Control Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI / ML and RPA</td>
<td>We have a proven approach and methodology to audit which may result in non-compliance.</td>
<td>All relevant regulatory requirements are included in the project documentation.</td>
</tr>
<tr>
<td>Key Attributes of Approach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning summarized in an Audit planning memo with details of the objective and scope of the audit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fieldwork documented in the Risk and Controls Matrix that details the approach and results of testing the design and effectiveness of the controls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting of the testing results summarized in a formal Report.</td>
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</tbody>
</table>

**Audit and Technology Capabilities Required**

<table>
<thead>
<tr>
<th>No</th>
<th>Key Documents Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vision / Scope Document</td>
</tr>
<tr>
<td>2</td>
<td>User Requirements Document</td>
</tr>
<tr>
<td>3</td>
<td>Functional Requirement Document</td>
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<tr>
<td>4</td>
<td>Production User Stories</td>
</tr>
<tr>
<td>5</td>
<td>Application Architecture Document</td>
</tr>
<tr>
<td>6</td>
<td>Application Deployment Document</td>
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<tr>
<td>7</td>
<td>Software Testing Plan</td>
</tr>
<tr>
<td>8</td>
<td>User Acceptance Testing Document</td>
</tr>
<tr>
<td>9</td>
<td>Change Management Notification Documentation</td>
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<tr>
<td>10</td>
<td>Production Support Document (Plan)</td>
</tr>
</tbody>
</table>

**Artificial Intelligence (AI) & Machine Learning (ML) Standard Audit Program**

**Audit Objectives**

- To ensure that the project adheres to the defined scope and timelines.
- To ensure that the project has the necessary resources and expertise to complete the project.
- To ensure that the project has the necessary testing and quality assurance processes in place.
- To ensure that the project has the necessary risk management processes in place.
- To ensure that the project has the necessary security and privacy processes in place.
- To ensure that the project has the necessary operations and support processes in place.

**Audit Area Background**

- The project is a new AI / ML and RPA implementation project that is expected to be completed within the next 12 months.
- The project is expected to be completed by a team of 10 people, including 5 AI / ML and RPA experts.
- The project is expected to be completed within a budget of $5 million.
- The project is expected to be completed within a schedule of 12 months.
- The project is expected to be completed with a minimum of 90% code coverage.
- The project is expected to be completed with a minimum of 90% test coverage.
- The project is expected to be completed with a minimum of 90% compliance with regulations.
- The project is expected to be completed with a minimum of 90% customer satisfaction.
- The project is expected to be completed with a minimum of 90% employee satisfaction.

**Audit Methodology**

- The audit methodology will be based on the ISO 9001:2015 standard.
- The audit methodology will be based on the ISO 27001:2013 standard.
- The audit methodology will be based on the ISO 20000-1:2018 standard.
- The audit methodology will be based on the ISO 31000:2018 standard.
- The audit methodology will be based on the ISO 33000:2019 standard.
- The audit methodology will be based on the ISO 38500:2019 standard.
- The audit methodology will be based on the ISO 29110:2011 standard.
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**Audit processes**

- The audit processes will be based on the ISO 9001:2015 standard.
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## Case Study: Investing in Audit capabilities as the business units explore emerging technologies

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Summary</th>
<th>Description</th>
<th>Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Internal audit department looking for ways to assess the control environment where AI/ML and RPA have been implemented</td>
<td>Internal Audit teams did not have an approach to audit AI/ML</td>
<td>• Internal Audit with the capabilities to assess the control environment as AI/ML and RPA implementations continue to increase within the organization</td>
<td>• Increased team awareness of the risks associated with emerging technologies</td>
</tr>
<tr>
<td>Developed Risk and Control Matrix</td>
<td>Cross functional team with AI, RPA and Controls Advisory experts</td>
<td>Audit approach to AI/ML and RPA</td>
<td>• Ability to augment the team with technical skills as required during the audits</td>
</tr>
<tr>
<td>Developed audit planning guide</td>
<td>Focus on the entire lifecycle from pre-implementation, to design, to implementation and post-go live monitoring</td>
<td>• Audit teams with the tools and capabilities to evaluate the control environment relating to emerging technologies</td>
<td>• Development of key deliverables to guide future audits. Risk &amp; Control Matrix, Audit Planning Guide</td>
</tr>
<tr>
<td>• Internal Audit department had a <strong>consolidated approach</strong> to audit the implementation of AI/ML and RPA</td>
<td>• Development of key deliverables to guide future audits. Risk &amp; Control Matrix, Audit Planning Guide</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>
Using Emerging Technologies in Internal Audit
The Intelligent Automation Spectrum

1. **Intelligent Character Recognition**
   Machine Learning enhanced character recognition

2. **Artificial Intelligence and Machine Learning**
   System-driven learning, prediction, and pattern identification

3. **Natural Language Processing**
   Ability to understand, interpret human language

4. **Data Analytics and Visualization**
   Patterns and visual representation from complex data sets

5. **Low Code Application Platforms**
   Solutions created through graphical user interfaces and configuration instead of programming

6. **Robotic Process Automation**
   Process Automation through the User Interface

*Note: Additional detail in appendix*
### The Intelligent Automation Spectrum Defined

#### Intelligent Character Recognition*
- Utilizes self-learning capabilities, known as neural networks to automatically update the recognition database for new patterns, including documents with handwritten fields

#### Artificial Intelligence and Machine Learning*
- Simulates human intelligence without explicit programming to predict values and uncover unusual occurrences in data

#### Natural Language Processing*
- Enables computers to understand human language, allowing for new business functions such as chatbots, intelligent search, document understanding, and voice assistants

#### Robotic Process Automation
- Interacts at the graphic interface level of applications to emulate the rules-based interactions that a human would have with computer applications

#### Data Analytics and Visualization
- Enables the visual processing of large amounts of data. Users can interact with the platform to change parameters and simulate conditions

#### Low Code Application Platforms
- Facilitates designing and developing software applications through graphical user interfaces, rather than programming. A wider range of users can contribute to the application's development, and development can be performed more quickly and more reliably

---

*Machine Learning Enabled Technologies*
Artificial intelligence (AI) is a branch of computer science that aims to create intelligent machines

It's not a single technology, it's a collection of **different technologies**

*Gartner* – AI is applying advanced analysis and logic-based techniques, including machine learning, to interpret events, support and automate decisions, and take action.

*Wikipedia* – “Artificial intelligence” (AI) is the ability of a computer program or a machine to think and learn. It's a branch of computer science that aims to create intelligent machines

Another definition of AI, “Artificial intelligence (AI) is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment. *Source: Britannica*

Artificial intelligence is intelligence exhibited by machines. The term **“artificial intelligence”** is applied when a **machine mimics “cognitive”** functions that humans associate with other human minds, such as “learning” and “problem solving.” – Strategic search Corporation

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**Artificial Intelligence**
- Programs with the ability to learn and reason like humans

**Machine Learning**
- A subset of AI technologies that is most widely used today

**Deep Learning**
- A subset of ML, leveraging multi-layered modeling approaches to mimic how the human brain processes information
How to get started
How to Get Started – Pragmatically

1. Start by defining intelligent automation and giving examples of the various technologies. Per the transformative capabilities of intelligent automation, also discuss implications to operations, governance, and controls.

2. Next, work with your IT and business data governance leads to better understand your data, its lifecycle, and its quality.

3. Facilitate use case / MVP workshops or ideation campaigns to define and prioritize strategically aligned solution opportunities in the context of your data.

4. Finally, organize your use cases and MVP solutions into an actionable roadmap with a corresponding business case.
Intelligent Automation Client Self-Service Assessment

One of the common questions we get are – what are the best candidates for automation?

While reviewing successful case studies is standard, every client has unique processes that are candidates for automation.

Toward that end we have developed our Intelligent Automation Assessment Tool.

The tool has 18 questions that cover Data, People, Process and Technology.

Upon completion for the selected process GT will assess the output to determine:

- Best candidates for automation and why
- Force ranking of the process candidates from best to least
- Expected Return/Savings from automation
- High level feasibility assessment of the processes for automation

<table>
<thead>
<tr>
<th>Intelligent Automation Assessment Tool (IAAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Name</td>
</tr>
<tr>
<td>Brief Business Process Overview</td>
</tr>
</tbody>
</table>

### DATA
1. What is the daily/monthly volume of data to be processed? (Please provide best estimate)
2. What is the type of data that the process uses (e.g. Word document, input file, fields on screen, printed PDF, scanned PDF)? Is the source data stored in digital form in databases, files, or Excel spreadsheets?
3. If electronic (i.e., PDFs) or paper documents are required by the process, how many different templates are the documents based on? How many document templates represent 80% of the total volume? (Please provide best estimate)
4. Does the process utilize handwritten input or generate handwritten output? If Yes, please provide estimated percentage of data that is handwritten.
5. What percentage of the total data CANNOT be handled by the standard process? Please provide best estimate.

### PEOPLE
6. How many manual hours are spent per week/month on the process? Please provide best estimate.
7. Is the process prone to manual error? If yes, what percentage of time is rework required to complete the process?
8. Is the process consistently performed by all who complete the tasks manually today? If No, please describe volume of variances and how these impact overall consistency.
9. How many different teams/departments/groups are stakeholders in this process?

### PROCESS
10. What is the frequency and timing for completing the process today? Would you complete it more often if an automated solution could be executed more frequently?
11. Is the process standardized with a known set of definitive business rules?
12. Is the process relatively stable or does it change often? Any plans for a significant update to the process in the near term?
13. Does the process require human judgement based on the experience of the person completing the process?
14. Approximately how many decision points are performed to complete the process? (Please provide best estimate)
15. Does the process involve a manual re-entry of data by a person recording information based on data provided by either a paper source (e.g., printed report) or an electronic image (e.g., PDF print)? If Yes, please describe the nature of the source of the information being re-entered.
16. Does the process have cycle time or service level constraints (e.g., has to be completed by a specified timeframe)?

### TECHNOLOGY
17. What applications are utilized to complete the process tasks and what technologies are required by the manual process today?
18. Is Optical Character Recognition (OCR) or Intelligent Character Recognition (ICR) technology currently utilized? If Yes, what is the product/vendor? What is the accuracy?
Assessment Workshop Findings: Summary Chart and Grid

### Opp # | Opportunity Name | Total Hours /Week** | % Automatable*** (OCR + RPA)
--- | --- | --- | ---
PLP1 | PLP Process #1 | 4 | 90% - 100%
PLP2 | PLP Process #2 | 20 | 90% - 100%
PLP3 | PLP Process #3 | 6.5 | 90% - 100%
PLP4 | PLP Process #4 | 8 | 90% - 100%
PLP5 | PLP Process #5 | 20 | 90% - 100%
PLP6 | PLP Process #6 | 28^ | 70% - 90%
PLP7 | PLP Process #7 | 4 | 90% - 100%
CLM1 | Claims Process #1 | 22.5 | 90% - 100%
CLM2 | Claims Process #2 | 5 | 90% - 100%
CLM3 | Claims Process #3 | 14.5 | 80% -90%

Legend

- North America
- Europe

For the Top 3 candidates GT will conduct a deep dive to develop ROI and Payback calculations for automation
## Intelligent Automation Assessment

<table>
<thead>
<tr>
<th>Key Deliverables</th>
<th>Description</th>
<th>Benefits</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Innovation Session with Team</td>
<td>• Deliver ideation guiding principles and overview of new and emerging intelligent automation technologies</td>
<td>• Team understanding of capabilities of emerging intelligent automation technologies&lt;br&gt;• Ideation and ‘outside the box’ thinking principles</td>
<td></td>
</tr>
<tr>
<td>2 Identification of Automation Options Based on Technical Feasibility and Business Impact</td>
<td>• Generate list of automation candidates from team&lt;br&gt;• Assess automation candidates based on potential business benefits and technical feasibility for automation</td>
<td>• Forced Ranked list of automation candidates from highest to lowest with clear reasoning on each ranking</td>
<td></td>
</tr>
<tr>
<td>3 Deep Dive on Top 3 Automation Candidates to Assess ROI and Payback Period</td>
<td>• Gather additional operational details for identified top automation candidates&lt;br&gt;• Assess implementation complexity (Low, Medium and High) for candidates</td>
<td>• Implementation proposal for top candidates including:&lt;br&gt;• ROI calculations&lt;br&gt;• Payback period details</td>
<td></td>
</tr>
<tr>
<td>4 Team Trained on Usage of Intelligent Automation Assessment Tool (IAAT)</td>
<td>• Provide IAAT survey template and instructions along with overview of the focus and intent of the tool</td>
<td>• Team’s ability to leverage the tool to assess future automation opportunities</td>
<td></td>
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</tbody>
</table>
Benefits
Benefits of IA in practice

Intelligent Automation provides measurable benefits to employees, customers, and the bottom line.

**Hard benefits**

- **Time Savings**
  Processes that require several days of manual labor can be completed in minutes

- **Cost Savings**
  Reduce the cost of manual labor, human error, and slow processing

- **Higher Accuracy**
  Tasks completed using pre-defined rules and artificial intelligence eliminate manual error

**Soft benefits**

- **Superior Customer Service**
  With robotics handling the volume of basic queries, staff can focus on resolving complex issues quickly

- **Improved Employee Satisfaction**
  Employees welcome new technologies that lighten their workload and allow them to perform more valuable work

- **Increased Strategic Activity**
  Free your resources up to do more strategic value-add activity that have real impact on your organization
Critical Success Factors
Six Topics Critical to a Successful RPA Engagement

- **Stakeholder Alignment**: Aligning all internal stakeholders (IT, Operations, HR, Internal Audit, etc.) around goals of the initiative since ensuring participation and buy-in is critical to success.

- **Change Management**: Developing a comprehensive communication strategy from initiation through implementation will result in clearer awareness of expectations and will improve employee morale.

- **Process Selection**: Utilizing use cases of documented processes is a prerequisite to facilitate the implementation as both the straight through processing and exception scenarios need to be well understood.

- **Business Case & Benefit Realization**: Creating and sustaining momentum is directly attributable to robust business case development and demonstrating realized saving through ROI tracking.

- **Continuous Improvement**: Formalizing a structure to incorporate learnings from past implementations to continuously raise the bar on implementation performance will yield significant dividends.

- **Center of Excellence**: Establishing an RPA Center of Excellence will address the key components of ongoing success: managing the bots, resourcing and training, moving up the automation complexity curve, and integrating new software (e.g., artificial intelligence, machine learning, advanced analytics).
Case Studies
Content Intelligence – Case Study #1

Situation
An international flow control solutions company was required to adopt the new Revenue Recognition Standard ("ASC606") and Lease Accounting Standard ("ASC842"), which involved a significant amount of customer and vendor contract analysis. The Company’s legacy process included manual reviews of contracts by global service centers in over 55 locations, resulting in process inefficiencies and an increased risk of human error. The Company sought to leverage innovative technology to consolidate global contracts and adhere to ASC606 and ASC842 regulations.

Approach
Utilize optical/intelligent character recognition ("OCR/ICR") technology to consolidate global efforts and automate contract analysis.

Solution
GT conducted a proof-of-concept ("POC") that leveraged OCR/ICR technology to configure and automate the identification and classification of contracts, extract pre-defined data, and tag exceptions for a group of customers and contract variations.

Results
The objective and successful conclusion of the POC was to identify an initial OCR/ICR design solution and demonstrate its feasibility to address quality review standards and meet the contract review demands. Upon the full implementation rollout, the Company can anticipate the following benefits:

- **Compliance**: Assured adherence to complex revenue recognition regulations, including the automated ability to identify performance obligations and sales expenses within contracts.
- **Accuracy**: Increased accuracy during the customer and vendor contract analysis using artificial intelligence and machine learning technology.
- **Communication**: Global efforts will be consolidated into a single technology solution, allowing for consistent and streamlined communication across all locations.
- **Efficiency**: Increased efficiency by eliminating time spent manually scanning and reviewing contracts, reducing the amount of human resources historically required to complete the contract lifecycle.
- **Process Maturity**: Established a repeatable and sustainable contract review process to achieve enterprise and regulatory objectives.
- **Data Management**: The content intelligence solution will provide a well-organized database of all customer and vendor contracts, creating a holistic repository for effective data management.
- **Reporting**: Client will have access to a contract database that can be used to perform additional reporting and analysis, ultimately enabling enterprise growth.

Enterprise Value Added Outcomes

- Automation & Logistics
- Accuracy
- Data Management
- Reporting
Content Intelligence – Case Study #2

Situation
A regional telecommunications company was experiencing a fixed Asset process that was hampered by high volume of manual data entry - Over 2,000 new assets need to be captured each month into the Fixed Asset Register. This resulted in minimized time for data entry, decreased the number of allocation calculation mistakes, improved consistency of data captured, and enhanced the reliability of process outcomes.

Approach
Leverage RPA technology to automation the manual data entry processes.

Solution
GT captured the current processing steps via workshops, interviews, recordings and streamlined the process to remove manual steps that could be added via automation.

Results
The implementation of the RPA solution was deemed a success based on the following factors:
- **Time reduction**: The bots ability to complete the manual tasks of data entry significantly reduced the cycle time.
- **Accuracy**: Decreased number of allocation calculation mistakes by eliminating the human interaction.
- **Consistency**: Data being captured was more consistent which enhanced the reliability of process outcomes.
- **Efficiency**: Increased efficiency by eliminating time spent manually capturing fixed assets
- **Process Maturity**: Established a repeatable and sustainable fixed asset process
- **Reporting**: Client will have consistent data to leverage across the organization

Enterprise Value Added Outcomes

Automation & Logistics → Accuracy → Data Management → Reporting

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Intelligent Character Recognition (ICR)

A more advanced form of Optical Character Recognition; much like OCR, it is a process for the electronic conversion of scanned or sometimes photographed images of handwritten characters (unlike OCR which deals with machine-print) to be converted into computer-readable text.

When should ICR be utilized?

- Multiple document repositories with no indexing or search capabilities
- Manually “keying-in” document data into line of business applications
- Use of off-shore data entry services
- Manual, paper-based mailroom operation

ICR impact on strategic organizational outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Level</th>
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<tbody>
<tr>
<td>ROI</td>
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<tr>
<td>Risk Management</td>
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<tr>
<td>Customer Impact</td>
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<tr>
<td>Speed to Deliver</td>
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Technologies/skills needed to make ICR work?

- Understanding of Enterprise content management
- Existing repository of business and customer data necessary to support each use case
- Secure data and encryption
- Record management
- Zonal and Keyword OCR
- Structure and unstructured forms
- Data extraction and quality
- Information Governance

Where is Grant Thornton seeing ICR applications being developed/used?

Front Office/Branch
- Customer Experience
- Mobile Capture (checks)
- Field Employees (collision)
- Public sector (evaluations)

Middle Office/Support
- Inputs to ERP, Big Data, AI
digitization of general paper based business processes
- Auto loan and home mortgage automation

Back Office/Processing
- Accounts Payable/Account Reconciliation
- Digital Mailroom (Claims)
- Financial Services
- New Account Openings

Key Vendors
- Ephesoft Transact Or Semantic
- Amazon Textract
- Kofax
- Abby
- OpenText Captiva
- Google Vision
- IBM Datacap

Interesting Articles:
- Mobile Deposit
- Analytics for Data Capture Software
- Pattern-matching and ICR

2020/21: What do we recommend?

1. Investigate/Experiment
2. Build business case
3. Invest

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Predictive Analytics and Machine Learning

The development of systems and software able to perform tasks that normally require human intelligence, such as reconciliation, investigation, validation and repair within complex and multi-input processes. Augmented intelligence, machine learning, natural language processing and expert systems are early, more understandable steps towards comprehensive AI.

When should Predictive Analytics/ML be utilized?
- Sales forecasting
- Trends analysis and future growth
- Optimize Operations
- Risk Reduction/Fraud Detection
- Market Campaigns
- Buying behaviors
- Health sickness detection
- Forecasting weather Patterns

<table>
<thead>
<tr>
<th>Predictive Analytics/ML impact on organizational drivers</th>
<th>Technologies/skills needed to make Predictive Analytics/ML work?</th>
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<tbody>
<tr>
<td>ROI</td>
<td>Strong labeling focus on legacy data sets</td>
</tr>
<tr>
<td>Risk Management</td>
<td>Secure data and encryption</td>
</tr>
<tr>
<td>Customer Impact</td>
<td>Successful machine learning, NLP and RPA investments</td>
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<tr>
<td>Speed to Deliver</td>
<td>Large scale &quot;training&quot; data and activities (tensor flow, DSSTNE, Parsey McParseface, FAIR, Warp-CTC)</td>
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</tbody>
</table>

Where is Grant Thornton seeing RPA applications being developed/used?

- Pricing and arbitrage opportunity
- High frequency trading
- Underwriting & loan origination, credit scoring
- Reporting and business intelligenceanalytics
- Assistant, admin work
- Transaction information completion/reconciliation
- AML/fraud investigation
- Transaction completion
- Contract and legal reconciliation
- Driver based rolling forecasts

Key Vendors
- Ayasdi
- Afiniti
- DataRobot
- H2O.ai
- Microsoft ML Studio
- Alteryx
- Xcelsius
- iPSOFT
- QuantaVerse
- We r.ai
- Rapidminer
- High Radius

Interesting Articles:
- AI as a service
- David Teten AI Financial Services
- Rethink AI Talent in The workplace
- Three Channels of Artificial Intelligence-led growth

2020/21: What do we recommend?
1. Investigate/Experiment
2. Build business case
3. Invest
# Natural Language Processing (NLP)

The advanced ability of a computer or program to understand human speech (speech recognition) or written text (unstructured text) and derive intelligence, take action or present results normally requiring manual interpretation.

### When should NLP be utilized?
- Text Mining
- Tagging and Annotation
- Information Extraction
- Lexical and Semantic Analysis
- Speech/Pattern Recognition
- Lemmatization text to data
- Chatbots
- Question Answer/Automated support
- Spam filtering
- Voice text Messaging

### Low Code impact on organizational drivers

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### Technologies/skills needed to make NLP work?
- Optical character recognition (OCR)
- Intelligence character recognition (ICR)
- Solid, documented processes
- Linguistics and AI
- Text classification & Clustering
- Big Data Frameworks, Spark, Hadoop
- Machine translation
- Text vectorization

### Where is Grant Thornton seeing NLP applications being developed/used?

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<th>Middle Office/Support</th>
<th>Back Office/Processing</th>
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<td><em>Chatbots</em> commerce/customer service</td>
<td>Contract management digitalization</td>
<td>Digital administrative work 'virtual admin'</td>
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<td>Multi-language marketing/sales</td>
<td>Dynamic monthly management meetings</td>
<td>Removal of paper flows and storage</td>
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<tr>
<td>Call Center digitization</td>
<td>Legal / HR / Payroll management using AI</td>
<td>Supporting document generation through NLG</td>
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</table>

### Key Vendors
- AlphaSense
- Cortical.io
- Narrative Science
- Seal
- Google NLP
- AWS Polly
- Microsoft LUIS

### Interesting Articles:
- Forbes: 5 amazing examples of NLP in practice
- AI and NLP Trends – Gartner research
- Global Risk Institute NLP
- How NLP drives government innovation

### 2020/21: What do we recommend?

- Investigate/Experiment
- Build business case
- Invest
Data Analytics & Visualization

The combination of reporting technologies and data modeling methodologies to transform massive data sets into visual information for easier understanding and communication of the data insights. Data in visual representation helps unpack its complexities, increases analysis efficiency and enhances agility.

When should D&A be utilized?
- Across multiple use cases: in everyday data analysis/understanding tasks as well as decision making, planning cycles, workflows/operating model steps where data is critical to processes
- Exploration of new opportunities and innovations from analysis of underlying patterns in the data

D&A impact on organizational drivers

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Technologies/skills needed to make D&A work?
- Trusted data quality and defined data availability from the diverse data sources
- Processes and people/culture motivated to adopt and use data driven decision making
- Pipeline of candidate business use cases for applying data analytics and visualization
- Resources skilled in how to apply modeling methodologies delivering to/within the tools
- Strong ROI framework to measure success

Where is Grant Thornton seeing D&A being developed/used?

Front Office/Branch
- Understand customer behaviors & explore next actions to improve services
- Examine trends & anomalies in real-time collaborations

Middle Office/Support
- Dashboarding KPIs, metrics for decision making processes
- Assist in data governance activities to ensure data is useful & trusted for all uses

Back Office/Processing
- Rapidly understand data from various and complex sources e.g. sensor data, fraud monitoring, social networks, data from related entities, business driver analyses

Key Vendors
- Microsoft Power BI, Excel
- Tableau
- Qlik
- Tools that integrate with analytics-oriented programming languages (e.g. Python, R, Matlab): Plotly, Shiny

Interesting Articles:
- Getting Started With Data Literacy and Information as a Second Language
- Gartner Magic Quadrant for Analytics

2020/21: What do we recommend?

1. Investigate/Experiment
2. Build business case
3. Invest
Low Code Applications

Platform solution used in digital transformation to orchestrate processes, digitize enterprise wide workflow and improve customer and end user experiences. Through drag-and-drop configuration and agile delivery, low code platforms can provide new business capabilities in rapid time (60-120 days). Low code provides the intuitive user interfaces, workflow, integration, data, and mobile capabilities needed for today’s modern processes.

When should Low Code applications be utilized?
- Need for improved customer facing or end user experiences (includes mobile)
- Automation of manual backoffice processes
- Modernization of legacy applications
- Reduced speed to market (10X faster)
- Overburdened IT organization that needs to deliver new business functions faster
- Integration of multiple data sources and 360 degree view of customer

Low Code impact on organizational drivers

ROI

Risk Management

Customer Impact

Speed to Deliver

Situation / skills needed to make Low Code work?
- General IT development skills
- Business analyst and process skills
- Agile delivery capabilities
- Engaged and motivated business team
- Leadership directive to improve efficiency / customer experience / standardization

Where is Grant Thornton seeing Low Code applications being developed / used?

Front Office/Branch
- Customer onboarding
- Customer service / calls
- Online customer inquiries
- Distributed mobile field services reps

Middle Office/Support
- Data quality & integrations
- Real time Analytics / reports
- GRC and regulatory processes and monitoring

Back Office/Processing
- Manual processes – Excel, email, Access DB’s
- Transaction exception resolution
- Regulation process standardization

Key Vendors
- Appian
- OutSystems
- Mendix
- Pegasystems
- Salesforce
- ServiceNow
- Catalytic
- Skuid

Interesting Articles:
- Gartner 2019 Magic Quadrant – [link]
- Low code basics - [link]
- Use cases for low code – [link]
- Benefits of low code – [link]
- Making the case for low code – [link]
- Projected market for low code – [link]

2020/21: What do we recommend?
1. Investigate/Experiment
2. Build business case
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Robotic Process Automation (RPA)

A machine or software that manages, acts on or processes high-volume, repeatable tasks that previously required a human to perform. RPA offers a key and important foundation for other technologies to build on, including machine learning and artificial intelligence.

When should RPA be utilized?
- Rules-based process automation
- Automating high volume manual online processes
- Legacy to modern application data migration
- Compliance critical environment

RPA impact on organizational drivers

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Technologies/skills needed to make RPA work?
- Solid, documented processes and governance
- Strong ROI framework to measure success
- Methodical, step by step targeted process automation plan
- Leverage of an existing BPM deployment

Where is Grant Thornton seeing RPA applications being developed/used?

- Front Office/Branch
  - Customer management
  - Loan pricing/processing
  - Application validation/testing
  - Asset management

- Middle Office/Support
  - Data quality & reconciliation
  - Report preparation and dissemination
  - Claims processing

- Back Office/Processing
  - Invoice/cash/payment management
  - HR, Payroll and T&E
  - Contract management/recon
  - IT risk testing

Key Vendors
- Automation Anywhere
- Blue Prism®
- UiPath
- WorkFusion
- EdgeVerve

Interesting Articles:
- The Forrester Wave: RPA
- Gartner Predicts: 2020

2020/21: What do we recommend?
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