Lessons Learned from Automation Success: Identifying What and When to Automate

And why having a defined roadmap matters

Presented by Cognilytica Analysts:

Kathleen Walch
Ronald Schmelzer

Cartoon illustrations by Timo Elliott (timoelliott.com)

About Cognilytica

- Cognilytica is an ***AI-focused research, advisory, and education firm***
- Focused on ***advanced big data analytics, cognitive technologies, and evolving areas of artificial Intelligence and machine learning.***
- Provides ***role-specific education*** on AI, ML, and emerging technology
- Focused on ***enterprise and public sector adoption*** of AI, ML, and Cognitive Technology
- Kathleen Walch and Ron Schmelzer are ***Managing Partners*** of Cognilytica

Why do we Automate?

- Automation is about ***efficiency*** and ***repeatability***
- Automation enables ***next-level innovation***
- Automation enables us to ***deal with variability***

The lowly nail: a symbol of automation

Automation is a Necessity in Environments of Change

Reasons to Automate: ROI and More

Economic Reasons

- Process Improvement and process optimization
- Cost reductions
- Increase revenue through efficiency
- Accelerates digital transformation

Efficiency Reasons

- Human labor cost and time savings
- Increase in speed of operations
- Minimization of costs

Competitive Reasons

- Increased margins provide competitive advantages
- Greater resilience
- Get products & services out faster
- Deal with rapidly changing environments more effectively

Satisfaction Reasons

- Customer satisfaction: increased reliability
- Employee satisfaction: taking away the drudgery
- Management satisfaction: providing predictability

Quality Reasons

- Reduction of errors
- Reduction of variability of results
- Improvement in availability of operation

Safety & Governance Reasons

- Perform dirty, dull or dangerous tasks (“The 4D’s”)
- Improve visibility into operations
- Increase in reporting and auditability
- Process and Task Standardization

Why Does The Automation Journey Matter

- From paper and people-bound processes to automated processes
- Many different things to consider
  - **Digitization & Digitalization**
  - **How to encoding business processes**
  - **Dealing with exceptions**
  - **Security and Data access challenges**
  - **Data Governance challenges**
- Adding increasing levels of intelligence can help deal with many of the above issues, but you have to know what to do in what order … ***a Roadmap!***

Automation usually provides a fast ROI, assuming you know which processes and systems to automate

Hardware "Physical" Automation vs. Software Automation

Physical Automation: Robots and other Automation

- **Hardware automation**
  - Machines that can automatically perform tasks
- **Industrial robots**:
  - Dedicated to a single repetitive task over and over, often used for manufacturing
- **Collaborative robots** (cobots):
  - Fixed robots that work in close proximity and conjunction with humans
- **Autonomous mobile robots** (AMRs):
  - Meant to move around and operate in a real-world environment

Software Automation: "Bots"

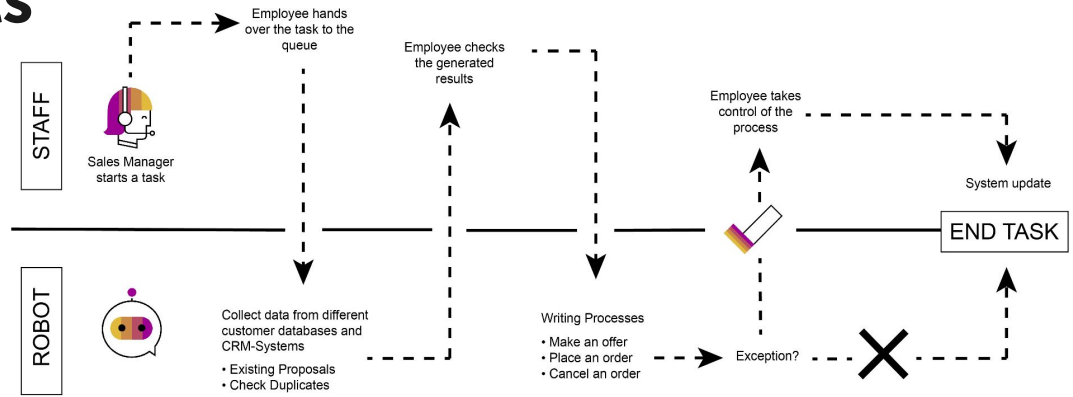
- **Software Automation**
  - Software that perform repetitive tasks on a computer system.
- **Process Automation**
  - Programmatic ways of getting machines to perform steps across multiple computer systems
- **Robotic Process Automation** (RPA):
  - A kind of Software Bot that specifically performs repeating User Interface tasks

Robotic Process Automation (RPA)

- **Robotic Process Automation**
  - If you can automate hardware, why can't you automate software?
  - Automate repetitive tasks previously handled by humans
    - "Swivel-chair" Integration
  - Repeating User Interface tasks: keyboard, click, swipe, etc.
  - Solves many problems of system-to-system integration
- **Attended bots ("Speeding up humans")**
  - Software automation that sits alongside humans to assist with tasks
- **Unattended bots ("Process Flows")**
  - Software automation that can operate in the background

RPA is an alternate solution to Business Process Outsourcing (BPO) and APIs

Attended bots



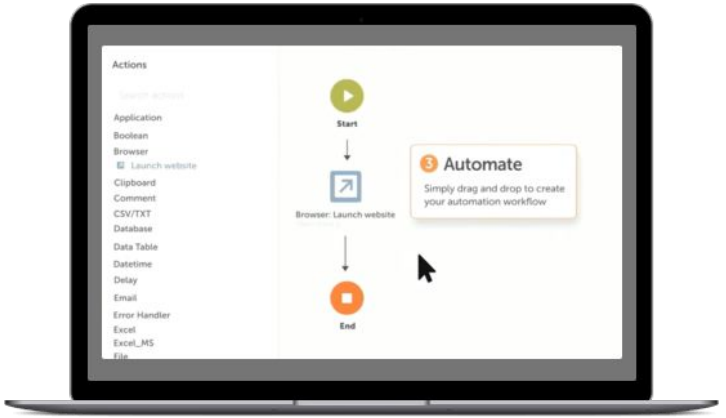
- ***"Assisting and Speeding up humans"***

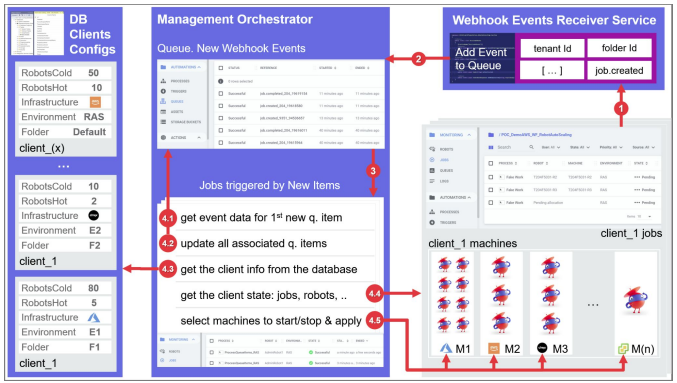
- Software automation that sits alongside humans to assist with tasks helping an individual employee with tasks to boost their productivity
- Assists ***front-office tasks*** by collaborating with employees and teams
- Employee triggers a bot and interacts with the bot as it helps
- Attended RPA bots wait to be activated by employees whenever they are needed to help the process along

Unattended bots

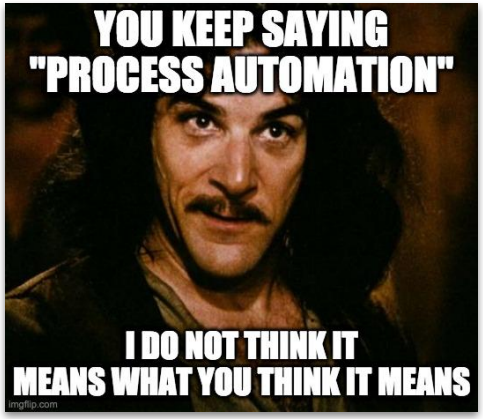
- ***"Automating Background Processes"***

- Software automation that can operate in the background
- Unattended RPA bots work independently, following a rules-based process to completion
- Automates ***back-office processes*** at scale
- Operate on a preset schedule, or as triggered by logic in the process flow

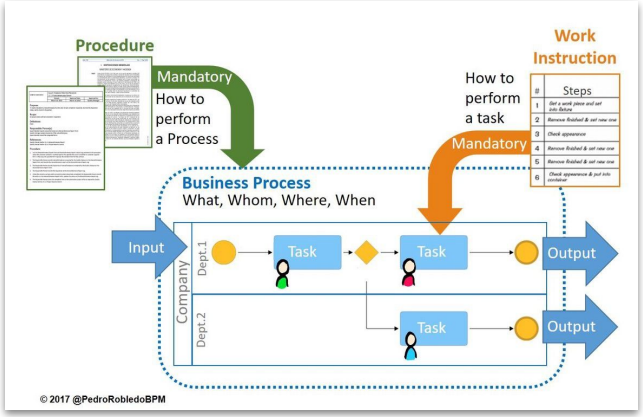




Automating Tasks vs. Processes



- Do you actually automate entire processes or just multiple tasks within a process?
- ***Processes***
  - The process is the “way”
  - Defined objectives
  - Defined flow
  - Defined ways of handling problems and issues
  - Involves Planning
  - Involves Measurement
  - Involves Outcomes
- ***Tasks (sometimes called Activities or Actions)***
  - The Tasks are the “action”
  - Performing an action is a task
  - Breaking down tasks into subtasks
  - Tasks can support multiple processes
  - Involves doing



~~Robotic Process~~ Automation

~~Repetitive~~ ~~Task~~ Automation

~~Workflow~~ Automation

User Interface

... using software bots

So… where is UI Automation with Bots Useful?

- ***Repetitive Human UI Tasks***
- ***Adding value to human UI tasks***
  - *The "attended" bot*
- ***Integration between multiple systems where APIs are not easy or possible***

The Revenge of the Buzzword

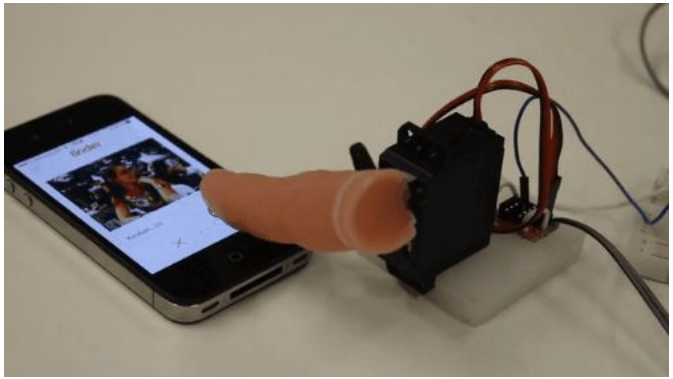
The Human in the Business Process

- In general, the various tasks of a business process can be performed in one of two ways: manually or automated
- ***Where does the human add value?***
- Getting ***someone*** else to do it: ***Process Outsourcing***
  - Mostly economic reasons
  - Outsourcing of processes vs tasks
- Getting ***something*** else to do it: ***Process Automation***
  - More than just economic reasons
  - Automation of processes vs. tasks
- **What's driving automation:**
  - Faster rates of change
  - Interconnected systems and companies
  - Breaking the Digital Transformation logjam
  - Compliance and governance needs
  - Customer demands for agility, speed, and reliability
  - Increasing costs of labor and supplies
  - Keeping ahead of the competition
- You just can't deal with those factors using 100% human-performed tasks
  - So, we need to automate. But *what*, *when* and *how*? ***STAY TUNED.***

Automation is Not Intelligence

Automation is the act of using machines to repeat tasks

- The three key aspects of intelligence: ***Perceive, Predict, Plan***
- ***Is there any machine learning in the system?***
- ***Can the system improve over time and with experience?***
- ***Can the system determine next steps and avoid exceptions without human intervention?***



If not, then it's not intelligent

Automation comes from root "automatic"

- Synonym: "thoughtless"
- "This process was approved automatically"

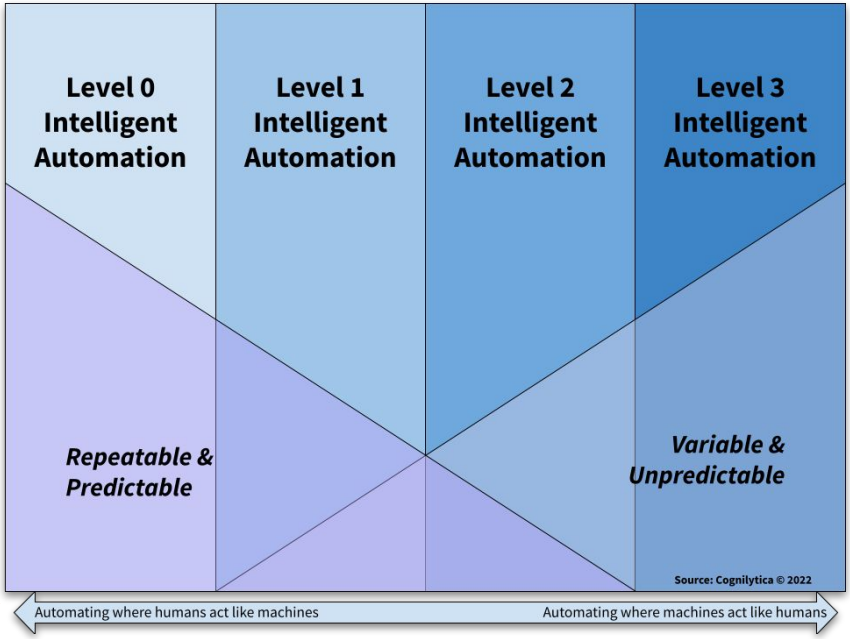
Autonomous comes from the root "autonomy"

- Synonym: "self-directed"
- "We have autonomy to approve this process"

Moving from “dumb” to “intelligent” automation

- Adding intelligence to automation enables ***greater degrees of variability and unpredictability***
- What can be variable?
  - Text, images, video generated by humans
  - Conversations
  - Data that has a wide range of possible values
- What can be unpredictable?
  - Things happening not in the same sequence or order
  - Things that can occur at random times, or not at all
  - Decisions might need to be made that depend on data and use of probabilistic “judgement”
- It’s very difficult to program or record something that doesn’t happen in a reliable, predictable way

We need to use cognitive technologies to handle variability and unpredictability.



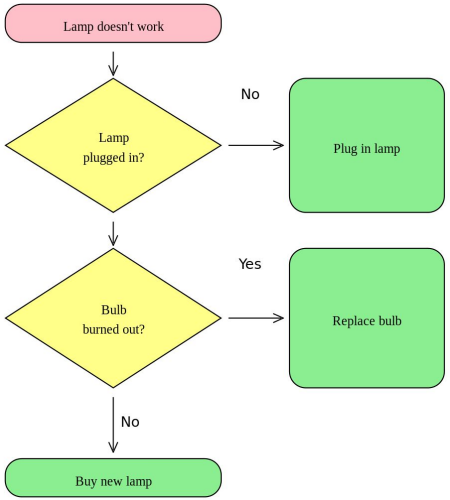
Increasing Levels of Intelligence with Automation

- ***Moving from simply automating processes to making them more intelligent***
- ***Process Automation***
- ***Applying intelligence to automation***

Level 0	Level 1	Level 2	Level 3
Unintelligent Automation	Language & Context Aware	Intelligent Process Awareness	Autonomous Process Optimization
			
• Screen recorder or visual flow designer • Complex rule sets • Focused on replicating user interaction capabilities with keyboard, mouse, swipe, and behavior modeling	• Use of natural language processing tools for text (OCR), speech, and other interaction • Virtual assistants to help with process development • Fix and validate data as necessary for context • Can deal with unstructured data and inputs	• Automatically identify process flows in new systems ("process discovery") • Anticipate and mitigate process flow exceptions • Understand UI changes & make dynamic process changes • Find and fix missing or incorrect data • Automatic process documentation	• Suggest and make modifications to processes to improve overall flow • Learn from itself to figure out better ways to handle process flow • Automatic orchestration of multiple bots to optimize processes

Finding Automation Opportunities in Business Processes

- *Focusing on Efficiency*
- *Focusing on Repeatability*
- *Focusing on Error Reduction*
- *Focusing on Speed*
- *Focusing on the 4Ds*



Answering the Right Questions for Automation

To answer the question “What can or should I automate?”, you need to ask:

- ***What processes or tasks am I currently doing?***
- ***How can I best optimize these processes or tasks?***
- ***What processes or tasks am I currently doing that aren’t really needed?***
- ***What processes or tasks am I currently doing that can be improved?***
- ***What processes and tasks am I not doing that really should be done?***
- ***How much variability is there in the tasks?***
- ***How much of the human can be taken out of the loop?***
- ***How complicated does the technology need to be to take the human out of the loop?***
- ***What can go wrong if the automation doesn’t work well?***
- ***What are the risks involved in the automation?***

Getting Started with Automation: A Step-wise Approach

- ***Identify the pain points***
  - Where is “Manual” causing problems?
- ***Measure the current cost of “manual”***
  - What are the costs of those manual tasks?
- ***Make Non-Digital Things Digital***
  - What would it take to automate the manual process?
- ***Take an Iterative Approach***
  - Is there a way to take a small bite first?
  - Start small - you want to show immediate ROI and “quick wins” to get buy in
- ***Start with the Stakeholder***
  - Automation can be very scary
  - Get stakeholder input from the start
  - If automation will be a constant effort, create an internal Center of Excellence (CoE)
- ***Intelligence is not the End Goal of Automation***
  - It’s perfectly ok to stay at “Level 0” Automation
  - We’ll talk about the higher levels of automation and intelligence in future podcasts…

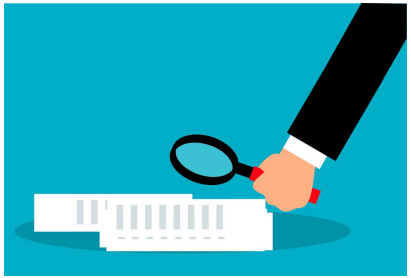
Level 0

Unintelligent Automation

- Screen recorder or visual flow designer
- Complex rule sets
- Focused on replicating user interaction capabilities with keyboard, mouse, swipe, and behavior modeling

Getting Started on Automation: Start in the Right Place

- ***Automating a Process vs Automating a Task***
  - Repeating a specific operation as a task
    - Manufacturing, moving, or manipulating real-world things
    - Entering, moving, or manipulating data
  - Connecting multiple systems together to accomplish a task
- ***Mapping Software-based Business Processes***
  - Identify operational bottlenecks
  - Identify areas of potential risk
  - Identify tasks that are redundant and remove them
- ***Process Improvement vs Process Optimization***
  - If the process is necessary, must it be done that way? (Optimization)
  - If the process is not necessary, can it be changed (Improvement)
    - Don't automate bad processes just because "that's the way it's been done"
- ***Measuring the Costs of Automation vs. the ROI***
  - Automation is NOT free
  - Identify, define, and report on KPIs aligned to strategic goals



How do we prioritize what to automate?

First, ask yourself some key questions:

- **What is the current cost of the task or process?**
- **What are the current problems?**
- **Is this a single task or a multi-step task or a subprocess or a whole process?**
- **How much a human needs to be in the loop?**
- **What is the cost of automation?**
- **What is the cost of failure?**
- **How often does the task / process change?**
- **How much variability is there in the task / process?**

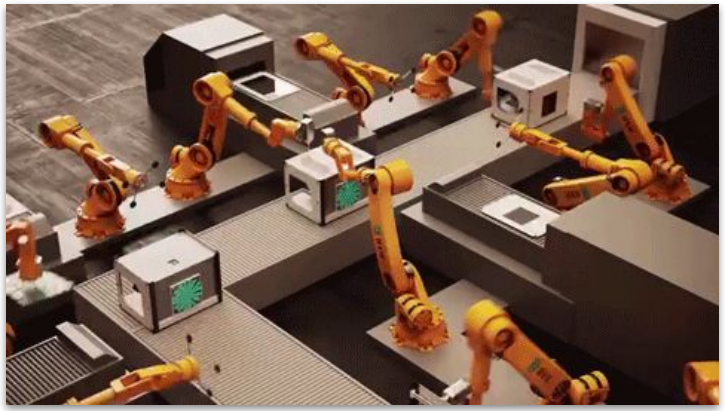
Starting with “Low Hanging Fruit”

- Think of tedious and redundant activities you perform regularly that need to happen but are done in a repetitive way – these are good candidates for automation
  - Start with “low hanging fruit” and automate these tasks first
- Sometimes Quick and Easy is the Right Thing
  - Saving time and money quick wins
  - Improving reliability quick wins
  - Removing the human bottleneck quick wins
- Sometimes Quick and Easy is the Wrong Thing
  - Automating something that will push the problems somewhere else
  - Automating something that shouldn’t be done at all
  - Not realizing how much human still needs to be in the loop
  - When Exceptions are the Rule

Is it really “Quick and Easy”?

Immediate ROI with Level 0 Automation

- Level 0 Automations focused on improving efficiency
  - "Movement"
    - Moving things / objects from one place to another
    - Moving data / information from one place to another ("Swivel chair integration")
    - Data capture
  - "Assembly"
    - Assembling multiple items together
      - Combining data from multiple sources
    - Packaging things together
      - Creating reports / documents / charts
  - ***90%+ of physical bots are doing just these two things.***
- Level 0 Automations focused on improving reliability / repeatability
  - Eliminating user error
  - Increasing precision
- Level 0 Automations focused on increasing task or process speed
  - Reducing the Human "Bottleneck"
- Level 0 Automations focused on improving compliance
  - Adding necessary steps that humans tend to avoid
  - Managing what you measure



Identifying & Prioritizing Opportunities for Level 0 Automation

- "Basic" Level 0: Finding the pain points
  - ***Time-based / Cost-based ("what will save the most time or expense?")***
    - Automating which tasks will provide efficiency & speed improvements?
  - ***Value-based ("what will provide the most value?")***
    - Automating which tasks will add most value to overall business process?
    - Automating which tasks will add reliability, repeatability, and precisions?
  - ***Risk-based ("what will reduce the most risk?")***
    - Automating which tasks will eliminate the most risk?
    - Automating which tasks will reduce the most costly errors?
    - Automating which tasks will enable required compliance?
- Advanced Level 0: Task & time analysis
  - (http://hfmethods.weebly.com/task-analysis-methods.html)
- In our workshop(s): the Automation Opportunities Checklist

Unstructured Data: The Focus of Level 1 Automation

- Dealing with Structured Data is easy
  - Databases and Data with well-organized schema
  - API-level / Programming based integration is mostly structured-data oriented
  - User Interface Automation also has some schema if you know the schema of the fields you're moving stuff into and out of
- Most of the real-world problems of automation deal with unstructured data
  - Email messages
  - Text documents / PDFs
  - Images and video
  - Conversations and messages
- How can you automate those tasks if you need to understand that variable data?
  - Dumb automation will put a number in a name field
  - Intelligent automation at Level 1 knows what is a name and a number
  - Dumb automation will move all email messages from one inbox to a given destination
  - Intelligent automation at Level 1 can classify the emails and documents and summarize them based on category

The key to Level 1 Automation is introducing context and language awareness

Identifying & Prioritizing Opportunities for Level 1 Automation

- ***Applying Natural Language Processing (NLP) at Level 1 Automation***
  - Categorizing / classifying documents
  - Validating data entry (making sure the right thing is put in the right place)
  - Handling some variability in data format, for example
    - Finding the PO# in a purchase order
    - Dealing with a wide range of invoice types
    - Handling limited variability on websites (scraping)
  - Support for conversational systems
- ***Applying Computer Vision at Level 1 Automation***
  - Handling image and video documents
    - Categorizing what is in an image / video
  - Using images & video as part of a process flow
    - For example: Insurance claims handling, Customer product returns, website support
  - Treating the User Interface as an image for recognition
  - Validating tasks using image data
    - Did something go into the right place? Is the data the right data?

The challenge of process exceptions

- What are process exceptions?
  - Where tasks or steps in your process don't flow according to plan
- Why do process exceptions happen?
  - Data doesn't match expectation
  - Processes keep changing
  - Decisions are highly variable (or arbitrary)
- The problem with process exceptions
  - Process exceptions usually kill the value of automation
  - Process exceptions are compliance nightmares
  - Lack of repeatability, introduction of errors, and… wait, isn't automation supposed to address those?

Level 2 Automation: Applying Intelligence to handle Process Exceptions

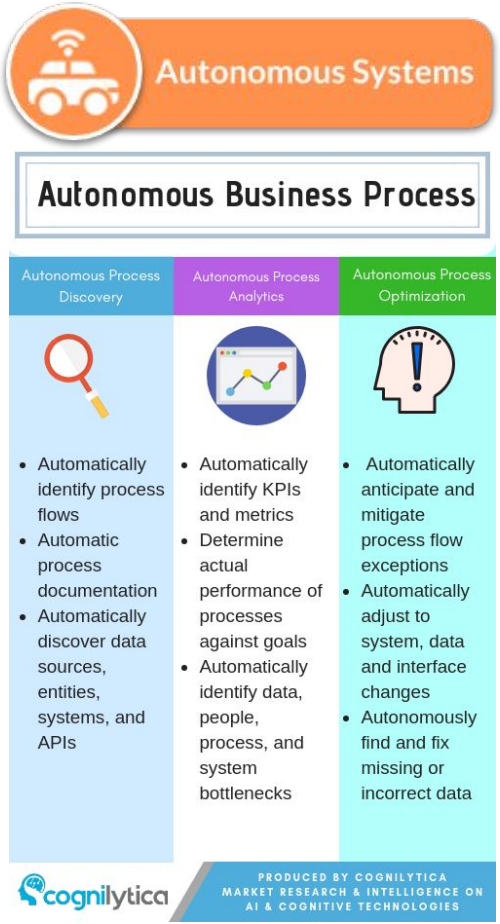
Identifying opportunities for Level 2 automation

- Where is it important to discover the truth about your processes?
  - Are processes happening according to the rules or the exceptions?
- ***Identifying patterns in process and tasks***
  - Good patterns and bad patterns
  - For example: fraud detection
- ***Handling process unpredictability***
  - Determining where process exceptions are the rule… and handling those exceptions
  - Where are inefficient *automated* tasks and processes that can be optimized?
    - Just because something is automated doesn't make it efficient
    - Unnecessary tasks and unnecessary process flows
- ***Intelligent Process Discovery***
  - Applying some intelligence to process management
  - Using machine learning to spot task and process patterns
  - Is your process operating according to rules or according to exceptions?
  - Discovering patterns in Level 0 automations
  - Identifying process bottlenecks
  - Automatic Process Documentation
  - Finding opportunities for process optimization

Autonomous Business Process

- ***Autonomous Process Discovery***
  - *Automatically identify and define process flows and task definitions*
  - *Automatically document the process*
  - *Automatically discover data sources, application endpoints, UI automation capabilities, systems, and APIs*
- ***Autonomous Process Analytics***
  - *Automatically identify process bottlenecks and process / task outliers*
  - *Automatically measure and analyze process and task performance against goals*
  - *Automatically identify areas of potential optimization*
- ***Autonomous Process Optimization***
  - *Automatically mitigate and anticipate process and task exceptions*
  - *Automatically adjust to system, data, API, and UI changes*
  - *Automatically fix and correct invalid or incorrect or missing data*

Think of this like autonomous vehicles: self-driving processes!



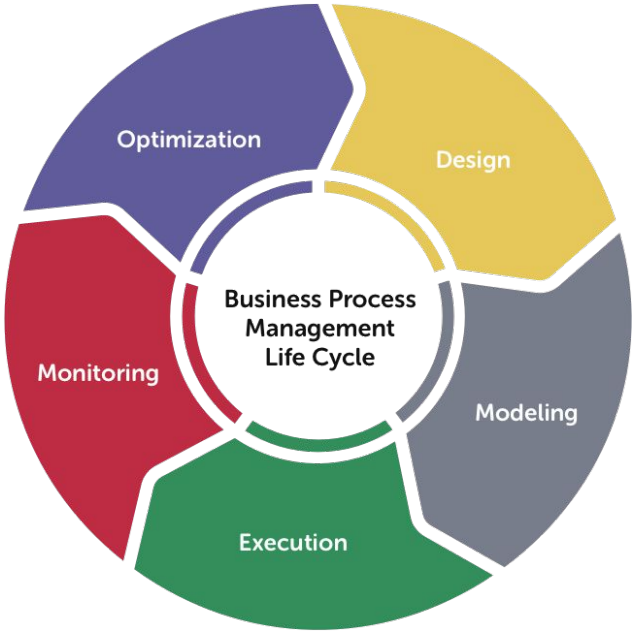
Identifying opportunities for Level 3 automation

- ***Going from task-level focus to process-level focus***
  - High rates of change, variability and unpredictability favor greater autonomous systems
  - We started thinking more about the processes at the process level at Level 2 automation
  - Level 3 automation removes any task-level thinking for automation
- ***Borrowing a page from Level 5 Autonomous Vehicles***
  - Where are Autonomous vehicles the most valuable?
  - Can we apply those lessons to Autonomous Business Process?
  - "Self-driving Processes"
    - Autonomy vs. Automatic

The Key to Process Success is Planning, Documenting, and Measuring

- **"You can't manage what you don't measure."**
- Having a repeatable, documented, set of steps to follow provides:
  - Consistency
  - Streamlining of procedures
  - Eliminating unnecessary tasks
  - Automating work
  - Eliminating duplication of steps
- Business process modeling
- Business process management

The dangers of Process Modeling Shelfware
Methodology, not Technology



Automation Threats & Challenges

- ***Security challenges***
  - Gaining necessary access
  - Preventing unacceptable access
- ***Data challenges***
  - Data availability, quantity, and quality
- ***Process Exceptions and Process Unintelligence***
  - Band-Aids and Duct Tape
- ***Issues of Process Versioning***
  - Dealing with “Citizen Developers”
  - How often will things change?
  - How often are there exceptions?
- ***Avoiding Vendor Lock-in***

LACK OF VENDOR-NEUTRAL BEST PRACTICES…..

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Thank You!

Presenters:
Kathleen Walch & Ronald Schmelzer
Cognilytica - http://www.cognilytica.com
info@cognilytica.com