Deloitte.

Robotics, Cognitive Automation and Artificial Intelligence in Revenue Cycle

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Presenters

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Ed has over 25 years of experience as a management consultant and in senior roles in the healthcare business process outsourcing (BPO) and provider services segments. His consulting experience encompasses revenue cycle, mergers and acquisitions, performance improvement and turn-arounds. He routinely leads large scale transformations that include revenue enhancements, cost reductions and shared services design and implementation. His clients include integrated delivery systems, academic hospitals, and sub-acute providers. Ed's consulting practice focuses on organization and process improvement through better use of existing and new technologies. He can be reached at eberenblum@Deloitte.com and 631-431-1707.

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Julia has experience assessing, designing, and implementing large scale revenue cycle transformations for healthcare provider clients. Her work includes process improvement, organizational redesign, physician and hospital consolidation, shared services activation, workflow tools implementation, and robotics process automation. Julia has co-authored white papers on robotics process automation in revenue cycle, published in Becker Review and in Health IT. She can be reached at jdashuta@Deloitte.com and 774-313-6230.

Agenda

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- Industry Trends
- Robotics and Cognitive Overview

Chapter 2: Robotic Process Automation

- Overview
- Use Case Example
- Lessons Learned

Chapter 3: Emerging Automation Technologies

- Cognitive Automation
- Contract Management Example

Chapter 4: RPA and Cognitive Applications in Revenue Cycle

- Revenue Cycle Automation Opportunities
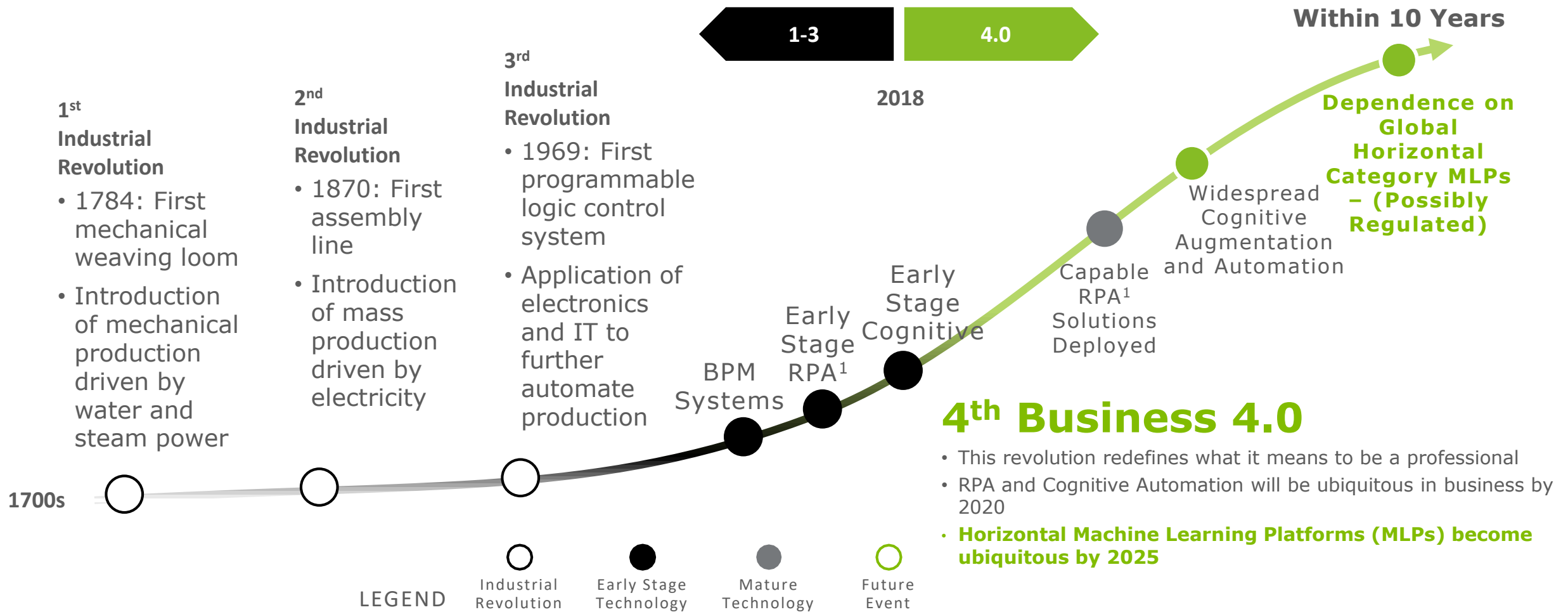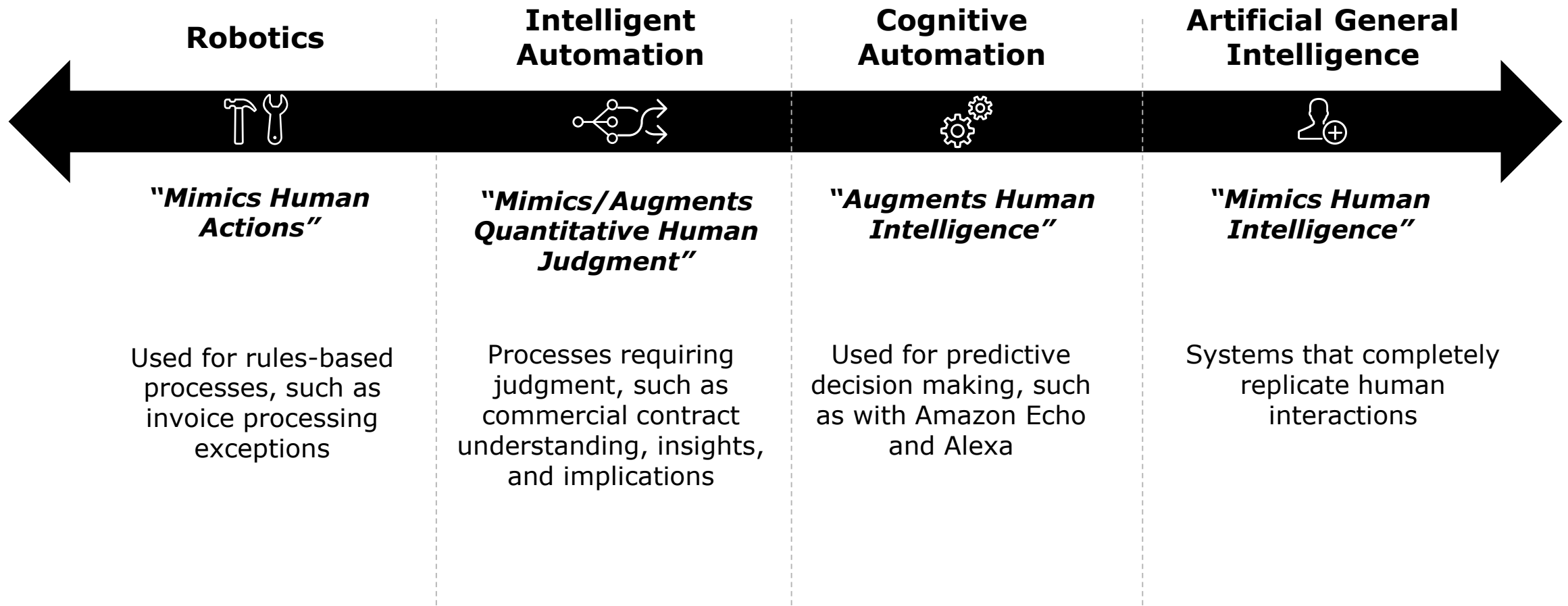- Collections Automation Example

Q&A

Chapter 1
Digital Automation Overview

We Are on the Cusp of "Business 4.0"

Digitization of white collar jobs via robotics and cognitive automation, and advances in data science, have sparked the Business 4.0 revolution

1-3	4.0

Within 10 Years

2018

1st Industrial Revolution
- 1784: First mechanical weaving loom
- Introduction of mechanical production driven by water and steam power

2nd Industrial Revolution
- 1870: First assembly line
- Introduction of mass production driven by electricity

3rd Industrial Revolution
- 1969: First programmable logic control system
- Application of electronics and IT to further automate production

Dependence on Global Horizontal Category MLPs – (Possibly Regulated)

Widespread Cognitive Augmentation and Automation

Capable RPA[1] Solutions Deployed

Early Stage Cognitive

Early Stage RPA[1]

BPM Systems

1700s

4th Business 4.0

- This revolution redefines what it means to be a professional
- RPA and Cognitive Automation will be ubiquitous in business by 2020
- **Horizontal Machine Learning Platforms (MLPs) become ubiquitous by 2025**

LEGEND

○ Industrial Revolution	● Early Stage Technology	● Mature Technology	○ Future Event

1- Robotic Process Automation

Source: Industry 4.0: Challenges and Solutions for the Digital Transformation of Exponential Technologies, Deloitte AG, 2015 and Deloitte proprietary research

Robotics & Cognitive Automation Replicate Human Actions and Judgement

Robotics	Intelligent Automation	Cognitive Automation	Artificial General Intelligence
"Mimics Human Actions"	*"Mimics/Augments Quantitative Human Judgment"*	*"Augments Human Intelligence"*	*"Mimics Human Intelligence"*
Used for rules-based processes, such as invoice processing exceptions	Processes requiring judgment, such as commercial contract understanding, insights, and implications	Used for predictive decision making, such as with Amazon Echo and Alexa	Systems that completely replicate human interactions

Automation is an evolving technology whose application can be extremely powerful. When coupled with the right process and the right level of human intervention, it has the power to transform organizations

Chapter 2
Robotic Process Automation

Overview

Robotic Process Automation (RPA) is delivered through software that can be configured to undertake rules-based tasks; it is not actual robots in a production line

RPA **replicates human interactions with technology**: it mimics common tasks such as queries, cut/paste, merging, button clicks, etc.

RPA can be **rapidly scaled up or down** based on business requirements: it provides the flexibility to quickly deploy automations directly onto existing desktops (PCs, laptops) or virtually (virtual machines) to save on additional hardware costs

RPA **operates at the user level**: it automates rules-based work without compromising the underlying IT infrastructure

WHAT RPA CAN DO

Open email and attachments

Log into web/enterprise applications

Read and write to databases

Move files and folders

Copy and paste

Fill in forms

Make calculations

Connect to system APIs

Collect social media statistics

Follow "if/then" decisions/rules

Extract structured data from documents

Scrape data from the web
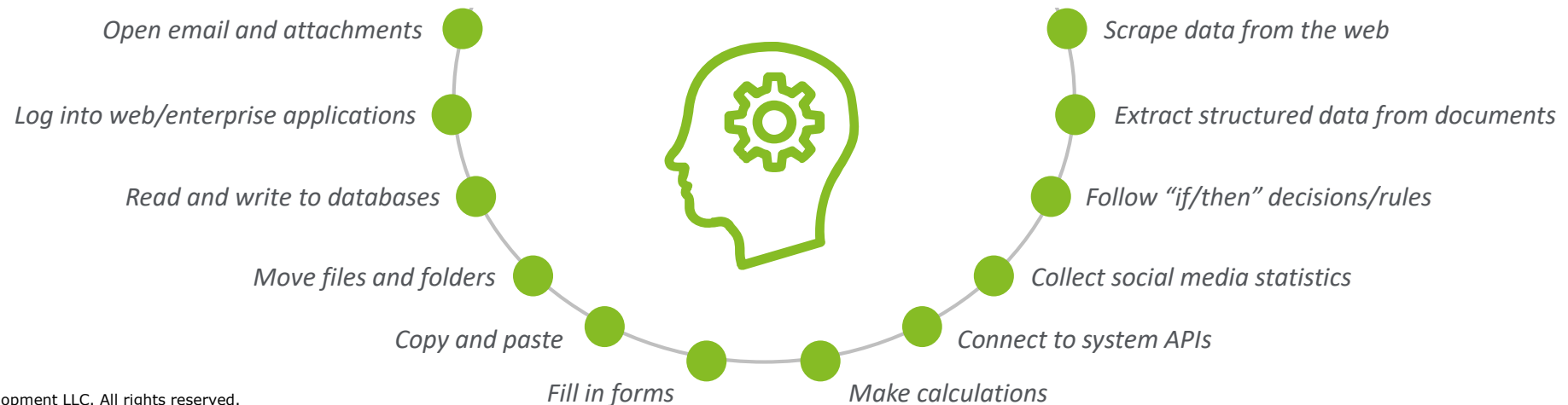
RPA Benefits

RPA allows organizations to focus resources on more value-added activities while helping the business improve service effectiveness at a lower cost than current methods

Cost
Savings can be achieved with every deployed automation

Efficiency
Higher level task and decision enablement for existing employees

Quality
Execution quality improvements can be immediately realized

Security
Robust security design and architecture

Scalability
Scalable automation based on anticipated demand by "turning on" capacity

Traceability
Comprehensive audit logs, documentation, and credential management

Speed
Process turnaround time can be dramatically improved

24/7 Operations
Process execution 24 hours a day, 7 days a week

● Quantitative
● Qualitative

Illustrative Demo of Robotic Process Automation (RPA) using Automation Anywhere

URL: https://www.youtube.com/watch?v=EdHRjKUhtRs

Revenue Cycle RPA Example

Project Overview

Client wanted to expand their market presence through M&A activity, and was exploring solutions that would allow them to minimize revenue cycle labor costs

Client Overview

- Large for-profit health system operating in the New England area

- Owned 7 community based hospitals and over 1,000 licensed beds

- Employed 800 physicians with an additional 2,500 affiliated physicians

- Recently underwent a Revenue Cycle transformation to modernize their operations

- Had a Centralized Business Office (CBO) for back-end revenue cycle functions and a Patient Access center (PAC) for front end revenue cycle functions

Client Issue

After consecutive years of successful operations, the client was looking to expand their market presence through M&A activities, but did not want to increase Revenue Cycle related labor costs

Solution

Assessment client's revenue cycle operations and identified multiple opportunities to implement RPA to reduce staff's current workload and allow the organization to grow without increasing revenue cycle related labor costs

Summary of Revenue Cycle Findings and Savings Potential

We identified an opportunity of up to 55% FTE savings for front end and 40% for back end resulting in a 7.5 month payback period for the project

Assessment Findings

Function	Area/Tasks for Improvement		FTE Savings Est.
Patient Access	• Eligibility • Benefits • Authorizations • Referrals • Medical Necessity	• Notification • Outsourced work • Pre-Registration	**45% - 55%**
Patient Financial Services	• Billing • Collections	• Denials Management • Cash Posting	**25% - 40%**

Sample Business Case Overview

Project Benefit (in $000's)

	Year 1	Ongoing
Projected Benefit[1]	**$1,305**	**$1,740**
Costs		
Bot Development [2]	$950	$0
RPA License and Support[3]	$135	$180
IT Infrastructure.[4]	$50	$0
Training[5]	$16	$0
Total Costs	**$1,151**	**$180**
Total Project Cash-flow	**$154**	**$1,560**

5-Year NPV[6]	**Payback Period**
$5.7M	**7.5 months**

1. Assumes $ 50,000 per US FTE. Year 1 savings computed April through December 2017 for Year 1 and 12 months for Ongoing
2. Fees plus expenses
3. Licensing and support through Deloitte Consulting
4. Estimated cost of 12 virtual machines
5. $ 4,000 for RPA essentials up to 8 people plus $ 12,000 for in-person 5 day specialist training for up to 8 people
6. Calculated using a 4% discount rate

RPA at the Patient Access Center ("PAC")

We automated four of six core operational processes within the financial clearance department

PAC Financial Clearance Modules within Revenue Workflow					
Automated Modules				**Manual Modules**	
Eligibility	**Benefits**	**Precert / Auth**	**Referral**	**Notification**	**LMRP**
Verify the patient has active insurance coverage prior to appointment	Calculate the expected amount the patient will owe based on plan benefits (e.g., co-pay, deductible, co-insurance)	Obtain authorization from the payer to proceed with the planned procedure/service, if one is required	Obtain a referral from the payer to proceed with the planned procedure/service if one is required	Obtain certificate confirming service is medically necessary;	Notify payer that the patient is in-house

Four financial clearance modules were automated to the fullest extent possible, with staff working pre-defined exceptions

No automation

Financial Clearance Process Flow: High Level Future State

Bots take the first pass at completing all financial clearance activities. Anything the bot is unable to complete gets transferred to a staff member
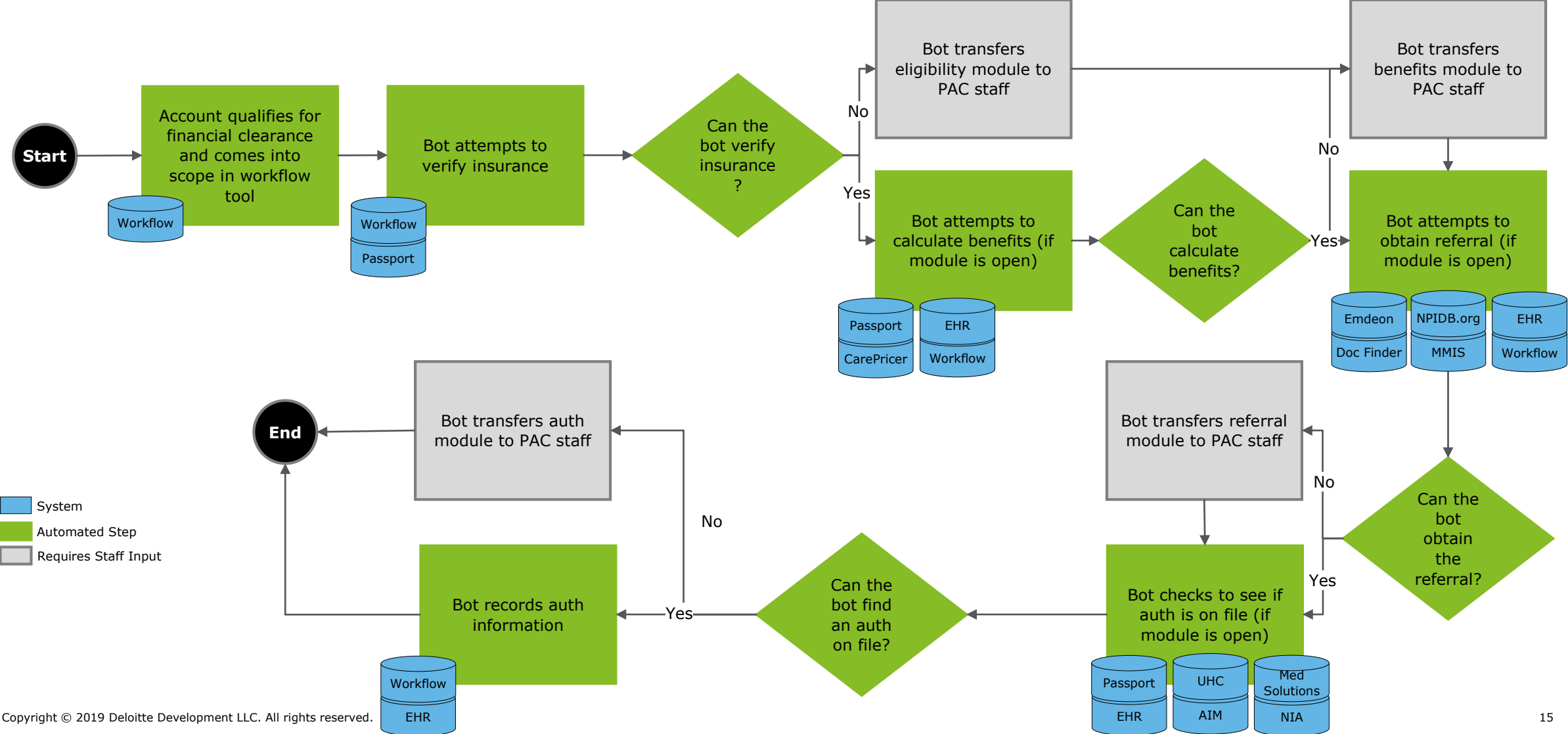
System Interactions
The bots interact with 14 different internal and external applications and websites across the four processes

System	Internal vs External Site	Bot Actions
Workflow Tool	Internal	• Navigate worklists • Capture key patient info required to complete all automated modules
Passport/eCareNext	External	• Verify insurance eligibility and whether it matches patient accounting system • Calculate patient liability based on deductible, co-pay, co-insurance
EHR	Internal	• Find CPT code • Enter referral and auth information • Enter patient liability
CarePricer	External	• Enter CPT and benefit information to price the patient's service
New England Healthcare Exchange (NEHEN)	External	• Check whether patient has additional coverage beyond what is listed in Passport
Emdeon	External	• Request a referral
Major Payer Portals (Medicaid, UHC, AIM, NIA, MedSolutions)	External	• Verify that auth or referral is on file and validate against patient and service info
Microsoft Excel	Internal	• Reference throughout all processes to obtain key variables, mapping tables, CPT, URLs, etc.
Client DocFinder	External	• Validate whether a physician is a Client doctor
NPIDB.org	External	• Lookup a physician's specialty to facility referral process

Robotic Process Automation – Lessons Learned

1
Select the right process or activity and ensure there is documentation around processes and exceptions
Ensure that the process is well-defined with documentation around robot processes, changes, outstanding assumptions, exceptions, and error handling. Ideally in a standard operating procedure or video.

2
Do not automate broken processes
Processes should be amended and made as efficient as possible continuously throughout the automation implementation process.

3
Monitor the quality of outputs and invest heavily in exceptions management
The quality of outputs from automation must be continuously, systematically monitored and individually owned to ensure that they are trustworthy. It is important to invest heavily in exceptions management for quality purposes.

4
Invest in comprehensive stakeholder management
Stakeholders need to be engaged from the program's outset to ensure effective buy-in, collaboration and adoption of changes/re-design.

5
Systematically measure and track benefits delivered
Strong focus should be afforded to ensure benefits of robotics are tracked and understood, with a detailed approach to measurement agreed prior to implementation. Address strategic resource planning, tactical cadence planning, and be sure to validate benefits.

6
Engage and build strong relationships with IT
IT controls permissions, IDs, hardware, infrastructure management, etc., so collaboration with them is key to operating smoothly and keeping abreast of back office updates.

7
Conduct robust testing in multiple environments
Business process testing in both production and testing environments is required to ensure any process errors are identified. This is to ensure that the robot can 'have their eyes open' during the process.

8
Have a production readiness checklist, and don't overlook infrastructure and compliance requirements
Production readiness is vital when moving from pilot to full scale implementation. Ensure that the correct infrastructure is in place and compliance requirements have been met early on in the project.

Chapter 3
Cognitive Automation

Cognitive Automation – What is it?

Cognitive systems employ technology and algorithms to automatically extract concepts and relationships from data and "understand" their meaning, learn independently from data patterns and prior experience and extend what either humans or machines could do on their own.
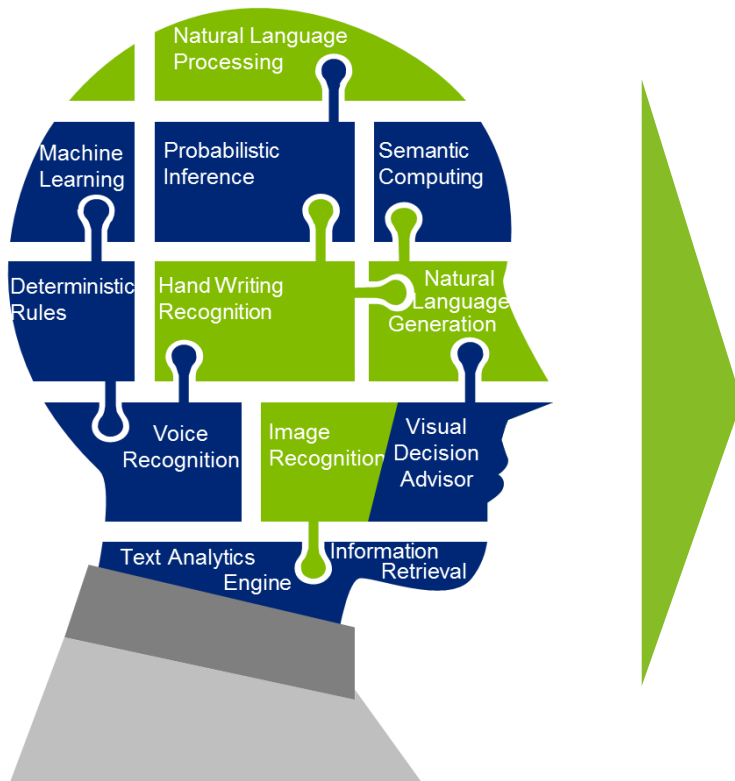
- Emulates strengths of the human brain, including parallel processing & associative memory

- Enables natural language processing of structured and unstructured data.

- Understand/leverage big data in real time

- Use machine learning to develop context-based hypotheses

- Convert text, images, and voice data into meaningful concepts and relationships

- Make reasonable predictions and recommendations based on learned concepts and relationships

- Understand environment and present contextually relevant information

- Ability to automatically process, filter, and extract key information from a vast amount of data

- Interact with humans in natural language, voice, and text

Cognitive computing can push past the limitations of human cognition and connect the dots between big data, enabling more informed decisions.

Cognitive Solutions can be Categorized by Their Specific Features and Benefits

COGNITIVE SOLUTIONS

Solution	Description	Business drivers	Main Benefits
		Cost optimization / Revenue generation	
COGNITIVE AUTOMATION	Automation of **repetitive processes with complex decisional junctions** and **human language interpretation**		**Transformative change:** automating the repeatable activities reducing processes cost **Flexibility**: release profit and revenues from the handwork constrains in order to enhance firm flexibility **New competencies:** involve the existing talent to focus on high level activities and develop new competences without administrative cost
COGNITIVE INSIGHTS	Identification of **relations** between variables coming from **billions of data sources real time** to derive **useful insights**		**New growth**: identify models and hidden relations for innovation opportunities **Evidence-based decisions**: apply a decision-making-process based on science, together with deeper insight **Timely action:** communicate information to decision-making responsible people in real time
COGNITIVE ENGAGEMENT	Improvement of client's needs understanding through mass - customization, **influencing desired actions**		**Optimized consumer behavior:** allow clients to offer large-scale customization **Next-gen customer experience:** implement personalized digital assistants to interact with each client in natural language **Ubiquitous engagement**: provide personalized recommendations to clients through all meeting channels (e.g. call center, mail, social network)

Cognitive Application Example: Contract Management through Natural Language Processing (NLP)

Input:

PDF of payer contracts

Documents ranged from 3 to 200+ pages

1

Ingest

- Load contracts / fee schedules
- Normalize data from multiple input formats
- Extract information from contracts / fee schedules through natural language processing

2

Analyze

- Identify functional information from contracts / fee schedules
- Develop semantic ontology / rules to extract functional information
- Normalize, classify and prioritize rules into a specific rules dictionary

3

Act

- Translate requirements into an automated, executable business process workflow
- Execute the analysis workflow
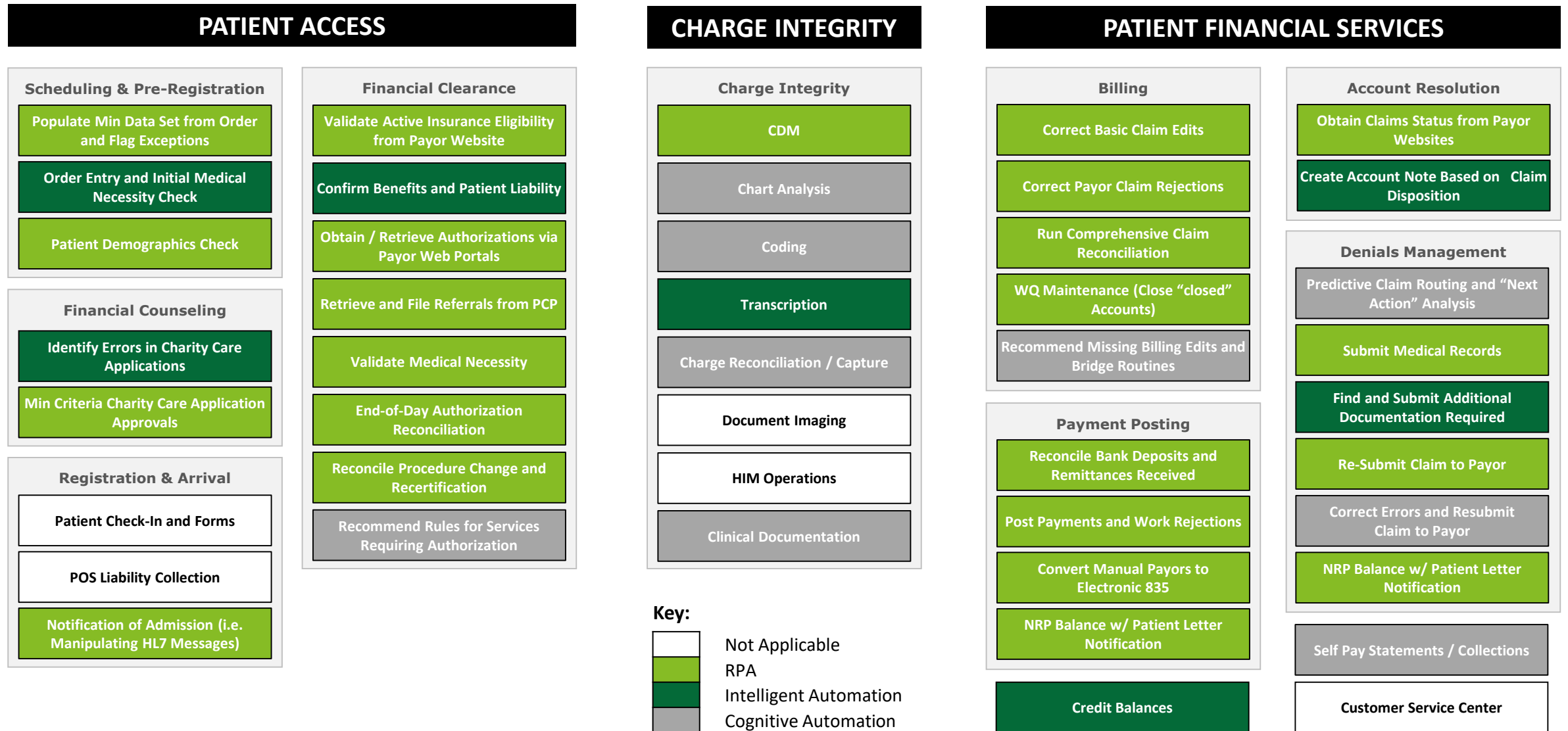- Identify opportunities to maximize contract potential

Output:

Standardized and consolidated key information for tracking and decision making

Result: Automated solution yields improved accuracy and management of contracts to allow business users more time to spend on value activities
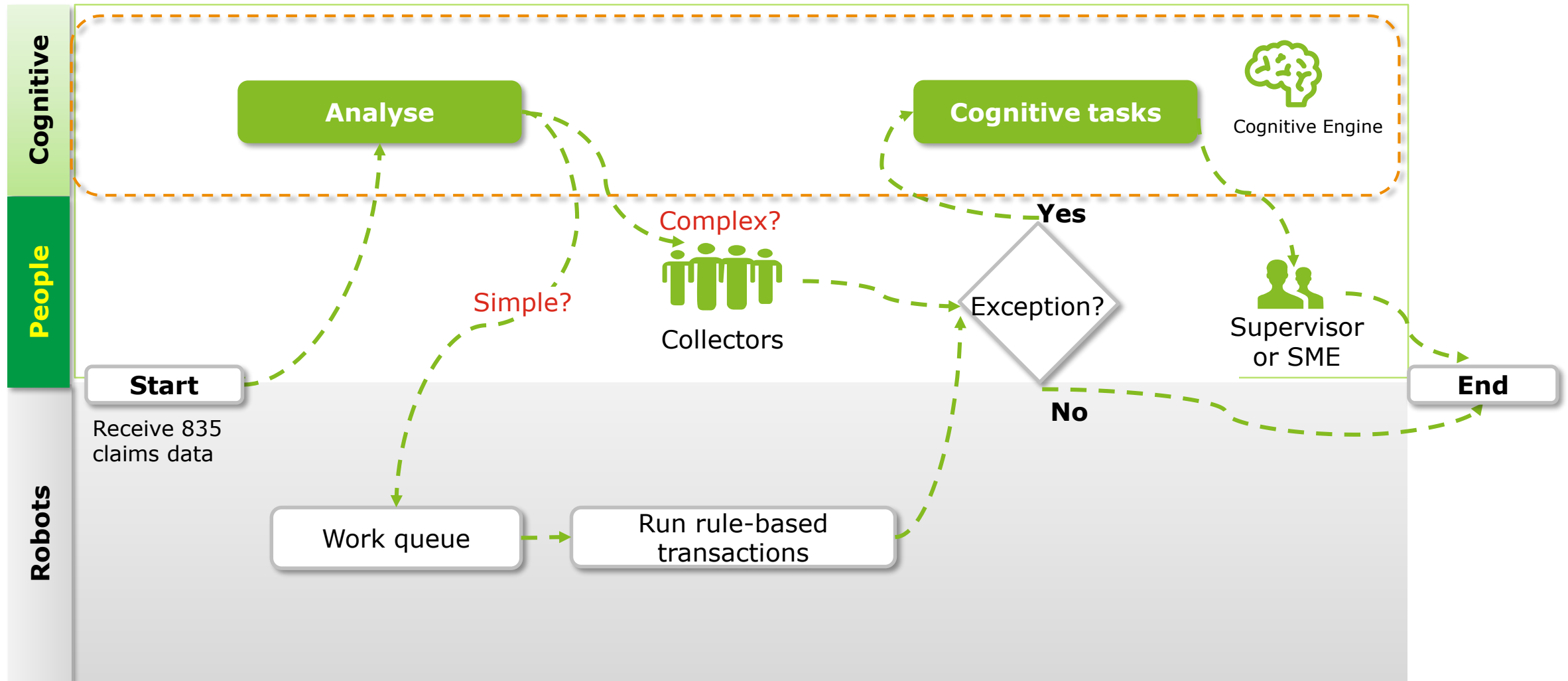
Chapter 4

RPA and Cognitive Applications in Revenue Cycle

Revenue Cycle Automation Opportunities

PATIENT ACCESS

Scheduling & Pre-Registration

- Populate Min Data Set from Order and Flag Exceptions
- Order Entry and Initial Medical Necessity Check
- Patient Demographics Check

Financial Counseling

- Identify Errors in Charity Care Applications
- Min Criteria Charity Care Application Approvals

Registration & Arrival

- Patient Check-In and Forms
- POS Liability Collection
- Notification of Admission (i.e. Manipulating HL7 Messages)

Financial Clearance

- Validate Active Insurance Eligibility from Payor Website
- Confirm Benefits and Patient Liability
- Obtain / Retrieve Authorizations via Payor Web Portals
- Retrieve and File Referrals from PCP
- Validate Medical Necessity
- End-of-Day Authorization Reconciliation
- Reconcile Procedure Change and Recertification
- Recommend Rules for Services Requiring Authorization

CHARGE INTEGRITY

Charge Integrity

- CDM
- Chart Analysis
- Coding
- Transcription
- Charge Reconciliation / Capture
- Document Imaging
- HIM Operations
- Clinical Documentation

Key:

- Not Applicable
- RPA
- Intelligent Automation
- Cognitive Automation

PATIENT FINANCIAL SERVICES

Billing

- Correct Basic Claim Edits
- Correct Payor Claim Rejections
- Run Comprehensive Claim Reconciliation
- WQ Maintenance (Close "closed" Accounts)
- Recommend Missing Billing Edits and Bridge Routines

Payment Posting

- Reconcile Bank Deposits and Remittances Received
- Post Payments and Work Rejections
- Convert Manual Payors to Electronic 835
- NRP Balance w/ Patient Letter Notification

Credit Balances

Account Resolution

- Obtain Claims Status from Payor Websites
- Create Account Note Based on Claim Disposition

Denials Management

- Predictive Claim Routing and "Next Action" Analysis
- Submit Medical Records
- Find and Submit Additional Documentation Required
- Re-Submit Claim to Payor
- Correct Errors and Resubmit Claim to Payor
- NRP Balance w/ Patient Letter Notification

Self Pay Statements / Collections

Customer Service Center

Example of how RPA and Cognitive can Interact to Improve Collections

While RPA is rules-based, Cognitive can handle decision-making processes. Combining technologies unlocks a world of possibilities

Cognitive

People

Robots

Analyse

Cognitive tasks

Cognitive Engine

Complex?

Simple?

Collectors

Yes

Exception?

Supervisor or SME

Start

Receive 835 claims data

No

End

Work queue

Run rule-based transactions

Questions?

Further Your Knowledge on RPA in Revenue Cycle

Article	Publication Link	Description
Robotic Process Automation in Revenue Cycle: A Report from the Front	Health IT Outcomes 2/8/18: https://www.healthitoutcomes.com/doc/robotic-process-automation-in-revenue-cycle-a-report-from-the-front-0001	This article summarizes some of our learnings from simple and complex implementations of robotic process automation, and describes key steps providers can undertake to reap the potential benefits of this technology.
Combine RPA with BPO to Improve Revenue Cycle Performance and Reduce Costs	Becker's Healthcare 2/13/18: https://www.beckershospitalreview.com/finance/combine-rpa-with-bpo-to-improve-revenue-cycle-performance-and-reduce-costs.html	Revenue cycle has historically been hindered by numerous challenges from staff and personnel issues to technology shortfalls leading to underperformance. By combining RPA with BPO, organizations can achieve significant performance improvements.
How to Train your Revenue Cycle Robots	Becker's Healthcare 2/20/18: https://www.beckershospitalreview.com/finance/how-to-train-your-revenue-cycle-robots.html	Through our experience of designing, building, and managing RPA projects and solutions, we share our lessons learned and provide strategies to continuously improve the degree of automation and the Replacement Factor of a given RPA solution.
Deloitte Global RPA Survey	https://www2.deloitte.com/us/en/pages/operations/articles/global-robotic-process-automation-report.html	Robotic process automation (RPA) is already delivering value, and early movers in shared services and other administrative organizations are achieving significant benefits, which are highlighted in Deloitte's third annual RPA Survey
Robotic Disruption and the New Healthcare Revenue Cycle	HFMA September 2017: https://www.hfma.org/Content.aspx?id=55353	Using software robots to perform repetitive, ongoing financial processes can improve efficiency, increase accuracy, and boost the overall well-being of a health system's revenue cycle and other data management applications.