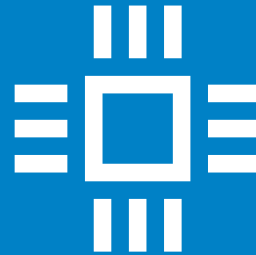**Data Analytics**

Robotics Process Automation
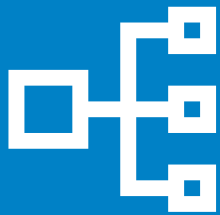
Machine Learning / Artificial Intelligence
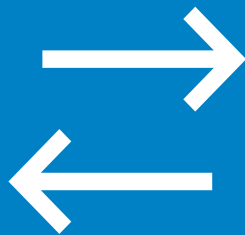
Cybersecurity

Cloud Computing

Process Mining
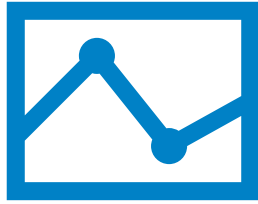
Data Exchange APIs

Blockchain / Cryptocurrencies
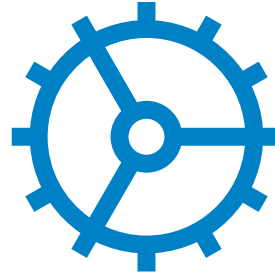
Social Media Governance

Visualization / Business Intelligence Tools

Data Analytics

The identification of data sources and the testing of data to identify patterns, anomalies, errors or potential fraud by using established data tests and statistical analysis methods.

Robotics Process Automation

Software robots and/or artificial intelligence workers that use technology to automate a workflow that follows a predictable or routine process.
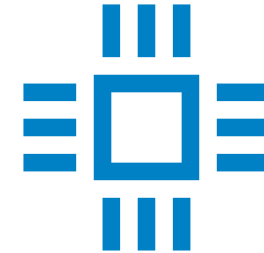
Machine Learning / Artificial Intelligence

Tools, algorithms and statistical models that automate tasks or predict data behaviors/outcomes without explicit instructions by relying on patterns and inferences instead.

Cybersecurity

The protection of computer/information systems from theft or damage to their hardware, software or electronic data, as well as from the disruption or misdirection of the services they provide.

Cloud Computing

The on-demand availability of computer/information systems or platforms, especially for computing power and data storage, without direct active management by the user. This term generally describes data centers that are accessible over the Internet.
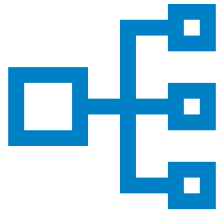
Process Mining

Techniques applied to the field of process management that support the analysis of business processes based on event logs. Process mining typically uses data mining algorithms applied to event log data to identify trends, patterns, and details contained in event logs recorded by a computer/information system with the intention of improving process efficiency and effectiveness.
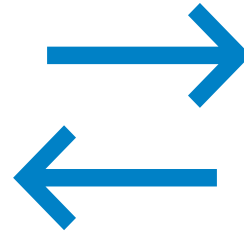
Data Exchange APIs

Data Exchange APIs (Application Programming Interface) facilitate the transfer and/or communication of data between two or more computer/information systems. In addition to the actual data being exchanged, security during transmission and security access to the data in both source and target systems is in scope of this definition.

Blockchain / Cryptocurrencies

Blockchain is a digital record-keeping technology that stores encrypted transactional information in a public database with the goal of allowing the information to be recorded and distributed but not edited. Cryptocurrency is a digital asset designed to be a medium of exchange in secure financial transactions or the transfer of assets.

Social Media Governance

Social media is the interactive technologies that facilitate the creating and/or sharing of information, ideas, and other forms of expression (i.e. opinions, referrals, etc.) via virtual communication and networks. Examples of social media include: Twitter, LinkedIn, Facebook, Instagram, YouTube.
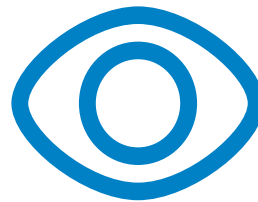
Visualization / Business Intelligence Tools

Data visualization is the graphical representation of information and data. By using visual elements, such as charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Data Analytics

Novice	Beginner	Follower	Expert	Leader
• No understanding/ buy-in or interest in using data analytics	• Basic awareness of the benefits of data analytics • Can analyze DA results and document conclusions • Has attended training but is not actively using data analytics • Has access to DA licenses but is not using them	• Can identify data sources and required fields • Can quality check the data before the test is run • Can use pre-defined tests and analyze the results • Can define a DA test hypothesis and read results to determine if results are conclusive • Can create visualizations from the DA tests to communicate conclusions effectively	• Can identify data sources and required fields and extract data • Can create new DA tests based on a hypothesis • Can create continuous audit tests that can be used by others with minimal input • Can create advanced analytic tests in standard DA tools • Can create enhanced visualizations from the DA tests to communicate conclusions effectively • Can understand and use data architecture documentation such as ER (Entity Relationship) diagrams and database data dictionaries • Knowledge of SQL and script writing	• Can identify data sources and required fields and extract data in an automatic fashion • Can create Bots to run data analytic scripts and tasks • Can create predictive analytics that help the business make future decisions • Can create advanced analytic tests in R or Python • Can create advanced analytics that can be run by the business as a 'leave behind' • Can create interactive visualizations from the DA tests and change the audit report format with visuals to convey a more impactful message • Knowledge of big data and cloud data sources that can be used to augment testing capabilities • Participates in thought leadership in DA activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/in the organization

⚙ Robotics Process Automation

Novice	Beginner	Follower	Expert	Leader

Novice
- No understanding, buy-in or interest in using Robotics Process Animation (RPA) tools
- No ability to audit Robotics Process Animation (RPA) bots or processes

Beginner
- Basic understanding of the benefits of RPA
- Responsible for consuming the results of an RPA bot but no understanding of HOW the bot works
- Involved in RPA workflows but does not build RPA bots
- Has attended training but is not actively using RPA
- Basic understanding of where RPA could be and/or is being used within the organization

Follower
- Can identify data sources and workflows required to create an RPA process
- Can create a single use/simple RPA bot
- Involved in RPA design but does not build RPA bots
- Can select from a library the correct RPA bot to use and activate it
- Can copy and alter an RPA to test a different hypothesis
- Has ability and/or limited experience auditing simple RPA bots
- Can identify rudimentary risks and address them "around the bot"

Expert
- Can identify use cases for RPA and help build the business case for tool usage/selection
- Can create and schedule RPA bots to test complex transaction or workflow sets and easily modify the bot when changes are required
- Can create a full end-to-end process bot that fully replaces a previously scheduled audit (i.e. T&E)
- Can create RPA bots that automate next action tasks based on a result or previous action
- Can manage change in a governed RPA environment
- Expertise in one of the standard RPA frameworks
- Has ability and/or experience auditing simple to moderate complexity RPA Bots
- Can identify more advanced/technical risks and address them when auditing "through the bot"

Leader
- Can influence the use of RPA in business, evaluate RPA software, and create governance rules for bots
- Can create advanced RPA bots that can be run by the business as a "leave behind"
- Can create RPA bots that use unstructured data (i.e. text)
- Can create RPA bots that "hunt" for scenarios and report back when matches are found
- Can create RPA bots to act predictively
- Can create bots to access multiple applications and data sources
- Participates in thought leadership on RPA activities, contributes to relevant journals, blogs, whitepapers
- Takes a leadership role in the training and upskilling of others on the team/organization
- Has ability and/or experience auditing moderate to complex RPA bots
- Can identify advanced/ technical risks when auditing "through the bot"
- Has tools and tests to audit RPA bots in an effective and efficient manner
- Can assess operational effectiveness of the bots (resource allocation)

Machine Learning / Artificial Intelligence

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in learning the value of Machine Learning (ML) or Artificial Intelligence (AI) • No ability to audit ML/AI platforms or organizational usage	• Basic awareness of the benefits of ML/AI and can describe a work practice that could benefit from this technology • Reads resources about ML/AI to further knowledge but does not benefit from having hands-on experience with the underlying technology • Basic understanding of where ML/AI could be and/or is being used within the organization	• Actively seeks out how peers are using the technology and adopts similar practices • Can describe a work practice that could benefit from the ML/AI technology • Some hands-on experience with ML platforms (i.e. Google TensorFlow, Amazon or Microsoft ML kits, or Apache Spark) for simple to moderate ML tasks on audit data • Has the ability and/or limited experience auditing simple ML/AI platforms/usage • Can identify rudimentary risks and address them for ML/AI platforms/usage	• Regular hands-on experience with ML platforms (i.e. Google TensorFlow, Amazon or Microsoft ML kits, or Apache Spark) for simple to moderate ML tasks on audit and/or organizational data • Reasonable knowledge of how to identify potential ML/AI bias in control or workflow design • Has the ability and/or experience auditing simple to moderate complexity ML/AI platforms/usage • Can identify more advanced technical risks and address them when auditing ML/AI platforms/usage	• Runs ML/AI tasks that automate significant audit processes or tasks • Designs ML/AI tasks that take decision tree-based follow on actions based on predictive behavior • Expert knowledge of how to identify potential ML/AI bias in control or workflow design • Participates in thought leadership on ML/AI activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization • Has the ability and/or experience auditing moderate to complex ML/AI platforms/usage • Can identify advanced/technical risks when auditing ML/AI platforms/usage • Has tools and tests to audit ML/AI platforms/usage in an effective and efficient manner

🔒 Cybersecurity

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in auditing cybersecurity beyond standard organizational training/annual confirmations	• Basic understanding of cybersecurity risks and controls • Can identify environments and applications that are governed by cybersecurity controls • Capable of identifying cybersecurity tests that are applicable to current audit scope	• Stays knowledgeable of the regulatory environment and current known threats (i.e. OWASP lists) • Understands the connections and exposures of organization-owned environments and applications • Can design new cybersecurity tests based on new information applicable to current audit scope	• Understands the connections and exposures of third-party environments and applications • Designs cybersecurity tests that either in-house or outsourced experts run to expose cyber risks (based on external or industry information) • Has access to and regularly monitors incident resilience planning and strategy • Understands and can assist outsourced experts when penetration tests are performed • Understands and can assist with HITRUST adoption and/or certification	• Designs cybersecurity tests that either in-house or outsourced experts run to expose cyber risks (based on internal hypothesis) • Organizes hackathons with ethical hackers • Consults with IT/CISO on cybersecurity control design or updates to design • Participates in thought leadership on cybersecurity activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization • Possess certifications, such as CISSP, CEH, CISM, CySA+, HITRUST CCSFP[1]

☁ Cloud Computing

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in how cloud computing affects the business/ organization	• Basic awareness of cloud computing • Understands the cloud computing environment and has inventoried it • Capable of identifying cloud computing tests that are applicable to current audit scope	• Stays knowledgeable of the regulatory environment and current known risks • Can design new tests based on new information applicable to current audit scope	• Understands the connections and exposures of the environment and its applications • Designs tests that either in-house or outsourced experts run to expose cloud risks (based on external or industry information) • Good knowledge of DevOps best practices • Has access to and regularly monitors incident resilience planning and strategy • Understands and can assist with HITRUST adoption and/or certification • Able to perform a "cloud readiness assessment" and advise an organization on cloud strategy"	• Designs cloud tests that either in-house or outsourced experts run to expose risks (based on internal hypothesis) • Strong knowledge of DevOps best practices • Consulted with IT/CISO (Chief Information Security Officer) on cloud computing control design or updates to design • Participates in thought leadership on cloud computing activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization • Possesses certifications, such as CISSP or CISM • Understands and can assess compliance with HITRUST adoption and/or certification

Process Mining

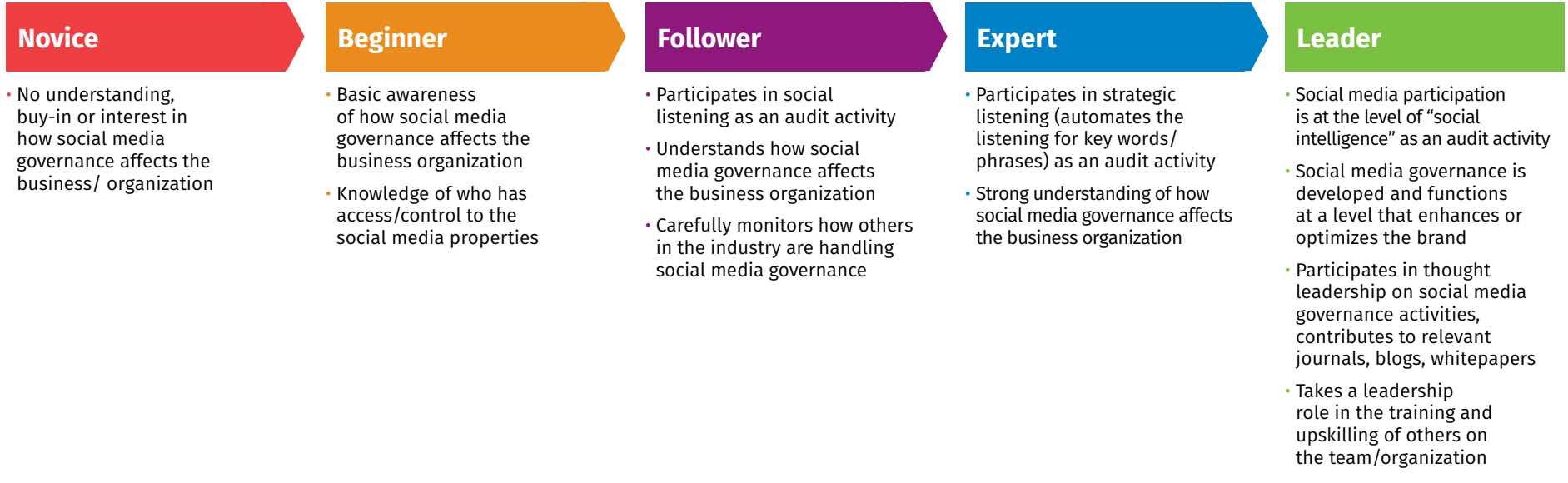| Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in how to use (mine) organizational data	• Basic awareness of process mining as a concept • Still continuing to use the designed process model as the basis for audits	• Able to construct/discover the desired process model • Understands the shortcomings of the designed process model and the actual process model • Seeks knowledge and training on process mining to bridge the gap between actual process and designed process • Identifies process mining tools	• Uses meta data to reconstruct the executed process • The actual process model is now the standard start point for further audit procedures • Expert in both business process conformance checking and performance analysis • Proficient in process mining tools, such as Celonis, Minit, Disco, etc.	• Currently uses a combination of AI and data analytics to provide unbiased visibility of an organization's process • Uncovers hidden bottleneck and opportunities to connect data sources to eliminate manual work or redundancies • Participates in thought leadership on process mining activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization • Professionally certified in process mining tools, such as Celonis, Minit, Disco, etc.

Data Exchange APIs

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in how data that is created in other parts of the organization can benefit audit data or tasks • No understanding, buy-in or interest in how data can be shared through APIs	• Basic awareness of APIs • Basic level of knowledge of the potential benefits of APIs with respect to sharing audit data with other assurance providers • Basic level of knowledge about the benefits of leveraging other data sources to better plan assurance activities • Basic awareness of APIs as a concept and the potential risks posed by APIs	• Understands the benefits of APIs • Actively investigates how others in same industry are leveraging APIs • Has identified various data sources within the organization that could be leveraged with APIs • Understands/has participated in creating an inventory of organizational APIs • Consideration given to assessing controls around APIs during audit planning, but APIs are not necessarily considered in the risk assessment process	• Understands the use and benefits of APIs • Understands the data sources and type of data that can be exchange • Actively realizes the benefits of APIs • APIs are regularly reviewed during audits • Possesses the relevant skills and knowledge to review a diverse array of APIs • Has extended audit plan coverage to third-party relationships where APIs are used	• Actively implements APIs across applications within the organization • Has a documented API strategy that aligns with business strategy • Participates in thought leadership on data exchange/API activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization • APIs are actively reviewed during audits • Risk assessment planning includes API components and potential risk exposures by third-party relationships and APIs • API testing is currently or will soon be incorporated into automated test plans

🪙 Blockchain / Cryptocurrencies

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in how blockchain affects the business/ organization	• Basic awareness of blockchain/cryptocurrencies as a concept • Seeks education on blockchain/cryptocurrencies	• Has developed an ability to identify the risk associated with blockchain/ cryptocurrencies • Seeks audit content on blockchain/ cryptocurrencies from others in the same industry	• Has developed own audit content on blockchain/ cryptocurrencies (library of risks, controls, procedures) • Auditor of smart contracts of the organization • Ability to identify risks of Blockchain as a Service	• Has deep understanding of blockchain/ cryptocurrencies • Positions blockchain as a solution with ecosystem differentiation, behavioral change and regulatory implications • Able to evaluate/assess existing private/public blockchain use cases • Active conducting audits of "Blockchain as a Service" – built, hosted applications on cloud-based solutions • Participates in thought leadership on blockchain activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization

💬 Social Media Governance

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in how social media governance affects the business/ organization	• Basic awareness of how social media governance affects the business organization • Knowledge of who has access/control to the social media properties	• Participates in social listening as an audit activity • Understands how social media governance affects the business organization • Carefully monitors how others in the industry are handling social media governance	• Participates in strategic listening (automates the listening for key words/phrases) as an audit activity • Strong understanding of how social media governance affects the business organization	• Social media participation is at the level of "social intelligence" as an audit activity • Social media governance is developed and functions at a level that enhances or optimizes the brand • Participates in thought leadership on social media governance activities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization

👁 Visualization / Business Intelligence Tools

Novice	Beginner	Follower	Expert	Leader
• No understanding, buy-in or interest in how business intelligence (BI) tools (i.e. Power BI, Tableau, QllikView, Spotfire, etc.) can benefit audit data or tasks	• Basic awareness of the benefits of BI tools • Incorporates the output of BI tools that others on the team create in their work product • Has attended training but is not actively using BI tools • Has access to BI tool licenses but is not using them	• Can identify data sources and required fields for BI tool usage to create visualizations • Can use pre-defined reports or visualization templates and can summarize/conclude on the results • Can define report/visualization requirements to an expert, and with some guidance, create own outputs	• Can effectively use BI tools to create visualizations to tell a story and/or convey significance in findings • Creates starter or templates for other team members to use • Regularly explores one or more data sets for trend identification and correctly selects the visualization (chart) to use to best explain the output	• Can effectively use BI tools to create visualizations of large data sets to tell a story and/or convey significance in findings • Regularly joins and explores multiple data sets including outside sources to create benchmarks, trend identifications and predictions in visual format • Participates in thought leadership on BI tool usage and opportunities, contributes to relevant journals, blogs, whitepapers • Takes a leadership role in the training and upskilling of others on the team/organization