

# **REAP THE REWARDS OF INTELLIGENT AUTOMATION IN ENERGY SECTOR WITHOUT INJECTING RISK USING DESIGN THINKING**

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## **ABSTRACT**

The power technology and intelligent automation revolution coupled with other factors like decarbonization, deregulation, decentralization, has the potential to transform today's workplace as dramatically as the machines of the Industrial Revolution changed the factory floor. In the support and technical functions, it plays a key role in driving greater efficiency, customer and employee satisfaction; while at the same time help rethink operating and business models. It's far-reaching, unpredictable in growth, and occasionally messy. How the energy and utilities industry evolves embracing intelligent automation over the next decade in meeting climate change goals and the growing demand for clean, cheap, reliable energy will have profound effects for generations?

To capitalize on the potential, many enterprises are jumping and experimenting with these "new shiny technologies" to gain hands-on experience by advancing individual pilots. However, research reveals, most companies have under-estimated intelligent automation's true potential. In fact, executives are seeing the experimental tactical fix projects are having longer implementation timelines resulting in budget overruns, leading to questions about the true value of automation. Or, realize automation of redundant processes that helped create efficiency and cut costs is only the first step; because collectively across the automations, they're not seeing the operational transformation they know is possible. Many organizations that have implemented automation at scale are in the same position. They have realized significant returns but are left wanting more: more value, more ROI, more impact. In some cases, where the projects have been abandoned when the leadership lost confidence in automation technologies - it has result in unrealized efficiencies and missed opportunities to gain the competitive advantage with outsized benefits.





This attention on intelligent automation has overlooked a critical element in the digital revolution - the workforce, both digital and human, need to integrate, manage and work alongside to disrupt and destruct. This paper focuses on: What drives this new, strategic approach of a shift in the focus from launching one or two automation projects to creating an end-to-end automation across entire process value chains? What are the automation derailers and traps that prevent from reaching scale? How to leverage "design thinking" to innovate using automation and scale? What are the automation lessons learnt you can implement, to increase speed, realize scale and maintain ROI?

## **KEYWORDS**

Design thinking, energies and utilities sector, human-centered design, intelligent automation, intelligent automation derailers.

## INTRODUCTION: OUR PLACE IN THE DIGITAL WORLD

The energy and utilities sector globally had a natural reluctance to ‘jump’ into new technology without prolonged periods of assessment and testing - at times lasting decades. But, the convergent effects of the four long-term trends 4-D’s “decarbonization, decentralization, deregulation, and digitalization,” along with the classic trilemma of “security, affordability, and sustainability”, is altering the way in which we use and think about electricity and utilities. Today, incumbents with an aging, often eclectic, and diverse legacy environment will need to completely change their approach to innovation and technology adoption to transform business and operating models or risk face becoming sidelined. A wake-up call to the laggards in the sector was given in May 2019, when UK went coal-free for 100 hours to power homes and industry continuously, setting new record for energy use. Coal currently accounts for under 10 percent of UKs power output and by 2025 they intend to phase out coal entirely, and become the first major economy to legislate for net zero emissions, (Telegraph, 2019).

			
ENABLING TECHNOLOGIES	BUSINESS MODELS	MARKET SERVICES	SYSTEM OPERATION
<ul style="list-style-type: none"> <li>• Utility-scale batteries</li> <li>• Behind-the-meter batteries</li> <li>• Electric-vehicle smart charging</li> <li>• Renewable power-to-heat</li> <li>• Renewable power-to-hydrogen</li> <li>• Internet of things</li> <li>• Artificial intelligence and big data</li> <li>• Blockchain</li> <li>• Renewable mini-grids</li> <li>• Super grids</li> <li>• Flexibility in conventional power plants</li> </ul>	<ul style="list-style-type: none"> <li>• Aggregators</li> <li>• Peer-to-peer electricity trading</li> <li>• Energy-as-a-service</li> <li>• Community-ownership models</li> <li>• Pay-as-you-go models</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing time granularity in electricity markets</li> <li>• Increasing space granularity in electricity markets</li> <li>• Innovative ancillary services</li> <li>• Re-designing capacity markets</li> <li>• Regional markets</li> <li>• Time-of-use tariffs</li> <li>• Market integration of distributed energy resources</li> <li>• Net billing schemes</li> </ul>	<ul style="list-style-type: none"> <li>• Future role of distribution system operators</li> <li>• Co-operation between transmission and distribution system operators</li> <li>• Advanced forecasting of variable renewable power generation</li> <li>• Innovative operation of pumped hydropower storage</li> <li>• Virtual power lines</li> <li>• Dynamic line rating</li> </ul>

Source: Adopted from (IRENA, 2019)

**Figure 1: The innovation landscape**

Advances in the power technology and cost declines in areas such as – battery storage, distributed energy resources, electrical vehicles, microgrids, sensors, drones, smart buildings, ubiquitous behind-the-meter devices, solar power, two-way power flows, wind power, all create unprecedented

opportunities to innovate. Another enabler is the development and decline in costs for vital building blocks such as computing power, mass scale data storage, and internet bandwidth. The developments in power technology, running in parallel with the digital revolution like intelligent automation (IA), mobility, and social media adoption, is opening up new easier ways of generating, controlling, managing and trading energy, and boosting innovation as shown in Figure 1.

The rapid transition has profound impact on the way we will light our homes and communicate, fuel cars, and power our industries. It also has implications on customer preferences; competitive landscape; traditional roles along the value chain; investor landscape; regulations for distribution, transmission and retail, etc.

While, technological innovation is at the heart of these shifts and plays a pivotal role in managing the balance between demand and supply, many incumbents are struggling to make innovation breakthroughs, particularly the ones at the consumer end of the value chain. These opportunities are opening doors for startups, and companies from adjacent industries like ‘oil’, conglomerates in technology, retail who are competing with incumbents that have historically enjoyed dominant positions and disrupting the industry. Furthermore, moving away from mature markets into fast-growing but often more volatile and less familiar environments, is making many incumbents still dabbling with traditional technologies, vulnerable across the globe. The options for the incumbents and new players alike on the new spectrum is ranging from ‘passive and market-following’ to ‘innovative and market-making’.

While, technological advances and regulatory change may be ‘push factors,’ the ability to influence the customer behavior is likely to become a strong ‘pull factor.’ We anticipate new ‘role’ among the market participants and a distinction will emerge between energy suppliers, enablers, integrators, and optimizers with different points of focus along the value chain. The key is to rethink: Defining the future role of the enterprise is central to shape their business model and operating procedure to reach new levels of performance, to deliver on goals and aspirations, and value to stakeholders.

That said, on the journey to get there, the early movers have realized that innovation does not automatically come from new technology. In many cases it can be from a radically new approach to solve a problem or addressing an opportunity. To thrive in this bright future full of opportunities, the companies in this industry will have to develop new capabilities and transform their working environment. The companies who can adapt, learn and scale fast are likely to emerge winners, as the market are all set to become more decentralized, fragmented, and interactive than ever before. This requires a shift in these mindsets:

- **Accept every business is an energy business** - where consumers and other businesses are able to generate energy on their own and become producers “**prosumers**”. As energy can come from anywhere and can fluctuate wildly from day to day, they need an ability to store and sell excess energy to peers; and expect a sophisticated, service-based industry (require onsite or outsourced staff to manage energy);
- **move from guts to data-driven decisions** - allows leadership across all levels to process vast amounts of data and discover, make a gut check triggered by a stimulus that requires attention, relook at the data to justify a bias-free decision they make;

- **a medium to long-term capital innovation program to fit-for-purpose funding, rapid, repeatable innovation cycle** - move from idea to operational offering in short timeframes, by creating new innovations to leverage the multiple window of opportunities, with the ability to experiment and iterate, applying a “scale or fail” mentality.

While, the range of paths to choose from to move forward and the speed of transformation, depends on where the company is geographically located and where they are today along the innovation journey, it gives rise to three central question: *How might IA impact our business over the next five to ten years? How best are we geared to become agile and embrace IA in meeting diverse market needs, deliver value and design future business models? What can we do to build a sustainable innovation capability?*

This paper will discuss why design thinking is a critical capability that will help the industry is moving forward, and help businesses plot an intelligent automation (IA) path aligned with business strategy to innovate and thrive amidst uncertainty. The key is to recognize that an imperfect view of the future will likely lead to an unfinished portfolio of products and services that will evolve through time.

## DEMYSTIFYING INTELLIGENT AUTOMATION

“Intelligent automation” (IA) is constellation of digital technologies and methods, changing relationship between humans and machines, to drive the right outcomes for each style of work – and free people to work on things that can’t be automated. Intelligent Automation is also a term that defines a holistic solution for the prevalent trend “digital transformation” fundamentally changing how the business operates.

IA is not the latest wrench for tightening the next dollar out of your business operations using emerging technologies - there are more than dollars at stake. It represents a new way of thinking and execution that enables organizations to continually discover, learn, change and grow as they strive to meet business objectives. It does so by digitizing and structuring data, processing and evaluating information to enable cognitive decision-making to fundamentally change how work is performed, and improve the routine, predictable and rule-based processes.

The compelling case for IA is multifaceted and includes a number of interconnected benefits, all pointing towards the company's ability to innovate, perform, be accountable, auditable, reduce cost and risks, resulting in:

- performance of both support and core business functions,
- enable new business models, products and services,
- the efficiency and effectiveness of the employees resulting in their satisfaction,
- and ultimately, the experience of the customer.

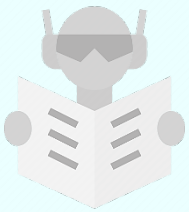
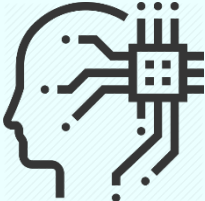
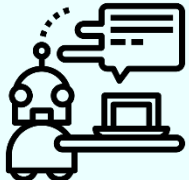


IA will automate a wide range of routine tasks (simple and repetitive to complex and unique) in the energy and utilities industry, both in the field – demand/supply balancing services, smart and efficient energy generation, storage, distribution and omni channel retail and so on, and in support functions such as procurement, supply chain, finance, and human resources, as shown in Table 1.

<b>Expert work</b>  Increase impact and productivity of employees with assisted automation.  Example: Quality: Defect detection Sales: Personalized consultation		<b>Cross-enterprise work</b>  Deliver end-to-end journeys across the value chain  Example:  Grid behavior interface: Under customer behavior by measuring parameters such as grid load, electricity consumption and generation, weather forecasts, and electricity prices  Customer support: Channel-agnostic solution to enhance CX a) resolve customer complaints on issues such as outages and bills b) personalized offers using consumer's insights c) proactive alerts wrt outages, or adopting some best practices based on usage insights  Enable new business models, products and service
<b>Administrative work</b>  Reduce manual efforts and minimize the burden of compliance and audit  Example: Compliance documentation	<b>Departmental work</b>  Reduce departmental efforts with low code application  Example: <b>Finance and Accounting:</b> Pricing calculations, order entry; <b>Procurement:</b> Updating inventory records, responding to customer and supplier requests, contract management <b>Human Resources:</b> Employee data management, expense tracking and approval, absence management, HR compliance and reporting; <b>Operations:</b> Remote and predictive maintenance; develop a hyperlocal weather forecasting system	
<b>Repetitive work</b>  Reduce manual efforts and minimize the burden of compliance and audit  Example: Copy and paste between systems, responding to L1 queries		

Source: Author analysis

**Table 1: Types of work common to most energy and utility organization**

The rule-based technologies automate high-volume, repeatable tasks without errors and imitate human actions and include IT process automation (ITPA), robotic process automation (RPA) and DPA (digital process automation) for automating large-scale processes enterprise-wide. Artificial intelligence encompasses a range of technologies that learn from diverse data sources to exhibit perceptual and judgement-based behaviour and capabilities that we perceive as intelligent. The AI technologies include: biometrics, context-aware computing, chatbots or voice bots, digital forms, image and video analysis, machine and deep learning, natural language generation, speech recognition, swarm intelligence. The emerging technologies include block chain, 5G, serverless computing and so on. An IoT platform, helps create a digital twin (a virtual representation of a physical asset or a device) and connects different components of the infrastructure using a network of sensors, connecting energy, information flow, materials, and products, to gather insights how business functions. Advanced analytics analyzes the data collected for better decisions about resource consumption. Cyber security to defend against increasingly virulent cyber-attacks.

“DIGITAL” EMPLOYEE SKILLSET	BRIEF DESCRIPTION
 <p><b>Digital Reader</b></p>	<p>This colleague is a specialist at responsible for capturing and uploading data for use across the enterprise by reading information off documents and images.</p> <p>For example, a warehouse employee must write down and manually enter new shipments of parts and equipment that arrive. This colleague will capture images of packing slips and automatically update the inventory.</p> <p>Components - Data Collection, Preparation, Entry, Validation; Next Gen OCR , Machine learning, Keyword-based recognition, Variable format processing</p>
 <p><b>Digital Processor</b></p>	<p>These coworkers are specialists in performing system actions, an activity that is often categorized as robotic process automation (RPA). They do this replicating specific tasks or keystrokes using existing system screens, just like a person would do it, only a lot quicker.</p> <p>For example, they create work orders, update inventory, implement price changes and much more.</p> <p>Components: RPA - Entering data into systems, processing data in Microsoft Excel, sending emails, comparing datasets</p>
 <p><b>Digital Communicator</b></p>	<p>This associate is communication focused and a language (text and voice) specialist who is able to understand natural language and have a conversation with a person in the language of their choice (Chatbots). NLP uses statistical methods and learning algorithms to analyze text and unstructured information to understand the meaning, sentiment and intent.</p> <p>Components: Mimics end-to-end processes and applies reasoning, Speech-to-Text Conversion , Machine Learning, Narrow Intelligence, Natural Language Processing (NLP), Web Chatbots</p>
 <p><b>Digital Navigator</b></p>	<p>This co-worker makes rule-based decisions and actions in line with all product, policy and procedures and, like the map apps on your phone, navigates you through the decisions and actions you need to perform in a consistent, compliant and context-relevant way.</p> <p>Components: Built-in knowledge repository, Learning capabilities, Ability to work with unstructured data, Pattern recognition, Reading source, data manuals, Natural language processing</p>
 <p><b>Digital Thinker/Predictor</b></p>	<p>This teammate is a cognitive specialist and an expert in making predictions from data patterns.</p> <p>For example, in determining what your customers will want to buy next based on their purchase history or assessing if they are a fraud risk based on a huge range of possible predictors gleaned off multiple data sources.</p> <p>Components: Complex Rules &amp; Learning using Structured and Unstructured Data, Mathematical validations to process super datasets, predictive analytics, Evidence-based / Self-learning (sometimes self-optimizing)</p>

**Figure 2: Digital “Employees” Categorized Based on Their Skillsets**

In general, “human” employees, will move from data collection, repetitive, rule-based tasks and reporting duties to more value-added activities and performing physical tasks that robots struggle to get right. Figure 2 shows how IA helps humanize digital “employees” and can be categorized by skillsets. In this context, IA at times can be seen in a negative light. You often see stories about “predicted job losses” as the “robots take over” particularly by the press and analyst community.

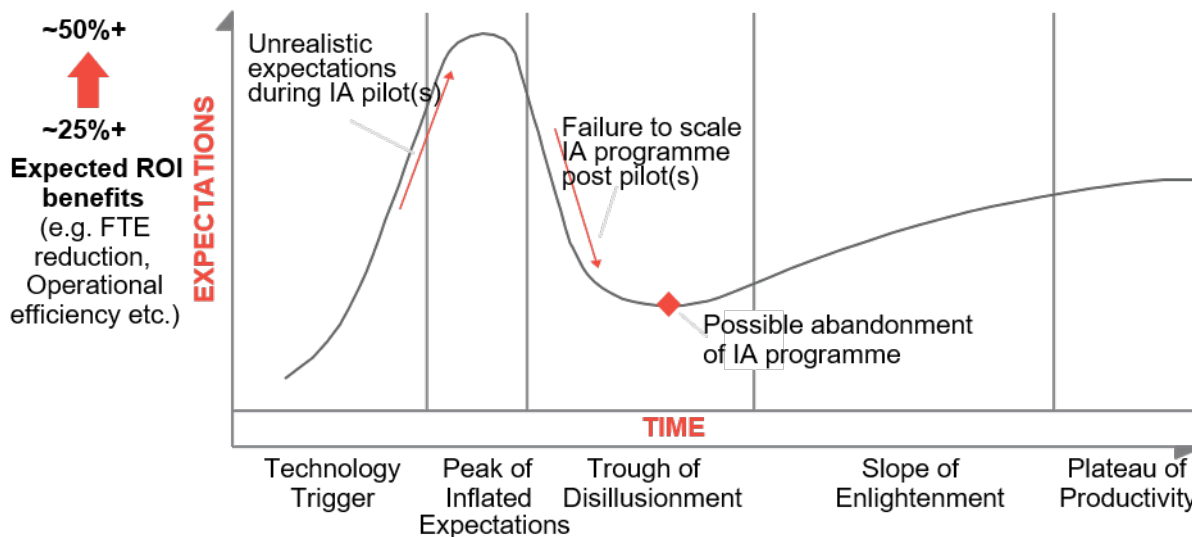
As a number of organizations are already demonstrating, IA offers significant potential:

1. AppOrchid, a US-based startup is deploying deep learning and natural language processing to understand grid behavior under variable wind conditions (App Orchid).
2. Con Edison, a US utility offers an hourly pricing program, enabling consumers to shift their load and save approximately 15% on the electricity bill. (Con Edison, 2018)
3. Xcel Energy, a US-based electric and gas utility, uses data from sensors on wind turbines to develop high-resolution wind forecasts through predictive analytics and AI. They have reduced costs to end customers by \$60 million by increasing efficiency of generation. (HBS, 2018)
4. Gazprom, used RPA to automate verification of meter readings. Within 2 weeks of going live, an employee could validate 130 invalid meter reads, saving 10 hours of work per employee.
5. IBM has installed solar PV-powered DC mini-grids for its datacentre in Bangalore, India providing a reliable and clean back-up. The system provides 50kW of DC for 330 days a year and result in a 10% reduction in energy consumption as compared to AC power (IBM, 2011).
6. International Power Systems from Bulgaria has developed Exeron, a plug-and-play system to remotely monitor and switch between multiple energy sources such as solar PV panels, wind and a battery system. It offers significant savings in operational expenses and can provide off-grid electricity at a cost of USD 0.28/kWh. (Exeron, 2018).
7. Offset Solar, a US-based solar company, generated \$1.2 million revenue within six months using a simple homepage messenger chatbot (Many Chat, 2019)
8. Open Utility, a UK-based start-up, has peer-to-peer activity using its algorithm-based platform, Piclo Flex. This is the UK’s first online marketplace for renewables, provides commercial energy users & generators an intuitive, and transparent way to buy and sell power (Piclo).
9. Pacific Gas & Electric has employed machine learning to increase the accuracy of load reduction forecasts for demand response (Engerati).
10. STEM, a US-based energy services provider, helps commercial and industrial customers reduce their energy bills by using the energy stored in their batteries during periods of peak demand, using a cloud-based analytics system to identify best time to draw energy (Colthorpe, 2017).
11. Tokyo Electricity Company, aim to install approximately 29 million residential smart meters by 2020 and are striving for real-time transmission and processing of power consumption (cumulative) every 30 minutes ((TEPCO, 2019).
12. United Utilities, UK’s largest water utility, recently tested an AI platform to analyze large data sets on factors such as weather, demand for water, pump performance and electricity prices. Enables cost-effective and efficient way to run pumps, detect burst pipes and minimize the risk of discolored water. During the trial, the utility saw energy savings of 22%. (DataQuest, 2019)
13. Vestas Wind Systems is using a digital solution to deliver faster, more efficient, and more cost-effective wind turbine installations, providing clean energy. It wants to provide workers in the field, managers, subcontractors, customers, and suppliers with accurate, real-time information 24x7 wherever they are, connected or offline (SAP).

## THE DERAILERS TO SCALING IA ADOPTION

With so many potential benefits by harnessing IA for business model, efficiency gains and customer intimacy, it's not surprising that many companies have already implemented some form of it. Your business team evaluate the vendors (Automation Anywhere, Blue Prism, UiPath, etc.) and firm up the automation tool. The pilot proves that the 'chosen' tool (works effectively with one or more core systems. It also demonstrates that the IA application does not take too long to build and test. Often, businesses drive these pilots without 'too much' involvement from the IT team. Often, one successful pilot result in a strings of pilots across the organization. Alas with a few months, business teams, realize that the bot has been underutilized, as they learn the hard way since not all automated processes were suitable for this tool in the first place. One team realized that apart from integrated back-end technologies, a successful chatbot experience requires sparkling creative and marketing chops. Soon, IT team gets involved, when maintenance of the tool becomes ever more difficult due to lack of coding standards and governance. Alternatively, the business involves IT, who help develop an initial business case through 'process discovery'. Over the next few months IT team find that the benefits fall short of expectations due to asymmetry of information, changing applications and process flow.

In both the scenarios, the IA pilots are quite successful, but eventually the project never scales. Despite the innovation promised by IA, most incumbents struggle with realizing the benefits – and for reasons often not related to technology. The question is: What's holding back wider adoption and integrating it with the enterprise strategy?



Source: Adopted from Gartner

**Figure 3: Pilots rarely fail but program seldom scales**

We find Gartner's Hype Cycle construct as shown in Figure 3, useful in depicting the typical journey of an IA program – where the pilot usually is a success, but program fails to scale. The 'Peak of Inflated Expectations' phase sets unrealistic aims for business outcomes through an IA program. This phase is concurrent with the string of successful IA pilots in the organization mentioned above. The

‘Trough of Disillusionment’ phase is concurrent with realization of the challenges mentioned above for scaling the IA program, which in some unfortunate cases results in its abandonment of IA program.

Based on our research and discussions with executives in many companies, the reasons for disappointment can be classified into four broad areas:

- 1) Tool based approach for identifying IA use cases or applications
- 2) Implementing IA with traditional IT project implementation playbook
- 3) Internal organizational barriers to adoption
- 4) Underestimating the significance of innovation outside of product design

### 1. Tool based approach for identifying IA use cases or applications

Based on our experience, an approach focused on finding applications for specific IA tool achieves unsatisfactory results. This tool-led approach is basically unreliable. To start with, every technology tool has limitations that restrict the potential scope of automation. When you focus on a specific tool, you create the scenario of a hammer looking for a nail. In these circumstances, if a process includes tasks that the tool can’t solve for, the process is often rewritten to fit the tool – rather than optimizing the process itself. Overstretching the abilities of a specific tool – using it to solve for something it isn’t intended to solve – is another common pitfall.

	TaskBots	MetaBots	IQBots	Artificial Intelligence (AI)
Description	<ul style="list-style-type: none"> <li>- Replicate complex process actions</li> <li>- Perform actions taken by humans at presentation layer of any desktop-based application</li> <li>- Capable of executing multi-step processes</li> </ul>	<ul style="list-style-type: none"> <li>- Leverage API-level integrations to create system-to-system automations</li> <li>- Share automations with Task bots</li> <li>- When combined with Task bots, Meta bots are ideal for multi-skill processes</li> </ul>	<ul style="list-style-type: none"> <li>- Learn and adapt over time</li> <li>- Become independent but with fewer errors</li> <li>- Leverage unstructured data</li> <li>- Capable of making decisions based on accumulated learning and experience</li> </ul>	<ul style="list-style-type: none"> <li>- Combines smart data and smart algorithms</li> <li>- Decision making based on machine learning and synthesis of large datasets</li> </ul>
Best for	Repetitive, rules-based tasks relying on structured data	Complex, scalable processes	Managing through fuzzy rules and processing unstructured data	Language interaction, processing and dealing with high amounts of unstructured data
Examples	<ul style="list-style-type: none"> <li>• New supplier registration</li> <li>• Change of points of contacts</li> <li>• Inventory</li> <li>• Structured storage of documentation</li> </ul>	<ul style="list-style-type: none"> <li>• Basic reporting generation</li> <li>• Contracts execution follow-up</li> <li>• Flaws detections</li> </ul>	<ul style="list-style-type: none"> <li>• Auctions</li> <li>• Customer charge-backs</li> <li>• Demand forecast generation</li> <li>• PO generation</li> <li>• Payments screening</li> </ul>	<ul style="list-style-type: none"> <li>• Fraud investigations</li> <li>• Customer complaints</li> <li>• Advanced financial risk management of ongoing contracts</li> </ul>

**Table 2: Robotics Process Automation Types and Applications in Procurement**

Let's look at an example of tool-led automation where you may encounter the issues discussed. Your Procurement team attempts to automate the New Supplier Registration process using only robotic process automation (RPA). Since RPA cannot read any data that is non-electronic with unstructured inputs, the process might be re-engineered to add a manual step where a human inputs key new supplier details in a format the RPA tool can utilize, leaving the system exposed to human resources and resulting in employee dissatisfaction for continuing to doing a low-end job. Alternatively, the RPA capability may be stretched to mine information from the paper based registration forms using optical character recognition (OCR) and/or natural language processing (NLP).

Additionally, there was limited deliberation of how an IA tool may reimagine a process. Though a lower value business case, the process could have been changed to accept new supplier registration online from the company portal and integrated with an ERP. Alternately, only soft copies of the supplier form should have been accepted. The bottom line is not every problem requires IA. Nor can IA solve any problem. So, before selected a tool based approach, it's absolutely critical that you understand the limitation of each IA tool, as shown in Table 2. Quite a few of these scenarios lead to lower value business cases and impede the ultimate goals of digital transformation. The remedy lies having clarity about the problem being solved or objective at hand and then applying automation holistically, considering the full automation toolkit and selecting the most appropriate technique and relevant high-value automation candidate in each situation.

## 2. Implementing IA with traditional IT project implementation playbook

Criteria	Intelligent Automation	Traditional IT
Time to value	Days/weeks	Months/years
Cost to achieve	ROI in months	1+ years to ROI
Human Resource Impact	People replacement; job profiles will undergo a change; free up people to do more creative work	Increase in efficiency of people
Project Management	Collaborative and co-creative; flexibility to experiment and make changes to find the best alternative solution	Top-down approach, with little or no scope to making change
Vendor management	Manage multiple software and hardware vendors and system integrators	Usually manage 1 or 2 software and hardware vendors, 1 System Integrator
Ownership and Transparency	All team members share ownership of the project	Only project manager is responsible
Problem Solving Approach	Team members have authority to take decisions to avoid wasting time; quick and short iterations provides checkpoints at regular intervals	Team member need to escalate issues to project manager; delay in decision making
Development	Business driven, presentation layer integration	Complex IT architecture and implementation
Maintenance	Super User, teachable robots	Rigid/time consuming
Focus	Speed to value, low and medium complexity	Complex enterprise automation projects
Security	User driven access	Enterprise standards

Source: Author analysis

**Table 3: Comparison between Intelligent Automation and Traditional IT Implementation**

A traditional IT program implementation might follow one process: choose a vendor, buy the tools, cascade the rollout. little to no scope for making changes. It is usually a costly and time consuming approach. IA on the other hand, requires a different way of thinking, because it is a business strategy to enable intelligent decision-making, not a piece of software. Table 3 highlights the difference between implementing IA and traditional IT solutions. It can be done finding ways to reengineering existing processes to reimagine new processes. It allows faster time to market, with business process-focused digital workforce development.

Further, IA projects require considerable integration and re-engineering of process flows. Force-fitting these solutions to existing structures carries risks: financial, safety, or reputational. Many implementations disappoint because they try to automate everything they can, rather than everything they should. In our experience, another reason for failure is organizations usually over-emphasize the difficulty of technology execution and underestimate the importance of process re-engineering and workforce impact.

Apart from the classic IT investment dilemma that closely depends on the business case and existing architecture, the implementation of IA solutions poses different challenges, from investments needed in power technology and infrastructure development to other kinds of obstacles, such as regulatory challenges, complexity rising from the coordination of multiple stakeholders and/or possible changes in the roles of the main actors, to challenges created by the political environment, international settings, etc. Table 4 illustrates the high-level challenges that may appear for different solutions and innovations.

	INVESTMENT REQUIRED	CHALLENGES
Enabling Technologies	<ul style="list-style-type: none"> <li>High in hardware investment</li> </ul>	<ul style="list-style-type: none"> <li>Operation of enabling technology</li> </ul>
Business Model	<ul style="list-style-type: none"> <li>Limited in hardware, but high in software (investment in personnel and software may be needed)</li> </ul>	<ul style="list-style-type: none"> <li>Change in regulation may likely be needed</li> <li>New Digital technologies need to be implemented (like sensors and predictive models)</li> </ul>
Market Design	<ul style="list-style-type: none"> <li>Limited in hardware, but high in software (e.g., investment in software in power exchanges and market participants)</li> </ul>	<ul style="list-style-type: none"> <li>Change in the regulatory framework</li> <li>Political challenges</li> <li>International co-operation may be needed</li> <li>Co-ordination between several different stakeholders</li> <li>Changing roles of the actors in the power sector</li> <li>Because of winners and losers, may take time to agree and implement</li> </ul>
System Operation	<ul style="list-style-type: none"> <li>Limited in hardware, but high in software (new software, tools, control systems may be needed)</li> </ul>	<ul style="list-style-type: none"> <li>Availability of data</li> <li>Data handling</li> <li>Change in regulations may be needed</li> </ul>

Source: Adopted from (IRENA, 2019)

**Table 4. Challenges for implementing different innovations and solutions**

### 3.Internal organizational barriers to adoption

The latest study of assessing the digital portfolio initiatives of 134 best-in class digitally mature companies by analyst firm Forrester showed that these businesses still lag in emerging technology adoption (Forrester, 2019). The survey of 2,473 organizations by another analyst firm IDC indicates, only 25% have developed an enterprise-wide AI strategy (IDC, 2019). Most organizations reported some failures among their AI projects with a quarter of them reporting up to 50% failure rate; lack of skilled staff and unrealistic expectations were identified as the top reasons for failure (IDC, 2019).

Other surveys highlight the reasons for IA innovation failures are constrained by the disconnect between the contemporary front end and a manual, dated back office. Additionally, departmental silos, internal resistance due to fear of job loss and the risk aversion of many in operations make cross-functional, creative cooperation a relatively rare occurrence. A majority of the organizations are still struggling to figure out relevant use cases to use IA and make an impact. The reason sighted is the current organizational practices are flawed and leadership lack the vision and right mindset to kick start initiate culture and change management, and a transformation simply magnify those flaws. While experimenting with IA you may see multiple challenges as stumbling blocks to scaling, Table 5.

TECHNOLOGY RELATED CHALLENGES	TALENT RELATED CHALLENGES	BUSINESS RELATED CHALLENGES
<ul style="list-style-type: none"><li>• Process fragmentation</li><li>• Integrating IA technology with legacy systems (operating models, designs and processes) and tools</li><li>• Data availability, quality and data governance concerns</li><li>• Complex IT security requirements and cyber security challenges and threats</li><li>• Inadequate IT suppliers in emerging areas</li><li>• Mismatches with vendors</li><li>• Significant capital outlays in IA technologies, grid hardware, distribution network planning and analysis tools, and distribution management and customer systems</li></ul>	<ul style="list-style-type: none"><li>• Inadequate technological awareness at senior management/ board level</li><li>• Lack of technological awareness in mid-management level</li><li>• Inadequate change management and governance capabilities</li><li>• Limited efforts to reskill for employees</li><li>• Employee resistance to learning new skill sets</li><li>• Difficult to retain skilled/reskilled employees</li><li>• Lack of communication between data scientist's and end users</li><li>• Internal resistance to change due to fear of job loss</li></ul>	<ul style="list-style-type: none"><li>• Lack of leadership commitment and vision for IA</li><li>• Maturity of current governance models</li><li>• Unrealistic expectations</li><li>• IA viewed as replacement for human workers</li><li>• articulation of potential use cases and develop a roadmap</li><li>• Lack of back/middle office alignment to customer needs</li><li>• Inability to experience quickly</li><li>• Lack of coordination across different business units</li><li>• Inadequate budget</li><li>• Leadership can't effectively manage humans and machines</li><li>• Organizational ethos not allowing to experiment technology to replace humans</li><li>• Challenges in measuring a proving business value</li><li>• Ineffective change and culture management</li><li>• Organization silos</li><li>• Risk aversion</li></ul>

Source: Analysis by author.

**Table 5: Stumbling Blocks to Scaling IA Adoption**

#### 4.Underestimating the significance of innovation outside of product design

Part of the problem stems from a fundamental underestimation of the importance of innovation outside of product design. Table 6, based on experience and observations over the last decade, emphasizes the diversity of innovation value sources, and highlights how business processes are at the core, not just of the scalability, but also arguably the design, of much innovation that evolves beyond mere invention.

Profit	Network	Structure	Process	Product performance
<ul style="list-style-type: none"> <li>•Pricing model</li> <li>•Pay per outcome vs pay per resource</li> <li>•OEM, licensing, royalty</li> <li>•As a service vs product implementation</li> <li>•Managed outcome for client</li> <li>•Value sharing</li> <li>•Pay to customise</li> <li>•Limiting Supply</li> </ul>	<ul style="list-style-type: none"> <li>•Open innovation</li> <li>•Partner ecosystem to utilize each other's resources, processes, technology, offerings, channels, brand etc.</li> <li>•Crowdsourcing</li> </ul>	<ul style="list-style-type: none"> <li>• Arrange tangible and intangible assets to give the best results. It can include everything from superior talent management systems to ingenious configurations of heavy capital equipment.</li> </ul>	<ul style="list-style-type: none"> <li>•Outsourcing</li> <li>•Intelligent process automation</li> <li>•Crowdsourcing</li> <li>•Standardization</li> <li>•Radical efficiency</li> <li>•Design</li> <li>•Production flow</li> </ul>	<ul style="list-style-type: none"> <li>•Value of product taking into consideration features and quality</li> </ul>
Deloitte, Fortnite, Syngenta	GE Eco imagination, Microsoft, Huawei	OneLeap, NetFlix, WeWork, Perpetual Guardian	Ali Express, Amazon Web services, Google, Tesla	Amazon, Jaipur Foot, Gorilla Glass, Raspberry Pi
Product system	Service	Channel	Brand	Customer engagement
<ul style="list-style-type: none"> <li>•New features</li> <li>•Aggregated feature, bundle</li> <li>•Ease of use</li> <li>•Safety</li> <li>•Environmental</li> <li>•Personalization</li> <li>•Product systems</li> <li>•Platform</li> </ul>	<ul style="list-style-type: none"> <li>•Product as a service</li> <li>•Productized service</li> <li>•Product/service platform</li> <li>•Financing/leasing</li> <li>•Guarantees</li> <li>•Personalized support</li> </ul>	<ul style="list-style-type: none"> <li>•Omni channel</li> <li>•OEM/Partner</li> <li>•Flagship stores</li> <li>•Direct to consumer</li> </ul>	<ul style="list-style-type: none"> <li>•Extension</li> <li>•Co-branding</li> <li>•Private labels</li> <li>•Certifications</li> </ul>	<ul style="list-style-type: none"> <li>•Deliberate orchestration of any relevant previous characteristic to deliver cohesive, designed human-centred experience</li> </ul>
Apple, AirBnB, Intel, P&G, Ryobi, SAP, Zapier	Amazon, GE Capital, Uber, Kroger, Purple Bricks	Amazon, ING direct	Nike, Virgin	Apple, Amazon, Tesla

Source: Adapted from Doblin, "Ten types of innovation"

**Table 6: Ten Types of Innovation**

The Ten Types of Innovation offers companies a structured way to understand and pursue innovation through intelligent automation. It demystifies the innovation process and makes it easier, less risky, and more reliable and replicable, IA is already helping businesses rise above conventional performance tradeoffs to achieve unparalleled levels of efficiency and quality. Applications range from the routine to the revolutionary business model: from collecting, analyzing, and making decisions about textual information to guiding autonomous vehicles and advanced robots.

## TAKEAWAY: WE NEED AN INNOVATION APPROACH TO INTELLIGENT AUTOMATION

Against this backdrop, Design Thinking, a proven innovation approach, should not be perceived as a “soft” concept better suited for marketing teams. While these teams have indeed been the first to harness its power. Design Thinking has been at the core of the success of some of the older giants and designer-founded digital unicorns, such as Airbnb, Google, LinkedIn, and Uber in the world. With human-centricity at the core, it has a dual problem orientation - Top Down (Make Money) + Bottom UP (Create Magic) works from day one to uncover two separate sets of problems - those of the consumer and those of the business to innovate.

The Design Management Institute found that over the past ten years, companies earlier rooted in engineering and Lean Six Sigma, have outperformed the S&P by 228% illustrated in Figure 4 by embracing design thinking for digital transformation.

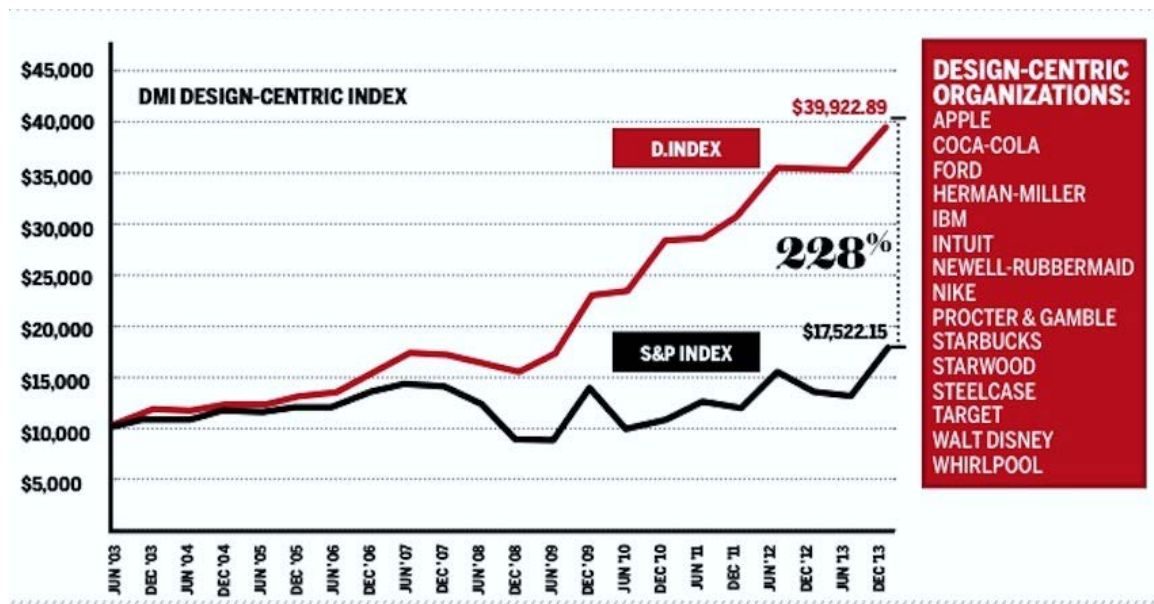


Figure 4: Performance of 'Design Index' vs. S&P

The opportunity however is very significant. Just as Lean and Six Sigma principles reinvented how large enterprise processes work, Design Thinking has started to empower middle and back offices, together with front-office operations, to harness the power of digital and ultimately deliver not just on the traditional cost-reduction agenda, but rather on organizations' new mission to deliver superior customer experiences while achieving unprecedented growth and agility. Applied to intelligent automation, design thinking shifts the focus from individual business actions that accomplish specific tasks to broader strategies that accomplish entire outcomes, resulting in more comprehensive transformation and higher returns.

## CHARTING THE 'IA' PATH: ITS ALL ABOUT OUTCOMES

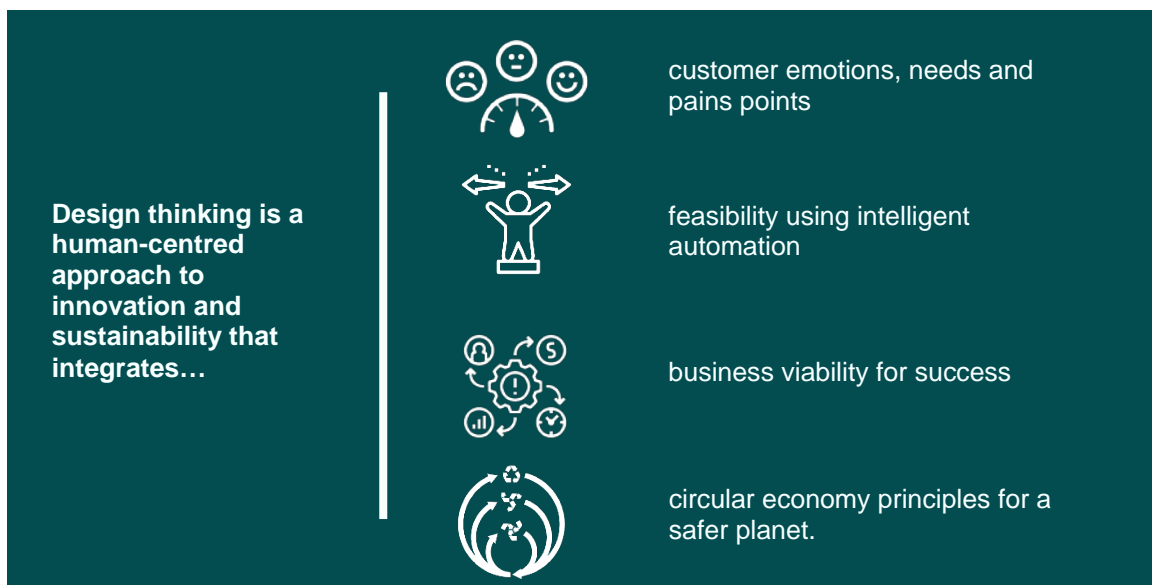
Picture this: Your organization has decided that IA can deliver big benefits - and identified you're the right person to make it happen. On one hand you have a long list of IA candidates, with ideas coming from multiple parts of your organization, and each department is sure that their processes are the best place to start. On the other hand, you realize your business leaders need to stop viewing automation as a functional exercise and take an enterprise approach to plan for scale enabled by strong governance structure and a change management angle. Where do you start?

### LEARNING FROM CUSTOMER EXPERIENCE

Think about your favorite experiences as a consumer. Maybe it's hailing a car using a ridesharing app or buying tickets to a concert followed by a table at your favorite restaurant to relax with your friends. It's very likely that design thinking techniques went into creating that experience. Simply put, design thinking (aka human-centered design) is an immersive process that helps organizations build leading products and services by looking beyond individual tasks (requesting a car on your phone to the larger intended outcome (arriving at your destination)).

### HOW DESIGN THINKING WORKS

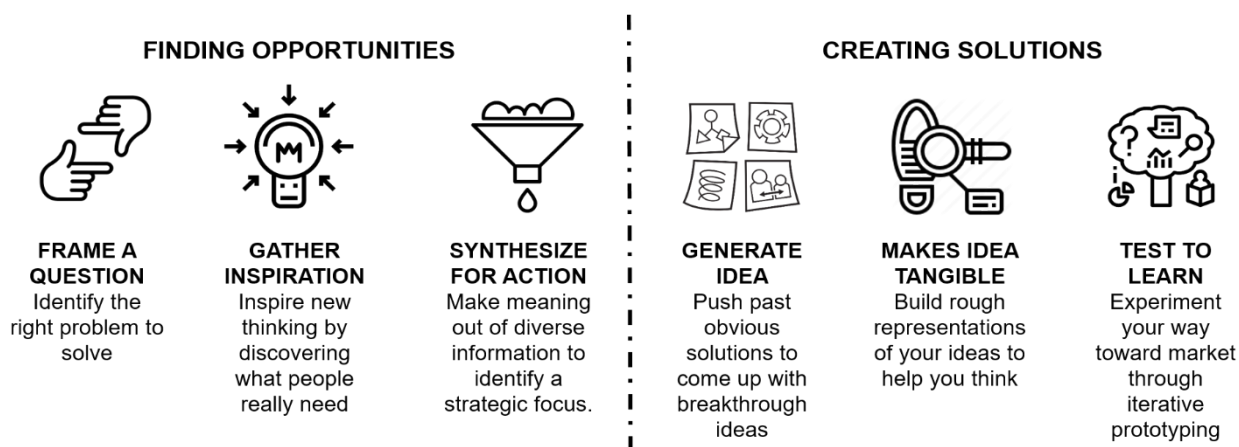
Design Thinking is an outcome-based, human-centered approach to innovation and sustainability that integrates customer emotions, needs and pains points; the feasibility using intelligent automation; the business viability for success; and the circular economy principles for a safer planet, as shown in Figure 5. It crystallizes customer experiences into an executable prototype, and enables cross-functional experiments - and ultimately builds - end to end, across the enterprise, processes that serve a specific business outcome.



**Figure 5: Build end-to-end holistic solution**

Design thinking is a creative, complex problem-solving methodology rooted in a set of skills, which can be readily learned by people. It views every problem as an opportunity to differentiate and disrupt. It gives you a flexible way to generate new strategies in response to constantly-evolving customer expectations and needs. Designers have hundreds of tools and ways to discover problems, conduct qualitative and quantitative research, ideate solutions, build prototypes and test use cases to find the best path forward. The design thinking innovation process is shown in Figure 6.




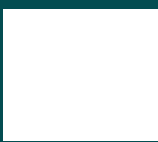




Firstly, it encourages your team to set the context, by empathizing with the customer to fully understand the problem before looking for solutions. Often, you realize the problem you need to address is not the one you originally set out to address. The second stage is all about developing solutions to the opportunity. You brainstorm a range of unconventional ideas culled from a wide variety of sources, which can expand the team's knowledge. While ideating, you focus your energies on the final outcome and not get stifled by the present constraints. By not replacing messy upfront exploration with assumptions to get to the finishing line, the creative process recognizes patterns and new connections between the needs of the consumer and business, finding the sweet spots by sparking ideas out of the misunderstandings and tensions between them. To surge ahead of the many possibilities, you shortlist using a set of evaluation parameters, to provide maximum value to the customer and bang for the buck spent to the business. You build prototypes for exploring possible solutions test it with end users, reflect on the results and iterate to close the weak gaps. It enables your team to learn from your mistakes and failures -, and arrive at the best viable solution (MVP).



**Figure 6: Design Thinking Approach**

By directly involving customers in the design and development process, you get their acceptance before you move into implementing the design. While implementing you have all the energy to focus on detailed design, training, tooling, and ramping up. It is a huge amount of effort, so get it right before you expend that effort. The best part is, the process does not stop even after the outcome is delivered, as you focus on continuous improvement and look at scaling with new customers or markets.

In design thinking, it's the "Outcome That Matters". Like Ken Mores said, Innovation = Invention + Commercialization. Innovation success isn't measured in the total number of ideas as potential automation candidates generated in the design workshops; but it's measured in market by how well you can execute and commercialize it. The right innovation process is one that serves this end.

			
Place <b>customer at the epicenter of your efforts</b> by understating their emotion, needs and pain points identified through <b>customer experience/ journey</b> . Also, accept employees and customers are two sides of the same coin.	Identify <b>common rallying points</b> internally to define the pain-gain equation and <b>get the buy-in</b> to prioritize innovation projects.	Get <b>comfortable with ambiguity and stifle judgement</b> by shifting mindset from should to could. One no longer has to come up with a single, right answer. Instead, can generate unconstrained ideas and work with infinite options to create solutions	Clearly <b>define roles and responsibilities of each team member</b> ; have clarity what is expected of them to solve a problem or explore an opportunity
			
Keep it “ <b>Agile and Lean</b> ” – aim for smallest and fastest viable solution that generates value and superlative experience for customers. Pick a use case, form a cross-functional team, pilot in a sandbox by environment by rapid prototyping and testing	<b>Continuously iterate</b> based on customer feedback and increasingly refine solutions - experiment before freezing requirements, and scale	A greater level of <b>collaboration to expand conversation</b> both within the organization and with players in the ecosystem to share knowledge, gain better understanding of pain points and available innovations, and build joint solutions to take full advantage of the transformative opportunities offered	Operate under <b>shared metrics of success</b> to gain clarity on what's working and what is not and track progress towards outcomes; <b>learn by doing</b> , teach people how to <b>fail properly</b> and learn when things go wrong without the stigma of failure; provide support to scale when things go right

**Figure 7: Eight tenets of design thinking that enable innovation in enterprises**

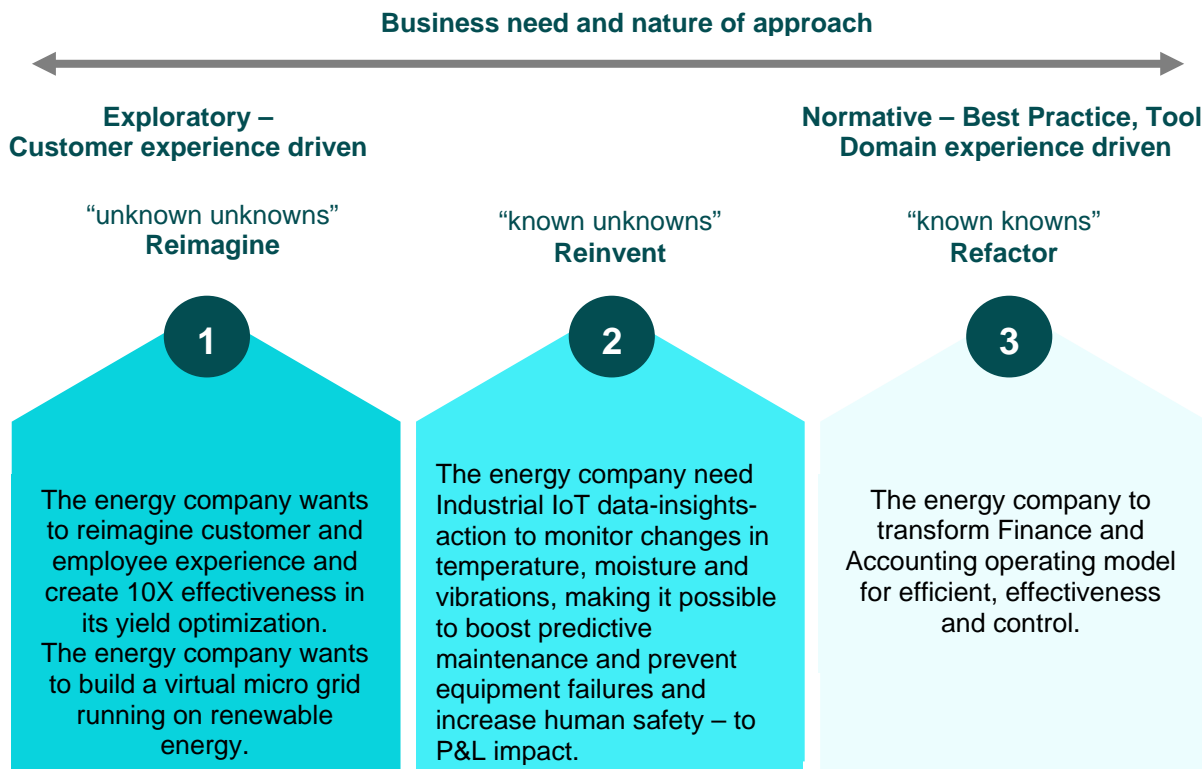
A common misperception is that Design Thinking is common sense - that most engineers (or process engineers) would be able to master it easily. Kodak, RIM (Blackberry), Nokia, and other companies that have fallen from seemingly uncontested leadership positions offer clear examples of how engineering firms often miss a crucial point: powerful technical solutions are often those that elicit superior emotional responses, and it isn't trivial to build innovation processes - and indeed an innovation culture - able to harness both engineering and human centered design. While Design Thinking requires far more than template checklists, some principles are often applicable and worth remembering - eight of them are listed in Figure 7.

## WHERE DOES DESIGN THINKING ADD VALUE?

In general, it is most powerful when:

- it creates a sense of purpose and place for your business through methodical storytelling, and by responding to unmet user needs, behavior, motivations, thinking and habits;
- the problem is to a certain extent is unclear and the range of customer-centric solutions needs to be explored (i.e., no obvious “best practice” exists);
- the opportunity can be meaningfully addressed by reimagining the role of people (customers and employees);
- a cross-function team of stakeholders from business, technology, designers, and support functions use an iterative “tinkering” to find a solution by obtaining engaging end users and obtain meaningful feedback; and
- the leadership is open to try disruptive, less traditional approaches to build an innovation ecosystem, to make sure your companies strategies are effective and say so when they are not, to yield a very high return but whose risk profile is less predictable than standard projects.

Assessing suitability of processes for digitalization across the innovation spectrum as shown in Figure 8, can facilitate to filter out processes based on the complexity and focus efforts on the processes that may offer the best value to customer within the investment timelines.



**Figure 8: Situate The Need Across the Innovation Spectrum for IA Adoption**

While IA is a valuable way to alter/ refactor an existing approach (known knowns), maximum potential often occurs in reimagining new applications (unknown unknowns). Take, for example, renewable power microgrids. With the advent of battery storage, coupled with predictive analytics, it is possible to build virtual micro grids that can run totally on distributed renewable energy. A high-potential use case like this would not be unearthed and considered if an enterprise only concentrates on reengineering existing functionalities and processes.

## **LEVERAGE DESIGN THINKING AS A CATALYST OF CHANGE**

Design Thinking instigates deep understanding of the human side of the people involved in the flow of work required to create superlative client experiences and facilitate quick iteration of ideas. This is made possible through a holistic approach.

For example, with a typical IA approach, you may replace call center agents with a chatbot or digital agent to automate and streamline responses. But this can lead to less-than-ideal customer experiences. With a human-centered approach using design thinking, the IA technologies, will be used to augment the call center agent to identify the right information and find and expedite answers, resulting in better customer experience.

Let's take another example, you are considering a large-scale smart meter implementation. Currently, meter reading is done manually every month, whereas with smart meters' readings can be done in real-time. The volume of available data will rise exponentially, say 600 times. Your existing human employees are neither trained nor experienced in areas of advanced analytics, benefits may not be realized, as analysis of such data cannot be done with traditional skill sets or spreadsheets. Using design thinking techniques, you can adjust the job roles to focus on data engineering and reskill people.

Digital transformation will require a continuous state of change for many functions, and a radical openness to the advances of new technology. The fundamental advantage of design thinking is that it helps craft radically creative solutions - solutions that are often less complex to integrate with the existing legacy operations, easier to adopt for the individuals impacted, and easier to implement.

The main limitations to embrace Design Thinking in end-to-end operations of your organization are twofold. Firstly, the shortage of professionals able to lead such projects, who must possess know-how of Design Thinking facilitator skills as well as a decent understanding of business processes and operations. Secondly, often sponsors of automation projects want quick results. They are habituated to the relatively lower risk of more incremental Lean Six Sigma or IT projects, are reluctant to embark in efforts that aim for disruptive solutions with somewhat less predictable outcomes.

Hence the need to carefully assess the pros and cons is a prerequisite for a successful Design Thinking effort in any IA initiative. You may explore collaborating with external partners to complement your capacity and capabilities to increase your chances of digital transformation success.

## **UNDERSTAND NEED, ASSESS OPPORTUNITY AND IMPACT USING DESIGN THINKING**

You realize your time is limited to determine the future direction of the markets you operate in - as distributed generation adoption is on the rise, and consumers are looking at alternate energy solutions, due to falling technology cost, increasing commodity prices, and local government regulations. At the same time, while IA is breaking down barriers, you need to a process to map out the risks, identify and measure opportunities of the investment and prioritize automation candidates. And because scale is essential for success and impact, you want to do it in a programmatic way.

Design thinking can help you evaluate and prioritize IA opportunities in a safe and secure manner by minimizing the risks, and move from small-scale success to large scale transformation. It will enable you establish and utilize a defined set of criteria to determine which processes are good fit and measure their potential benefits. prior to applying automation. The only pre-condition is, you have to stabilize and optimize your processes prior to applying automation. Here are six steps to help you choose the right direction.

### **1) UNDERSTAND BUSINESS NEEDS, CUSTOMER NEEDS TO TRANSFORM, BEFORE TECHNOLOGY**

While it's easy to focus primarily on the automation tools, any barriers to achieving scale and speed can become strategic risks with a substantial level of potential impact to your business. Hence, the business need and customer needs for transformation should be the primary driver.

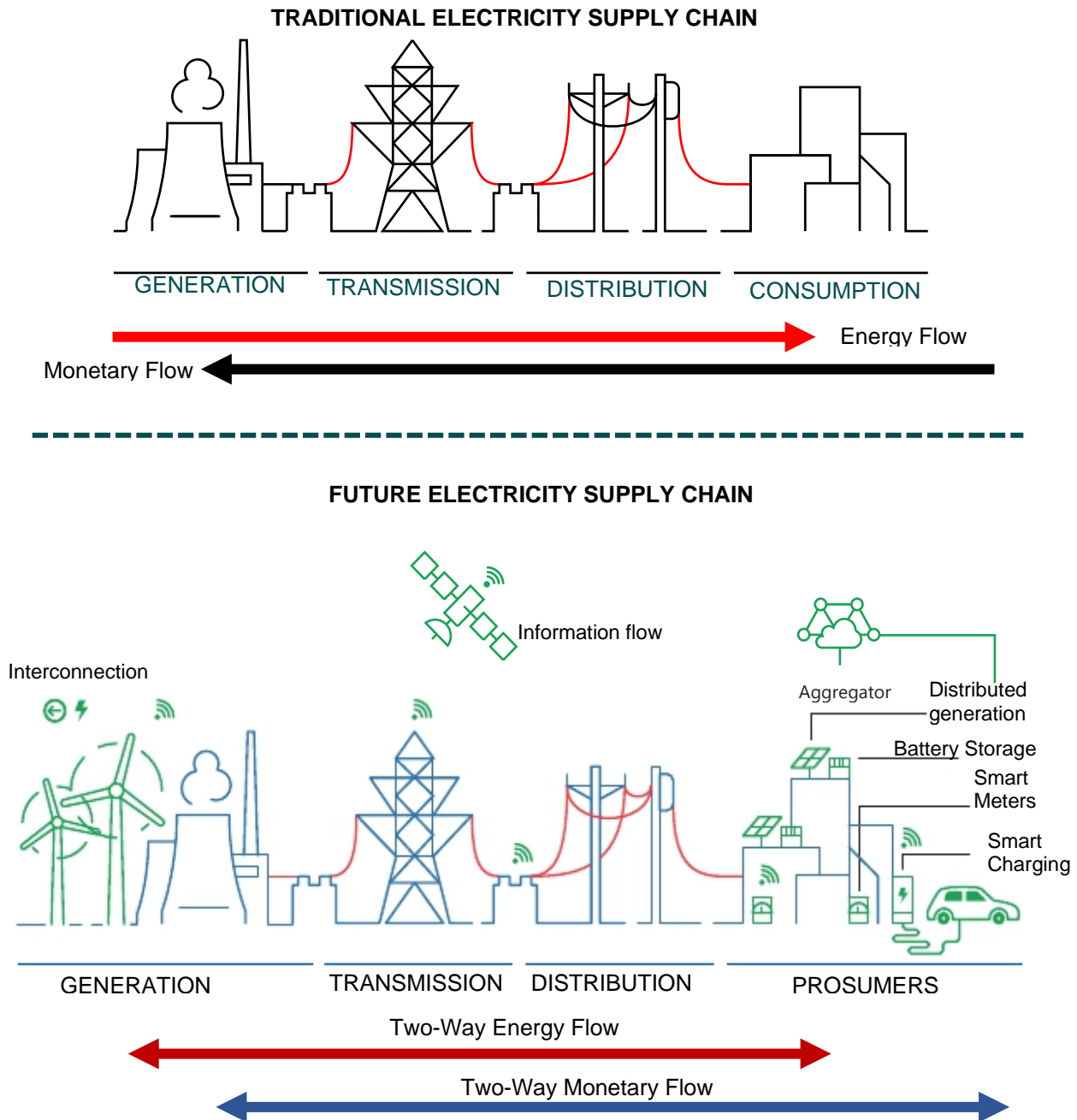
#### **1.1. UNDERSTAND BUSINESS NEEDS**

To keep pace with the disruptive trends, you need to change the way you operate. Take a look at the innovation taking place in your electricity supply chain, as shown above in Figure 9a. To succeed and thrive you need a long-term strategy for developing the opportunities along the future value chain by embracing intelligent automation, and this can't be done overnight.

First, let's consider what went before IA. Prior to the development of algorithms, machines, or robots, people did pretty much everything in any business - from setting the strategy and vision, to the day-to-day business processes to the management of all the data.

However, in the digital age, the human capacity alone can't sustain this traditional approach. Customers who consumed electricity can now generate, consume, store and trade electricity, and demand flexible end-to-end service; competition has intensified; data volumes have exploded, compelling you to find new ways to respond to opportunities in real time. And, this is what's driving innovation as IA can monitor systems, analyze datasets, and carry out tasks on behalf of people - faster, more efficiently, 24/7, and without error. This means you have to challenge the status-quo, and use IA as a catalyst to operate, maintain and reimagine your systems and processes, without the benefit of an increased load-based revenue to pay for it.

While, not saying IA is taking over. People still need provide for robots with the instructional knowledge they need to perform their tasks. People still need to decide what will be automated, and how. People still provide the creativity, imagination and ambition to push the boundaries of what business and technology can achieve.



Source: Adapted from (IRENA, 2019)

**Figure 9: Innovation in the Electricity Supply Chain**

Along with customer insights discussed in Section 1.2, using design tools like visualizing drivers of change, mapping innovation ecosystem, helps you articulate what are the business needs in the short-, mid-and long-term as shown in Table 7. Co-creating this grid with relevant stakeholders helps break departmental silos, see things from different perspectives and supports sense making and creativity.

<b>Short term</b>	Maintain prevailing unidirectional approach using fossil fuel; add small-sized energy generation and storage	Continue big data asset-management investments; digital process centralize remote maintenance	Maintain real-time network balancing, digitize end-to-end processes from the sensor in grid to mobile device of the field technician	Deliver multi-channel integrated customer platforms; employ customer predictive analytics	Offer more smart home products and energy management services; New business models - pay-per-use
<b>Mid term</b>	Ongoing investment in renewable energy and distributed energy generation; rollout of smart meter	Predictive maintenance based on asset health predictions	Big data extensions of the B2C & B2B sales process	Improve employee experience and invest in people analytics	Real-time energy settlement calculations; new business models
<b>Long - term</b>	Provide intelligent distributed generation; feature optimal demand-response capabilities	Personify the data-driven energy company; integrate big data, agile analytics, and supercomputing	Demonstrate the flexible smart grid; enable two-way flows and assimilate independent islands	Become “trusted energy advisor”; offer personalization to customers	Offer large variety of solution to diverse client base; build strong customer partnerships; offer market and peer-to-peer trading of energy flexibilities.

Source: Author analysis

**Table 7: Illustrative Short-, Mid- and Long-Term Priorities**

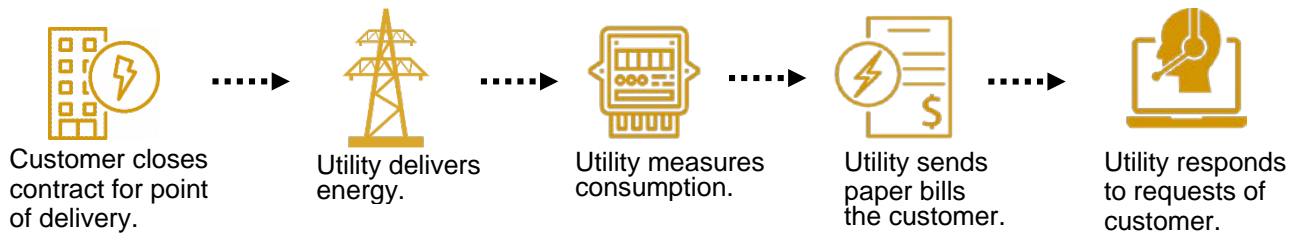
## 1.2. UNDERSTANDING CUSTOMERS “PROSUMERS”

The next generation of your consumer “prosumer”, generates, consumes, stores and trades energy. Using the scenario mapping tool look at how the relationship with the consumer is about to change, as shown in Figure 10.

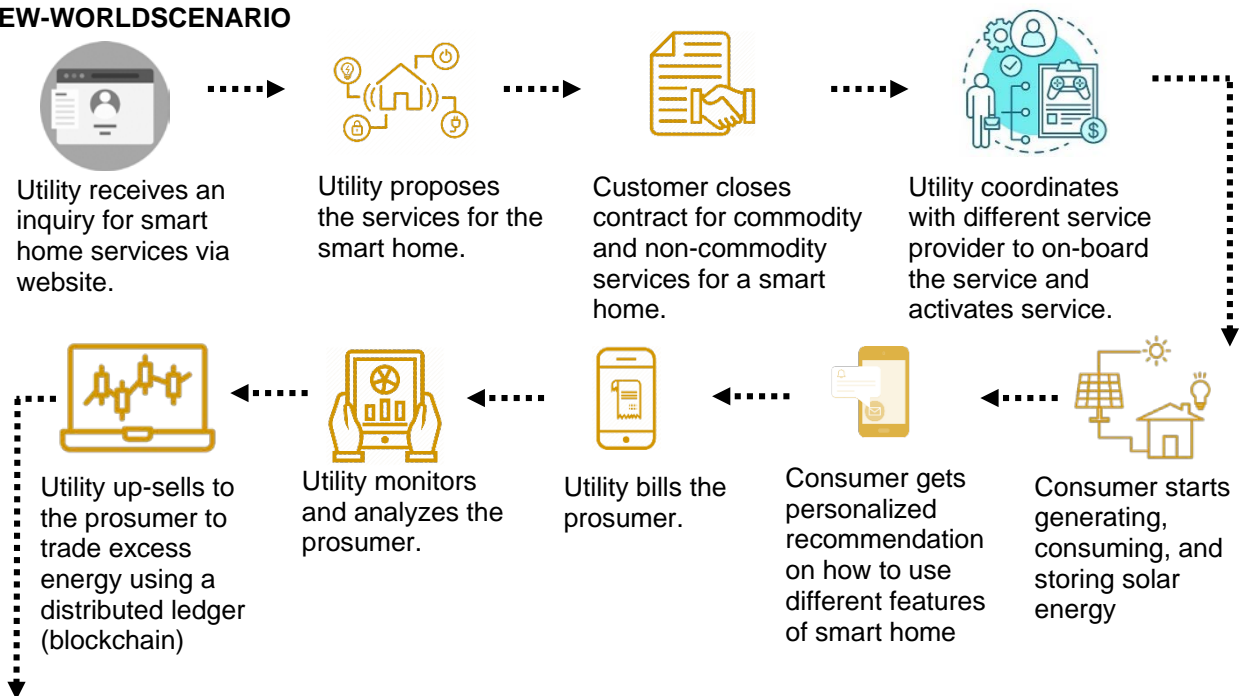
As a lot of digital first attackers are setting a high bar for simplicity, interactivity, and personalization, you realize the need to reinvent the customer experience (CX). By showing empathy you develop a deep understanding of their point of view, eliminate their problems (and even delight them in the process) and find new business opportunities. Using a combination of tools like buyer persona, customer journey maps, gives you data and analytics-based insights about what they value, related wants, concerns, channel preferences for interactions, behaviours and so on.

You then need to then explicitly tie-in the reinvented CX, to operating model, develop new products and services, measure customer satisfaction along functional lines, business model, partner ecosystem and change the way your employees work. Because, more holistic you can make specific interactions along the journey, the higher the customer engagement, satisfaction and later followed by advocacy.

### TRADITIONAL SCENARIO



### NEW-WORLDSCENARIO






**Figure 10: Changing Relationship with the Consumer**

The prosumer has a personal relationship your utility company, as you provide a dedicated “smart home platform” that they can access through a digital device of their choice (phone, laptop, tablet, or smart home speaker). The platform delivers a personalized, data-driven customer experience (CX) in real time, as well as services such as Smart Home enabled by a host of IA tools (Artificial Intelligence, Advanced Analytics, Blockchain, Machine Learning, IoT); transactions management; and other products and services in addition to electricity. The virtual assistant is able to provide personalized suggestions after analysing external data and the prosumer consumption habits.

### 1.2.1. Create Personas of Next-Generation Prosumer

Persona is a fictitious representation of the characteristics of your prospective buyer. As a successful provider its vital you understand how, what and why your new energy consumer requires much more than what you provided in the past. To develop a blueprint for the future, you must address the spectrum from “energy agnostic” to “energy literate” personas of your prosumers. A sample representation of few such personas is shown in Figure 11.

		
<b>Arvind - The Tech Savvy</b>	<b>Manish – The Farmer</b>	<b>Sheena – The First Time Frugal Homeowner</b>
He is an energy literate and keen to reduce environment impact. He is an early adopter when it comes to tech gadgets as it delivers financial savings, convenience and individual control. He recently moved into a smart home is equipped with a specially designed community energy scheme, linking the plant, households, automobile and their solar panels, offices and battery storage together. He is concerned about the high bills.	He is energy agnostic, as using energy for the first time in his 30 years of life. He invested in solar because of the subsidy scheme and that it made the most financial sense for his family. He can power his home at night and farm in daytime. He is also lured by the sales pitch that they can generate, store and sell excess electricity to the locals in the village. Still wary about getting financial returns promised by the energy company after 3 years.	Is interested in a prepaid energy solution, as she has to operate within a limited budget. Chooses not to use air conditioner, and feel “hot and stuffy,” rather than face a high bill. Is interested in collaborating with others to learn how to conserve energy. Is willing to switch provider if they offer competitive prices and more for less. In favour of seamless virtual interaction anytime, anywhere. She also welcomes personalized inputs addressing her unique needs and preferences based on her usage.

Source: Author analysis

**Figure 11: Next-Generation Prosumers with Diverse Needs**

### 1.2.2. Customer Journey Maps

Describing comprehensive journeys from the customer’s perspective - “I strongly believe in the benefits and safety of a Connected Home” or “I receive a bill which I do not understand” - helps you understand their goals and drives insights into customer moments of truth, as well as gaps between expectations and experience.

It is also helpful in exploring what can go wrong across different touchpoints and how to put it right and rethink the operating model and define future customer initiatives.

Some of the key steps could include:

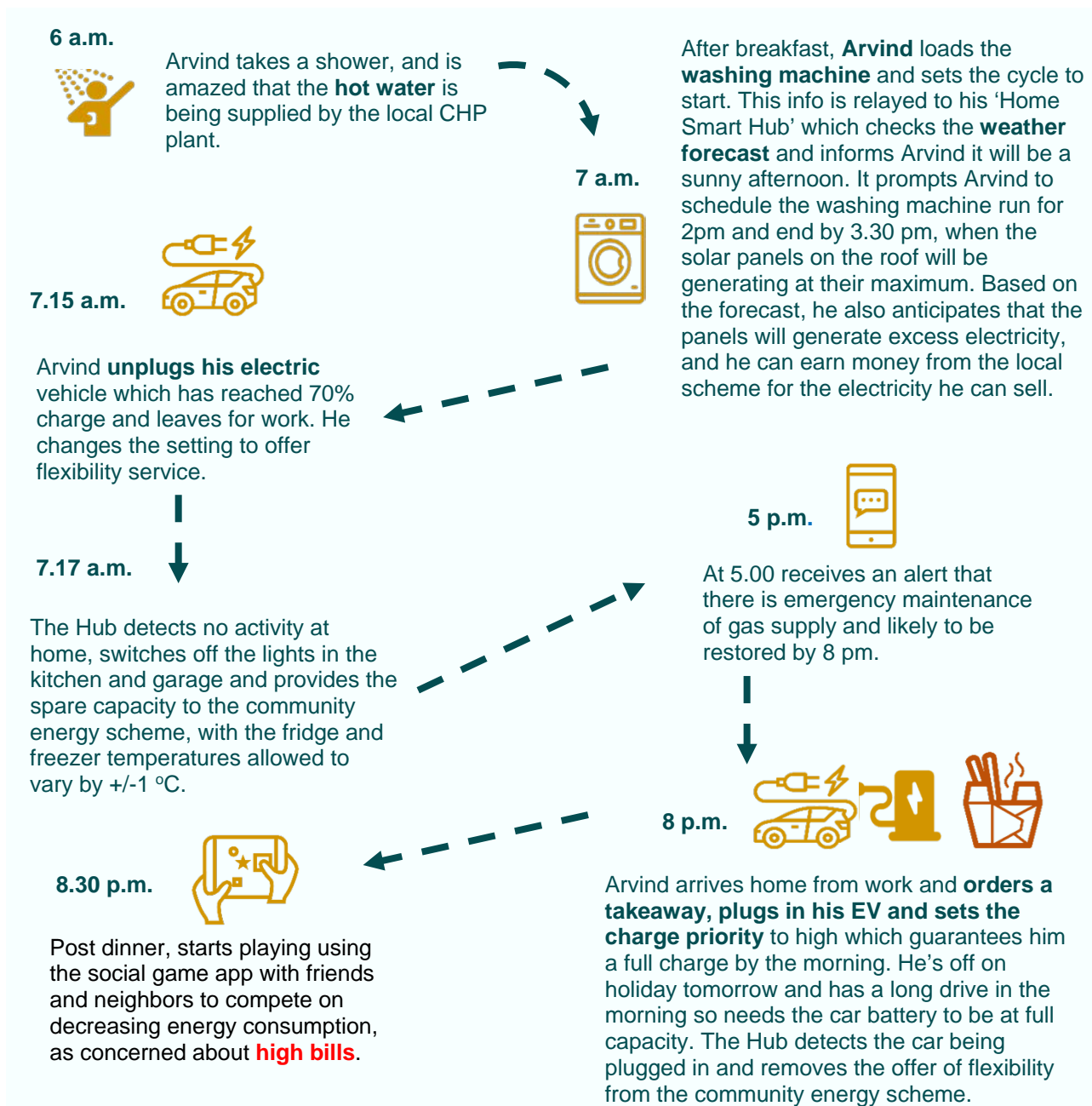
- Define key data inputs required to understand customers
- Collect, integrate, and assess all available customer information
  - Determine specifics of how often a specific channel is used (mobile app, call center, website and so on) and what type of concerns
  - At each channel touch point capture, the various things a customer says, sees, hears and likely feels, tone of voice (neutral, irritated and so on) when making contact
  - The products and services they use and their usage patterns
  - Conduct focused primary research to fill gaps in existing information
- Define customer segments based on relevant factors, including (but not limited to) behavior, demographics, and expectations
- Map out perceived vs. expected performance around journeys, moments of truth (high bills)

Table 8 shows complete journey of a smart home prosumer from research to personalized support, cutting across multiple functions and channels. Nailing down on the day in the life of *Arvind – The Tech Savvy Prosumer*, as shown in Figure 12 you get to understand his preferences for personalized support and helps you identify the relevant IA solutions. Mapping customer experience journeys drives insights into customer moments of truth as well as gaps between expectations and experience.

RESEARCH AND PURCHASE	INSTALLATION AND ACTIVATION	USE AND GENERATE	PERSONALIZED SUPPORT
PRE SERVICE PHASE	SERVICE PHASE		POST SERVICE PHASE
<ul style="list-style-type: none"> <li>Ability to be a trusted advisor by clarifying concerns moving to a new Connected Home. Example: What is the anticipated savings in energy bill while opting for flexibility services</li> <li>Purchasing products, smart home appliances, solar panels and flexibility services online</li> </ul>	<ul style="list-style-type: none"> <li>Transparency in order fulfilment and installation</li> <li>Timely delivery and installation of equipment and services</li> <li>On-time energizing of equipment and meters</li> <li>Activation of contracts and devices</li> <li>Capture feedback on the installation</li> <li>Tutorial to learn about new smart home energy services</li> </ul>	<ul style="list-style-type: none"> <li>Ability to remote control heating, air-conditioning, lighting, home appliances and entertainment device</li> <li>Transparency and accuracy in billing</li> <li>Single invoice to pay for commodity/ non-commodity products and services</li> <li>Constant feedback collected during use to adjust interactions with the customer</li> <li>Timely maintenance of devices</li> <li>Automatically adjust energy use based on real-time changes in price of energy</li> </ul>	<ul style="list-style-type: none"> <li>Proactive personalized notification weather forecasts, planned outage and emergencies in a timely fashion</li> <li>Personalized offers, pricing, new energy packages, and education based on “experience data”, individual consumption, storage and generation patterns, installed equipment, and devices</li> <li>Self-service and intelligent bots as a way to act conveniently anytime</li> </ul>

Source: Author analysis

**Table 8: Complete Journey of a Tech Savvy Connected Home Prosumer**



**CHP – Combined Heat and Power** A CHP plant produces both electricity and heat from a single fuel source resulting in a highly efficient process.

**EV Charge Priority** A high priority ensures the EV charges to full capacity as quickly as possible. Lower settings allow for more flexible, variable charging.

**Flexibility Services** A range of services provided using controllable electricity generation and/or consumption sources.

Source: Author analysis

**Figure 12: Day in Life if A Tech Savvy Prosumer Living in a Connected Home**

Output from a customer journey mapping exercise, and if you focus on the concern “HIGH BILL”

- Different departments in the have access to diverse customer information
- The bills do not have all the information the customer need or are confusing
- The are frustrated that you don't warn them of expected high bills based on their usage patterns
- No system to push information to customers
- Need to leverage existing customer data and capture additional data to personalize experience
- Provide more options and solutions to customers

This paves way for identifying a lot of automation candidates using tools like Analytics to analyze their bills and provide options and innovate. The information could be delivered via their preferred channel (bill inserts, emails, texts, automated calls, social media posts, website tools, technician visit). If you opt for technician visit, then the mobile application made available to technicians should be able to alert them of only the individuals customers who are facing the problem.

## **2) FIND THE AUTOMATION CANDIDATES**

While some IA applications are spellbinding in the audacity of their vision and scope most are more mundane, yet no less impactful. Not all processes are created equal and will require a combination of different technologies to make an impact. While, the following guidelines aren't exhaustive, they can help you focus on the right starting point, as good candidates share some common characteristics:

- High volume, low complexity work, repetitive and longer execution time, mundane and unfulfilling for employees, partners
- Low volume, high complexity and time-consuming to perform
- Runs 24/7 or occur with significant frequency or could be performed after-hours
- Prone to human error or high business impact if error occurs
- Require manual interaction with one or more IT systems; integration with legacy and external applications
- Include activities that are logical, defined or definable workflow and rules based that can be easily given to a new employee with zero or minimal training
- Leverage structured data and standard formats or free text for data extraction
- Does the process have peaks and troughs in work or the only way to scale is hiring more people
- No emotion or subjectivity in the process (simple) or requires human judgement to initiate, approve or define (complex)
- Difficulty level of modifying your front- and back-end applications as customer expectations and government regulations change
- Ability of competitors to offer more products, services, business models targeted at specific niches in the market than you
- Improve response rate to customer requests
- Percentage of customer transactions result in exceptions that must be manually processed
- Compare level of CX offered with other leaders in the industry, including digital natives

Following the guidelines and situating the need across the innovation spectrum (shown in Figure 8), differing stages of adoption can exist across an organization – transformative in one part (unknown unknowns) of the business and incremental (known knows) in another. The issues, goals and aspirations of the company, provide insight into identifying the automation candidates. Table 9 provides few sample uses cases for different stages of adoption.

**REFACTOR (KNOWN KNOWNs)** – Apply IA to enhance system behavior and performance within the context of existing business processes. Refactoring changes the internals of business processes and systems without affecting their external behavior. The intent is to perform existing jobs better and faster.

- Focuses primarily on making existing practices more effective and efficient via minor reconfiguration of data or value chain,
- Does not alter existing product/service portfolio, processes,
- Improves how but not what or when products and services are delivered,
- Automates high-volume decision points and tasks using existing data,
- Delivers incremental improvements,
- Keep pace with lagging peers, but not moving to the forefront

Such innovation projects provide a great jump off point to incrementally introduce and hone new skills and analytic methods required for more ambitious applications. Refactoring also provides a great opportunity to prove the value of IA in a business context that is already well understood and where expected outcomes can be clearly measured. This substantially lowers overall risk and barriers to entry.

**REINVENT (KNOWN UNKNOWNs)** – Apply IA to modify how and when processes and services are delivered. Reinvention changes how things work in ways that appear to be different and new.

- Shifts focus from automation to include augmentation,
- Leverage reconfigured data to extract value by integrating into existing products, services, business models and processes
- Changes how and when customers, partners and employees engage, by generating new information for specific decision-making, enabling rapid self-service, self-learning systems
- Offloads discrete functions and tasks with IA as a visible actor in the process,
- May introduce new revenue opportunities,
- Gain advantage over market peers, lag market leaders.

It is at this point that the IA solution becomes a visible entity within and outside of the enterprise. Employee roles and responsibilities morph as business processes are functionally reengineered to fully exploit more advanced IA capabilities. Customers and partners may notice that how and when they engage with an organization is changing. As a result, the IA user experience becomes important: relationships, interaction points and handoffs between IA systems and those they interact with must be carefully designed. In addition, organizations must carefully assess both real and perceived risks as parties adjust to a new method of working with each other and the “machine.”

REFACTOR	
Content Classification & Analysis	Apply natural language and image processing to identify and catalogue disparate documents (contracts, land deeds, regulatory policies, asset specifications, etc.). Perform contextual analysis to identify and highlight key terms, sentiment (if applicable), and requirements within and between different policies, contracts and specifications for action by human knowledge worker.
Energy Forecasting	Apply deep learning to optimize energy consumption forecasts by accounting for both short- and long-term variabilities in operating conditions and resultant long-term dependencies.
Other	Outage Prediction & Detection; Cybersecurity; Disaster Monitoring & Response; Automate financial reconciliation,
REINVENT	
Connected Home	Analyze environment-specific usage patterns and preferences to optimize comfort while minimizing usage and cost. Detect and adjust heating and cooling based on factors such as the number of people and level of activity present.
Consumption Management	Optimize HVAC and related control systems in data centres against acceptable operating parameters, variable and hard-to predict environmental factors and demand conditions, in real time.
Other	Asset Performance Management; Portfolio Optimization; Customer Personalization, Micro-segmentation and Targeting. Digitize new connection process, Automate field activities,
REIMAGINE	
The Smart Grid	Deploy integrated AI solutions to seamlessly and autonomously adjust energy generation and delivery between disparate producers, energy sources, and consumers to maximize use of renewable or low-cost energy sources, optimize energy mix, and avoid outages.
Omni channel Virtual Assistant	It helps manage energy use and optimize dynamically by price, time green attributes and more. It combines customer habits with external data, e.g. weather, make personalized suggestions; can be automated.
EV Charging	Customer offers electricity charging (EV) through EV sharing exchange
Business Models	Aggregators, energy-as-a-service, prepaid, Peer to Peer electricity trading

**Table 9: Sample Energy/Utilities Use Cases for Intelligent Automation**

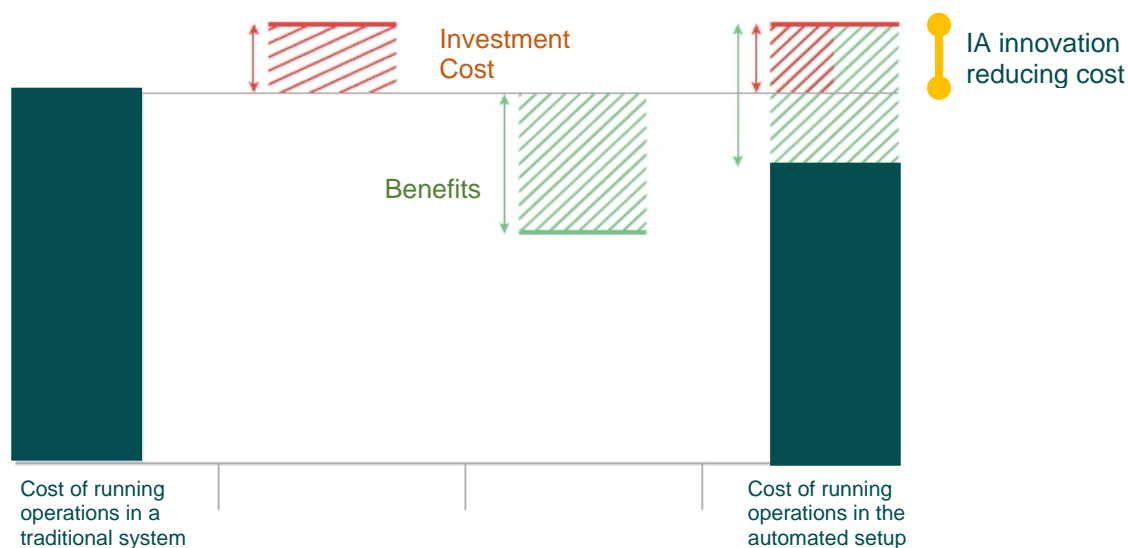
**REIMAGINE (UNKNOWN UNKNOWNNS)** – Apply IA to be disruptive and a game changer. Reimagining changes the playing field entirely: deploying products, services and engagement models never seen before.

- Focus on rethinking the playing field and expanding frontier using new business models overcoming legacy constraints,
- Introduces new products, services and business and operating models,
- IA is integral to product/service design and delivery enabling new forms of customer engagement and insight
- Self-learning ecosystems of continuous data and operations innovation,
- Introduces new roles and responsibilities,
- Creates new revenue streams.

At this juncture, mindful and seamless integration between human and machine becomes critical. Pre-existing business functions and roles are at a minimum redefined or may become obsolete. Net new jobs are often created as new engagement models are developed. Analytics and data ecosystems are highly mature, and DevOps practices have evolved to support the continuous improvement mindset required to maintain algorithms in the face of continuous environmental change.

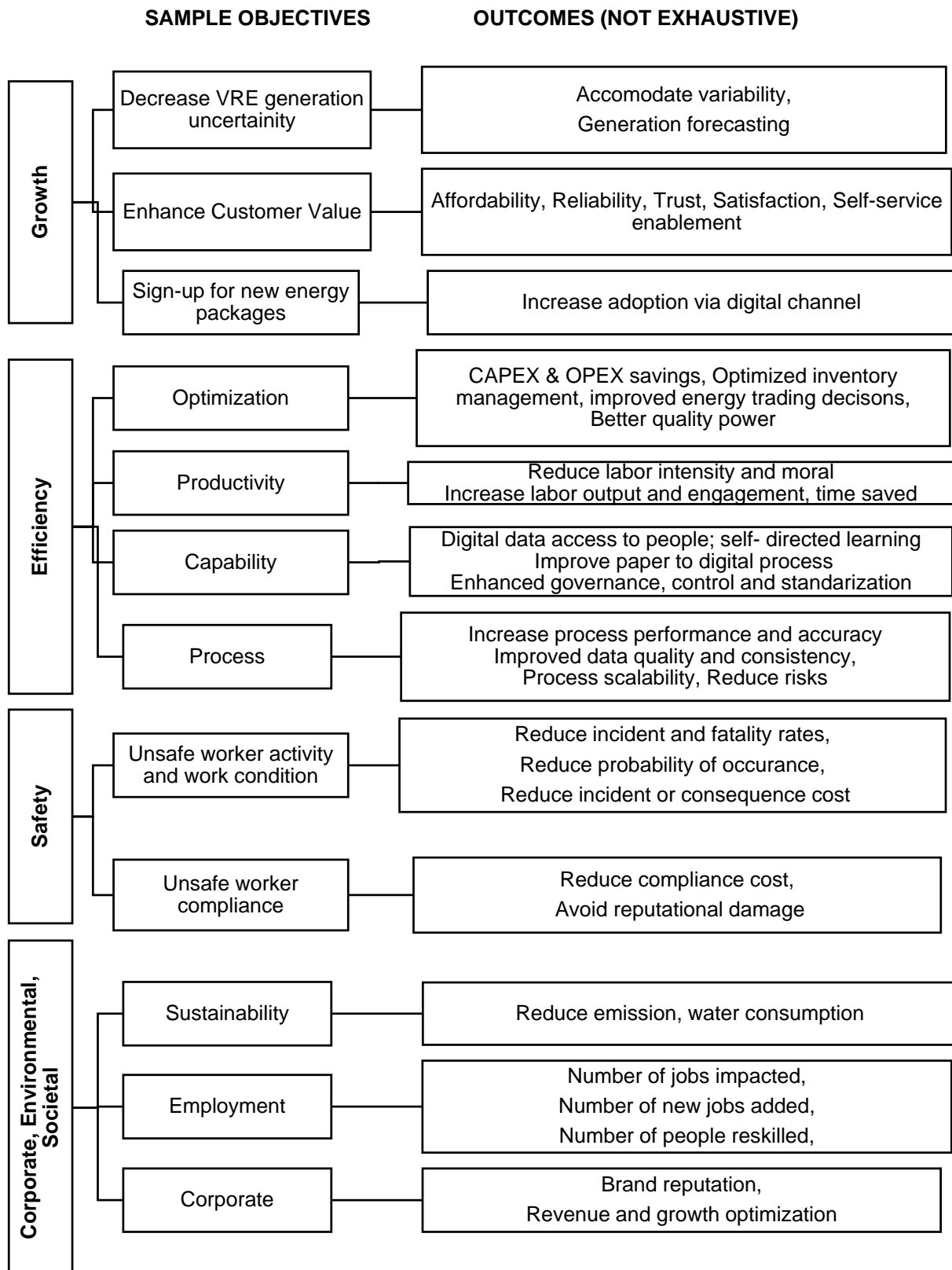
### 3) LINK JOURNEYS TO OPERATIONS, VALUE CREATION, AND MONETIZATION

While innovation driven by IA and user feedback act as a catalyst to enhance CX, simplify products, but to capture economic value, you need to take a further step: link the new desired CX to underlying processes automated using IA. That requires an understanding of two things: what creates value across a given journey from the customer's point of view (faster cycle time, personalization, cross-channel functionality, and so on) and what drives business costs and revenues (net savings, ROI and payback period, number of manual touches, extent of customer fallout, additional product sales, and so on). As your objective is to achieve a cost-effective digital transformation, you should aim to minimize the investment cost, while maximizing the associated benefits, as you don't have benefit of an increased load-based revenue to pay for it (as shown in Figure 13A).



**Figure 13A: Business Drivers for Impacting Maximum Value**

Keep in mind that determining value is not just about quantifiable cost savings. You can focus on a mix of tangible drivers and soft qualitative qualification criteria. It helps to create a consistent framework that helps to measure real value across different buckets like growth, efficiency, safety, environmental and societal drivers. Each of the values can be linked to potential IA candidates to establish a clear logic on monetization and strengthen a business case, as shown in Figure 13B. At times, there is a connection to a value driver, such as improving labor productivity, but the tactical link to monetization is missing because the cost savings - such as decreasing person-hours spent by introducing predictive maintenance and remote maintenance is not directly evident. With that said, it may be more appropriate to regard some IA initiatives as business enablers, rather than value creating projects.



**Figure 13: Business Drivers for Impacting Maximum Value**

#### 4) QUALIFY THE OPPORTUNITIES

You might have identified dozens of potential automation projects both from core business and support functions, and your department heads are pushing hard to make their processes first in line. It is a long list and it's time to qualify and evaluate individual opportunities and prioritize. Regardless of where you start, implementing IA will require changes to existing business and technical practices. The scope of the change varies drastically as one moves from refactoring existing processes to reimaging net new approaches.

You can do that by assessing the relative value to be achieved from automating the process against the complexity of building the automated process. On the complexity scale, be sure to get your arms around the scope, size, and variability of each process, developing a view of how the process is performed and the logic required for all decision points. When assessing the organization's willingness and ability to implement a proposed solution using automation, consider these twelve dimensions. However, not all dimensions are relevant in every context.

1. **Business Process** – Extent to which existing product/service offerings, operating models is impacted, availability of human capability, limitation imposed by prevailing business model on the IA opportunity
2. **Leadership** – leaders with necessary vision and resources
3. **Workforce Impact** – Number of employee roles and skills impacted, workers replaced/displaced
4. **Data Readiness/Maturity** – Sophistication and scope of required data practices from governance to management includes considerations for data availability, quality, privacy, and usage
5. **IT Practice Maturity** - Implications of traditional vs agile and lean IT practices including standard operating practices for deployment, ongoing monitoring, and maintenance. Tight alignment to business outcomes, enabling effective, agile, and cost-efficient solutions that complement existing IT investments while leveraging advanced technologies and analytics.
6. **Technology Maturity** – Maturity of the IA tool selected
7. **System Integration** – Integration challenges with legacy applications
8. **Technology and Infrastructure Costs** – green field or brown field project, and associated costs
9. **Regulatory framework** – requires changes in regulatory framework. There are over 15 cross-industry and regulatory initiatives in the process of dissecting the potential implications of IA from a trust and governance perspective.
10. **ROI Governance** - the governance mechanisms that need to be in place to monitor the value of delivered business outcome vis-a-vis return on investment
11. **Risk** – inclusive of an organization's ability to manage change and failure; perpetuate human biases, implementation risks from - technology, operations, vendors, security and resiliency perspective; increase cyber exposure; political or regulatory exposure; implications for external relationships (customer, partners and so on).
12. **Design Thinking Maturity** – Design thinking driven vision and an empowered workforce trained and incented to try new things without fear of failure.

In select projects, you may also have to take into consideration, the Environment Suitability Indicators (IRENA, 2019).

1. **Population density in cities** - is an important indicator for assessing the level of decentralisation that is physically and practically possible. Decentralised solutions are not feasible options in heavily populated cities where people live in skyscrapers or very busy neighbourhoods
2. **Seasonality** - is an important indicator for the flexibility needs of a power system. Countries with seasonal variations have much higher electricity and energy demand in some seasons than others (in regions with cold winters, energy demand in winter is much higher than in summer because of heating needs, whereas in regions with very hot summers and mild winters, energy demand is higher in the summer due to air conditioning usage). Therefore, long-term storage would enable saving the surplus renewable power generated in the season with lower demand to use it in the season with higher demand.
3. **Interconnection possibilities** - when a system is very large or well interconnected, the establishment of regional markets to capture the synergies among different power systems and enlarge the balancing area is a solution. It impacts how the interconnections should be operated to take best advantage of different wind / solar patterns in different locations.
4. **Spatial proximities of VRE sources and demand centres** - rather than focusing on flexibility options, this indicator guides you towards solutions that bring the VRE generation from areas rich in resources to the demand centres.
5. **Time match between VRE generation and load profile** - When the VRE generation profile does not match the load profile, flexibility in the system is required to meet the net load, when it peaks. Options to increase system flexibility, in this case, come from across the entire value chain of electricity, including increasing the ramp-up and ramp-down, capabilities of conventional plants, balancing the system via interconnections and regional markets, and demand-side management options and storage solutions

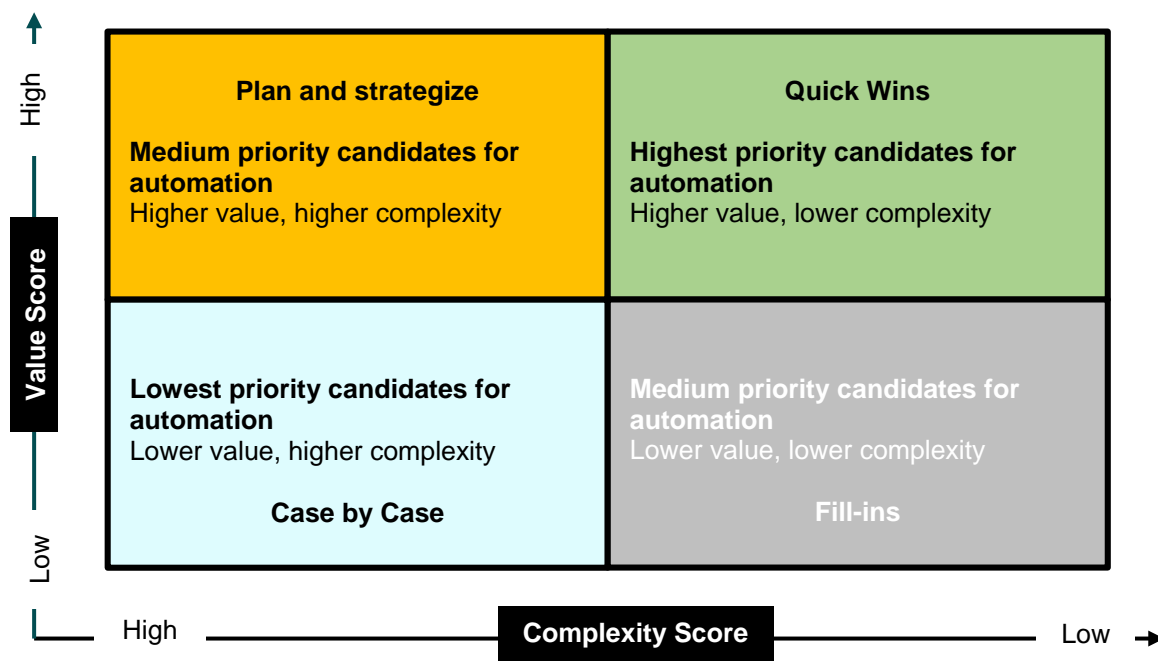
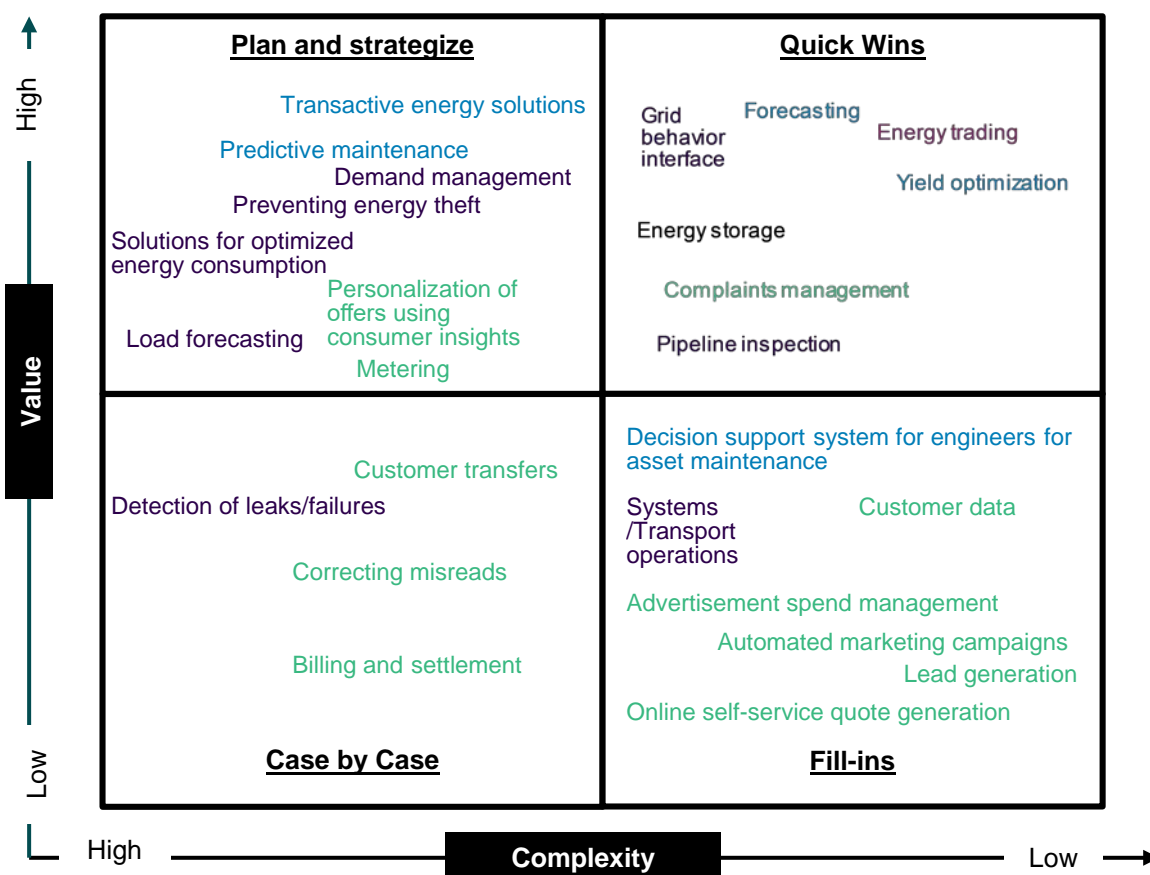


Figure 14: Sample complexity versus value process selection matrix

On the value scale, begin with a heavy focus on measuring time savings - determining how much time is spent performing the process today and how much of that time could be captured through automation. It is important, however, for the analysis to take into account several other factors, both quantitative and qualitative. These factors may include the potential for future cost avoidance, reduction of error rates and risk, and overall process efficiency gains (particularly in processes with multiple handoffs). Once the analysis is complete, you can compare opportunities based on their relative value and complexity. Then you can zero in on the highest-priority candidate processes - the ones that can provide the greatest potential return on your investment and shortest payback period. Depending on the situation, you may also need to take into account an additional factor related to the “fit” of the process for automation, such as whether it can be deployed in the current operating model and the functional owner’s readiness to deploy and own the automated process.

Having a detailed measurement of priority can, help plot the prioritization matrix shown in Figure 14. This results in deeper commitment to the success and scale of the process to be automated, collective agreement on priorities and proposed outcomes as decisions can be justified and quantified, and eventually higher returns on investments. An illustrative distribution of core-function technical use cases by complexity of implementation and value realized is shown in Figure 15.



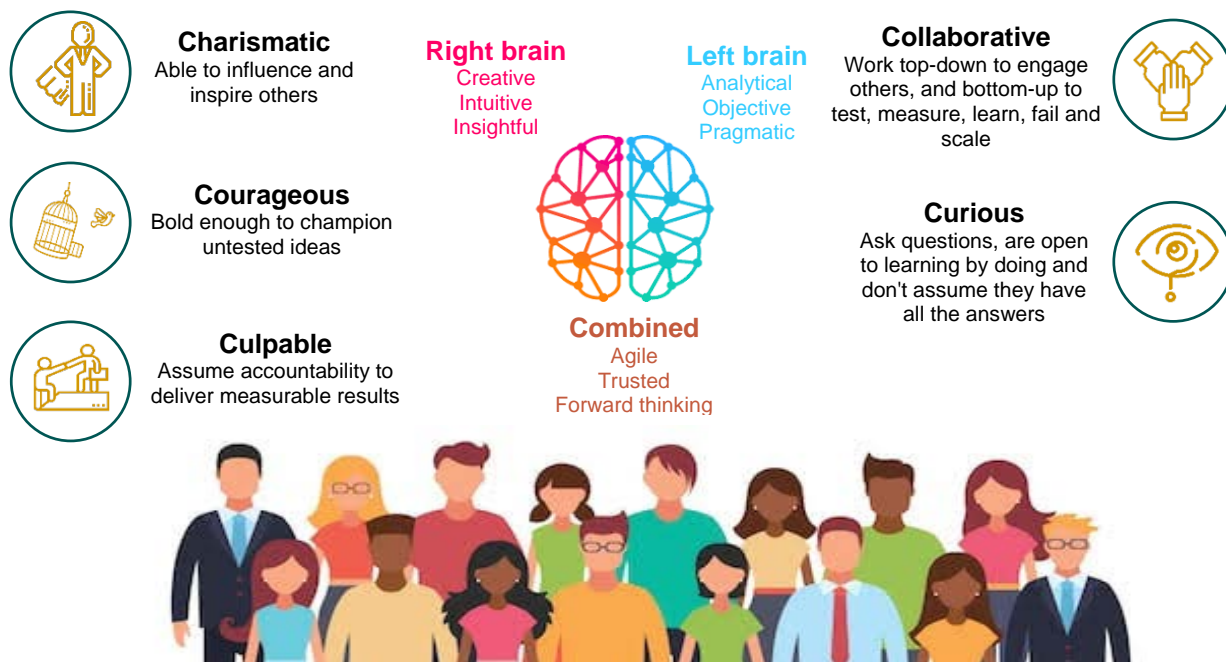
Source: Adapted from (Capgemini, 2019)

**Figure 15: Core-Function Technical Use Case for Automation**

## 5) REIMAGINE JOB ROLES OF PEOPLE OPERATING IN HUMAN+ WORLD

Whichever IA tools you choose; without the right skills and talent, you will not be able to realize automation's promise. It needs you to address two clear dimensions. One, is the specialized upskilling, training, and certifications. The other dimension is how people need to behave, think and act and work in a new way alongside automation technologies.

The key is to find people across your organization who are charismatic, courageous, culpable, collaborative and curious, as shown in Figure 16. In parallel, you would need to change the team structures. In addition to employing digital natives who understand innovation, design thinking, agile and lean methodologies, the team must also comprise of change agents, political navigators and senior executive influencers capable of sharing ownership, challenging the status quo and making meaningful strategic shifts.








**Figure 16: Talent with Design Mindset**

To prepare the workforce for the impact of automation successfully, you need to identify the jobs of the future and reimagine existing job descriptions. The work for digital era should be defined by:

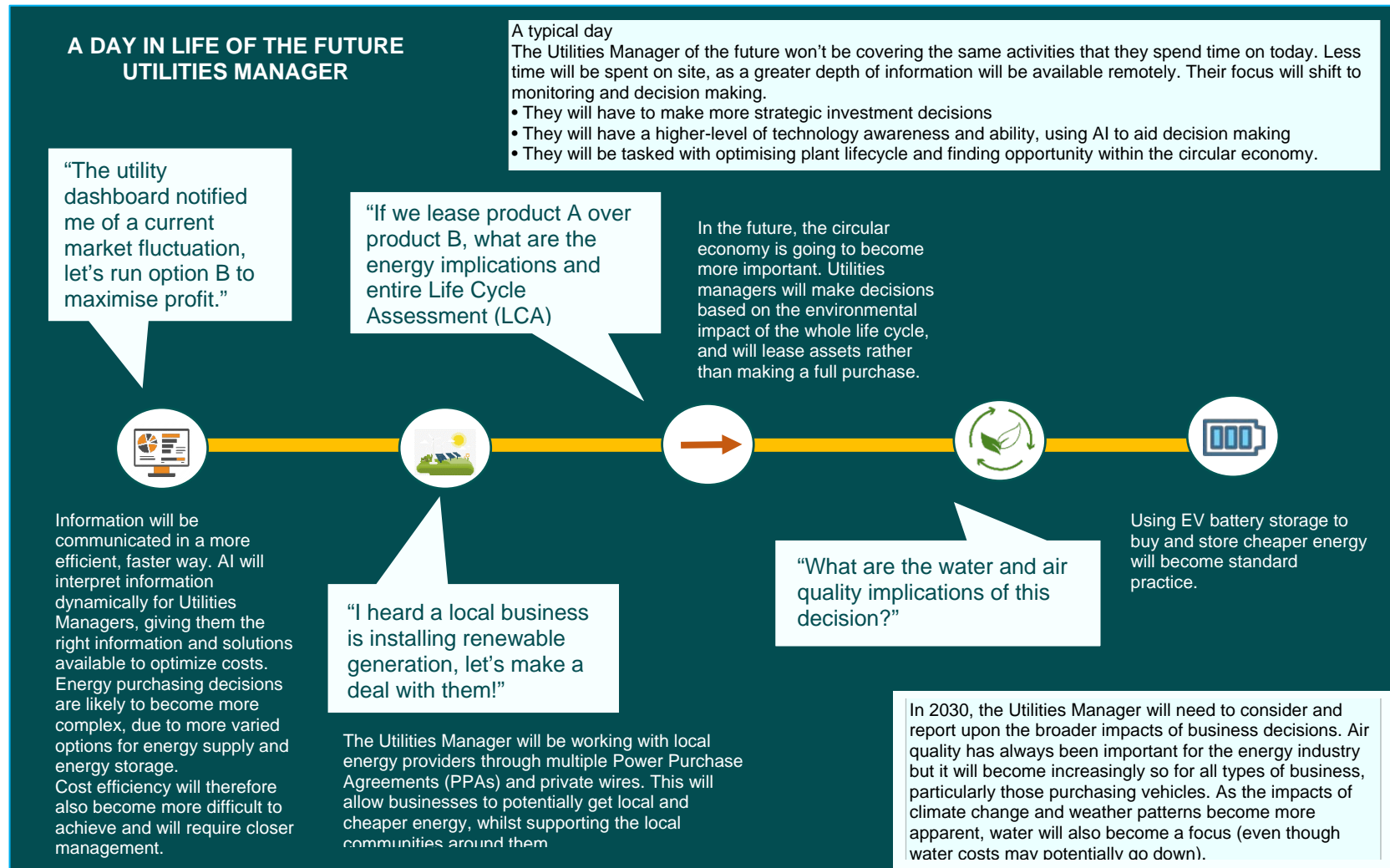
- the outputs and problems the workforce solves, not the activities and tasks executed
- the teams and relationships people engage with and motivate, not the subordinates they supervise
- the tools and technologies that both automate work and augment the workforce to increase productivity and enhance value to customers
- the integration of development, learning and new experiences into the day-to-day (often real time) flow of work. (Deloitte, 2019)

Based on “The Future Utilities Manager Report” by Inenco in collaboration with DJS and Ricardo Energy & Environment, their research partner, they anticipate the Utilities Manager will be a digital-native who is able to use their IT skills to understand and manage data on energy, water, waste and transport activities. The employee persona of Jacob, is shared in Figure 17 and day in his life is shown Figure 18. (Inenco, 2017)

<b>Persona:</b> Jacob (Jake) <b>2030:</b> Utilities Manager		
<b>PROFILE</b> What Jake doesn't know about energy demand, local energy sourcing and real-time automated data solutions, isn't worth knowing. Jake understands the detail. He's completely up to date with the industry who's who, with what's going on in the energy world today and with what to expect on the road ahead. As a digital native, Jake uses his IT skills to understand and model real-time data on energy, water, waste and transport activities. Jake is a strategic player who is comfortable making large investment decisions that are linked to all business departments.		
	<b>BACKGROUND</b> Jake is a utilities and data specialist. He sends out regular communications to his team, employees and partners - ensuring everyone is aligned, informed and motivated. Jake has exceptional communication skills and keeps up with developments within the business, sector and industry. He really takes the time to make sure his message is adapted for his many different audiences. Jake is a friendly, articulate, focused professional who is passionate about using both insight and technology to move his business forward.	
	<b>FRICTIONS</b> Jake gets frustrated when processes, data issues or outmoded systems slow him down. With so many stakeholders, from Finance to Transport to Procurement, Jake sometimes struggles to cope with day to day demands whilst effectively staying on top of what's going on in the industry. Jake gets excited about new opportunities such as technologies and local supply sources, but with a smaller team than 10 years ago, he doesn't always have the resource or time to explore them.	
	<b>NEEDS</b> Jake needs system support he can rely on; to ensure that data inputs are connected, automated and optimized, and to enable him to make informed decisions, fast. Staying informed on and managing changes to compliance takes time. Jake needs one trusted source to provide him with easy access to key, need-to-know information. With so many small local generators, structuring a deal and weighing up the best options can often be complex. Jake uses third party support to source and manage these partners.	
	<b>FEELINGS</b> Jake is proud of the positive impact he is having on business energy demand and bottom line, as well as wider UK energy demands. Jake is approachable, firm and fair. As a confident senior manager, he is respected business-wide and is trusted to make key strategic decisions. Jake does things the right way, making informed decisions based on insights from his tailored demand optimization tool.	

Source: Adopted from INENCO, 2017

**Figure 17: Persona of Utility Manager in 2030**



Source: Adopted from INENCO, 2019

**Figure 18: A Day in Life Of A Future Utility Manager**

## 1) PUT YOUR MACHINER IN MOTION - SCALE YOUR HIGH-PERFORMING PILOTS

In many instances, the move from successful pilot to fully operational initiative ends in failure. Hence, you must build a “machine” - a consistent and repeatable approach to assess, analyze, prioritize, prototype, iterate and evolve to scale your automation candidates, as shown in Figure 19. Without this approach in place, you will realize that you are fighting an uphill battle. Not only will it be difficult to identify potential fits for automation and estimate the value to the stakeholders, it can also take impact your budgets and project timelines.

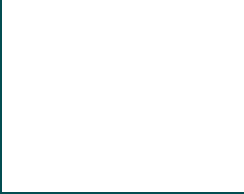
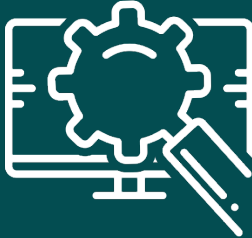

Achieving scale can mean different things in different automation contexts, but it entails implementation beyond a pilot to realize the promised value. It often requires securing funding or identifying partners that take the initiative to new users, markets and countries if it can make a local impact. Hence to scale, it is vital to think beyond the pilot and make choices that will enable extensive adoption later, as well as determine what will be affordable and usable, rather than by few participants in the pilot. You may need to evaluate the trade-offs among processes that would lead to rapid start-up and implementation of a short-term pilot versus those pilots that require more time and planning but lay the foundation for scaling by reducing future work and investment.

Right from the beginning, you need to invest time needed to plan for shortlisted automation candidates and design for scale. Based on pressure from sponsor to roll out a pilot quickly, you may be tempted to put off conducting ecosystem analysis, involving inputs from all stakeholders, developing partnerships, co-creating with the user, collecting user feedback and addressing the wide range of dissatisfiers, until after the pilot has started or concluded. Make sure you discuss these trade-offs with the sponsor to secure support for more work before rolling out a pilot.

Often, your early IA initiatives are driven by a desire to improve a specific process or activity, or to build capability of the technology, but as you have recognized the true value of IA, you are all set to embark on a full-scale digital transformation. However, usually there is a value leakage because of misaligned value; missed opportunities; lack of accountability and organization capability; suboptimal deployment, operation and measurement. For example, a goal of delivering \$1 billion in benefits through digital transformation generally requires a pipeline worth \$1.4 billion.

As leaders, you need to understand how all the pieces of the puzzle fit together in a digital transformation initiative, and be prepared to make decisions surrounded by more ambiguity and uncertainty than you are used to. You must commit to think and act with a continuous improvement ethos. This means expecting - even inviting - change. The key is to constantly measure value captured against targeted outcomes from every IA initiative, and adjust to ensure your organization is reducing leakage and maximizing returns. You need to take a pragmatic approach to choosing which automation and IA use cases to focus on, while also making sure they maximize ROI by re-engineering processes prior to implementation, else you end up digitizing existing complexity. It is essential that you build a healthy pipeline of automation candidates, by setting an idea management system. Revisiting targets on an annual basis is not sufficient. You need to ensure the IA portfolio purges and reviews be conducted regularly, in order to allocate resources to the most promising risk-adjusted initiatives. Finally, you must drive change management to create and instill a culture and mindset that

welcomes intelligent automation as a necessary component to complement the human workforce, creating the smart, augmented utility of the future.

<b>Identify pilot projects</b> <ul style="list-style-type: none"> <li>Identify feasible and tangible pilot projects based on the business need and what customer's value and care about</li> <li>Identify and secure support from sponsor</li> <li>Along with the cross-functional team, define what scale means for each pilot, to ensure stakeholders are working towards the same end goal</li> <li>Prioritize pilot projects</li> </ul>	<b>Pick winners</b> <ul style="list-style-type: none"> <li>Successful pilots obtain funding to create minimum viable products (MVPs)</li> <li>Unpromising pilots are discontinued</li> <li>Learning from failures to avoid repeating them in future projects</li> </ul>	<b>Scale</b> <ul style="list-style-type: none"> <li>Business areas impacted understand and are prepared for the business transition (not just the technology transition) so that disruption to business operations is minimized</li> <li>Drive growth in new customer's base, regions and markets after assessing the potential for creating local impact</li> <li>Equip employees with new skills to handle new jobs of future</li> </ul>
		
<b>Execute pilot projects</b> <ul style="list-style-type: none"> <li>Execute pilots based on available resources</li> <li>Gather evidence to check for relevance, addressing persistent or sharply felt problems or addressing identified opportunity</li> <li>Demonstrate impact using prototype to create interest and buy-in from the wider organization, to avoid buildup of sunken investment cost</li> <li>Identify the necessary enabling factors. Plan for how you can address them during the pilot.</li> </ul>	<b>Creating relevant solutions</b> <ul style="list-style-type: none"> <li>Successful and promising MVPs are given further funding to create products</li> <li>Identify and plug value leakages</li> <li>Monitor performance and continuous improvements</li> <li>Building urgency for change, clarify transition issues, assess transition portfolio capacity, and converting business drivers into pain, opportunity or remedy discussions</li> </ul>	<b>Become better, economical and faster</b> <ul style="list-style-type: none"> <li>Set up idea management system</li> <li>Change management to create and instill a culture and mindset that welcomes IA as a necessary component</li> <li>Experience and skills gained create more successful new pilots</li> <li>Costs and time to develop new solutions fall rapidly</li> <li>Frequent purges and review of the IA portfolio to allocate resources</li> </ul>
<b>Note:</b> <ol style="list-style-type: none"> <li>Keep in mind that not all initiatives will start with a clear path to scale but it may still be valuable to pilot and test the approach.</li> <li>Keep your design simple, flexible and modular to make it easy to change your content and adapt to new contexts.</li> <li>Don't attempt to scale without fully validating that your initiative is appropriate in a new context and addresses a priority need.</li> </ol>		

Source: Author

**Figure 19: Scaling IA initiative is best achieved through an iterative process (start small, but grow fast)**

## TAKEAWAY: CONNECT MOMENTS THAT MATTER

Digital transformation needs to be clearly grounded with the overall strategy your company, as our experience has shown that the relentless pursuit of automation is not the objective. While IA provides great benefits, it also entails new ways of managing the workforce and associated risks. The automation governance framework therefore needs to be holistic in its approach to cover strategy, people, processes and technology. The framework, as shown in Table 10 guides the automation journey to remain grounded in the bigger picture.

EMBEDDING AUTOMATION NEEDS TO BE			
HOLISTIC	DESIGN-LED	HUMAN-CENTRED	PRAGMATIC
Holistic, starting with a pain point understood well by all stakeholders and a commitment from all to take necessary action, by considering end-to-end processes and the full spectrum of automation techniques, from day one aligned with the purpose and growth strategy of the organization	Design-led, with a focus on solving complex problems of the business - starting with context and outcomes, not tools and data sets	Human-centered, engineered around the needs of people, including customers, employees, vendors, regulators and other stakeholders	Pragmatic, setting an action roadmap and clear direction to achieve the vision, realistic in setting expectations with inputs from all critical stakeholders (business, customers, designers, process owners, technology, risk management), weighing readiness, risks and value of the automation journey in the both in the interim state and in the ultimate future state.
THE GOVERNANCE FRAMEWORK ENSURES PEOPLE ARE AWARE			
1) Link company vision and strategy with Intelligent Automation Value Use cases 2) Determine digital strategy and roadmap			
Why are we doing this?	What are we doing?	How do we do things?	
Increased visibility on the impact and trade-offs of strategic decisions on business operations. Incorporate flexibility to prioritize technologies that are relevant now to encourage adoption.	Translates strategic intent into operational capabilities. It serves as the basis for execution and provides clear guidelines to the leadership team, middle management and operational teams.	It provides stakeholders a clear view of their roles and responsibilities, decision-making rights, processes, teams and supporting technology.	
Organizations with governance framework		Organizations with governance framework	
<ul style="list-style-type: none"> <li>Operational inefficiencies</li> <li>Ambiguity around accountability</li> <li>Low interaction and integration</li> <li>Increased chances of adoption and operating risks</li> </ul>		<ul style="list-style-type: none"> <li>Leadership vision and support</li> <li>Better connect with stakeholders</li> <li>Increased integration of processes</li> <li>Improved coordination and better decision-making</li> <li>Increased scalability</li> <li>Improved risk management</li> <li>Improved business performance</li> </ul>	

**Table 10: Governance Framework Guiding Intelligent Automation Journey**

## CONCLUSION: SETTING PRIORITIES FOR THE YEARS AHEAD

As a leading player in the energy and utilities sector, you realize the augmented energy governance is a juggling act between three key dimensions: security of supply, sustainability and affordability/equity. It requires realistic long-term planning, human-centered design, goals-based collaboration between the whole ecosystem (policymakers, investors, producers, the market), and a faith that the technologies of tomorrow will provide questions that cannot be answered today. If they could, everyone would be doing it the same way. As a result, old ways of thinking/working are not appropriate today, the ability to be flexible to change is the key.

The traditional business models of stable long-term agreements backed by large tickets capex projects is slowly being replaced with small players and smaller projects – shale oil, rooftop solar panels, micro-grids are a few examples of this trend. Therefore, you need to focus efforts towards this domain, as well as new businesses, such as renewables and beyond the meter. To become a disruptor, you will need to make a range of difficult decisions. You will need to determine how to embrace innovation and transformation while still earning a sustainable profit. You will need to clarify your role in the distributed energy system by determining where you can best add value - as producers, distributors, managers, operators, financiers, support service providers or something else.

You must also shore up your organization's strategies related to renewable generation, energy efficiency and the role that natural gas might play in your generation portfolio. It is easier to grow the value from a digital enabler in these new deep techs than refurbishing an existing asset (coal or gas plant for example). If you need to grow alongside this era's challenges, it requires an ambitious adoption of IA and Design Thinking.

Design thinking can turbocharge automation value. By applying design thinking techniques across your IA program, you can be better positioned to drive ROI exponentially, not incrementally. You can shift your focus from reducing defects and cycle times to reimagining business outcomes. This will require an empowered workforce that is trained and incented to try new things, and changing the culture of the organization so that automation, enabled through a process-first approach, is a part of everything you do. Building these capabilities is vital to innovate more aggressively through new business models and grow vibrantly at the expense of the competitors who fail to change.

To make this transition effectively, you must identify the most likely future scenarios for your jurisdiction's energy and utility systems, consider the implications of each scenario on your company, develop alternative responses to each one and invest in the changes necessary to help you bridge any current gaps. Although there are no hard and fast answers to these quandaries in an interconnected world, options do exist, if your enterprise is willing to think through your opportunities for the future. We hope this paper has helped to frame some of these options for you.

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## ACRONYMS

AI	Artificial Intelligence
CHP	Combined Heat and Power
CX	Customer Experience
EV	Electric Vehicle
IA	Intelligent Automation
IOT	Internet of Things
IT	Information Technology
VRE	Variable Renewable Energy

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