DIGITAL STRATEGY

Digitally Forward

Putting digital in the context

FOREWORD

Bhutan Power Corporation Limited (BPC) aspires to keep itself abreast with the technology transformations aided by Information Technology and digitalization efforts. BPC needs to adapt the organization's strategy and structure to opportunities enabled by digital technology and it is therefore imperative to have a strategy to embrace and embark on the journey of digital transformation. This would also involve transitioning into more collaborative, agile, mobile, innovative and creative ways of working.

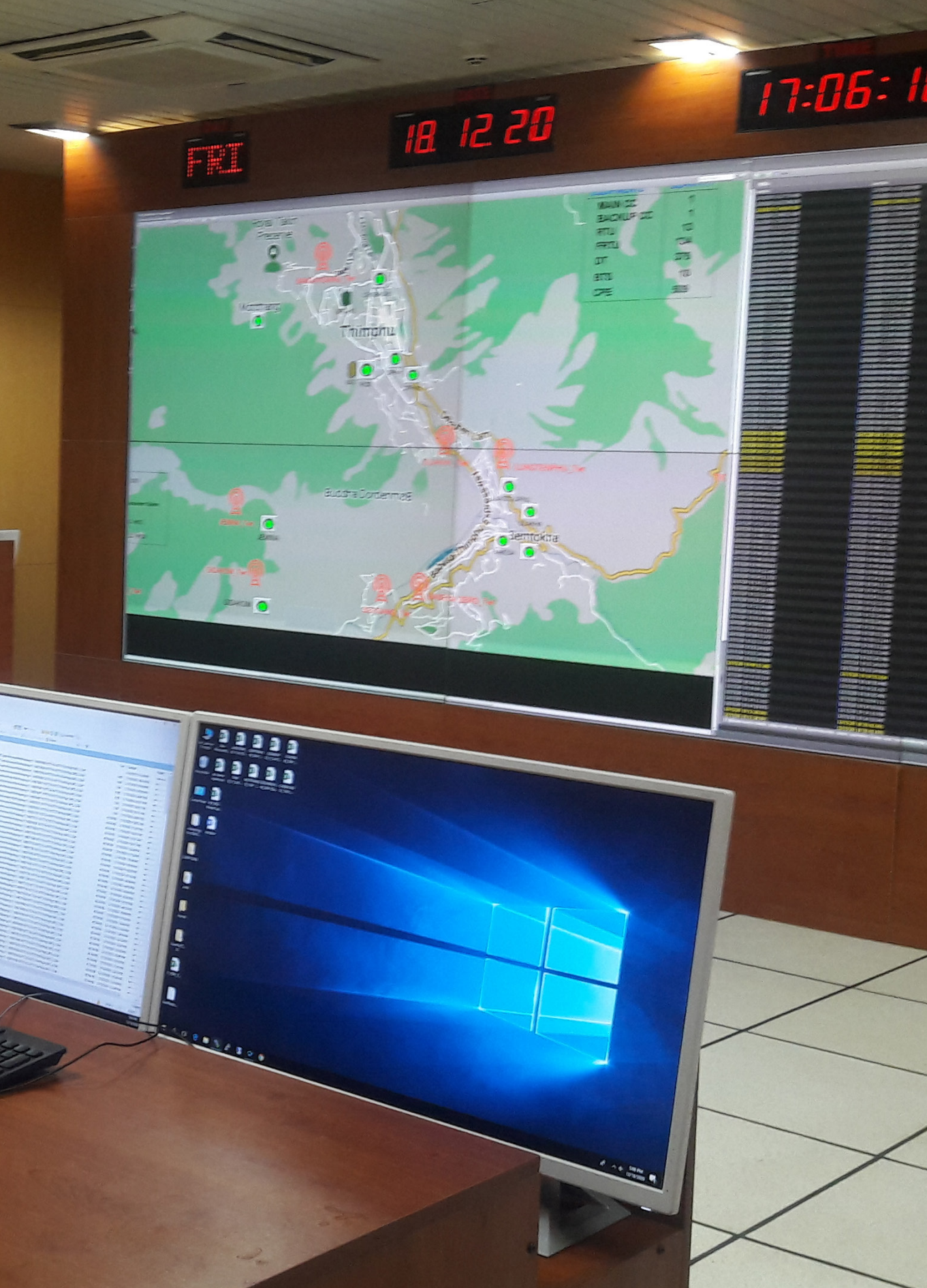
Digital transformation in BPC is envisaged to make business processes and services prompt, accurate and reliable to offer maximum satisfaction level to our valued customers. BPC is committed to transform its processes and services digitally and move towards becoming the "Utility of the Future". Towards this, this strategy document has been framed and is expected to serve the following broad objectives:

- Identify the core focus-areas for digitalization;
- Be the blue print and foundation for all digitalization efforts;
- Be the guideline to initiate digitalization activities; and
- Implement the digital transformation programs as per the road-map developed herein.

The undersigned would like to place on record the excellent and conscientious work carried out by the digital strategy team of BPC and bringing out this document which is not only important but very timely as well. This digital strategy should set the path for making rationalized and prudent investment choices to maximize growth, profit and value to the various stakeholders, and in implementing the strategies and measures with discipline.

Tashi Delek!

(**Sonam Tobjey**)
Chief Executive Officer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1.0 INTRODUCTION

Digital technology, in its broad, holistic sense, is the nearly instant, free and flawless ability to connect people, devices and physical objects anywhere. Mining of data, which it supports, greatly enhances the power of analytics that leads to dramatically higher levels of automation, in terms of both processes and, ultimately, decisions.

Therefore, companies need to make key decisions with regard to digitalisation and will need to work on suitable ones for them, or at least have a clear idea of their digital needs and how it would benefit their companies. Connecting digital strategies to their businesses would, otherwise, prove a challenge. A holistic view of the organisation's current digital state and the capabilities required to advance its digital initiatives are crucial for successful transformation.

The fourth Industrial Revolution, or Industry 4.0 shapes the world. The Internet of Things (IoT), Big Data, Data Analytics, Artificial Intelligence (AI) and Blockchain are a few technologies that ease how things function through heightened intelligence, efficiency and transparency. In the face of technology transformations, it is imperative that BPC develops a strategy to embrace and transcend to digital transformation.

The company's vision is "To be innovative and efficient power utility, driving the socio-economic transformation of Bhutan." The Corporate Strategic Plan (CSP) 2019 – 2030 outlines the various strategic objectives, mapped one upon another, ultimately leading to fulfilment of the themes. Objectives, such as "Improve Tools & Technology, Adopt Appropriate Technology, Improve Efficiency, Improve Customer Satisfaction, etc.", all necessitate the overall transformation of systems and functions. Therefore, it is clear that if the company is to achieve its objectives and goals, a transformation to a smart and digitalised system is the way to go. It evokes a sense of urgency to speed up the technology transformation to bring about excellence in operational efficiency and resource optimisation.

The digital strategy has been worked around four strategic themes of *Customer Engagement Digitalisation, Grid Operation Digitalisation, Enterprise Digitalisation and Human Resource Functions Digitalisation.*

The themes are aligned with the company's vision, its CSP and other strategic plans through identification of objectives under each theme and linking them with those of CSP's. The objectives are then supplemented by the initiatives. The implementation timeline of the same is spelt in a manner that is integrated and complementary to one another.

2.0 ASSESSING THE BUSINESS VALUE CHAIN

Before we explore the digital strategy or digitalisation, it is imperative that we take stock of BPC's value chain to better understand and identify areas and processes for digitalisation. It entails understanding the company's current structure and its businesses, which would provide the framework for BPC's digitalisation plans. Figure 1 presents BPC's business value chain, segregated under 'core functions' and 'support functions'. The core functions describe BPC's activities to meet its main activities, while support functions are the ancillary undertakings that help operationalise the core activities.

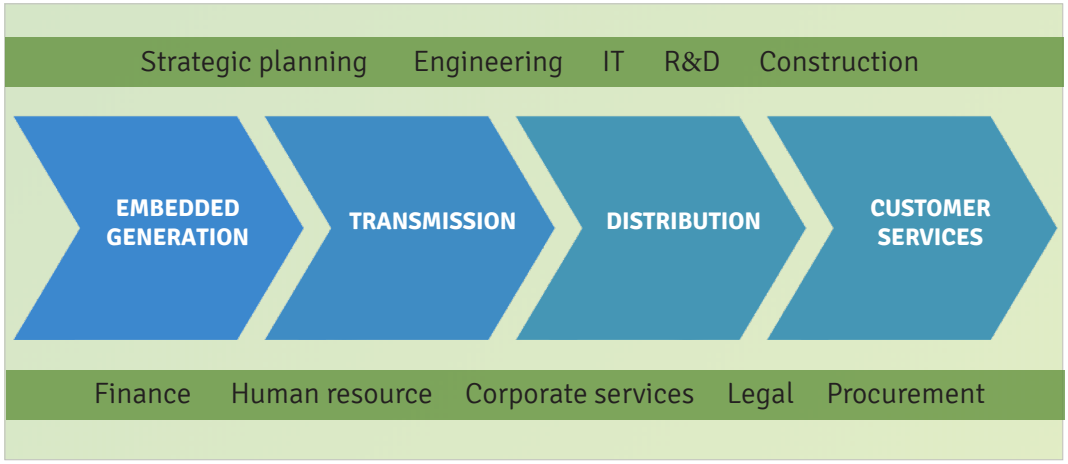


Figure 1: Business value chain

As evident from figure 1, BPC's core functions comprise embedded generation, transmission and distribution of electricity, towards meeting customer needs. Considering that BPC is a service-oriented company, excellence in this area is critical in the business value chain. The 'support function' facilitates in realising the core functions as shown in figure 2.

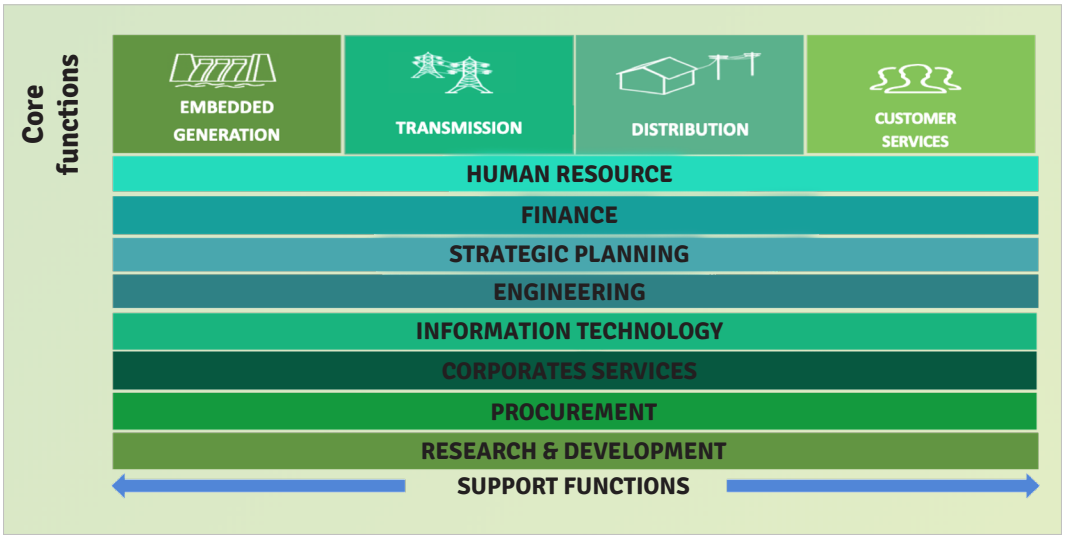


Figure 2: The core and support functions along the business value chain

3.0 IDENTIFYING FOCUS AREAS

For a power utility, its primary purpose (in a conventional view) is to ensure reliable and secure electricity supply. In that sense, to meet the ever-growing expectations and demands of its customers, BPC has to take its business onto the digital platform. The shift to a digital platform becomes all the more compelling in the face of new demands in services, because of advances in digital technologies and access of information to customers.

Besides that, customers also compare BPC with other service-oriented companies that are innovative and function more efficiently riding on digital technology. The introduction of mBoB, eTeeru and chatbots of the Telcos have transformed customer experience vis-à-vis services that have gone online through digitilisation.

Therefore, for BPC, it is an added impetus to quickly mobilise the resources so it can latch on to the associated opportunities digitilisation brings. As highlighted in section 2.0, customer service excellence stands out and is the end goal of the value chain functions.

All activities BPC undertakes eventually go on to ensuring customer service excellence in its operations. Therefore, 'Customer Services Excellence/ Engagement' becomes a key area of focus for digital transformation in the company's digital strategy.

Generation, transmission and distribution of electricity are BPC's other core functions. These functions are merged under 'Grid Operations' and is taken up as the second major component of BPC's digital strategy. The Smart Grid Master Plan (SGMP 2019) details all schemes in the development of smart grid in BPC and deployment of digitalisation efforts.

At the heart of all digital efforts is a robust Information Technology (IT) ecosystem. While BPC's IT infrastructure has been the backbone of its business functions for now, it has been limited to processing transactions and system analysis within the operating environment of the corporate data centers and server rooms. While adopting digital ways of working, we cannot shy away from the deluge of data the Operational Technology (OT) elicits.

The level of OT data for the electrical grid systems will continue to grow as more intelligent and communicable devices are added to the grid in pursuit of Smart Grid. For example, the amount of OT equipment with sensing, data processing, control and communications on feeders will increase drastically. SCADA for distribution and transmission would merge. Automatic Meter Reading (AMR), Outage Management System (OMS) and Advanced Metering Infrastructure (AMI) would feature as a common digital platform. This would force the IT and OT to collaborate to increase distribution system performance.

Also, with the digital transformation plans in the near future, the scope of existing IT ecosystem would grow, compelling it to modernise with operational needs. Alongside, expenditure on the new IT system would grow exponentially, making appropriate planning in the evolution of IT ecosystem crucial. Today, the IT infrastructure has only been identified as a support activity in BPC's business value chain. Digitalisation would lead to convergence of IT and OT, resulting in a special attention to the IT ecosystem. Therefore, this 'IT architecture along with its ecosystem' has been identified as the digital strategy's third key area of focus.

While BPC initiates numerous schemes with a brand-new ambition, it will continue to grapple with challenges of large and complex legacy operations and operators that might inhibit the rapid innovation towards digital transformation. Many of the executives and the workforce have spent their careers in a predictable working environment and shall take refuge in their legacy processes and systems.

For the success of this anticipated digital transformation, it is important that the current pool of employees and the future workforce become the company's digital talent. The existing digital talent gap should be bridged by focusing on the company's 'human resources perspective'. This aspect warrants prominence and, therefore, is identified as the digital strategy's fourth key area of focus.

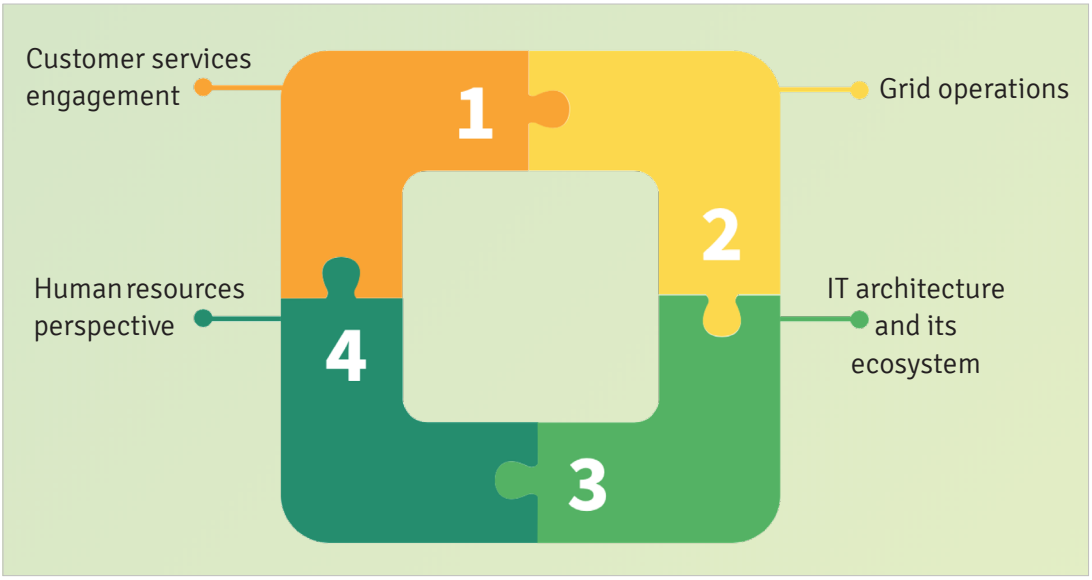


Figure 3: Key focus areas

4.0 BECOMING A DIGITAL UTILITY – STRATEGIC THEMES

Understanding the organisational framework, categorising business processes (as either core or support activity) and defining the focus areas chart the way forward to identifying the strategic themes of the digital strategy to launch BPC onto the digital platform. To transform BPC into a digitalised utility, the following four core strategic themes are identified to support the digital strategy.

1. Customer Engagement Digitalisation
2. Grid Operations Digitalisation
3. Enterprise Digitalisation
4. Human Resource Functions Digitalisation

Figure 4 shows the core digital strategic themes of the digital strategy.

CORE DIGITAL STRATEGIC THEMES

HR Functions Digitalisation

- Data-driven, collaborative, automated processes.
- Iterative approach to HR services and processes.
- Meet the future demands of employees.
- Employee productivity.
- Research and development.
- Digital specialists and digital factory.

Customer Engagement Digitalisation

- Design a delightful customer experience with omni-channel touchpoints.
- Customer service analytics.
- Customer journey optimization.
- Customer affordability, trust and satisfaction.

Digital Transformation

Grid Operation Digitalisation

- Operational excellence aided by smart grid.
- Predictive and condition-based maintenance.
- Plant optimization.
- Crew productivity analytics and management.
- Efficiency and line loss reduction.

Enterprise Digitalisation

- Build a robust, efficient, interoperable and agile core digital platform to support digitalisation efforts.
- IT and OT convergence.
- Modular IT architecture.
- Efficient IT governance structure.
- Business Intelligence architecture.
- Data center and hardware readiness.

Figure 4: Core digital strategic themes

5.0 CORE DIGITAL STRATEGIC THEMES

5.1 Customer engagement digitalisation

Customers need no longer be passive users of electricity in the near future. Smartphones and easy access to data are driving expectations in customer services to new heights. Energy efficiency is the new buzz word, where manufacturers have optimised consumption appliances and prosumers generate their own electricity.

To succeed when facing such highly informed, tech-savvy and empowered customers, utilities must elevate consumer experience to the best-in-class level. Utilities need to focus on leveraging the power of data to make the best services, along with value-added ones, available to its customers. All together, BPC should bring customers to the center of its functions and build its strategies around them.

Below, an approach is framed to customer service transformation that will help BPC capitalise on this opportunity to reduce costs, maximise customer satisfaction, and boost employee engagement.

5.1.1 Redesigning customer journey and Turn-Around Time

There is opportunity to transform customer experience by capturing their entire journey in availing BPC services. The process from application of new meter connection to testing of a meter, typically cuts across multiple functions of service value chain within the organisation and can last between minutes and months.

For instance, a customer's journey to request a new service connection might involve touchpoints in multiple channels – web research, ESD office visit, phone calls, a technician visit - taking several days to execute from initial enquiry to billing to final connection of a meter.

Figure 5 illustrates a customer's journey and the number of days taken to avail of BPC services. The advantage of capturing an entire journey is unlike that of the touchpoints. They capture the whole of a customer's experience. An important aspect is, even if a particular interaction scores high on satisfaction, perhaps because of an employee's courteous attributes, it does not speak for the customer's entire journey.

The customer could have experienced delays or a second-rate experience of some kind with a technician. By examining the customer's journey from beginning to the end, BPC can identify breaks in the process that embitter customer satisfaction and experience. More important, BPC can record the Turn-Around Time (TAT) and can devise strategies to improve it.

All services BPC provides to its valued customers need to be mapped out against the TAT and the journey captured in totality. Avenues to automate processes through digitalisation have to be explored towards meeting customer services excellence. BPC's following services will be considered for enhancement through digitalisation.

1. Power and construction clearance
2. Shifting of electrical infrastructure
3. Temporary power supply
4. Permanent power supply
5. Up-gradation of energy meter
6. Additional energy meter
7. Testing and replacement of energy meter
8. Relocation of energy meter
9. Interim billing
10. Change of information in the system
11. Closure of account and security deposit refund

RELEASE OF PERMANENT POWER SUPPLY

TaT: Maximum 3 working days in urban areas
Maximun 4 working days in rural areas

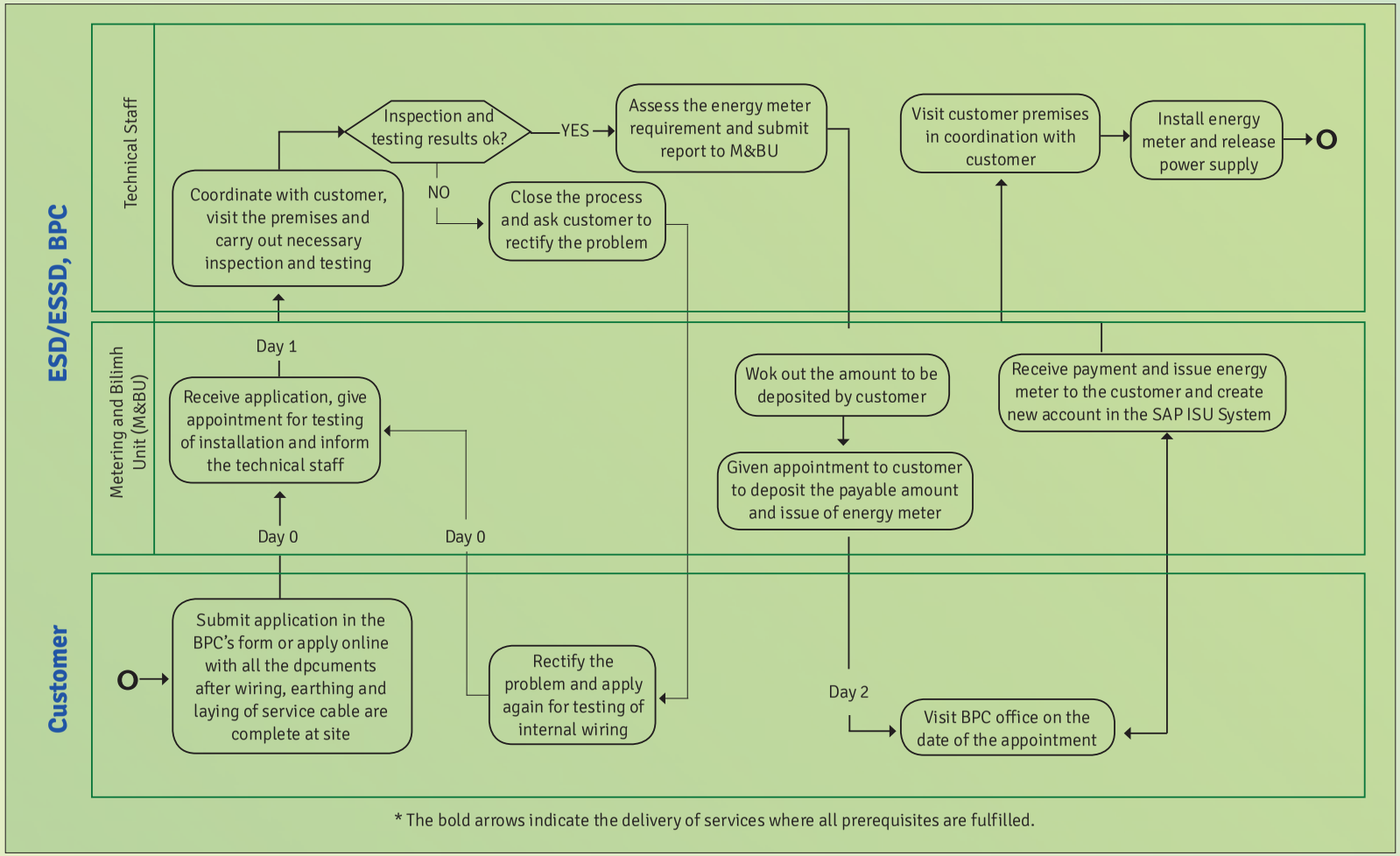


Figure 5: Customer journey redesign and turnaround time example for a BPC service

5.1.2 Omnichannel contact center

Today, BPC interacts with its customers over the 1250 toll-free number, manned by a few operators. The services defined and made available to customers are also limited. There is an increasing need for building a meaningful customer experience, such that customers are able to interact with BPC in multiple ways, over various channels, easily and simply. Creating better journeys means, invariably making more use of digital technologies. Enabling more customers to use digital channels also benefits the utility in bringing down costs of having numerous human touchpoints. Therefore, it is imperative that the contact centers are upgraded to support omnichannel interactions with following features.

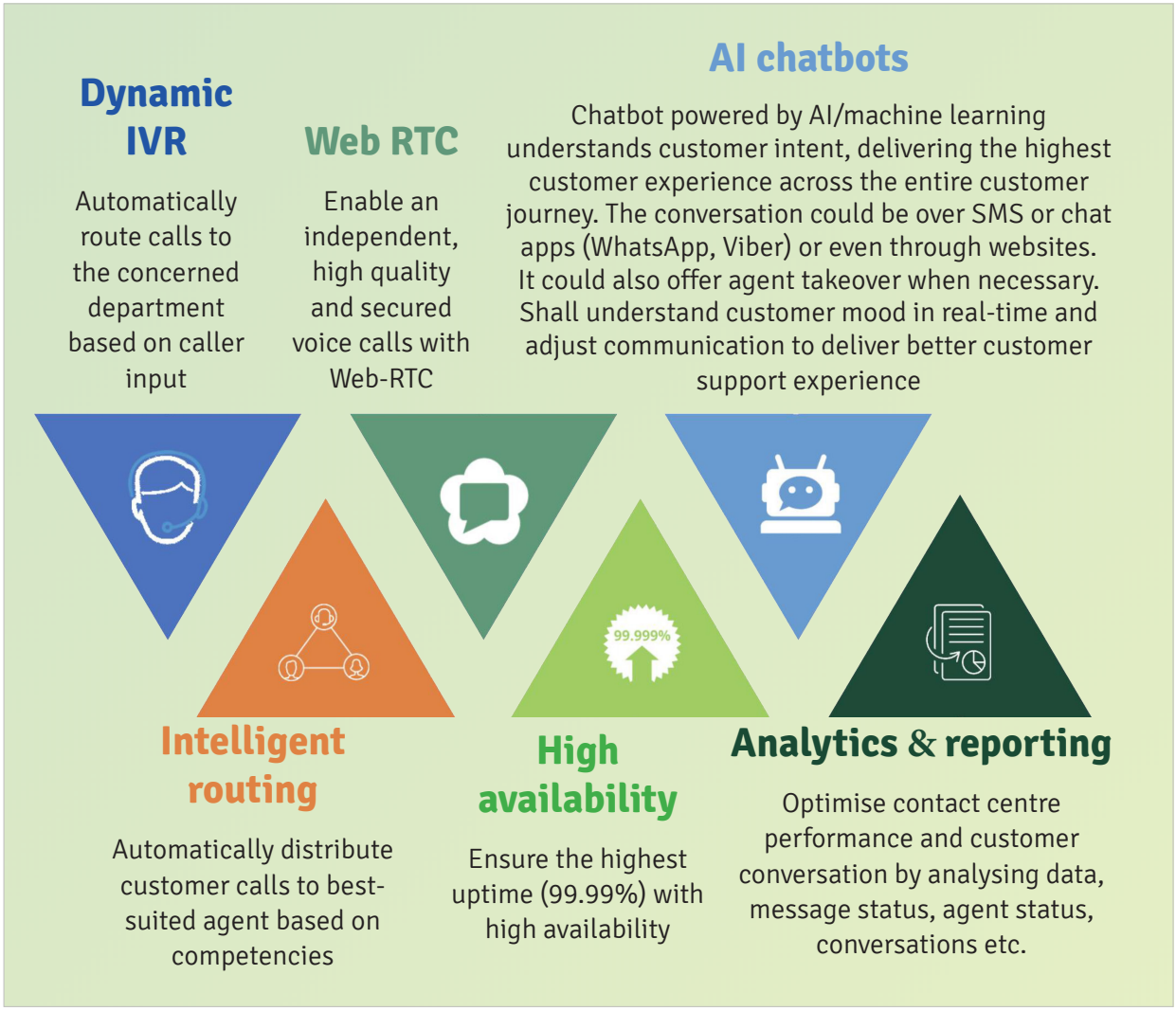


Figure 6: Omnichannel contact center

5.1.3 Customer centricity

Electricity companies are gearing towards becoming 'customer-centric' than 'energy-centric', using increasing volumes of customer data to better understand their behaviors through their experiences with the utility. There is tremendous prospect in developing innovative and digitally enabled products and services to provide integrated customer service.

Technology is propelling this opportunity through sensor-rich objects, smart devices and the increasingly seamless nature of connectivity. It is important to invest in integrated customer service offerings to increase customer segmentation and improve loyalty and experience. BPC can leverage on this and offer various personalised customer experiences to different categories of customers so they share personal relationship with BPC.

Inadequate data model in SAP that is 'meter-centric' may hobble BPC's intentions to do so. Therefore, BPC should design and develop a stand-alone system to solve these inherent design constraints in the SAP ISU module.

One of the salient features of the 'customer-centric' system is to enable consumers to update their personal information and their movement. Seamless and user-friendly workflow processes, from "move-ins" to "move-outs", should be designed with necessary third-party intervention. It will help validate and authenticate new data flowing in at each stage of such transactions. This model will be the basis for deploying other value-added services such as Centralized Online Service and Personalized Customer Portal.

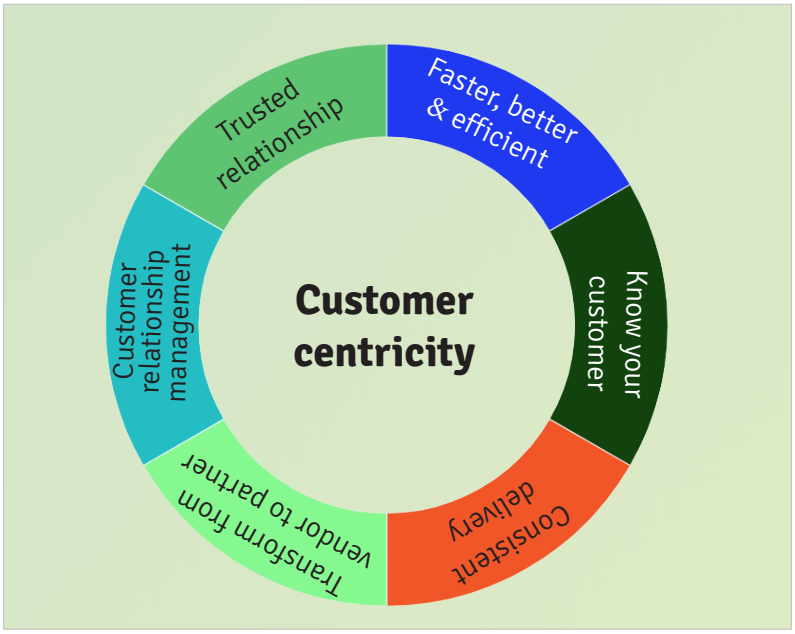


Figure 7: Customer centricity

5.2 Grid operation digitalisation

At the heart of digitalising grid operations is the Smart Grid system. For this, the Smart Grid initiatives have been comprehensively mapped out in the Smart Grid Master Plan (SGMP) 2019.

The focus areas in Transmission and Distribution Systems with regard to digitilisation are the Supervisory Control and Data Acquisition System (SCADA), Energy Management System (EMS), Distribution Management System (DMS), Advanced Metering Infrastructure (AMI) and other components and functionalities specified in SGMP for smart and digitally-enabled electric grid systems.

Therefore, initiatives mapped out in the SGMP form the part of initiatives of grid operational digitalisation of this document. Accordingly, initiatives in the two documents have been integrated and mapped to bring about uniformity. Figure 8 and 9 illustrate BPC's SMGP along with key initiatives for both the Transmission and Distribution Systems.

Some of the major programs identified in the SGMP are reproduced here. However, the focus has been drawn to data analytics in this document as it was not spelt out in SGMP.

Sl. #	Activity	2020	2021	2022	2023
1	Installation of SCADA in substation under SMD Jigmeling, Deothang, Phuentsholing and Semtokha				
2	Complete replacement of PLCC with FOTE for tele-protection, telemetry and voice communication				
3	Operationalize Automatic Meter Reading (AMR)/Advance Metering Infrastructure (AMI)				
4	Complete installation of numerical relay based protection system and SCADA in all sub stations				
5	Operationalize Transmission Control Center (TCC)				

Figure 8: Smart grid programs of transmission system and timeline

Sl. #	Activity	2020	2021	2022	2023	2024	2025
1	Installation of AMR for 50 MV industries						
2	Installation of FPIs on 33 kV Gangtey feeder and Dorokha-Sombaykha line						
3	Complete installation of AMR compatible feeder meters in all 33/11 kV substation						
4	Customer mapping of all ESDs till Distribution Transformer (DT)						
5*	GIS mapping and Network Topology Building						
6*	Distribution automation-installation of ARCBs, Sectionalizer and FPIs						
7*	Installation of Distribution Transformer Meters						
8	Replacement of electromechanical with numerical relays in all 33/11 kV substations						
9	AMI for Thimphu ESD for LV bulk and above customers						
10	Establishment of Regional Distribution Control Centre (DCC) in Phuentsholing						
11	Establishment of 3 Regional Control Centres in Mongar, S/Jongkhar and Gelephu						
12	Upgradation of Central DCC at Thimphu and integration of Regional DCC to Central DCC						
13	Nationawide Advanced Metering Infrastructure (AMI) Roll Out						

** Activities with asterisks are explained further later*

5*	**GIS mapping and Network Topology Building**	
	ESD Paro, Wangdue, Punakha, Phuentsholing, Samtse, Gelephu, Samdrup Jongkhar, Trashigang, Mongar, Bumthang	
	Tsirang, Trongsa, Zhemgang, Haa, Dagana, Lhuentse, Trashiyangtse, Pemagatshel	
6*	**Distribution Automation**	
	Phuentsholing, Samtse, Gelephu, Tsiring, Trongsa, Zhemgang, Bumthang and Dagana	
	Samdrup Jongkhar, Trashigang, Trashiyangtse, Mongar, Lhuentse and Pemagatshel, Haa, Paro, Punakha and Wangdue	
7*	**Installation of Distribution Transformer Meters**	
	Phuentsholing, Samtse, Gelephu, Trashigang, Samdrup Jongkhar, Wangdue, Punakha, Mongar, Haa, Bumthang	
	Dagana, Lhuentse, Pemagatshel, Trongsa, Tsirang, Trashiyangtse and Zhemgang	

Figure 9: Smart grid programs in distribution system and timeline

5.2.1 Optimised Asset Performance Management (APM)

For the transmission and distribution (T&D) system, data analytics can help improve its performance, reduce asset management costs and capture high intrinsic values. Efficient use of data analytics can allow BPC to use it for maintenance and manage maintenance schedules based on highly accurate predictions rather than post-event reporting culture. Instead of the routine or scheduled maintenance (bi-annual or annual), predictive maintenance could be carried out based on data analytics.

This holds out the promise of greater accuracy and reliability at lower cost. Successful implementation of such a technology has translated into annual gains of about two percent in utilities, operating costs reduced by 10 percent in distribution systems, 15 percent in high voltage systems and 20 percent in HV and MV substations. The use of data has also helped improve asset reliability.

A world of opportunities wait with data analytics as illustrated in figure 10, which would lead to improvement of BPC's overall performance.

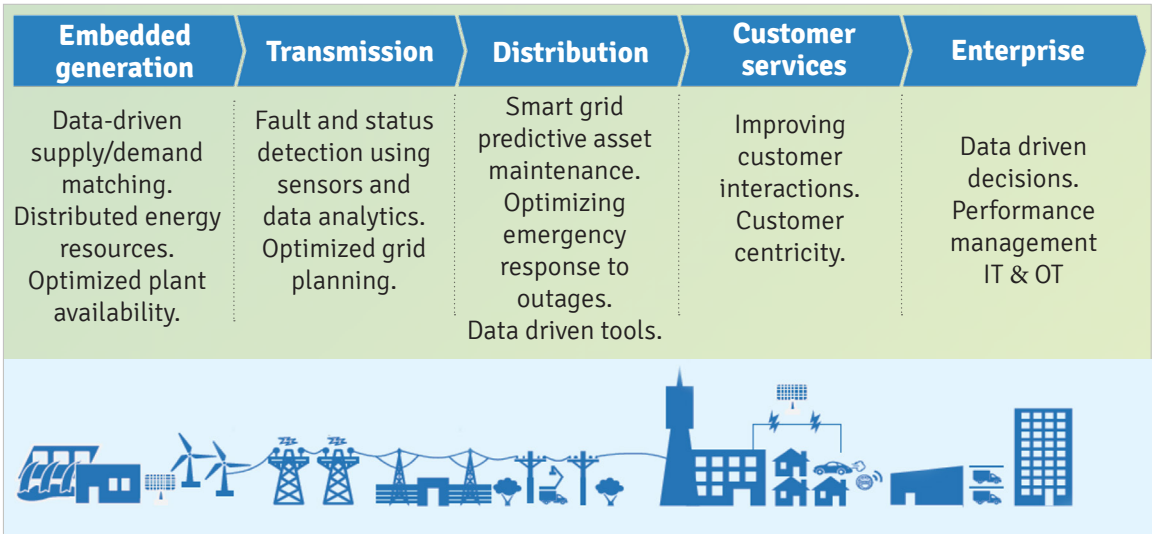


Figure 10: Multiple application of analytics along the utility value chain

The Figure 10 shows the opportunities presented by data analytics for multiple applications along BPC's business value chain.

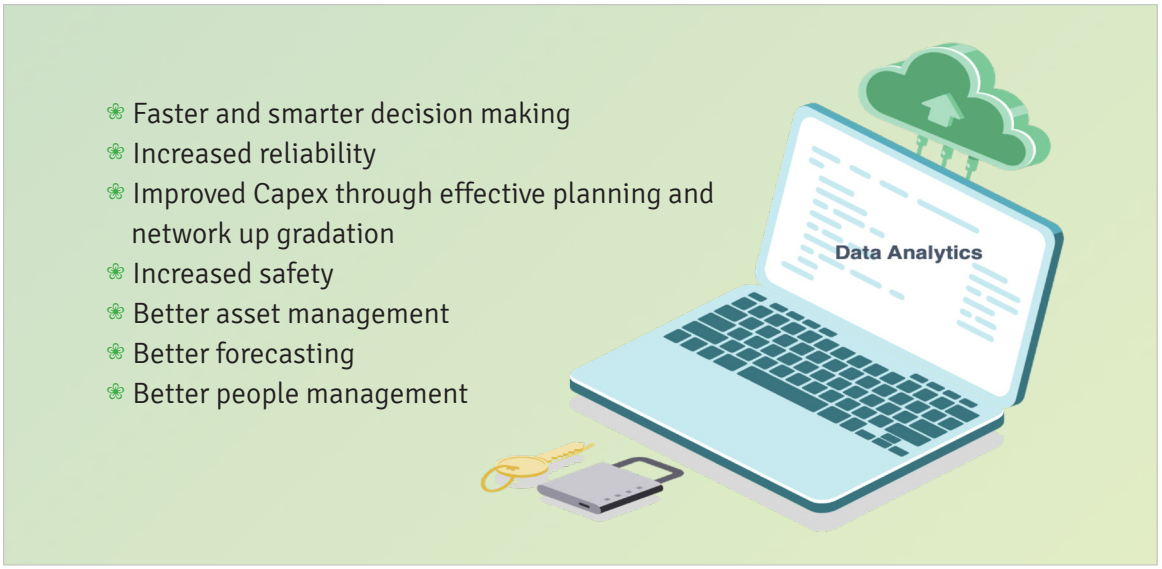
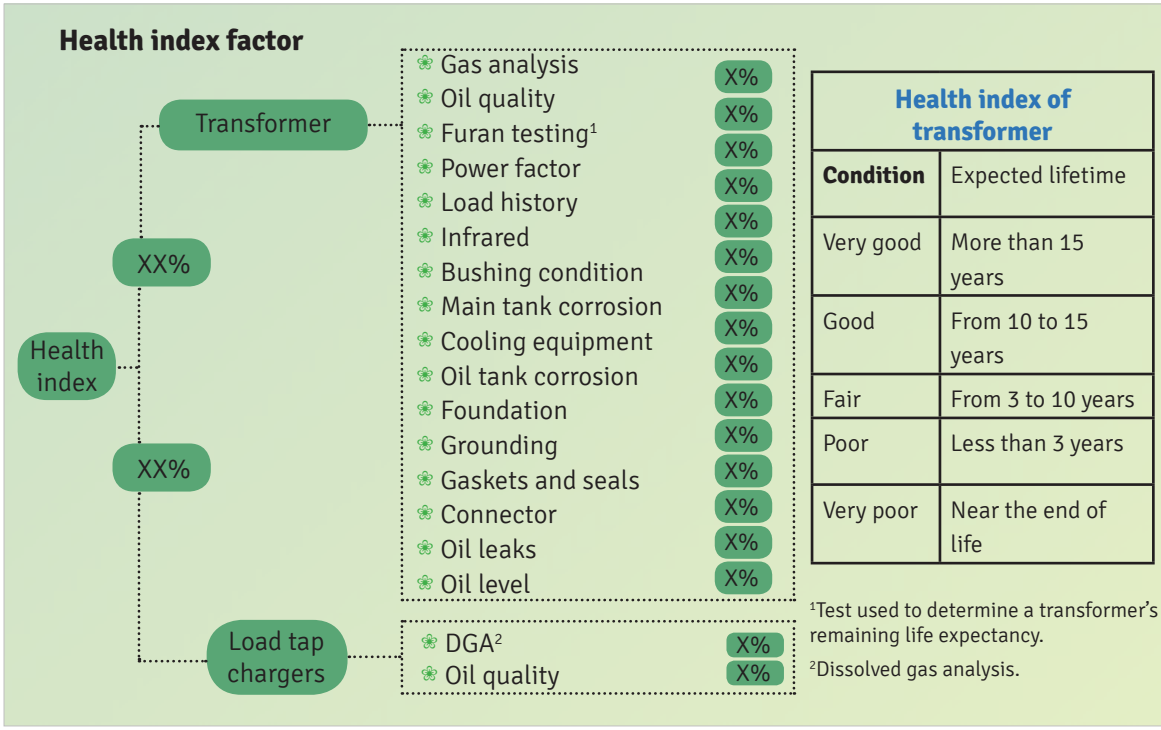


Figure 11: Data analytics opportunities

In the face of evident benefits that can be derived from data analytics, it is recommended that such technology be adopted for predictive maintenance of the critical components in the company's operations. The following figures illustrate potentials of the use of data analytics in the transformers (HV and MV) and distribution feeders as an example.



Health index of transformer	
Condition	Expected lifetime
Very good	More than 15 years
Good	From 10 to 15 years
Fair	From 3 to 10 years
Poor	Less than 3 years
Very poor	Near the end of life

[1]Test used to determine a transformer's remaining life expectancy.

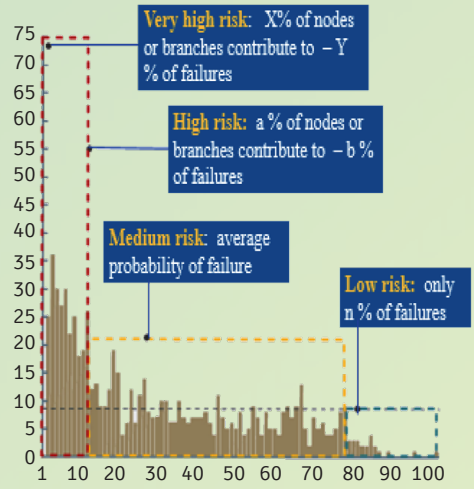
[2]Dissolved gas analysis.

Figure 12: An example of calculating asset health of a transformer

Use machine-learning algorihm to predict the failure of a distribution feeder element within 1 to 6 months using:

- SCADA events
- Historical anomalies
- Maintenance and inspection work
- Construction characteristics
- Geographical information
- Meteorological information
- Measurements of power quality

Incidence of localised failures[1] on nodes or branches per month grouped into % tranches



Nodes and branches ranked from higher to lower probability of failure

[1]Defined here as any failure causing sustained customer outages

Depending on operator needs and regulatory incentives, the model can be used to:

- Improve quality of service at same level of expenditure by redeploying inspections.
- Reduce maintenance opex by-k% by avoiding non-productive inspections in areas with very low probability of failure
- Trade off cost and quality of service taking into account regulatory incentives

Figure 13: An example for failure probability of the distribution feeder

5.3 Enterprise digitalisation

Of many, BPC has adopted numerous large-scale software systems such as SAP ERP, Distribution Management System, AMR and SCADA, to provide a stable backbone for business functions. The future digitalisation works would call for more investments in the IT infrastructure and digital solutions for maximum stability and performance, which can be customised beyond the standard features with evolving requirements.

As digitalisation grows, BPC may deploy newer software functions and update them frequently, considering the decisions made will be based on real-time data from different sources. Automation of services portfolio within the business value chain, smart grid, customer relationship management and asset management systems would manifest the digitalisation efforts.

Each of these digitalisation initiatives would place a unique demand on BPC's IT infrastructure. As a result, it is envisaged that it would grow manifold, making maintenance sophisticated and cumbersome. It is, therefore, important that BPC modernises the IT eco-system progressively, corresponding with its operational requirements.

The existing IT ecosystem consisting of the software, hardware and associated leading edge features provide a stable backbone to meet the company's IT needs. However, to meet the future needs as defined by the digital strategy, it calls for a thorough discussion on the ease of managing the IT ecosystem. The following strategic objectives are identified for managing BPC's digital transformation.

5.3.1 Converging information and operational technologies

Historically, information technology (IT) and operational technology (OT) have been developed with separate goals to operate in separate environments. In BPC, IT relates mostly to software applications for commercial decision making and business process management, limited to SAP ERP functions, e-payment and mobile application development among others. In essence, IT is typically associated with back-office information systems to aid and enable the business process management, such as financial accounting, billing, asset management and human resource records.

In most cases, manual entry is involved and computing resources are centralised in corporate data centers. OT, on the other hand, is associated with field-based devices connected to the electrical system and the infrastructure for monitoring and controlling them. The typical example of such a technology is SCADA and, the recently implemented, DMS. Unlike IT, these devices communicate with each other or with the computer requiring relatively little human interactions. The following table illustrates the comparison between information technology and operational technology.

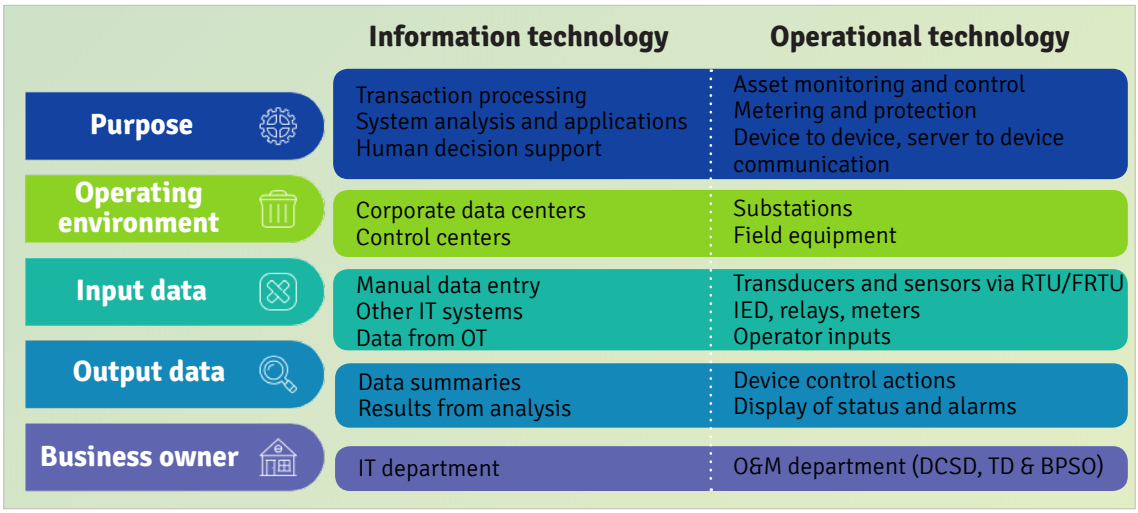


Figure 14: Comparison of IT and OT

The influence of IT on the electrical distribution system is growing with IP-based LAN and WAN networks, server virtualisation, cloud and mobile based technologies. The digital strategy points up the implementation of IT and OT systems in BPC for greater organisational improvement opportunities. The existing silos of OT and IT need to be eliminated for convergence, so it aligns and integrates works common to both. In anticipating this convergence, BPC has to work towards having reliable and standard data across all platforms for a single source of truth. Platforms for building standard and open data, linking both OT and IT, listing potential threats and data security management are envisaged to be taken up as projects under digital strategy.

The convergence of both IT and OT, specific to the grid operations are presented in figure 15.

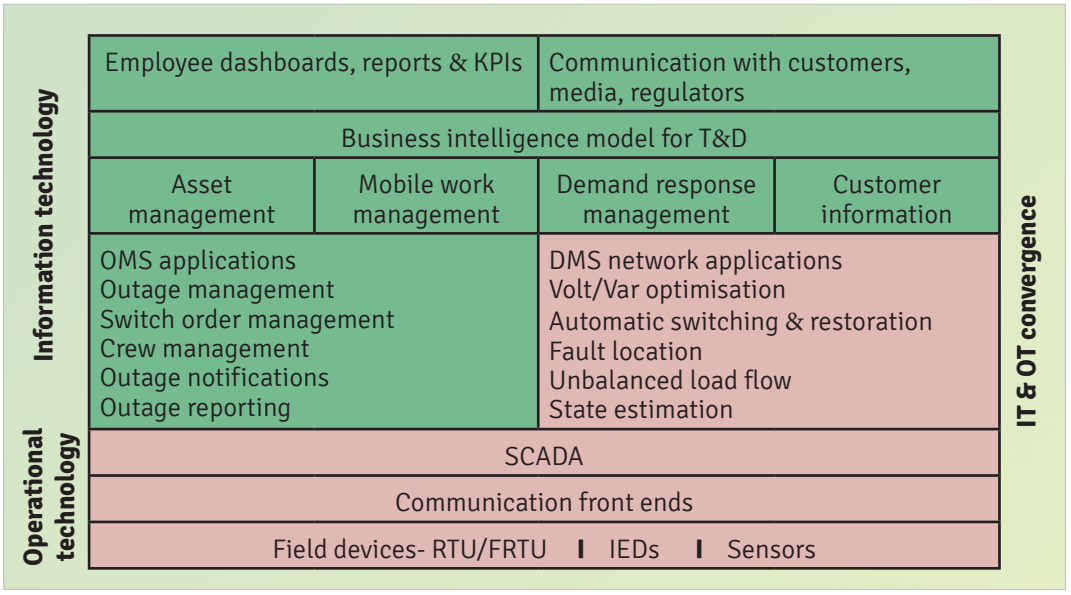


Figure 15: Convergence of IT and OT

5.3.2 IT governance and development

IT governance is a framework to amalgamate IT and business strategies. In BPC's case, instead of the business, it would be the OT strategy. For BPC, to ensure successful implementation of the digital strategy, IT governance should be key.

Not only should the IT strategy match with OT strategy, the framework, as developed, should also ensure delivery of appropriate financial and non-financial value BPC expects. The IT & OT performance should be periodically monitored along with activities undertaken for timely corrective interventions. The framework is also expected to manage resources and the embedded risks in digitalisation. To that effect, BPC can adopt globally accepted practices and frameworks, such as Control Objectives for Information Technologies (COBIT) and Information Technology Infrastructure Library (ITIL).

5.4 Digitalising HR functions

The digital strategy and its subsequent implementation in BPC will usher in modernisation of infrastructure and new capabilities through digital solutions. The grid will be smarter, processes automated and works, streamlined.

All these digital technologies will demand new skills in employees to work flawlessly and in tandem with the digital transformation. While its existing employees are trained to be the digital talent, BPC also has to prepare for the cultural shift in its working environment that is expected from recruiting and retaining the workforce of the future (Millennial workers).

Therefore, one of the critical elements about going digital is the human dimension. It is vital that a comprehensive approach be created for more productive and adaptive workforce, which uses digital technology during the course of digital transformation and sustains the process through to the future workforce. Below, an approach is framed, through strategic objectives, to develop new skilling programs, to attract and retain talent in the company.

5.4.1 Employee profile, skills inventory, development programs

An employee's competency plays a vital role in delivering new services in the midst of BPC's digital transformation programs. BPC needs to identify the competency required for each of the functions within the digitalisation programs.

A comprehensive competency mapping needs to be carried out. HR development training should be appropriately imparted to employees for new skills and sustained innovation and growth. Innovation should drive the new skilling programs and should be consistently designed to improve business performance.

5.4.2 Center of excellence - The digital factory

BPC's large employee base gives it an avenue to build on the collective strength and foster a break-through innovation in the company.

A center of excellence, to be called the 'Digital Factory', needs to be created. Diverse fields of experience within BPC should be capitalised on for in-house capacity development to produce tailor-made digital solutions for the company. This digital factory will determine the direction in developing innovative enterprise capabilities across the company. It will design innovation units and develop skills within itself and across the organisation. This group of people will make up the digital talent, the torchbearers of the whole digitalisation process.

The 'Digital Factory' could be refined into a multi-sectoral business and BPC could use the skills for business diversification. It will explore new revenue streams outside the core business.

5.4.3 Recruitment planning - Millennial workers

The sustainability of the digital transformation would rest in the hands of the current employees, expected to be equipped with new skills. As the torch of the digitalisation process is passed on to future workers, a cultural shift in the working environment is inevitable.

Excellent working conditions and workplace flexibility are factors that attract young minds to work and BPC should be cognizant of such future requirements. The needs of the business would change and so should the recruitment planning and environment.

To achieve the full digital transformation, BPC will need to hire designers, developers, digital specialists and analysts and machine-learning engineers. In essence, the HR master plan should comprehensively strategise new policies for attracting and retaining the 'Millennial Workers'. Figure 16 shows the initiative of digitalising HR functions.

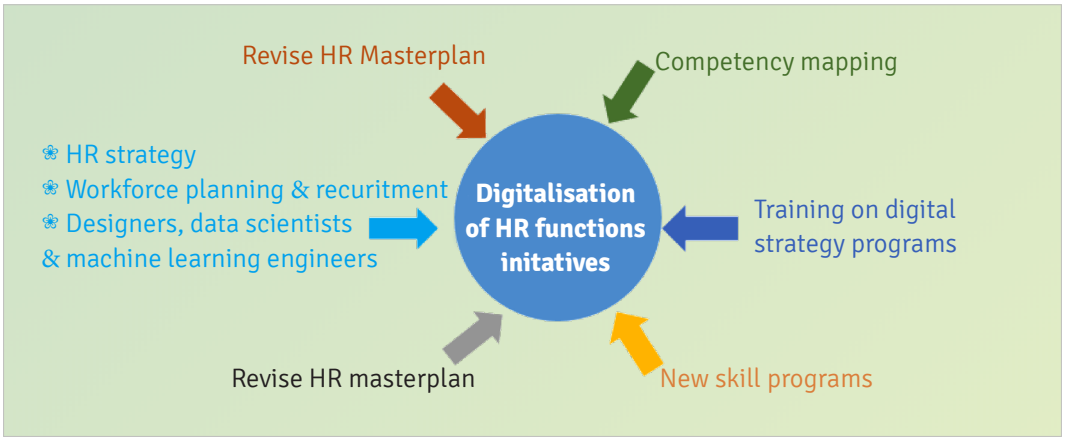


Figure 16: Initiatives of HR functions digitalisation

6.0 Aligning with corporate strategic plan

The Company's Vision is "To be innovative and efficient power utility, driving the socio-economic transformation of Bhutan."

The Corporate Strategic Plan (CSP) 2019 – 2030 outlines the various strategic objectives and strategy map towards fulfilling the themes. The objectives, such as Improve Tools & Technology, Adopt Appropriate Technology, Improve Efficiency and Improve Customer Satisfaction, among a few, call for the overall transformation of the systems. Figure 17 shows the alignment of this document with the CSP.

The strategy map in the CSP is a guide to achieving the end goals. Towards this, the strategic themes and objectives have been identified in the form of value chain process. The DHI Roadmap prescribes mandates for BPC and, in particular, the income projection from 2018 – 2030. Therefore, it is clear that if the organisation is to achieve its objectives and goals, there is need for transformation of the system that is smart and digitalised. It calls for embarking on and embracing the technology transformation with a sense of urgency to bring about operational efficiency and optimisation.

Towards this, BPC has worked out the Smart Grid Master Plan (SGMP), the Distribution System Master Plan (DSMP) and Human Resource Master Plan (HRMP), including this document. The masterplan and strategy documents look at the "As-is" state of the system and charts the path towards the "To-be" state.

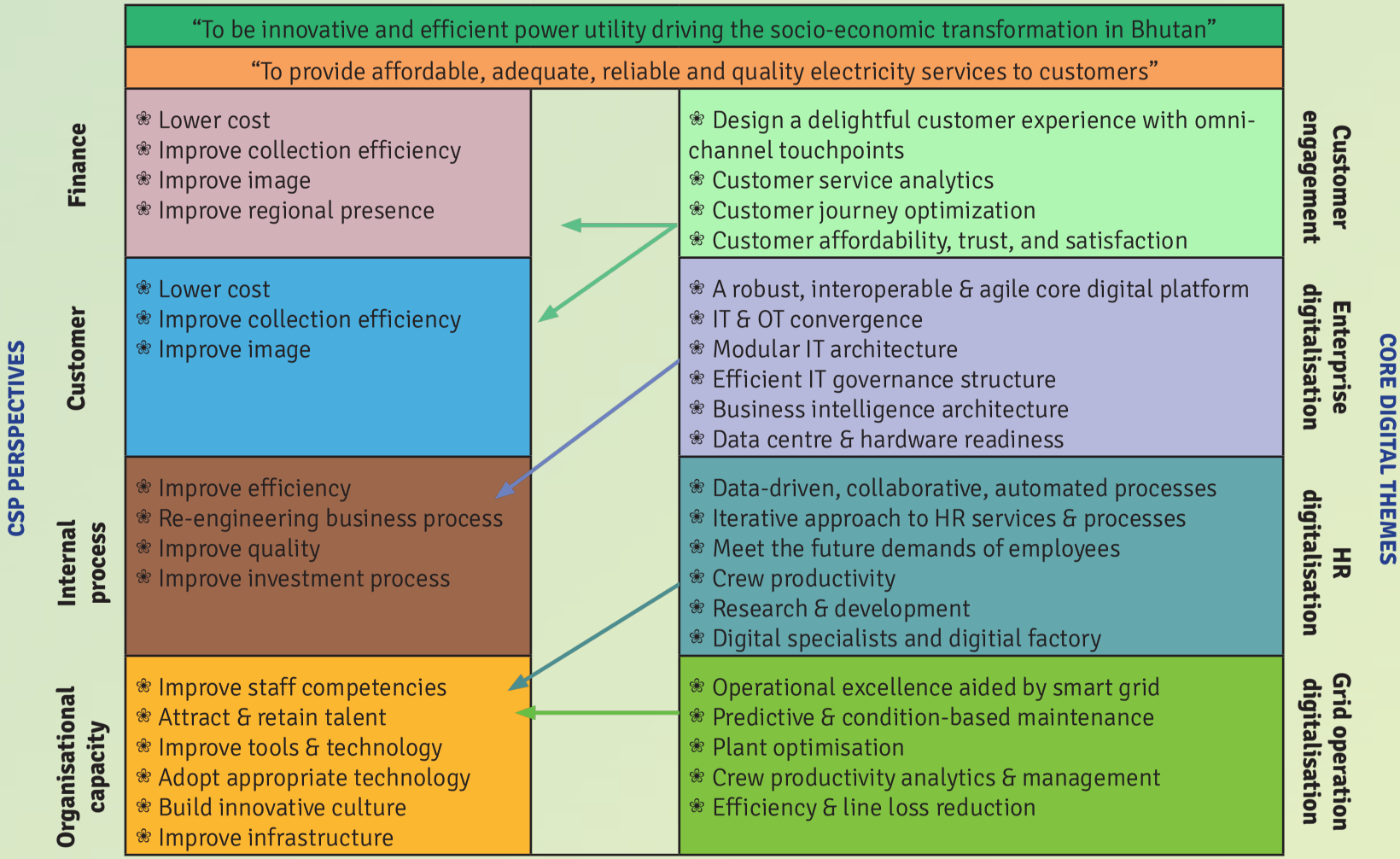


Figure 17: Alignment with corporate strategic plan

Figure 16 shows the integration of the digital objectives with those of the CSP. Although it does not clearly map out how one objective of the core digital themes will lead to the attainment of the objective of CSP, the objectives are linked to one another, forming a value chain model that leads to the company's ultimate goals.

7.0 Roadmap for implementation

The implementation timeline of digital initiatives has been drawn for each of the strategic themes over the period as in figure 18. Implementation of the initiatives have been arranged in a manner that is complementary to one another. The timeline for implementation of initiatives for grid operation has been comprehensively mapped in SGMP. The figure only depicts additional initiatives from the SGMP.

7.1 Customer engagement digitalisation

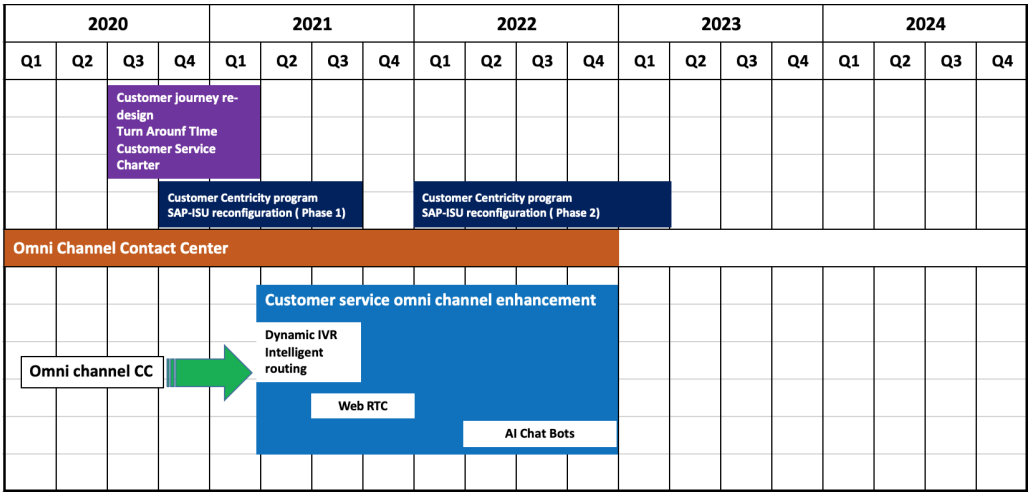


Figure 18: Roadmap of customer engagement versus services digitalisation

7.2 Grid operation digitalisation

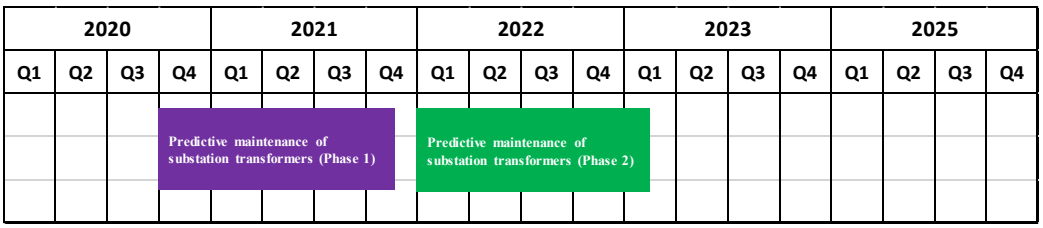


Figure 19: Roadmap of grid operation digitalisation

7.3 Enterprise digitalisation

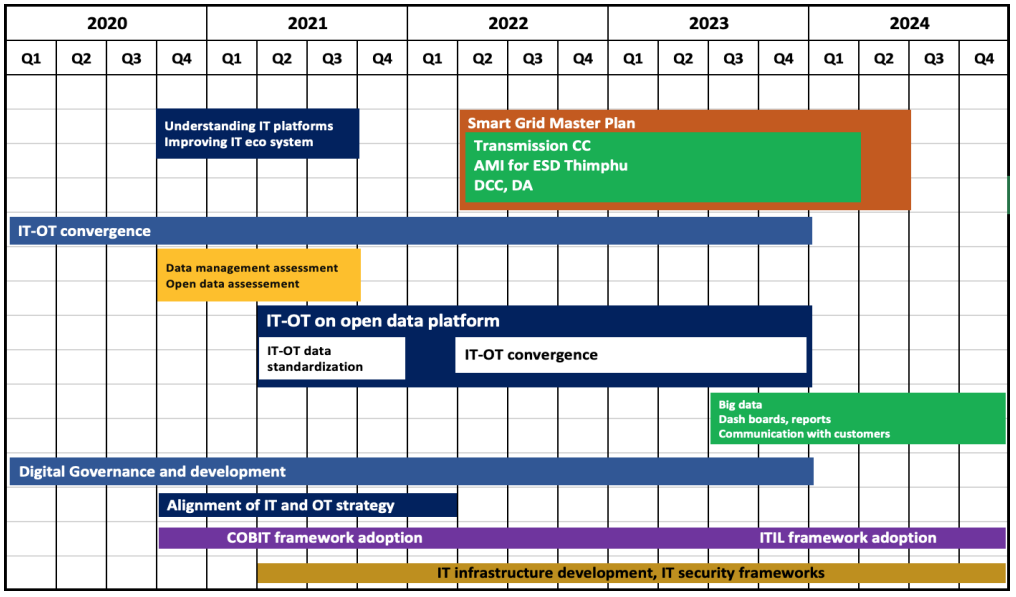


Figure 20: Roadmap of enterprise digitalisation

7.4 HR functions digitalisation

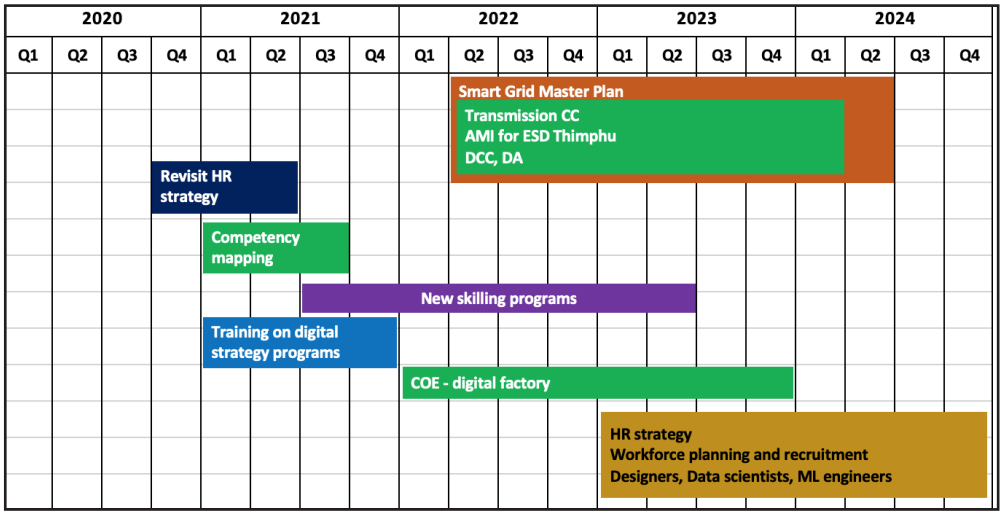


Figure 21: Roadmap of HR functions digitalisation

Particulars	2020				2021				2022				2023				2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Customer Engagement Digitalization																				
Customer journey redesign																				
Turn Around Time																				
Customer Service Charter																				
Customer Centricity program SAP-ISU reconfiguration																				
Phase 1																				
Phase 2																				
Omni Channel Contact Center																				
Customer service omni channel enhancement																				
Dynamic IVR; Intelligent routing																				
Web RTC																				
AI ChatBots																				
Grid Operation Digitalization																				
Predictive maintenance of substation transformers (Phase 1)																				
Predictive maintenance of substation transformers (Phase 2)																				
Smart Grid Master Plan																				
Transmission CC																				
AMI for ESD Thimphu																				
DCC, DA																				
Enterprise Digitalization																				
Understanding IT platforms																				
Improving IT ecosystem																				
IT-OT convergence																				
Data management assessment																				
Open data assessment																				
IT-OT on open data platform																				
IT-OT data standardization																				
IT-OT convergence																				

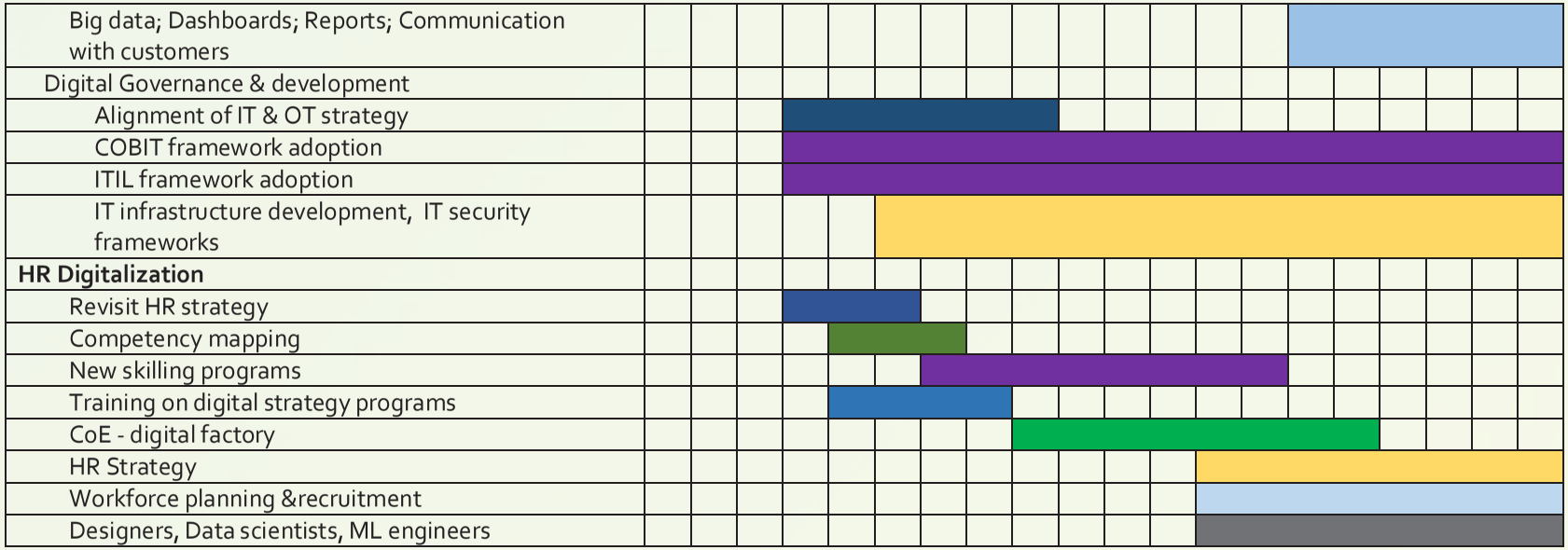


Figure 22: Roadmap of digital strategy

8.0 CONCLUSION

This digital strategy has been devised on "Think Big, Start Small, Scale Fast" concept.

The four thematic strategies of customer engagement digitalisation, grid operation digitalisation, human resource digitalisation and enterprise digitalisation, have been identified in the context of what digitalisation means to BPC.

The company, native to electric grid system, is defined by action plans mostly geared towards smart grid.

The digital strategy is, therefore, considered an overarching strategy for the overall technology developments, with the smart grid forming a large portion of it. The themes capture the objectives and initiatives that blend with those of the Corporate Strategic Plan. Together they form a value chain representation, suggesting the fulfilment of the corporate themes and perspectives through the realisation of those objectives and initiatives.

A number of initiatives have been planned with a sense of urgency over a five-year period for the company's digital transformation. Cost estimates have been left out to be worked on in keeping with the scale of initiatives and programs to avoid prejudices of precluding or including them based on assumptions.

A rigorous assessment of the "As-is" state of the system is essential before executing the initiatives for a smooth transition to the "To-be" state. Based on the evaluation, the initiatives will need to be facilitated and supported by prioritising investment plans.

Finally, in the company's bid to transform itself digitally, it is essential to enable a digital position through a company-wide effort. Company leaders should play an increasing role with broad organisational purview and own and lead the digital initiatives. Development of talents in digital skills, data mastery and infrastructure, including their continuity for agile deployment are all vital aspects to achieving the digital goals.


BPC
dhi Company