DIGITAL TRANSFORMATION JOURNEY

Nornickel has been consistently implementing a programme to improve its operational efficiency, including through the use of advanced information technologies. The Company is clearly ahead of the curve on technology adoption, rolling out multiple innovations that are unique in the industry. In 2020, Nornickel moved to the second phase of its IT strategy: advanced automation projects. Nornickel is already rolling out Industry 4.0 innovations across its operations and business activities, while our powerful IT infrastructure built out as part of Nornickel's digital transformation journey enabled fast response to the last year's unprecedented challenge and our continued operation throughout the pandemic.

IT INFRASTRUCTURE DEVELOPMENT

Nornickel's global IT strategy includes a programme to deploy high performance computing capabilities. The construction of a data centre in Moscow was the culmination of a major programme to build out a more resilient, advanced IT infrastructure. It also included projects to upgrade four data centres at the Polar Division and Kola MMC, build a company-wide backup system, create a new corporate-wide data transmission network, and build out a corporate services and infrastructure monitoring system. The IT infrastructure upgrade provided a solid foundation for Nornickel's further digital projects, from process automation to new ERP functionality, as well as ensured business continuity throughout the pandemic. Over 14,000 Nornickel employees were shifted to work from home in the shortest timeframe while meeting all information security requirements.

Our near-term key priority in developing IT infrastructure is to enable ubiquitous access to data centre resources and ensure fast data sharing between all sites. This will significantly accelerate management decision-making and support it, among other things, by data from resource-intensive AI platforms. Further development in this area will also be focused around an effective scale-up and high availability. During the year, Nornickel kicked off its private corporate cloud project, expected to dramatically accelerate IT infrastructure provisioning through automation. Within a few years, employees will be able to submit requests for a virtual machine or disk space via the self-service portal.

In 2020, Nornickel also launched a project to promote local solutions by upgrading technology networks through aggregation at a regional level and at our production sites. This includes networks to support projects within the Technology Breakthrough and Technology Breakthrough 2.0 programmes, as well as regional segments of the corporate network, including the creation of internet traffic filtering nodes.

BUSINESS APPLICATIONS

In 2020, Nornickel continued the successful automation of its key business processes through the implementation and rollout of corporate IT systems. For example, as part of digitising its document management, a document management system for binding B2B documents was deployed across pilot sites.

The project received an award for the Electronic Document Management Innovation of the Year at the CFO Russia contest. The number of users of the corporate document automated management & control system (CDAMCS) grew to 23,000, with an average of 4,000 documents and 6,000 orders generated in CDAMCS on a daily basis.

The Company also completed a project for comprehensive internal audit automation based on the SAP Audit Management solution to improve its audit processes and speed up analytical reporting. The project significantly boosted the reliability and performance of our corporate reporting, with 350 new users connected to the corporate data warehouse.

As part of net working capital optimisation, an IT service was set up to identify comparable inventories. Over 10,000 comparable products were identified in 2020, which allowed increasing the use of stale stocks in production processes. We have deployed RPA solutions across over 40 new use cases, with 40,000 Group employees already connected to the Nika virtual assistant.

Nornickel places a particular emphasis on improving industrial safety. In 2020, three more Group companies rolled out a video analytics system to monitor the use of personal protective equipment. The pilot implementation of the Control, Management, Safety system was also successfully completed, covering 70 OHS business processes. The system captures 700 behavioural safety audits and issues over 30 work permits on a daily basis.

Active digitisation of the Company's HR processes is also ongoing. In 2020, Nornickel completed the rollout of its HR management system, with the project covering 53 branches and legal entities across 12 cities within our footprint. The system has 4,500 users while 22,000 employees are using self-service products. In 2020, the project won the SAP Quality Award as the most ambitious business transformation project.

The Company also launched an onboarding solution to improve the engagement and performance of its new hires. The solution is integrated with the Nika virtual assistant: employees can use the chat-bot to get updated on their tailored onboarding plan tasks, find out more about the Company and fill in the necessary questionnaires.

Progress on the social agenda included the deployment of an integrated software suite for the Your Home housing programme. The service automates the processes for engaging and recording the performance under the corporate programme for relocating employees from the Far North.

IMPROVING DIGITAL LITERACY

Our IT function is actively developing the Digital Nornickel educational programme, which focuses primarily on improving the digital literacy of Company employees and enhancing their digital skills and knowledge. This list includes both basic IT competencies (knowledge of office applications and other software, messengers, electronic document management, etc.) and more advanced competencies such as coding, RPA basics, understanding and use of innovative technology: machine vision, digital twins, big data, virtual reality and artificial intelligence. 12 interactive courses under the IT and Digitalisation programme are already available on the Nornickel Academy portal. More than 500 employees took the courses over several months, while over 4,000 users successfully completed the Digital Literacy online course via the Tsifronikel mobile app.

DIGITAL LAB

Digital Lab (Nornickel's R&D function) is responsible for implementing innovative technology at Nornickel, exploring the applicability of innovations to the Company's operating processes and testing them.

In 2020, as part of measures to prevent the spread of COVID-19, the Digital Lab explored the use of a disinfecting robot in office spaces and the use of video surveillance to monitor mask-wearing.

The Digital Lab's pipeline of environmental initiatives included a number of projects to reduce the Company's environmental footprint:

- The Digital Tailings Dump, an integrated solution that combines automation and autonomous monitoring tools to ensure effective and safe operation of hydraulic structures. The technology includes space imagery using the InSAR method (a satellite-based radar technique used in geodesy), UAV surveys of the dam (using photogrammetric survey to create a 3D model of the tailings facility and detect weak zones in the hydraulic structure), as well as bathymetry of the pond bottom using an autonomous echoboat – a special boat carrying a geodetic-grade high-precision echo sounder and GPS receiver. The devices digitise the bottom surface and transmit the data to the operator's computer via an industrial Wi-Fi network)
- SO_2 Emissions Monitoring in Monchegorsk, driven by a hardware and software system designed to monitor air pollution and inform preventive measures
- An innovative oil filter designed to reduce the consumption of fuel and lubricants in rail transport

30% of the initiatives within the Digital Lab's 2021 portfolio are related to the environment.

The Lab's operating model is fully integrated into the Company's ongoing operational excellence programme. The Digital Lab seeks out innovative solutions to do more and better with less. The economic benefits generated by the Digital Lab's activities over 2018–2020 total RUB 650 million (USD 9 million).

collected by the Digital Lab at production units.

>200 ideas

The Digital Lab's research pipeline contains

>70 initiatives.

The use of the Digital Twin technology is a key focus area for the Digital Lab, which has already enabled a number of innovative solutions:

- An advisory system at Kola MMC's Concentrator, which increased component extraction by 0.73% from the baseline period
- A Digital Twin in the main aisle of Copper Plant's smelting shop – a system for optimising in-process logistics of the converter operations through the use of digital tools for real-time charge planning
- The Digital Core, a software suite that uses machine vision components in combination with neural network algorithms to enable the online detection and analysis of ore present in a core using a photograph, as well as highly accurate estimates of mineralisation grades.

As part of the efforts to ensure safety and drive operational efficiency at Kola MMC's Severny Mine, the Digital Lab tested a prototype of an autonomous UAV to inspect the workings. The drone's built-in navigation allows it to fly without connecting to GPS/GLONASS while video-recording the surrounding space to build a horizontal section of the area. The solution can survey workings that cannot be accessed by people or machinery.

Awards and partnerships

The Digital Lab's initiatives consistently generate strong interest and recognition from the industry. Its projects won awards at the Mine Digital contest of innovative solutions and technologies for digital transformation of the mining industry held as part of the MINEX Russia 2020 Mining & Exploration Forum. The Intelligent Automated Process Control System at Kola MMC's Concentrator project was the gold winner while the Digital Core project won the bronze award.

Also in 2020, a cooperation agreement was signed between Nornickel and Gazprom Neft for the development and implementation of digital products and industrial exoskeletons designed by the Digital Lab.

BIG DATA

In 2020, the Nornickel – Shared Services Centre data analytics group used machine learning to develop and test a number of systems to optimise concentration processes at the Talnakh Concentrator. The implemented algorithms provide real-time recommendations on ore milling and floatation. The process aims to increase metal recovery in concentrate.

Plans are in place to roll out the new approaches to the Company's other concentrators over the next few years.

CREATING A DATA LAKE

In 2020, Nornickel set out to create a corporate data lake, a latest-generation data processing and storage platform with a number of advantages over incumbent architecture solutions:

- Storage and efficient processing of extra-large data sets – millions of gigabytes or more
- Ease of horizontal scaling
- Integration of diverse data sources with both structured and unstructured data
- Advanced business analytics including predictive analytics and data processing with machine learning algorithms
- Near real-time data delivery from source to the end user of business analytics
- Effective change management: short lead time from business need definition to implementation and productive use

The corporate data lake will help reinvent Nornickel's consolidated data assets (including entirely new data sources ranging from video files to social media data) to capture value and boost operational efficiency. Kola MMC was selected as a pilot site to launch a data lake prototype. The effort covered two business segments: HR management and production process management. Five prototypes of business solutions were implemented as Tableau dashboards:

- Production data deviation monitoring, a system to support process operator decisions on selecting optimal equipment operating parameters
- Production data quality monitoring, a control tower to detect and forecast abnormal equipment behaviour, with event logging and follow-up examination and corrective actions
- Sick leave prediction model, a system to predict employee sick leaves mathematically
- Career development/multi-skilling, an analytics system to define a career path for each employee and identify high-potential employees that could add value to the business
- Actual employee attendance analysis, a business analytics tool for real-time monitoring of employee workplace attendance and systematic analysis of employee and department working time

SAP ERP

Nornickel consistently automates business activities of the Group companies to achieve a high level of optimisation across its operational, logistics, financial and HR processes. In 2020, the following support companies were successfully connected to the unified management system of the Company's SAP ERP: Polar Construction Company, Nornickel – Shared Services Centre, Norilsk Avia, Norilsk Airport, Nortrans-Norilsk, Norilsk Plant and the Company's transportation branches (at Dudinka, Krasnoyarsk, Arkhangelsk and Murmansk), etc. The unified management system already enables interactions between more than 17,000 users.

Over the next two years, the system is expected to be rolled out to Nornickel's global sales network and a number of division-specific support companies, such as Norilsk Support Complex, Taimyr Fuel Company, Yenisey River Shipping Company, etc.

In parallel with the system's roll-out, it will be continuously improved to capture additional business impacts. Under the SAP 2.0 development programme, the Company's business units implement commercially viable (self-sustaining) initiatives for advanced automation with digital elements, e.g. Integrated Planning, Digital Treasury, and Tax Monitoring. Digital assistants, mobile solutions and analytics tools are developed under the programme. The Company's pilot project included 14 initiatives carefully selected out of 50 ideas based on the size of expected business impact.

Nornickel's holistic approach to business process transformation and digitisation has earned international acclaim. The Company won the gold award in the Business Transformation category at SAP Quality Awards — 2019 for EMEA (Europe, Middle East and Africa). For over 15 years, this award has been given by an independent international judging panel to recognise high-quality, large-scale business transformations based on a SAP platform, and Nornickel did very well representing Russia amongst the world's largest and most ambitious leaders in SAP-driven business transformation and performance improvement.

SMART CITY

Nornickel is also actively contributing to social projects. In 2019, the Company launched the Smart City project positioned as a new business segment and implemented in three phases until 2025. The project is aimed at the digital transformation of cities, harnessing innovative technology for an easier and more comfortable life for city dwellers.

In 2020, during the first phase of the project, Nornickel subsidiary Edinstvo launched the City Online platform in five cities: Norilsk, Dudinka, Monchegorsk, Murmansk and Krasnoyarsk. This digital solution was developed to improve quality of live and enhance urban management systems in northern cities and open up additional opportunities for business development.

The new platform received positive user feedback: support for its launch by city administrations; high focus group ratings (scores of more than eight points out of ten); early customer satisfaction metrics NPS = 7 and SCI = 78%; 68,000 unique users as at 15 December 2020.

A total of 14 products have been implemented on the platform, which is above target; however the product mix roll-out was adjusted to incorporate market feedback, prioritising the launches of traffic generating services and postponing some commercial service launches until 2021.

Preparations for future scale-up in 2020 included establishing close relations with the Ministry for the Development of the Russian Far East and Arctic, setting up a working group with representatives from 12 cities, diagnostics of urban needs, obtaining confirmations of interest in Edinstvo's offer from most cities, identifying the scale-up approach and getting it approved by the ministry, and identifying opportunities for co-financing and platform launches in small and medium towns.

The portal features telemedicine and remote learning services as well as news and upcoming events. SME support, urban online voting, utility bill payment, public transport tracking and monitoring, further education, professional development, and other services are expected to be added shortly. The platform is available both online and as a mobile app.

[1] NPS = 34 based on focus group data; NPS = 20 based on both survey and focus group research; NPS = 7 based on surveys only, excluding focus group data.