数字化转型难在转型

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在当前数字技术蓬勃发展的背景下,城市轨道交通企业的数字化转型已成为提升管理能力和实现可持续发展的关键。数字化转型过程不仅面临技术的挑战,更涉及到管理的变革。

数字化的关键要素在于数据和算法。数据是数字化的基础,而算法则是挖掘数据价值、实现智能化决策的关键。从技术角度看,数据的获取可依赖传感器、信息系统、AI识别等手段;算法的生成则可以通过机理分析、机器学习等方法来实现。数字化转型的目的是要利用数字化技术提高服务质量、提升运营效率、降低运营成本。要实现这一目标,必须在数字化技术加持的背景下,调整管理架构,优化管理流程,打破专业壁垒,这是管理变革转型的要旨。在城市轨道交通领域,对于数字技术的要求相对于其他领域不算最高,真正的难点往往出现在转型的管理层面,主要表现在以下几个方面。

一是数据的真实性存在管理难点。数据的真实性要求准确、及时、完整。由于人为因素影响,一些关键敏感数据可能在不同组织和层级上出现偏差,这会给决策带来困扰。因此,需要通过建立有效的奖惩制度、引入数据校验技术等手段来加强数据的真实性。数据的及时、完整对于决策至关重要,人工填报往往难以达到要求。当数据颗粒度越细致、质量要求越高时,用户需要填写的信息量就越大,人工填报方式会导致用户的体验变差,使系统难以推广应用。因此在系统设计时,需重点从需求角度衡量最具性价比和可行性的数据采集精度和范围,避免产生低效的填报工作,优先使用传感器、数据中台等技术,以减少人工操作,从而实现在保证数据准确性的同时,也能提升用户体验。

二是缺少数据共享的相关管理制度。跨专业、跨组织、跨阶段的数据共享是城市轨道交通企业数字化转型实现其价值取向的重要环节。供电、通号、车辆、工务等专业存在跨专业的数据需求,运营和设施设备维保之间也需要更高效的数据流动,从设计到施工、从建设到运营的交接也存在大量的数据需求。然而,现有的组织文化和制度设计往往缺少对数据共享的激励或强制性规定,因此往往会产生不愿意共享、怕麻烦、怕担责任、怕自己的缺陷被别人看到的心态。这种心态的存在,使数据共享大打折扣。另一方面,也有人出于对信息安全的担忧,不敢共享数据,这也制约了数据的共享流通。因此,需要营造积极共享的文化氛围,建立数据共享流动的责任制度,在商务合约中加上对数据共享的约束,并加强信息安全管理。

三是在管理流程变革中,基层管理者缺少动力,中层管理者信心不足。数字化转型一定伴随着管理流程的变革,只改变形式、不改变流程的转型,其价值必然不高。然而,对管理流程进行变革,基层管理者常常缺乏内在动力,中层管理者也缺乏执行信心。传统的岗位设置和流程是在多年实践中逐渐形成的,与之匹配的管理制度和人员配置安排非常稳固。因此,流程变革可能会使员工产生抵触情绪,担心变革会影响到自己的岗位和利益。这就要求管理者在推动管理流程变革的过程中,注重与员工的沟通和协调,尽量减少员工的抵触情绪,确保变革的顺利进行。对于中层管理者来说,改变流程则意味着需要打破既有的成熟模式,对于其中潜在的责任风险,需要通过制定与数字化技术背景相匹配的新流程来进行防范,这非常考验中层管理者对所管业务本质的理解。常言道,"艺高人胆大",要通过不断学习业务来增强变革的信心。

虽然存在上述难点,但数字化转型的目标始终是明确的:确保安全、提升效率、提高质量、降低成本。为了实现这些目标,建议采取三个策略:一是顶层设计服务战略目标,二是项目策划紧贴生产管理需求,三是落地实施从易处着手。在实施过程中,从具体的业务流程改进入手,配套建立明确的责任制度,改变员工的工作习惯,强化中层管理者的业务能力,培养积极的数据共享文化,从而推动整个组织流程的变革,实现数字化转型的目标。

综上所述,数字化转型是数字化技术发展到一定阶段的产物,既是技术的创新,也是管理的革新。只有深刻理解并有效应对转型过程中所面临的来自管理方面的挑战,城市轨道交通企业才能行稳致远。

3）数据共享。设计了统一的数据接口规范,并按照该规范进行基础数据处理,为不同类型的数据集提供开放接口,按照人员角色设置权限。

4）设备质量评价。可分析影响设备质量的关键因素,构建设备质量评价模型,实现了对关键信号设备(道岔转辙机、信号机、轨道电路)质量的量化评分。

5）作业质量评价。可分析检维修质量的关键信息,建立作业质量评价模型,实现了重点检维修任务质量的量化评分。

5　结语

本文分析了城市轨道交通信号系统在数据管理方面的现状和问题,通过现场采集数据,设计并建设了信号系统大数据智能运维平台,在试点线路完成了该平台阶段性建设,实现了数据集成、关联分析、数据共享、设备及检维修质量评价等功能。信号系统大数据智能运维平台的应用,解决了信号设备维护管理中查找复杂关联数据时效率低下的问题,降低了数据的冗余,提高了资源的利用,为信号设备维护人员的日常维护管理工作带来便捷,为进一步探索信号系统的大数据价值、持续进行业务和管理的创新创造了有利条件。

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Difficulty of Digital Transformation lies in Transformation

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In the current context of the booming development of digital technology, the digital transformation of urban rail transit enterprises has become the key to improving management capabilities and achieving sustainable development. The digital transformation process not only faces technical challenges, but also involves management revolutions.

The key elements of digitalization are data and algorithms. Data is the foundation of digitalization, while algorithms are the key to mining data value and realizing intelligent decision-making. From a technical perspective, data acquisition can rely on sensors, information systems, AI recognition and other means; algorithm generation can be achieved through mechanism analysis, machine learning and other methods. The purpose of digital transformation is to use digital technology to improve service quality, increase operational efficiency, and reduce operating costs. To achieve this goal, it is necessary to adjust management organizations, optimize management processes, and break down professional barriers under the background of digital technology support, which is the gist of management revolution and transformation. In the field of urban rail transit, the requirements for digital technology are not the highest compared to other fields. The real difficulties often appear at the management level of transformation, which are mainly reflected in the following aspects.

First, there are difficulties in managing the authenticity of data. The authenticity of data requires accuracy, timeliness, and completeness. Due to human factor influence, some key sensitive data may be biased across different organizations and levels,

which will cause trouble for decision-making. Therefore，it is necessary to enhance the authenticity of the data by means of establishing an effective reward-punishment system，and introducing data verification technology etc.. The timeliness and completeness of data are crucial for decision-making，and manual filling is often difficult to meet the requirements. When the data granularity is more detailed and the quality requirements are higher，the amount of information that users need to fill in is greater. The manual reporting method will lead to a worse user experience and make system promotion and application difficult. Therefore，when designing the system，it is necessary to focus on measuring the most cost-effective and feasible data collection accuracy and scope from the perspective of demand，avoid inefficient reporting work，and give priority to the use of sensors，data middle platform and other technologies to reduce manual operations，so as to achieve data accuracy while enhancing user experience.

Second，there is a lack of relevant management systems for data sharing. Cross-disciplinary，cross-organizational and cross-stage data sharing is an important part of the digital transformation for urban rail transit enterprises to realize their value orientation. There are inter-disciplinary data needs in power supply，communication signal，vehicle，track work and other disciplines. More efficient data flow is also needed between operations and facility equipment maintenance. There is also a large demand for data in the handover from design to construction and from construction to operation. However，the existing organizational culture and institutional design often lack incentives or mandatory provisions for data sharing，and thus often leads to a mentality of unwillingness to share，fear of trouble，afraid of taking responsibility and fear of their own shortcomings being seen by others. The existence of such a mentality makes data sharing much more difficult. On the other hand，some people dare not share data due to concerns about information security，which also restricts data sharing and circulation. Therefore，it is necessary to create a culture of positive sharing，establish a responsibility system for data sharing and flow，add constraints on data sharing in business contracts，and strengthen information security management.

Third，in management process revolution，basic management lacks motivation，and middle management has little confidence. Digital transformation must be accompanied by management process revolution. Values of transformation that only changes the form without changing the process is bound to be low. However，basic management often lacks internal motivation to change management processes，and middle management lacks confidence in execution too. Traditional job setups and processes have been gradually formed over many years of practice，and the matching management systems and staffing arrangements are very solid. Therefore，process revolution may create resistance among employees who are worried that the changes will affect their positions and interests. This requires management to pay attention to communication and coordination with employees in the process of promoting management process revolution to minimize employee resistance and ensure the smooth progress of revolution. For middle management，changing the process means breaking the established mature model. Potential liability risks need to be prevented by formulating new processes that match the digital technology background. This is a great test for middle management on their understanding of the nature of the business that they are managing. As the saying goes，"Capable person is fearless". We should enhance the confidence in revolution through continuous learning of the business.

Despite the difficulties mentioned above，the goals of digital transformation are always clear：to ensure security，enhance efficiency，improve quality and reduce costs. In order to achieve these goals，three strategies are recommended. First，top-level design should serve strategic goals；second，project planning should be closely aligned with production management needs；and third，implementation should start from the easy part. During the implementation process，we should start with specific business process improvements，establish a clear responsibility system for supporting，change employees′ work habits，strengthen the business capabilities of middle management，and cultivate a positive data sharing culture，so as to promote the revolution of the entire organizational process and achieve the goals of digital transformation.

In summary，digital transformation is the product of digital technology development to a certain stage. It is both a technological innovation and a management renovation. Only by deeply understanding and effectively responding to the management challenges faced during the transformation process can urban rail transit enterprises achieve steady and long-term development.

（**Translated by JIANG Na**）