

Staff Productivity Improvement Efforts in System Departments of JFE Steel

FUNAKOSHI Kenichi*¹ HARADA Masayuki*¹

Abstract:

In recent years, movement restrictions have been imposed due to the spread of the novel coronavirus, and it is necessary to quickly transform existing operations in order to cope with the obstacle. JFE Steel has been promoting citizen development using low-code development tools to improve labor productivity by automating routine work and promoting paperless. In the system departments, in order to promote citizen development more strongly, a "citizen development support team" was established to support the business operation department and contribute to the improvement of labor productivity.

1. Introduction

In recent years, restrictions on movement were imposed due to the spread of the novel coronavirus, and many companies made efforts to prevent the spread of infection, such as limiting in-person work and face-to-face meetings. A quick transformation of existing operations is required in order to cope with these rapid changes and continue corporate activities. As a solution to this problem, "citizen development," in which system development is performed by the staff of business operation departments themselves, and low-code development tools that enable persons without a specialized knowledge of IT or programming to perform system development, have attracted attention.

As an environment for "citizen development," JFE Steel adopted three low-code development tools between 2019 and 2022, and has achieved improvements in labor productivity by automation of routine work and conversion to paperless work led by business operation departments.

The challenge in citizen development is how to enable efficient development by the staff of business operation departments, who do not possess a specialized knowledge of IT or programming, when it is not possible to secure sufficient time to master the methods of using development tools or perform actual citizen development work. This paper introduces the problems

that may be encountered when attempting citizen development for improvement of labor productivity together with solutions to those problems, including concrete examples.

2. Efforts for Labor Productivity Improvement

2.1 Application of Low-Code Development Tools

As an environment for "citizen development," JFE Steel introduced three low-code development tools, beginning with the introduction of "Robotics Process Automation (hereinafter, RPA)¹" in 2019, followed by the introduction of an "electronic workflow system" and "mobile application development tools."

"RPA" is used to improve work efficiency and work quality by automation of routine screen operations performed on personal computers.

"The electronic workflow system" is used to cope with remote work, accelerate the decision and approval process, and enable paperless work by digitization of the application and approval process, which had been based on paper forms and the use of personal seals.

"Mobile application development tools" are used for improvement of work efficiency, achieving paperless work and digitization of analog data by developing mobile applications for various types of work such as inspection, reporting and control work, etc. which are performed at production sites.

2.2 Efforts and Problems of Citizen Development

To support citizen development using these tools, the system departments first worked to ensure prevalence of the tools by holding briefing sessions. Questionnaire surveys were also conducted to identify suitable operations for application of the tools, and activities to give the business operation departments an actual feeling of the merits of tool application were carried out by actually applying the tools to candidate

[†] Originally published in *JFE GIHO* No. 51 (Feb. 2023), p. 43–46

^{*1} Staff Deputy Manager, IT Innovation Leading Dept., JFE Steel

operations proposed by the departments. In addition, a support site was opened on the company’s intranet, cases were introduced, and inquiries were answered using Microsoft Teams.

However, there were problems in those activities, as development was delayed by the insufficient development experience and skills of the business operation departments, and development time was inadequate because routine work and responding to the demands of busy seasons were higher priorities. Therefore, the system departments studied measures to accelerate citizen development, leading to the establishment of a “citizen development support team” (hereinafter, support team) in October 2021.

When the support team was originally established, support was provided by a system of several persons, but the number was doubled after the first half-year, and strengthening of the system is also continuing at present.

In establishing the support team, the tool use skills of the team members were improved by participation in education programs inside and outside the company. In particular, because no in-house education program for mobile application development tools had been established, an education program was created in the support team (see **Figure 1**) in preparation for future strengthening of the system.

2.3 Efforts of Citizen Development Support Team

The support team made the following efforts to accelerate citizen development by the business operation departments.

- Education related to development tools
- Consulting on business restructuring
- Development of applications for business operations
- Trials of new functions

Following introduce individual activities.

2.3.1 Education related to development tools

Using educational materials such as product manuals, the education program prepared by the support team, examples of tool application, etc., education on the functions, use methods and the flow of introduction of the tools was given to the staff of the business operation departments.

These efforts supported the acquisition of skills for unassisted, early citizen development by the staff of the business operation departments.

2.3.2 Consulting on business restructuring

The support team provides consulting on business restructuring measures based on the flow of business

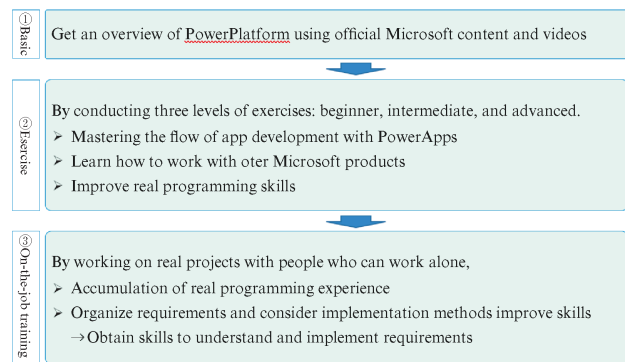


Fig. 1 Overview of Mobile App development tools education program

operations and status of system/data use in the business operation departments, and examples of tool introduction.

These efforts supported shortening of the time until tool introduction and restructuring of the flow of operations by effectively using the tools.

2.3.3 Development of applications for business operations

In cases where citizen development by a business operation department was difficult due to the complex content of the system, the support team performed direct development.

Rather than the conventional “waterfall” model of software development, development was carried out by an agile development methodology in order to develop a “system that can truly be used” with the business operation departments. As the support team system, by always assigning multiple developers to each system, it was possible to respond to knowledge sharing/transfer and realize early solutions/implementation by pair-programming in the case of requirements with a high degree of difficulty (see **Figure 2**).

2.3.4 Trials of new functions

When implementing new functions in the tools, the support team conducted trials as quickly as possible and worked to strengthen development capabilities to respond to advanced requirements from the business operation departments.

After a demonstration application actually using new functions was created and the use methods of each function were given concrete form, the support team notified the business operation department and provides ideas for performing citizen development.

3. Concrete Examples of Labor Productivity Improvement

The following three cases are introduced as exam-

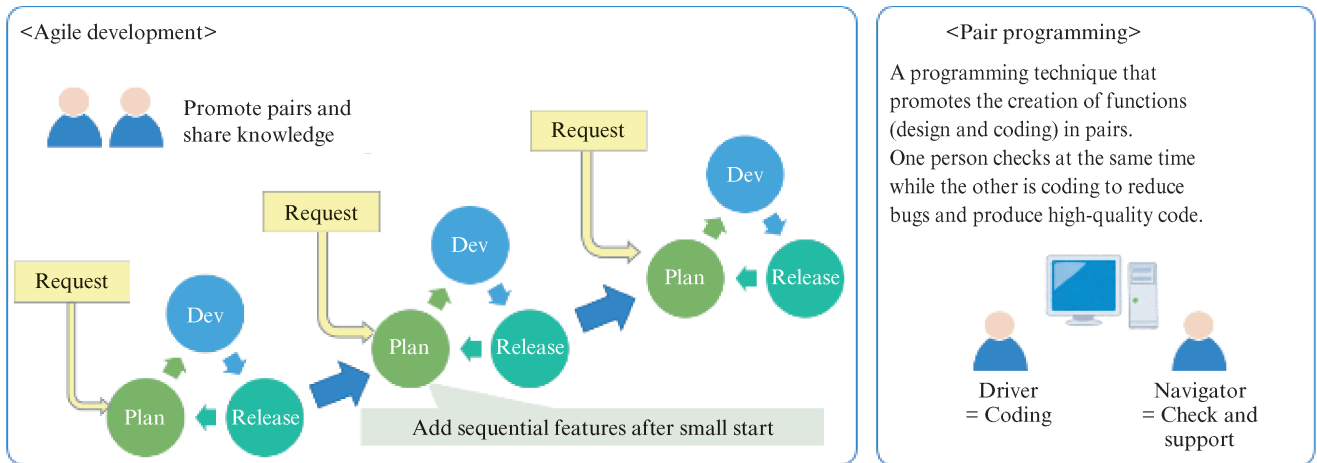


Fig. 2 Overview of development method adopted

ples of support for citizen development by the support team.

3.1 Automation of Packing Materials Management Work

3.1.1 Overview of packing materials management work

Because JFE Steel uses multiple materials in packing when shipping coil products to customers corresponding to the type of product, checking of the amount of use and inventory status of packing materials had been performed with spreadsheet software. Supplemental ordering work had also been carried out by a system that ordered packing materials when materials were in short supply.

Much of this work was performed manually, including checking data on packing materials by using the spreadsheet software, analysis and calculation work, and inputting data to the system, and this had been a load on employees.

3.1.2 Automation of manual work by RPA

When the content of this work was unraveled, it was found that a large part was routine manual work that did not require human judgment. Therefore, the work load on employees was reduced by automation of the work using RPA.

Because a large part of the work that was being done manually could be automated, it was possible to reduce working time by about 95 % by applying RPA. As a result, it also became possible for the staff to perform other core operations (see **Figure 3**).

Moreover, automation of manual work also made it possible to reduce errors and omissions that had occurred when inputting data to the system, checking data using the spreadsheet software, and performing analysis and calculation work.

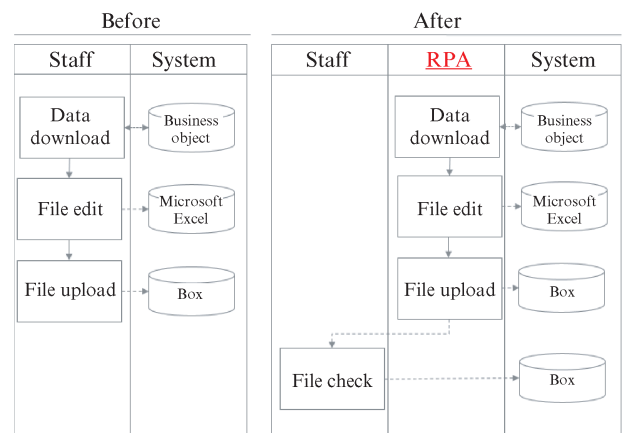


Fig. 3 Business reduction by RPA

3.2 Higher Efficiency in Applications for Construction Permits

3.2.1 Overview of construction permit application work

In JFE Steel, when fire is to be used in construction, the department or plant requesting the construction and related departments such as the disaster-prevention department check and approve the content of the construction in order to determine whether there are any problems in the method of use, location, safety measures, etc. from the application submitted by the construction contractor. In this process, employees of an affiliated company, which is the actual contractor, visit the offices of the related departments, explain the content of the work, and have the seals of the responsible persons stamped on the application documents.

Because the affiliated company was not included in the JFE Steel computer system, and application documents had been retained in paper media, applications for permits were approved by stamping documents with a personal seal, but this meant that movement

time was required when going to and returning from the related departments in the plant.

As an additional problem, because affiliated companies submit several thousand applications for construction permits in a year and it was necessary to prepare documents accompanying these applications, this process placed an enormous load on applicants.

3.2.2 Digitization of applications by electronic workflow system

To reduce the load on applicants, the electronic workflow system was applied to construction permit application work. The workflow was reviewed, and application documents were digitized by constructing an application screen and approval route.

The resulting electronic application process reduced the movement time of the affiliated company and time for adjustment work in reviews by the disaster-prevention department by almost 100 %. The lead time until permits were approved could also be shortened because approval is now possible even outside the company and from remote work locations.

In addition, use of the electronic workflow system also made it possible to eliminate the use of paper media (see Figure 4).

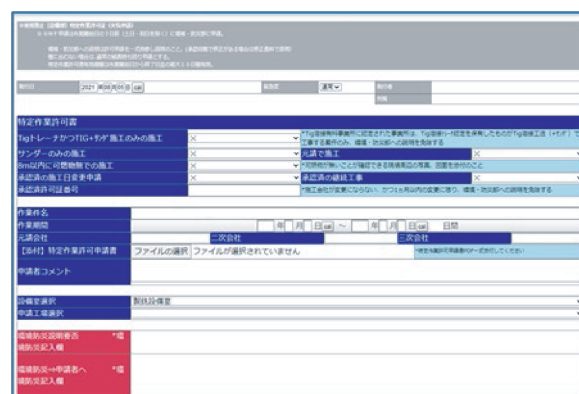


Fig. 4 Electronic workflow system screen actually used

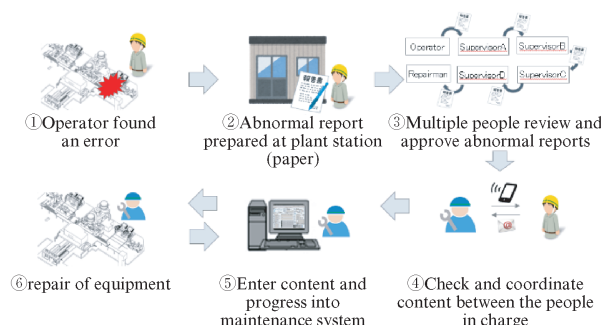


Fig. 5 Equipment maintenance work flow

3.3 Improved Efficiency in Equipment Malfunction Reports

3.3.1 Overview of equipment malfunction reporting work

Because the plant operator had submitted an abnormal report using a paper medium when malfunctions was discovered at the site, and the persons in charge of maintenance were informed only after receiving approval from multiple related persons, the following problems arose when equipment malfunctions were discovered (see Figure 5).

- Time was required for information communication.
- Handling of paper media was complicated.
- The most recent status of the response was not shared.
- Information was dispersed or was not retained because detailed information was communicated by telephone or email.

3.3.2 Application of mobile application development tool

Many of these problems were caused by operation using paper media. Therefore, conversion to paperless work (digitization) and improvement of the communication infrastructure were necessary.

To respond to these problems, a smartphone appli-

cation with the following four functions was developed²⁾ using the mobile application development tool.

(a) Equipment malfunction reporting function

The time required to move from the plant to the office in order to prepare documents was reduced by making it possible for plant operators to report from the site where the equipment malfunction was discovered by constructing abnormal reports as an equipment abnormality reporting application (JASIST™) for smartphones. Although the conventional abnormal reports did not include a photograph function, providing a photograph function as a function of JASIST has made it possible to communicate information with higher accuracy than expression by a verbal description alone.

(b) Electronic workflow function

In the conventional approval process, it was necessary for all related persons to stamp the documents with their personal seals. The time loss in this approval process was reduced and the speed of information communication was greatly improved by converting this process to an electronic workflow, removing persons whose approval was not truly necessary from the approval process, and instead adopting chat and email as forms of notification for the reported content.

(c) Progress sharing function

By providing a screen which makes it possible for

both plant operators and maintenance personnel to view and revise the data of the electronic abnormal reports, it has now become possible to grasp the progress of each item in real time.

(d) Individual item chat function

A function for group chats on individual items was provided by linkage with the communication infrastructure mainly used in JFE Steel. Although no records of communications between persons in charge remained in the conventional system, this problem was solved by the individual item chat function.

3.3.3 Effect of Introduction of Electronic Reporting Application

Introduction of this application has shortened the time required for reporting of one item by about 20 %. Because the application also allows users to access information on past items easily, it has become possible to respond more efficiently to similar trouble.

4. Conclusion

As initiatives for citizen development, JFE Steel

introduced three low-code development tools in order to improve labor productivity. Communication activities and development support by the citizen development support team were also carried out to accelerate citizen development. As a result, automation of various types of work and promotion of paperless work were possible, and labor productivity could be improved. At present, synergistic effects such as new ideas and more efficient work processes are appearing as a result of company-wide development of tool introduction examples and ideas and mutual incorporation of ideas. In the future as well, we will work to achieve further improvements in labor productivity in the company as a whole by promoting these activities.

References

- 1) JFE-Holdings. IT REPORT 2019. 2019. <https://www.jfe-holdings.co.jp/en/investor/library/itreport/index.html>
- 2) Microsoft Customer Stories. <https://customers.microsoft.com/en-us/story/1501481366124046490-jfe-steel-discrete-manufacturing-microsoft-365-ja-japan>