OPERATIONS MANAGEMENT

eBOOK

YOKOGAWA Co-innovating tomorrow®

CONTENTS

3 INTRODUCTION

4 OPERATIONS LOGBOOK

4 LEGACY SCENARIO

5 IMPROVED SCENARIO

6 WORK INSTRUCTION

6 LEGACY SCENARIO

7 IMPROVED SCENARIO

8 MANAGEMENT OF CHANGE (MOC)

8 LEGACY SCENARIO

9 IMPROVED SCENARIO

10 INCIDENT MANAGEMENT SYSTEM (IMS)

10 LEGACY SCENARIO

11 IMPROVED SCENARIO

12 PERMIT TO WORK (PTW)

12 LEGACY SCENARIO

13 IMPROVED SCENARIO

14 SHIFT HANDOVER

14 LEGACY SCENARIO

15 IMPROVED SCENARIO

18 CONCLUSION

19 CONTACT US

INTRODUCTION

Operations Management solutions help to ensure safe, reliable and efficient plant operations and regulatory compliance by digitization of information related to key operations management practices. This results in improved productivity through standardized work practices, streamlined processes, and improved communications and coordination across departments.

Process industries are typically very traditional and it is often the case that many plants are still doing things the old-fashioned way. By embracing digital transformation, moving from manual processes and old fashioned processes to digital solutions that add value, plants inherently become more safe and processes are optimized.

This eBook focuses on Operations Management, comparing an old fashioned or legacy, scenario to a modern day digital scenario in the areas of:

- Operations Logbook
- Work Instruction
- Management of Change (MOC)
- Incident Management System (IMS)
- Permit to Work (PTW)
- Shift Handover

OPERATIONS LOGBOOK

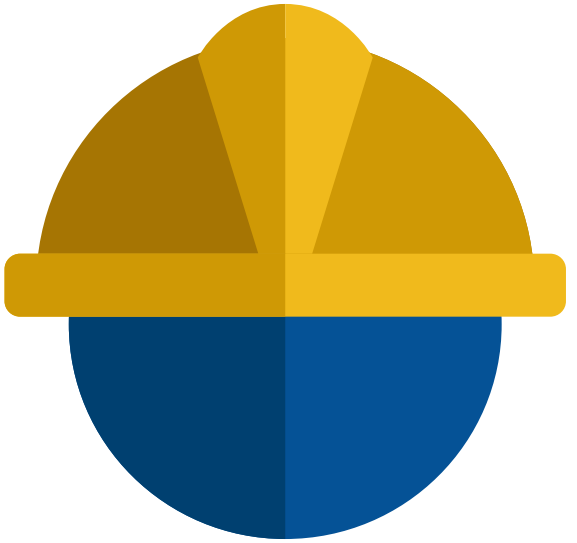
An operations logbook is a fundamental way to save information from the daily operations of plant operators. All operators have experience in writing, or searching for information in logbooks. Log information not only plays a key role in knowledge transfer between operators at the end of a shift, but also serves as a main source for managers to understand what happened, or is happening, at the plant.

LEGACY SCENARIO

In some plants, what is meant by the “operations logbook” is a standard A4 notebook or small diary that operators are free to write in at any time during their shift. Anything that they feel is pertinent can be written, signed and copied to someone else, and is finally filed away in some cabinet. There is a good chance that no one will read these entries again.

In other cases, logbooks are created on computers as text files, PDFs, or Excel worksheets. These files will then be mailed to another person or folder where they will archived somewhere on a hard disk.

Both of the aforementioned scenarios are considered conventional logbook procedures on many plants today. If a problem or emergency situation was to happen in this case, finding the right information to catch a problem ahead of time, or prevent an emergency situation from worsening, is a time-consuming task.



Conventional logbooks present issues of catching critical log information that are both time consuming and inaccurate, and removing these risks is a challenging task for plant managers.

IMPROVED SCENARIO

A proven way to address the aforementioned challenges is to record logbook data in a structured style to improve data management and knowledge transfer from operator to operator. Digital logbook solutions can be the precise resolution to solve critical issues in recording and managing plant data. A structured approach to logbooks leads to:

INTUITIVE LOG ENTRIES & FORMAT

There is no “best log format”, it simply does not exist. The logbook format should always be associated with the plant hierarchy in a way that reduces input mistakes. A proper logbook solution should include configurable log types, templates, and layouts to make the log creation quick and accurate.

STRUCTURED DATA THAT IS EASY TO MANAGE

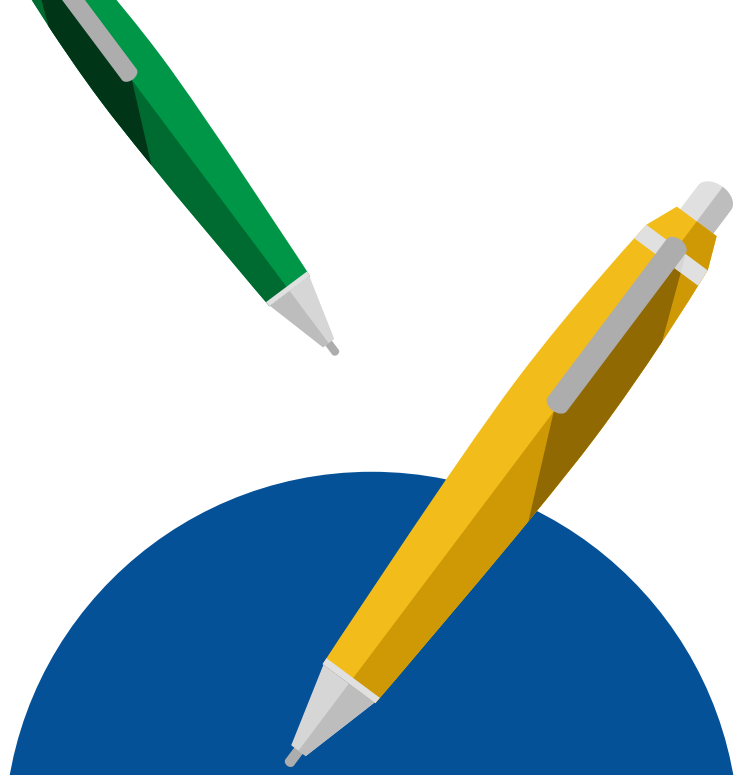
One study at Nanyang Technological University of Singapore identified that 18% of expected logbook contents are not included in conventional logbooks. The alternative to allowing operators to write anything that they feel is pertinent is to define and structure the log, ensuring that all the necessary contents are included, in a way that is also reader-friendly.

SEARCHABLE DATA FOR QUICK CAPTURE

If the logbook solution records and stores log data in a structured style, the search among different modules will be very efficient, and searching for information within the logs will be much quicker. A quick search based on keywords and log filtering helps users to find the expected contents, in little to no time.

DATA THAT IS EASILY SHARABLE AND INTEGRATED WITH OTHER SYSTEMS

Yokogawa considers logbooks a key asset in transferring knowledge from operator to operator. The logbook should be easily accessed by the web browser and shared on a common platform for production based or business based decisions. With this advanced feature, logbook solutions help to eliminate misunderstandings and share correct information, and disruptions or incidents can be more easily avoided.



It can be seen in both cases that the conventional logbook systems come with risks, such as disruptions or incidents due to misunderstandings. Conversely, the advanced scenarios not only reduce time-consuming log work and reduce risk, but also leverage logbook data by enabling it to be shared and managed effectively, adding tremendous value.

WORK INSTRUCTION

The biggest theme in an industrial process is safety. To realize the optimum business process and contribute to more efficient operation, work instructions are the most effective component to accelerate the activities in an improvement cycle.

LEGACY SCENARIO

The challenges of conventional work process are too difficult to identify issues in daily operations since the current operation is looked by operators as there is no loss.

Operators have many tasks that are not only related to productivity but also involve the critical information to maintenance staff and contractors. In many instances, however, the tasks of an operator are not managed in an efficient way and work processes are ambiguous. These inefficiencies lead to:

- Operating without full understanding of the work instructions
- Blurred roles and responsibility
- Time consuming retrieval of past samples which can be used to improve work
- and many more

These challenges are implied so improvement actions are not taken even though current operations are far from being best practice, and that leads to the loss of huge improvement opportunity.

Steps to detect implied challenges are very important for improving the work process. The first step would be to draw the process to recognize and evaluate the current circumstance. The next step would be to analyze the accumulated data to find obvious challenges. Then, an action plan can be made. This simplistic cycle is a key part in improving work processes.

IMPROVED SCENARIO

Work instructions are the best fit component to support and address the process improvement cycle.

THE FIRST STEP is to establish a rule for the collection of operational data that is required to make current operation circumstances visible. With work instruction software, the operator can capture data by following the operator's preferred format, making it very intuitive. This means it is very easy to input the status, progress, description, tasks, cautions, and responsibility for each work process. This is vital information for the improvement cycle. Furthermore, digitalizing this process helps to prevent leaks.

THE NEXT STEP is to analyze the data. It is important to verify which data can be eliminated, combined, rearranged or simplified in current operation because these analyzed results are directly related to operational challenges. Work instruction software should provide several ways to find these points such as a search function, plan & result comparison, past work information search, and so on.

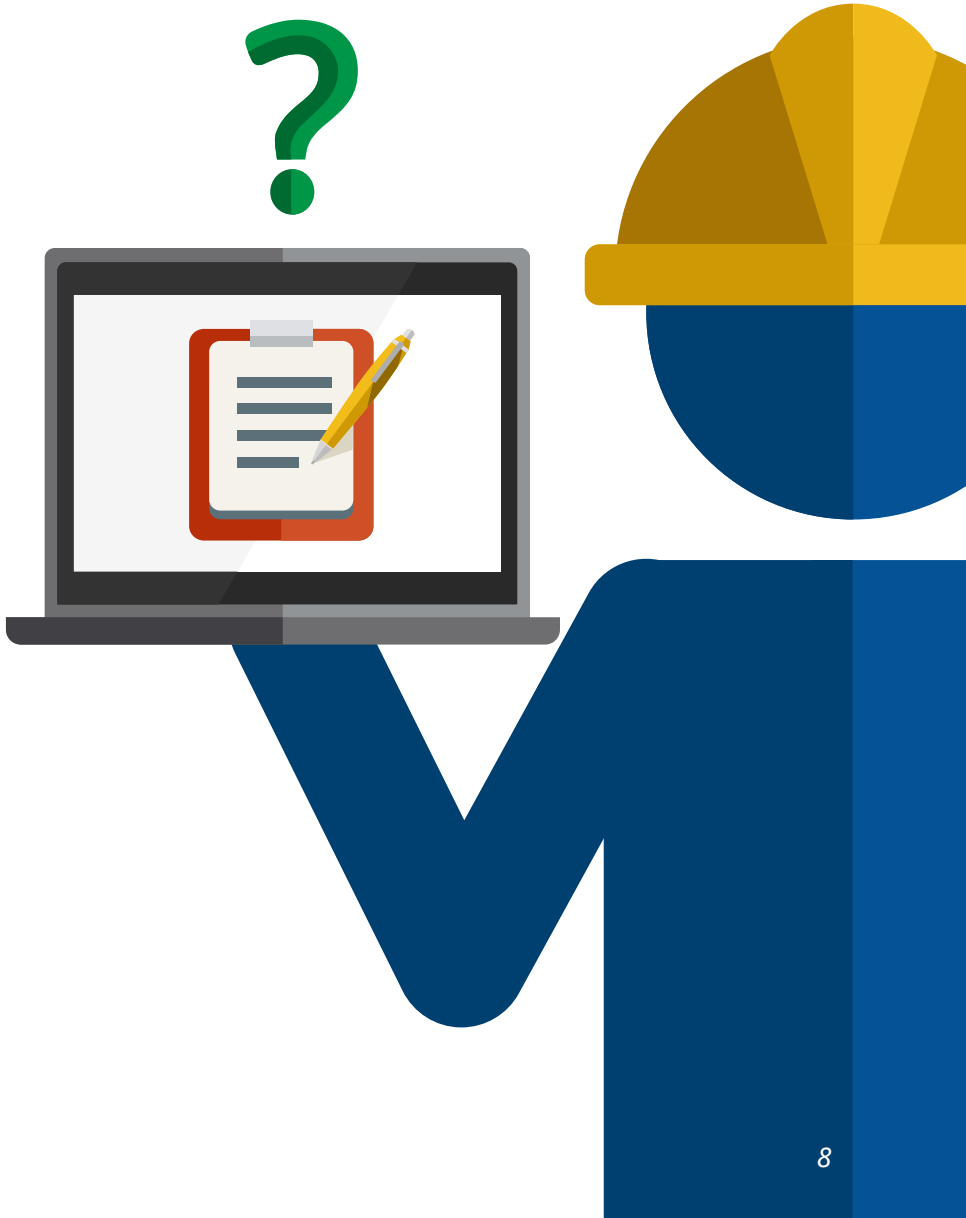
THE FINAL STEP in the improvement cycle is to make an action plan to be implemented. Based on the result of the analysis, operators can enhance the work instruction template which will ensure the best work process. Management of work processes is the most important and should be focused because it helps to optimize operations (Best Practice).

Technology will help to realize the optimum business process and contribute to more efficient operations. Work instruction software is key enabler for improving work processes. In addition, work instruction can bring the values of "to pile operational knowledge" and "ensure safe operations".

MANAGEMENT OF CHANGE (MOC)

Industrial or manufacturing organizations are always subjected to continuous changes throughout the plant lifecycle, until the plant is decommissioned. The changes are often driven by the need to continuously improve operational efficiency, productivity, production, and safety of the business. The fundamental definition of “Change” is “any addition, process modification, or substitute item (e.g., person or thing) that is not a replacement-in-kind”. Changes are often being made in equipment, process, material, procedures, control systems, infrastructure etc. and are mainly categorized into permanent, temporary and emergency changes.

Introducing a change even though for good reasons can at times lead to inadvertent consequences, if not immediate but possibly at a later stage of the change lifecycle. Hence, it is of the utmost importance to manage changes with an effective and robust business process in place with a well-defined set of procedures, enforceable guidelines, and clear stakeholder ownership.



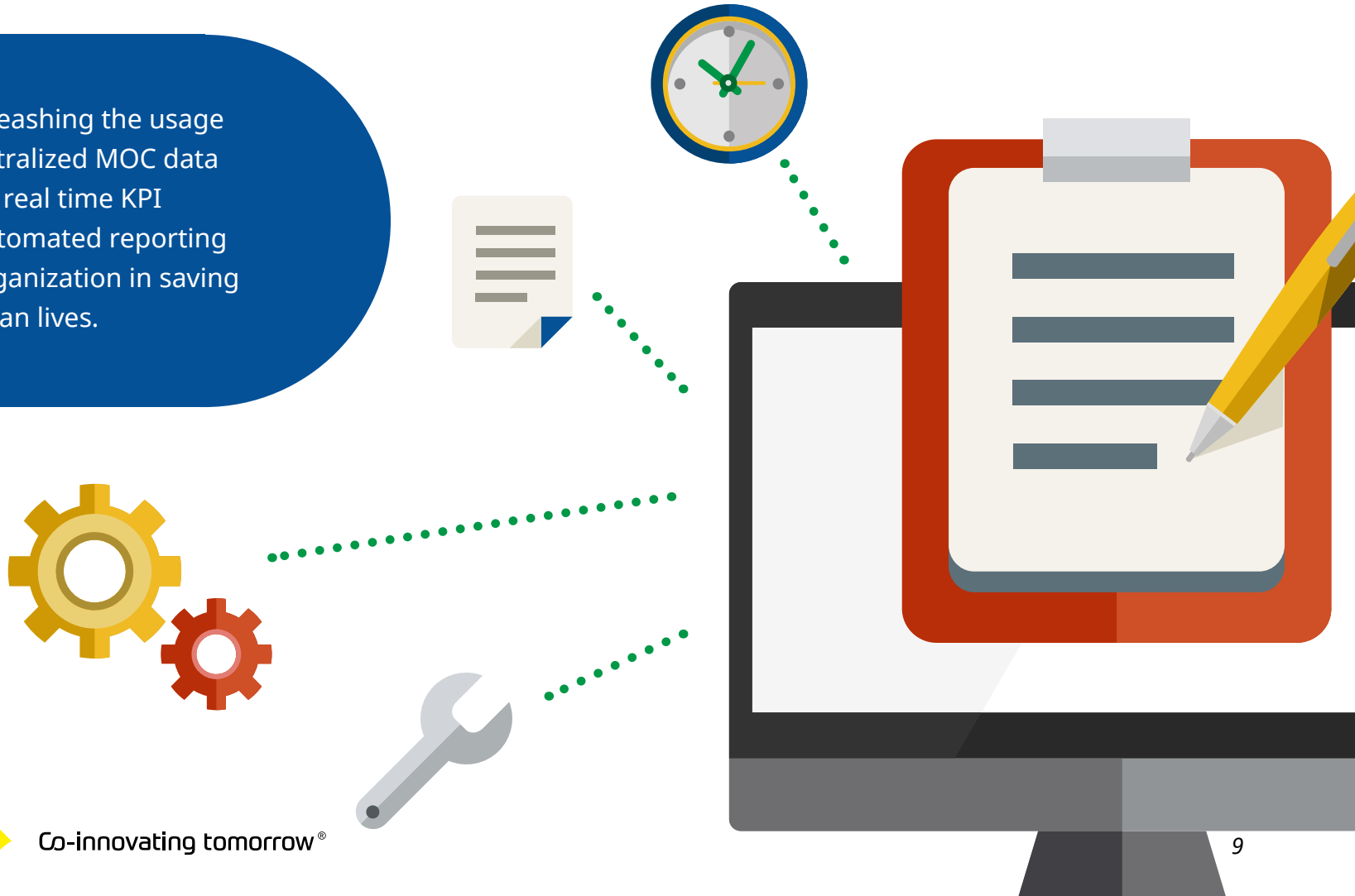
LEGACY SCENARIO

The plant operations environment is dynamic and managing critical changes are often complex and deceptive as to what the impact the change might bring. Even with a well-defined Management of Change (MOC) procedure in place, the manual execution and paper based compliance depends on the availability of the information on the status and potential challenges to all concerned stakeholders. An MOC with loose control on execution, documentation and follow-up generates unstructured (paper based file stacks) information. The human tendency of laxity during routine jobs tempts the personnel to go for shortcuts and often changes are not documented or are evaluated insufficiently.

IMPROVED SCENARIO

Digitalization of an MOC process using technology is a transformation that yields immediate benefits to plant operations. It enormously helps businesses to enforce best practices in managing plant wide changes more effectively with greater visibility, consistency, accountability and control. Digitized MOC are electronic workflows, which facilitate in managing changes from raising a change request to successfully implementing the change with tighter control. At each stage of the MOC lifecycle, all concerned stakeholders are notified of the status and timelines. These systems enforce usage of tools such as a risk assessment matrix, pre-safety start-up review checklist (PSSR), HAZOP checklist, and more to comprehensively assess the impact of change to lower the risk threshold as much as possible. Automated monitoring and reminders to follow up on temporary changes ensures timely actions are taken in due time. A compressive system audit trail helps to have a clear approval accountability and traceability while implementation of critical changes.

Most importantly, unleashing the usage of structured and centralized MOC data for advance analytics, real time KPI monitoring, timely automated reporting is priceless for any organization in saving time, efforts and human lives.



INCIDENT MANAGEMENT SYSTEM (IMS)

Incidents usually occur with very little or no advance warning and they require immediate response by operators and safety response teams. Incidents can range from a person tripping, to a catastrophe. The key objective of incident management systems is to monitor compliance with the key Health Safety and Environmental (HSE) guidelines defined by Process Safety Management, a regulation, promulgated by OSHA. Process Safety Management (PSM) suggests how incidents should be handled. A crucial part of the PSM is a thorough investigation of incidents to identify the chain of events and causes so that corrective measures can be developed and implemented.

LEGACY SCENARIO

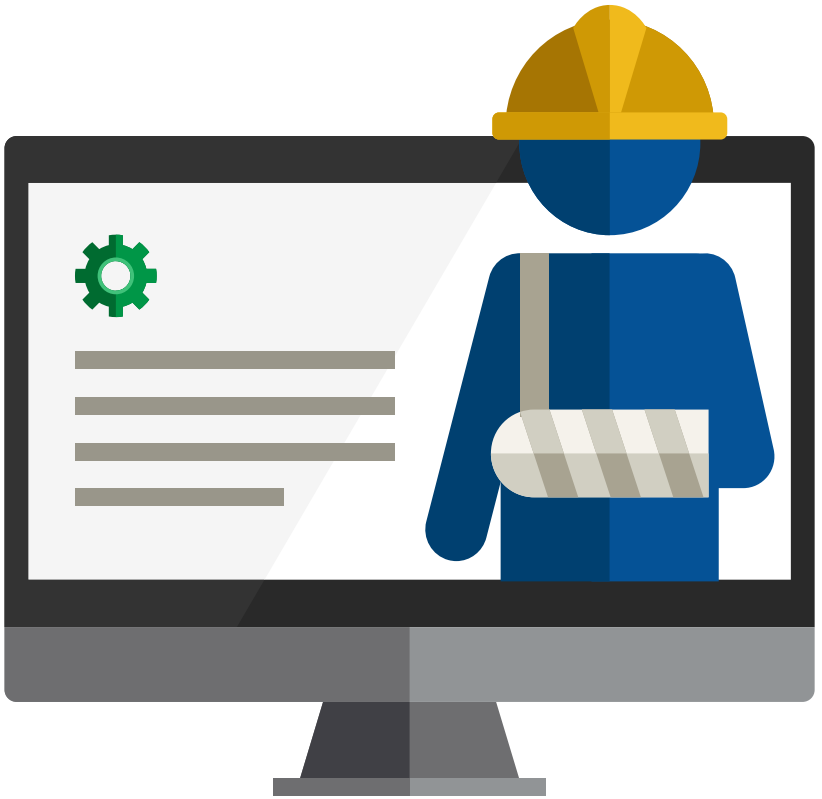
Process Plant operations are very dynamic and incidents are prone to happen from time to time. Even with a well-planned Incident Management and response team, the chances that the way these incidents are managed through paper based methods mean that they are ad-hoc and non-integrated in nature, resulting in reoccurring incidents of same or similar nature. These also depend on the availability of information and manual follow-up, be it for analysis to identify root cause or implementing necessary corrective actions. Another major challenge would be collaboration amongst the plant stakeholders such as plant personnel, safety teams, and management to handle all the incidents and necessary actions. Incidents are typically the result of multiple failures to address hazards effectively.

Based on the major incidents that have happened in the past, the number of technically competent operators is not sufficient enough to prevent an incident. Rather, the management of systems and culture plays the key role in process safety.

IMPROVED SCENARIO

Incident management is an essential business process to help avoid major incidents and near misses that lead to major accidents in complex chemical operations facilities. The process of incident management is to identify and resolve plant or human failures that result in greater exposure or the loss of threat to operation/environment, production, equipment downtime, and more. An integrated, holistic incident management system provides framework/workflow to process plant personnel to track plant wide incidents/near misses, non-compliances, and ensures compliance to safety regulations, effective operations by analyzing incidents large and small, and acting on them in a timely and efficient manner. It also ensures compliance to internal and external statutory/legislative safety requirements. An electronic system ensures complete visibility into the incidents and helps to track actions to closure along with accountability of the respective stakeholders who are supposed to act on it. The electronic system also ensures that all the incidents are analyzed through detailed investigations and that risks are evaluated through a pre-configured risk assessment matrix. Investigation can incorporate methodologies such as Root Cause Analysis; 5-Why Analysis, etc. to ensure root causes are resolved. It also enables efficient tracking of preventive/corrective actions through automated notifications to the assigned individual thereby eliminating manual follow-up and time loss.

Comprehensive audit trail tracks data changes throughout the workflow, thereby the integrity of the data is not lost. Once the incidents are managed in an electronic system, then it becomes quite easy to build KPIs for tracking and scheduling, and ad-hoc reports for collaboration.



PERMIT TO WORK (PTW)

Major hazard industries (MHI) are making considerable efforts to ensure safe operations to protect health and safety of the workforce and overall environment. The potential for serious accidents to occur at these plants is clear and evident. When these incidents occur, human factors, such as failure to practice safe operations and properly implement procedures are more often than not, the main root cause. These failures may in turn be attributable to lack of training, awareness, instruction, or understanding of either the purpose of safe work practices. Effective implementation of a comprehensive permitting program helps to prevent incidents.

In order to ensure safe work environments and practices, it is essential to control certain types of work that are identified as potentially hazardous through a formal written system/document/procedure. It is also important to ensure there is a clear methodology in place to ensure complete communication between the various stakeholders such as plant supervisors, plant operators and plant management who are involved in the whole process to avoid such incidents. It is a necessity to ensure proper planning and consideration given the risks of a particular job before it is performed in the plant.

LEGACY SCENARIO

In order to protect the health and safety of the workforce and environment, process plants have adopted a manual process of managing and mitigating the tasks and risks associated with it. This involves various tasks such as Job Safety Analysis (JSA), which ensures people are aware of the safety requirements associated in doing a task, Risk Assessment (RA) that ensures people are educated about the risks involved if they don't operate in a safe manner, and Isolation Management that is to ensure the work place is free of potential risks and threats to the workforce. However, manual management of these through paper-based methods means that, they are laborious, ambiguous and often time consuming. People end up spending many hours on filling out forms, identifying conflicts and coordinating across different stakeholders in the plant for approval. A significant amount of time is lost essentially waiting for the paper-based permits. It also mainly runs on personal knowledge, memory, and information from scattered documents. It brings the important question of do we carry out operations of our systems in an ad-hoc manner or a in an integrated way/environment.

IMPROVED SCENARIO

By harnessing the power of electronic software systems aligned with best in class safety and risk management procedures, one can ensure and protect the health and safety of workforce and plant assets through an electronic Permit to Work process. An electronic permit to work system offers significant functional advantages over a paper system. It allows easier management of permits by staff such as plant operators and maintenance personnel. Plant Managers are able at a glance to see the status of all permits and identify permits that are of interest to them. They can analyze what is pending and what is overdue and act accordingly. It helps in easier management of Risk and Method Statements. The electronic system automatically flags anything that has expired and overdue. It also flags isolation conflicts and automatically identifies management of tasks that may conflict with each other. It helps in reducing the paper work involved since it's electronic. The system allows users to manage these complex jobs in a simpler way through automated notifications. An electronic system also takes away the need for re-writing duplicate permits when a permit needs to be re-issued or extended. Permits are also quicker to find.

Last and not the least is the ability to analyse and build insights into these work statistics because it's very easy with digitization to track KPIs and standardized reports on a scheduled basis.

SHIFT HANDOVER

When effective, shift handover is the transfer of knowledge from an outgoing staff member to an incoming staff member; this is typically thought to be a unidirectional process when the outgoing operator decides which information is of importance for transferring, so that the incoming staff can effectively operate the facility.

Ensuring that shift handovers are conducted in a clear and concise manner is one of the most important components in mitigating risk during periods of change. Poorly written notes and/or technical misunderstandings are the root cause to these major issues. According to a company in the oil industry, it has been found that whilst startup, shutdown, and changeover periods account for less than 5% of operations staff time, these periods account for 40% of plant incidents *(NPRA 2009 National Safety Conference)*. Furthermore, every 2nd incident or accident in the process industry is related to communication errors that occurred during shift handovers.

Improving this situation can be made by following simple steps and proper structure, and most importantly, incorporating them in to the day to day activities and corporate culture.

LEGACY SCENARIO

Currently, during the shift handover process it is common for the outgoing operator to explain the important logbook entries to the incoming operator. Whilst it may seem reasonable and sufficient for shift handover to be conducted in a unidirectional nature, this is not nearly as effective as it could be.

Mental Models are a key component of the decision making process and no two mental models are the same, thus we have ZERO ability for 100% standardization in logbooks or a 100% guarantee in accuracy in verbal communication during the handover process, presenting a unique challenge in improving this process.

Whilst the risks in miscommunication during shift-handover are significant, the resolution is quite simple: Clear, Concise, Person-to-Person communications. The goal is to create alignment in the Mental Model of both incoming and outgoing operators and improving overall communication during the handover process through alignment and improved communications. With this the gaps in overall understanding are closed and there is less room for information to fall through the cracks.

But, putting this into practice day-in and day-out is where the challenge lies.

IMPROVED SCENARIO

STRUCTURED LOGBOOK

Thus, what we see is that during the shift handover process there is a fundamental underlying assumption that - when knowledge is being transferred - the same meaning is being received by the other party. But, as illustrated in the figure below, the message sent can be at times (maybe even often times) different from the message that is received.

The reason for this is identified as, even if the outgoing operator gives his or her best effort to anticipate and communicate the crucial information required by the incoming operator during shift handover (i.e. necessary for the incoming operator to know in order to operate the plant safely), this anticipation is based on their own personal mental model -- and the updates that have occurred to their mental model throughout the shift.

Based on this research the final message of The Kiel Center was that clear and quantifiable benefits can be achieved by moving from unstructured logbooks to logbooks with a structure – inevitably driving better understanding and communication, resulting in vast improvement of the shift handover process.

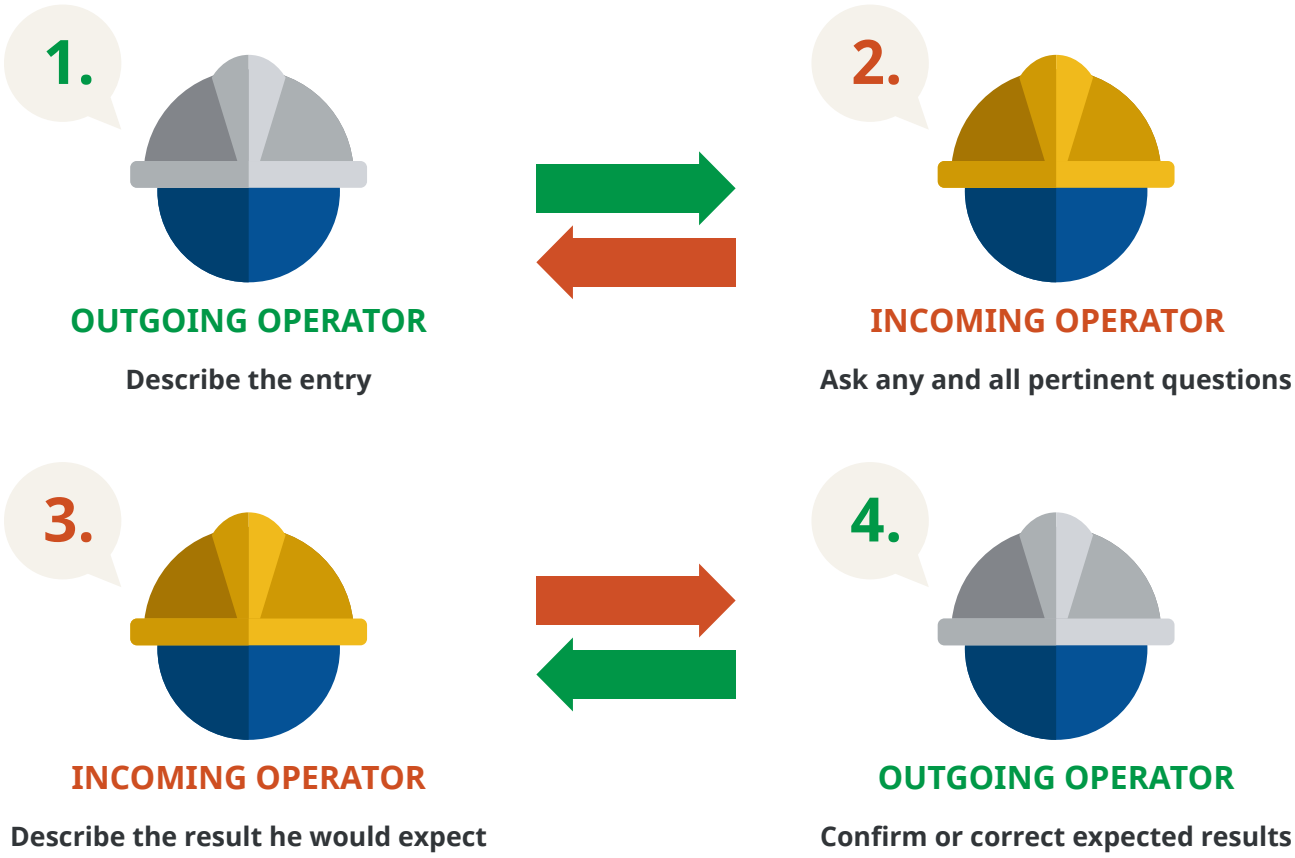
As seen in the figure below, a structured logbook clearly outlines each of the key information categories that operations staff are expected to provide to the incoming shift, thus acting as a prompt for the operator to ensure they are clearly thinking through each of the key knowledge areas.

The Kiel Centre identified via an operator survey that this change to structured logbooks resulted in a 71% improvement in the content of the completed logbooks; combined with a 66% improvement in the shift handover process.

VERBAL COMMUNICATION

The second component for effective shift handover is human-to-human interaction: both incoming and outgoing operators should review the full shift handover report together as a team.

In particular, the following process should be conducted for each item in the shift handover report:



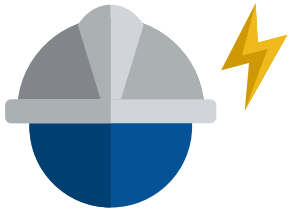
By carrying out these four steps in each shift handover, for every entry, there are multiple checking stages and these stages assist to ensure that the knowledge has been mapped and recorded correctly, and in a sense, the mental model of the incoming and outgoing operators is compared - validating logic and avoiding technical misunderstanding.

CLARITY

An operator's role often alternates between periods of quiet and periods of intense activity, and in many cases operators work 12-hour shifts, resulting in mental fatigue by the time their shift is completed.

From the perspective of the outgoing shift, the challenge in overcoming the disparity in mental models is expected to reside in 2 key areas, and require more clarity:

1.
Timing of when key information occurs



2.
Mental fatigue at handover/report creation time

Often times, the information that is of most importance for safe and efficient shift-handovers occurs during the periods of intense activity. As a result the operator typically takes notes in short-form and with minimal effort. The operator will sometimes deliberately exclude information because it is deeply embedded in his/her mental model.

Also, when handover reports are left unwritten until the end of shift, in many cases the key challenge is for the operator to then remember the fine details that occurred up to 6-12 hours prior.

Thus, it is critically important for operators to see that the creation of shift-handover reports must be an ongoing process that begins from the start of their shift. The reports are to be periodically and critically reread from the perspective of a junior operator, ensuring a final report that is crystal clear.

Whilst there are some shining examples of best-practice, as an industry we still have large areas for improvement when it comes to shift handover. From both the vendor and user perspective, we must continue to find methods and technologies that enable operators to take notes during their shift - accurately, easily, clearly and concisely - whilst having minimal impact on the operator's task at hand.

Based on our knowledge and industry research, at Yokogawa we are working strongly across various industries in the area of shift handovers and shift handover reporting to support our customers in realizing industry best practices.

CONCLUSION

The Process industry is old and very traditional. The only constant is change. By changing from a legacy system to a digitized system, risks can be avoided and value can be added.

Safe operations are the primary goal of any industrial process, the optimization of business solutions is mostly likely second. Implementation of a full and comprehensive Operations Management software program undoubtedly leads to both. Has your plant considered these solutions lately?

Thank You
For Reading!

ABOUT YOKOGAWA

Yokogawa's global network of 114 companies spans 59 countries. Founded in 1915, the US$3.5 billion company conducts cutting-edge research and innovation. Yokogawa is engaged in the industrial automation and control (IA), test and measurement, and other business segments. The IA segment plays a vital role in a wide range of industries including oil, chemicals, natural gas, power, iron and steel, pulp and paper, pharmaceuticals, and food.

DO YOU HAVE QUESTIONS OR CONCERNS?

Contact us to learn how Yokogawa's Operations Management software can help you achieve your safety and optimization goals, today!