LTO Whitepaper IPWC24

Capturing Knowledge and Training for a Better Future

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Introduction – The Staffing Problem

The water and wastewater treatment industry currently faces a critical challenge with an ageing workforce and a lack of new recruits. This has been particularly apparent in operations teams in New Zealand, and with many water treatment entities being dangerously understaffed. Working with the bare minimum number of operators leaves utilities with no resilience to cover cases of emergency such as pandemics and natural disasters or even simply missing resources due to turnover.

The lack of new recruits to shore up operations teams is a major issue, one that the industry needs to find a way to address. But what if it did and tomorrow 10,000 bright eager recruits showed up to start their training? How would you train them without also placing excess burden on your already over-worked staff?



We know that hands-on training is the best way to train an operator, but it is the most timeintensive and takes away time from your current staff to do their actual job of running and operating your treatment plant.

Another issue that comes from both the high turnover of staff in the industry and the older age of many senior operators, who are often reaching retirement age is the loss of institutional knowledge. Almost every treatment plant has slight differences, often with very specific peculiarities, that may affect the way a process is operated or maintained. If you lose a staff member, these small differences may be forgotten or lost, affecting your plant's performance, and resulting in time wasted on troubleshooting or even compliance issues. This means that simply learning from written manuals is not enough, they don't show recruits how to practically perform the necessary tasks, with most manuals being general instructions that do not contain plant-specific instructions. Even if your manuals were created specifically for your plant, there is a common issue at many water suppliers that documentation is not well managed, or easily accessible, with certain documents on one digital platform, and others simply printed and filed or just floating around onsite. This often means that even if well-written specific instructions are available, they are often hard to find.

Another common issue is a lack of detailed documented training plans and records to go with them, which makes it difficult for both trainees to know what they are supposed to learn, their trainers to know what they are supposed to teach and managers to know what has been completed. Regulatory authorities usually require that training is provided and evidenced. In New Zealand, at least this currently seems to be taken very lightly, but this may become a serious issue if any treatment issues arise.



The Solution - LTO a new way of teaching Operations

So that is the problem, it's a big one, with quite a lot of different moving parts to consider, and while Lutra can't claim to have solved the whole thing, we have developed a platform that goes a long way to helping.

Lutra have been working on improving the way that operators receive their training for the last 7 years, by delivering an online training platform known as License to Operate (LTO). Unlike most training courses LTOs are a unique training experience as they are site-specific, created from the ground up to capture and share the knowledge of your own operations staff, and the unique aspects of your plants.

But how do we do this? The main component of an LTO is video capturing operations and maintenance procedures carried out by your competent senior operators. Lutra sends a process engineer and a videographer along to your site, who work with your staff to film each operation. The process engineer will have requested any SOPs and process information for the site beforehand to understand these processes and plan our visit. The Process Engineer is then onsite to ensure that these SOPs and processes are followed and capture any adaptations to match how operations undertake the tasks.

We find that most operators, while apprehensive at first, seem to enjoy being part of the process and appreciate their knowledge being seen as a valuable resource. We ask them to perform the task as usual while giving verbal instructions and descriptions. This is the best way to capture not just the by-the-book procedure but also any nuances and institutional knowledge that your staff hold, ensuring that it is not lost. Your organization's own operators are also easier for trainees to trust than an unknown external trainer.



With that said, there will always be the odd occasion when operators are not confident enough, or are perhaps just too busy to record these videos, in which case Lutra's engineers can step in and record the content based on provided SOPs, and their onsite knowledge.

Videos are edited with full captions to enable users to use them even in noisy operational environments.

These videos are seen as going hand in hand with traditional one-on-one training and demonstrations. They are meant to be used in two ways, first learners should watch them before any onsite training, to get a general understanding of any procedures, and later after being shown hands-on, as a good way to re-familiarise themselves with tasks. We always recommend that staff are given hands-on training in conjunction with LTO training to ensure the best possible results while reducing the need for recruits to be shown processes multiple times.



Just having a collection of Operations and maintenance videos is hardly a training system though, and so LTO offers a place to store and access these through an online Learning Management System or LMS. This makes LTOs accessible anywhere there is an internet connection or even without if you pre-download content and on almost any device with mobile apps available for both Android and IOS or through a browser. The LTO LMS allows the different content to be organised into categories, usually by Water or Wastewater, then by plant and usually by a number of levels depending on the stage of training required, and lessons can then be further categorised at the plant level as seen here.

Using an LMS allows for different forms of content to be shared with your learners, from the aforementioned training videos, to process descriptions, tests, Standard Operating Procedures, Ops manuals and more.



LTO then tracks all learner progress so that you can ensure that your new recruits are actually completing their training. Progression can also be managed so we can either allow learners to access the training in any order, only after a prerequisite or in a set order, giving more control over their training. Progress is shown in reports on the LMS or can be downloaded for use in Excel or other reports. This means that you can show records of training if and when required, as well as provide the necessary encouragement, support or rewards to trainees as they progress.

LTOs don't stop at operations and maintenance training, but they will usually include process theory lessons that utilise engaging animations to explain complex process theory in an easily understandable way. These lessons can help ensure that your new operators not only understand how to make sure a process is working but also what it does and why. How processes such as UV treatment and Chlorination can be difficult concepts to grasp, but these lessons show exactly how they work, without the need to read heavy textbooks.

Once the students grasp the concepts behind the treatment process it is also useful to detail the specifics of the process they will be working with at their plant or plants, to this end LTO contain process descriptions that provide detailed information on the make-up of each process. What equipment, tank sizes, chemicals used, dose points, sample points and any other details important in the operation of the process are listed and explained. These enable your operators to quickly find the most important details they require to run the plant, without trawling through individual product manuals.



Another area that is often overlooked by other training programs is the need to understand SCADA systems, training on these complex systems is yet again time-consuming and resourceintensive. In a similar approach to operations and maintenance, LTO provides training videos, this time screen captures of the system, with voice-over, captions and the highlighting of buttons and inputs used to teach the use of each part of the plant. These videos are usually put together by our process engineers after studying the SCADA system in detail and talking to current operators to ensure they are teaching the right way to use them.

We also include more general lessons on SCADA systems such as how to properly read and understand trends, troubleshooting and optimisations, all of which help to make for a more complete training experience.

Lutra's team of designers, videographers and process engineers work to extract all the required information and put it together in an easy-to-understand and navigate way. Both the web interface and the apps are logically arranged and simple to follow, for learners and training managers alike.

After the initial setup and content creation, water suppliers can manage their staff through the LTO LMS, adding and removing new staff and checking progress. LTO can also be set up with gamification features and certificates are available to encourage learners on their way.

The Other Options – Why LTO?

Of course, other than LTO or resource-intensive hands-on training/apprenticeships, there is also the option of a standard training course, whether classroom or online. These are great for learning theory, and operational procedures from a high level, but they suffer in multiple ways:

They are not plant-specific, learners will not be learning how to operate their plant, and training will always be much broader and may not be applicable.

They do not share your operator's institutional knowledge, again missing out on things that only someone with experience of that specific plant would know.

They are not usually available for reference after the course is completed, a certificate is very nice, but the ability to refer to your training material onsite and even follow along as you are doing is invaluable. Being online and available on most mobile devices gives more flexibility than other training courses.

Does it work?

But does LTO work, well that is a hard question to answer, but it is in use at multiple municipal water suppliers in NZ and has helped teach hundreds of operators on both water and wastewater treatment plants.

There are a couple of cases I would like to highlight that show how truly useful LTO can be:

One sad but unfortunately true example of just how important capturing institutional knowledge can be, especially when dealing with an older senior workforce occurred at one council water supplier in NZ. Lutra were employed to produce an LTO for 4 of their treatment plants, and we were aided by a very experienced older operator and his young apprentice. We had a good time filming onsite and managed to capture all their operations and maintenance procedures, with both of them taking turns as tutors. We returned to the office and just a couple of weeks later as we were producing our LTO, the council reached out with the sad news that the senior operator had passed away suddenly. This was out of the blue because as much as the operator was senior, he was seemingly fit and healthy and still a few years off retirement. This left a hole at the council that would be hard to fill, but at least in some small way LTO was able to capture his knowledge and share it with future generations of operators.



Another example of LTOs providing a vital service is when another council used their LTO as part of their COVID response, enabling them to train non-operators in basic water treatment operations without even having to visit a plant. Obviously, this was very much a last line of defence, as you would prefer to have any operators fully trained and familiar with the plant, but in certain circumstances, this is just not possible. With LTO learners were able to familiarise themselves with the plants, concepts and processes, and in the extreme event that they actually had to work as an operator would be able to call up Operations videos in the field to enable them to complete these tasks or follow the SCADA video instructions to make process changes.

Many other water suppliers use LTO as a normal part of their training program, it is harder for me to measure success here, but most of these suppliers go on to add more plants, levels, or modules to their LTOs which does show that they see the value in the system.

Conclusions

No one thing will solve the problem of our ageing operational workforce and lack of new recruits, LTO certainly won't help to entice new people to the industry, for that I feel the industry as a whole needs to come together and work out a recruitment drive, but that is another story. Digital training platforms like LTO can though help reduce the stress and burden that training new starts brings upon already overstretched staff, while also supporting those same staff when carrying out less familiar procedures or working on a different plant. Passing along institutional knowledge is key to delivering the best training, and while there is no disputing that doing this face-to-face is the best way, video capture is a close second and one that is available anywhere and anytime. LTO also gives a place/system where you can store all your training material and process documentation within easy reach of your operators.

This along with the ability to monitor and record staff training progress, taking away a point of operational risk as managers can understand their staff's capabilities and prove their competence makes LTO a compelling way to train and manage the training of your operational staff.

It can be easy to forget the value of training, instead looking first to spend money on new processes and equipment, but staff are our most valuable resource and training them should be seen as your number one priority in ensuring our water is properly treated.