The promise of legible and intelligent P&IDs has always been the touchstone of plant documentation. The sad thing is that you could ask one hundred plant owners what defines an intelligent P&ID and if you were really lucky you would get fifty answers. But at their base level all would agree that each entity on the P&ID would represent a physical entity, and there should be some way of pulling up information that links that symbol to the real world.

Having these goals for intelligence is a good start, especially if done from the start. This would mean that when information is created it would be retained and that retention would then allow those downstream to benefit from the information captured. But it is a sad truth that much of this information is not always made available at the time these P&IDs are being created. Like it or not, most of the information represented by a P&ID component is created long after the P&ID is completed.

Reality Check

What we in the software world often forget is that most information gathering is done to help someone make a decision, and hopefully the best possible decision at that moment. That being the case it is important that the best info is made available at the point of need.

We all have to take a deep breath and be realistic about how much information we need to collect and for what purpose this information is to be used. So when we look at owners’ drivers for information gathering and retrieval we can see that they generally fall into the following seven categories:

- Safety
- Emergency
- Operations
- Maintenance
- Expansion/Decommissioning and Demolition
- Asset Inventorying
- Asset Transference

Where safety is the most critical and the last, asset transference, while not critical for safety or operations, may none the less be extremely important when needed.

Coordination is the Key Challenge

“As many units are under construction and commissioning at one time with many people involved, coordination is the key challenge. The flow of information and actions is missing and delays are caused due to one-to-one contact only.”

*Source: TechValidate. TVID: D4A-7CF-BF5

Silos of Expediency

Obviously personnel safety and emergency procedures are of paramount importance in a facility, that is a given. But the fact is that the need of safety and emergency information is not always planned, but is almost always urgent. This means that gathering, collating and indexing of this information in advance, and in a readily accessible form, would be ideal. But typically, that is not the case.

If you visit any site you will find those one or two people that everyone knows who to turn to for information. It could be Jan for the information on the new compressor expansion or Bernie in maintenance, who may have been there for 30 years, and does not even have to look at a drawing to locate that leaky valve you were searching for.

The bottom line is that, although this may often be a convenient and expedient form of gathering information, there is a danger in relying on employees’ great memories or their siloed knowledge for critical information. Likewise, we cannot risk point-of-need retrieval on anyone’s good health, an accident, poor adherence to standards or people leaving our employ – we need a better plan.

“I Don’t Have a Problem” — Really?

So are we even talking about a real problem? And if so, how bad is it?

One owner operator, on acquiring a floating production, storage and offloading (FPSO) unit requested all of the information on the FPSO from the past owner, and its engineering support company. In answer to this request the new owner received 11TB (terabytes) of hard drives full of information (this is equivalent to 4.8 trillion typewritten pieces of information or approximately 36 million P&IDs!), and much of this information was mostly unstructured.

In one instance, the owner enquired as to how many P&IDs covered the asset and were advised by the engineering support company that there were 150. During the capture exercise, it found that there were over 7,000 P&IDs distributed around the drives — clearly, there were many duplicates and at many stages of revision. After a full audit the new owner was finally able to determine that there were actually just over 300 master P&IDs for the asset. Double what was expected and 4 per cent of what they originally received.

Collating & checking Pre-Startup Safety Review (PSSR) information time consuming

20 experts surveyed spend 17 per cent of their time on average locating, collating, and checking information during PSSR.

*Source: TechValidate. TVID: CE3-1ED-2E5

While the P&ID has been the ‘go-to’ document for the representation of the process and functionality of a facility, it is unfortunate that much of the rich data that P&IDs represent in the real world is seldom even available at the time of their creation. This article discusses the various methods available to link rich asset data to P&IDs and how that data can be interlinked and made available to all stakeholders at their various points of need.
You are not alone
The truth is that there are 1000’s of well operated and functioning facilities that face
the same challenges and, in an emergency situation, could anyone be absolutely
certain that they have the latest information that they require at their point of need?
Out of the 7000 P&IDs we mentioned previously would anyone be able to find the
right one at the right revision that would show which manual valve(s) needed to
be shut down in an emergency?

The bottom line is that, in an emergency, the information we deliver to the field
ought to be better than ‘run!’

Dealing with the Realities of Information Creation
At this point there is little point in not dealing with the reality of plant owners’
situations. The truth is that owners are in possession of a vast quantity of existing
electronic design information, from multiple engineering companies, created with
a variety of tools.

These design systems are so varied and could include: Intergraph Smart 3D,
Intergraph PDS, AVEVA PDMS, Intergraph CADWorx, Bentley AutoPLANT or AutoCAD
Plant 3D or P&ID – each with their own way of representing the ‘truth’. That means
that whatever system is selected to gather and disseminate this information should
have the ability to use as much of this information as already exists. Additionally,
users should be able to navigate between the tagged assets inside the system, and
the streamed 3D model representation of the plant, regardless of the format the
information was originally created.

Fake it till you make it
Software vendors often speak about intelligent systems and information gathering
and the downstream benefits that can come from having that information available
to all stakeholders. On a positive note the truth is that those benefits are not only
real, but can be quantified in hard cash.

Then what is not to like? Well, for a plant owner, whose assets can range in age from
one week to sometimes one hundred years, it would make the task of documenting
and collating existing plant information daunting. This should be no surprise as
information could be held on anything from scanned drawings to fully intelligent
3D plant models.

So is it possible to access this collateral and thereby leverage the investments
already made in the creation of existing information? Well the answer is ‘yes’ to
providing access, as even the oldest drawings can be scanned and made available
electronically. The real challenge is not being able to view drawings, but in accessing
the underlying information these drawings, documents, and files represent and the
intelligent linking and grouping of common information.

Potential quality of information results in significant effort
68% of surveyed experts spend 10-30% or more of project hours dealing
with wrong or missing information.
*Source: TechValidate. TVID: 967-A1F-F79

Biting the Bullet
One approach on the road to recovery is to redraw P&IDs in a standard, legible
and intelligent format. Does it take time? Yes, it does, but here is the thing, we are
taking about developing a graphical information foundation upon which access to
all of your site data will be based, so it may be worth it.

In this case a solution like CADWorx P&ID Professional would help greatly as it
can not only quickly recreate these documents, and make them intelligent but it
can also allow any related data or documentation to be linked to any intelligent
P&ID component.

Here readers may be justified in thinking “we have now moved from one silo, and
created a better (shinier) one, where the creators and drafters of those P&IDs are
now the ‘go-to’ persons for information.” Luckily that is not the case, as CADWorx
P&ID Professional also allows P&ID projects, with all of their associated data, and
linked documentation, to be published and accessed by any stakeholder through
a browser interface.

But if you do not want to redraw your P&IDs CADWorx P&ID Professional also allows
the mapping of components in non-intelligent P&ID to and intelligent database,
and from there the drawings and linked data can also be published and shared.

Aims of Existing and Ongoing Asset Capture
So what if the desire is to automatically capture and aggregate information that
is already out there, without redrawing anything? That is also possible but for any
system to be successful it would have to as painless, accurate, and single touch in
its execution as possible, and should address these key challenges:

• The asset identification retrieval system would have to be simple to use.
• The cataloging of existing data should be as painless and automated as possible.
• Tools and information should be widely available and secure.
• Searching and acquiring data should be as easy and intuitive.
• Information should be viewable on various devices to give true point of need access.
• The acquisition and cataloging of ongoing data should be automated.

This is where SmartPlant Fusion can help, as it does not focus on the creation of
information, but on the automated capturing, extraction and aggregation of existing
information from a variety of assets and available collateral. This information may
be stored as P&ID and 2D drawings, datasheets, 3D models, laser scans, operation
manuals, etc and can be in a variety of document, drawing, and data formats, but
can be linked and accessed via a common tool.

The above capabilities enable existing datasets, which share common tag names,
to be quickly and automatically associated with one another. But what makes sure
that future information does not sink into a black hole is that SmartPlant Fusion
continually does this work on an ongoing basis. This means that personnel can
quickly access, not only pre-existing information, but also information that is
constantly being created as part of any facility’s ongoing process of development
and reinvention.

Complete & accurate information essential to improve
mechanical completion processes
85 per cent of surveyed experts believe that complete & accurate information
will improve efficiency of their mechanical completion and/or commissioning
process most.
*Source: TechValidate. TVID: 80F-886-3E6
**Let’s Get Physical**

One aspect of all of this that is seldom mentioned is the physical as-built documenting of an asset and the need for accurate information for time sensitive site updates, maintenance, repairs and operations. Owners are increasingly electing to scan portions of their facilities, and intelligently tag scanned assets, such as pumps, valves, vessels etc.

What is interesting is that, unlike in the past, these point clouds are not just a sea of either yellow, red, orange or green dots that seem formless. These captures now carry color and shade information about the asset being scanned, and a free tool, Leica TruView, makes viewing this information easy to do. An advantage of documenting the physical site using scanned point cloud data is that after tagging assets in the model, these can also be linked into the dataset by SmartPlant Fusion for ongoing linking and information retrieval.

**Ongoing Maintenance, Repair and Operations**

Point cloud models can also be leveraged by Intergraph CADWorx fieldPipe and CADWorx Plant Professional and by picking surface points on the scanned model owners are able to create intelligent models based on the latest as-built information for the production of fabrication or analysis deliverables.

If only a few lines are needed to be as built, and scanning seems like overkill, teams no longer have to rely on the ‘accuracy’ of plumb bobs, tape measures and unnecessary scaffolding to carry out as-built studies or verification of an installation. Now teams can go on site and still leverage the power and accuracy of lasers. By using Intergraph CADWorx fieldPipe and Plant Professional, in conjunction with Leica Total Station, by picking a few points on a line, users create intelligent as-built models, and fabrication deliverables directly in the field.

**Conclusion**

The maintenance of up-to-date, and therefore viable, site information has always been and challenge, with the elephant in the room being the acquisition of existing facility data. Tools like Intergraph CADWorx and SmartPlant Fusion are now available that make this task, not only more palatable, but now realistic. In the 21st century we now have the chance to give all stakeholders to access the latest information at their individual points of need, so that they can make informed accurate decisions based on the best possible data.

*These quotes present data that TechValidate has sourced via direct research with verified customers and users of Intergraph Information Management/Owner Operator Solutions. TechValidate stands behind the authenticity of all published data (http://www.techvalidate.com/product-research/intergraph-information-management-owner-operator-solutions).*

- 268 Customers Surveyed
- 2,191 Data Points Collected
- 69 Published TechFacts
- 16 Published Charts
- 9 Published Case Studies

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