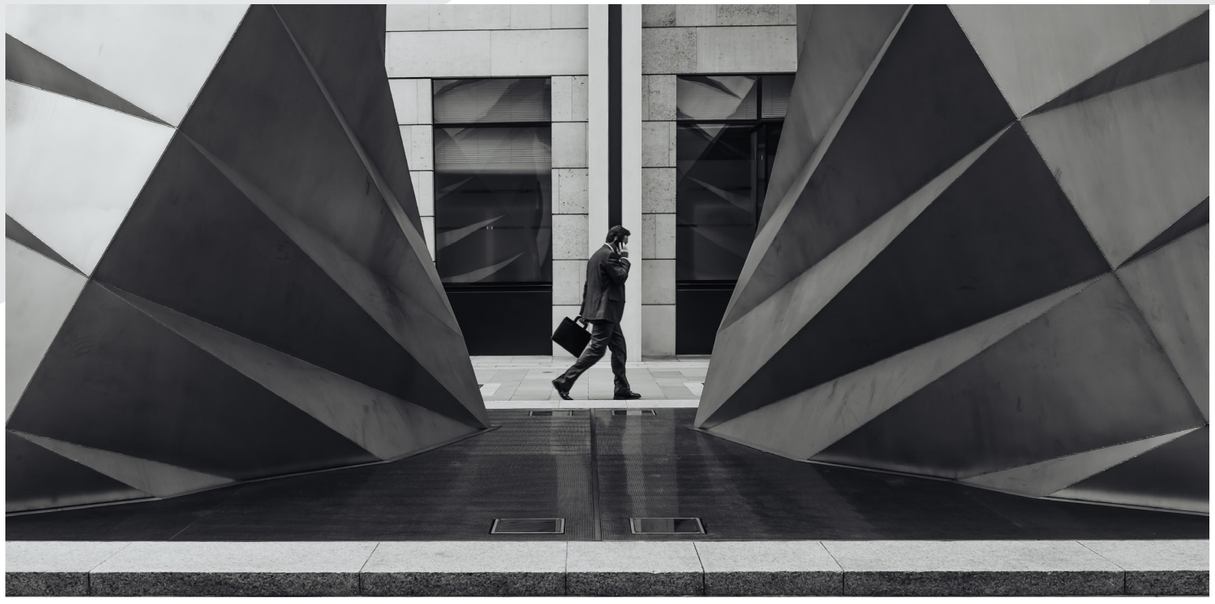
A2K Technologies

ROI ON SMART TOOLS FOR DATA MANAGEMENT

Presenting an ideal solution for enabling a single point of truth for Asset Management



INTRODUCTION

> “The whole enterprise of teaching managers is steeped in the ethic of data-driven analytical support. The problem is, the data is only available about the past. So the way we’ve taught managers to make decisions and consultants to analyse problems condemns them to taking action when it’s too late.”
>
> - Clayton M. Christensen, management professor at Harvard

Big Data and Big Data Analytics have become a well-accepted facet of both the business world and life outside work. People who are not specifically involved in data analysis can easily experience commentary on how trends can predict outcomes and provide insights into everything from sport to shopping trends to music popularity.

The mainstream popularity of data analytics is based mainly on interesting results being presented in an easily digestible format, with an understanding that clean data is essential to enable the analysis. Many scenarios involve processing, tidying up and filtering historical data as a one-off event. This provides a single snapshot of previous trends, but it does not allow for new design metadata or as-constructed information to be harnessed.

As BIM adoption continues to develop, Asset Custodians and Asset Owners can command highly sophisticated data sets at the completion and/or handover stages. Rapid technology advancement has challenged traditional workflows and methods with new design and data creation tools now embedding sophisticated asset information within the design model. For this to succeed, the asset design and construction processes need to be calibrated to work with the asset management requirements. Without this, there is a very real danger of a wealth of information

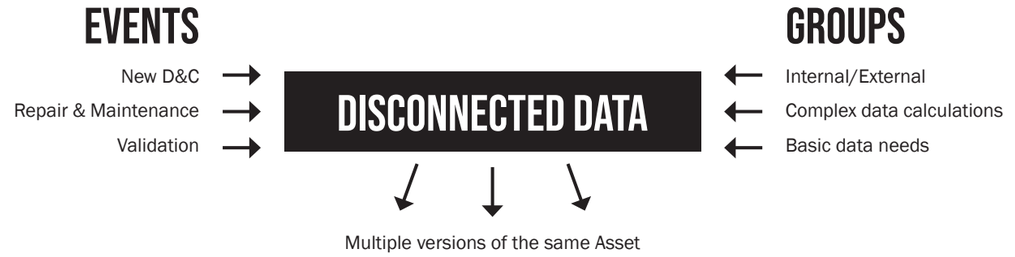


Fig 1. versions of the same asset for multiple groups / people

either being lost permanently or being re-created or re-processed later at significant expense.

Most Utility Companies have a requirement to manage infrastructure databases that accurately represent real world infrastructure in real time. Often these data sets span complex assets and ultimately service multiple groups with specific needs ranging from very basic access to the data through to specific and complex requirements. This applies to both internal and external groups with the data requirements typically being unique and not common to other asset information users.

As well as servicing the various groups needing access to the data, the Asset Management system needs to cater for events which trigger asset information contributions from a wide variety of disciplines and functions. These events include:

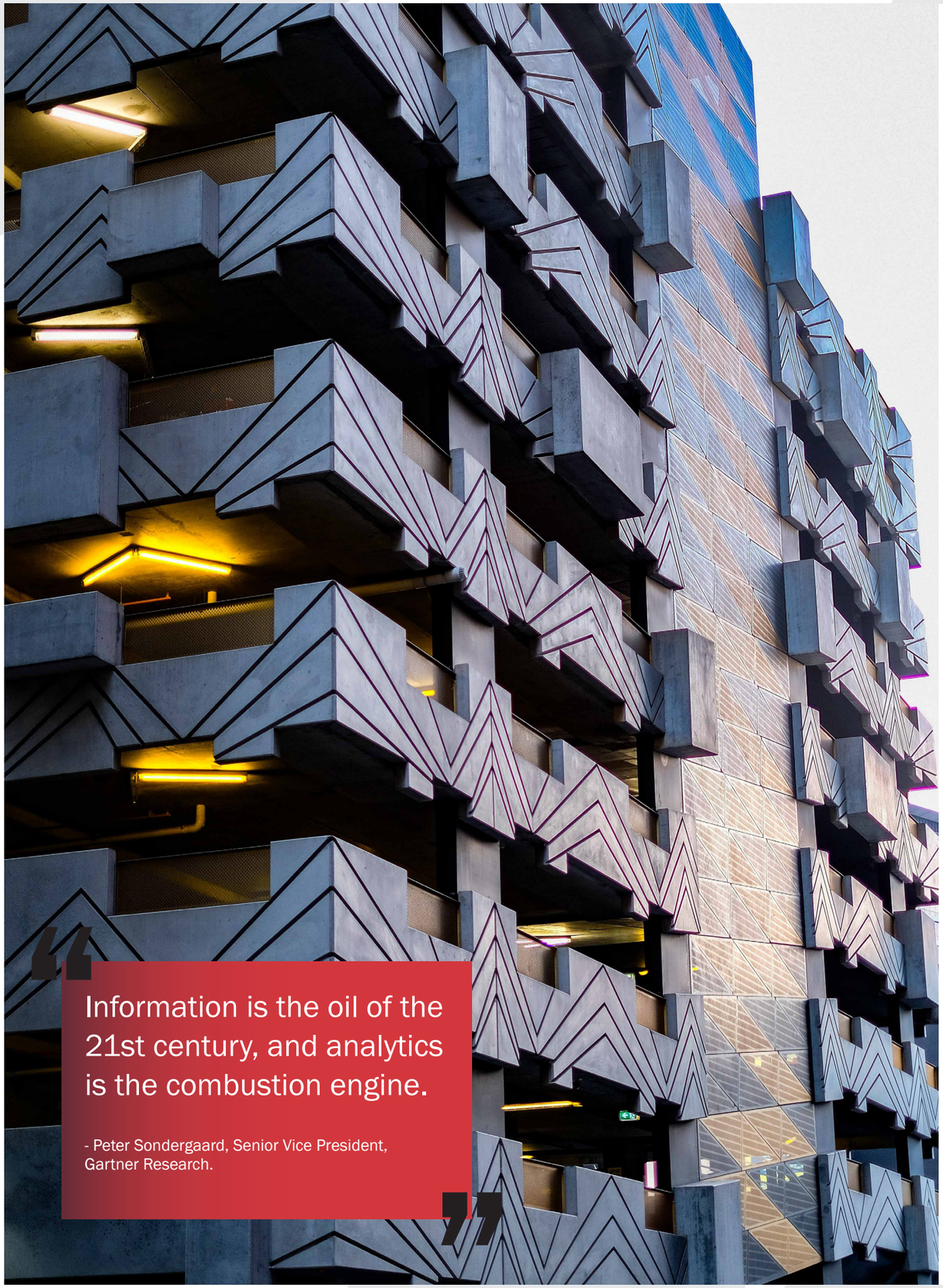
- New design and construction
- On-going repair and maintenance
- Constant validation of existing conditions and locations.

It’s very common for this wide variety of usage to force multiple versions of the same asset types in multiple non-connected databases. Single point of truth (SPOT) is a massive issue faced by Utilities globally given the age and scale of the assets typically managed and the complexity and dynamic nature of the actual asset management process.

As there are so many potential data authors and creators in multiple roles with differing focus levels on data integrity and such a wide variety of data entry and exit points, it can be challenging to control the standards but typically through data validation at asset information handover, the asset custodian can ensure that the asset data adheres to their SPOT standards and underlying data structure and standards.

Smart tools are a method to assist asset information authors through a set of specific automated data creation tools that simplify the design and engineering functions whilst automatically facilitating and enforcing the asset information underlying database structure to facility automatic data synchronization. These tools sets are also embedded with data validation functions to ensure that additions and modification to the asset information data sets continue to adhere to defined SPOT structures and standards. In many organisations, it is extremely challenging to enforce common data standards and synchronization between the wide variety of asset information users and the asset information custodians without forcing the data authors to take on additional duties that are often only viewed as functions of the asset custodians alone.

The benefits of maintaining a SPOT and still service the internal and external parties who need to utilise the asset data sets are indisputable but since there is a significant investment of time and money, the ROI needs to be calibrated in practical terms so that realistic expectations can be set.



> Information is the oil of the 21st century, and analytics is the combustion engine.
>
> - Peter Sondergaard, Senior Vice President, Gartner Research.

UTILITY COMPANIES, ASSET DATA AND SMART TOOLS

The main focus for most Utility companies is providing service and support to the ever-increasing customer base. This needs to cater for future planning with business systems integration, as well as logistics and conservation for current workloads.

Asset Data information is critical to the success of this service, and enabling the entire extended team with the ability to leverage and update the data is the key to achieving this. Within the Utilities Industry, Asset Data can refer to the following:

- Substations
- Switch gear
- Pole
- Street light
- Cable (underground)
- Overhead Line
- Pits and Pipes

For Utility Companies, the physical areas covered are large and many of the assets have been in place for significant time, before the current big data trends became the norm. This leads to an ongoing process of updating existing records as well as creating new data. On top of this, the survey work is carried out by multiple parties (both internal and multiple external companies), all usually using different software packages to achieve the task.

The consequence of this is that large amounts of submissions are rejected for not meeting data standards – this is an expensive and frustrating experience for all parties involved. Ultimately, a framework is needed to control the process of uploading data to the main data store (usually a GIS/ Asset Management system). The basic technical components of this include the following:

- Data Migration for the historic records in multiple formats.
- Data Validation for existing assets being submitted to the data store.
- Automation and enhancements for the process of digitising new assets.

A combination of smart tools can be implemented to improve efficiencies in each component of the data flow process. This paper explores the details of calculating real ROI for investing in this process, focusing mainly on the efficiencies from validation of the data in the design/draft stage. We will refer to the data migration and data input but are mainly considering the live error checking options within the design/draft step, which ultimately make the output/submission process seamless.

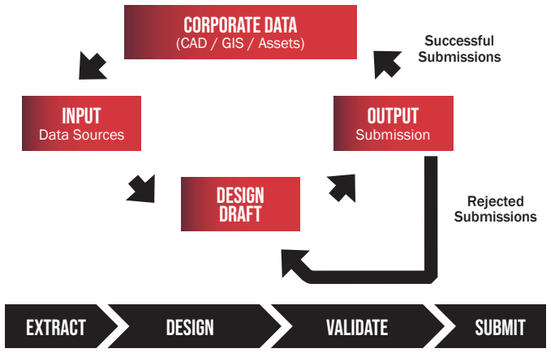


Fig 2. General diagram of data flow process.

SOFT ROI + HARD ROI

The ROI discussion is often a contentious one as in many cases, the process (across most industries) is not as simple as the classic approach of dividing Net Income by Investment Costs. This has led to the distinction between Soft ROI and Hard ROI.

Hard ROI tends to be measurable and quantifiable while Soft ROI tends to be subjective and emotional. In general, soft ROI does not have an immediate effect on finances so cannot be measured in direct dollars. However, the soft ROI areas represent the foundation for the ultimate success of most projects as they tend to focus on the people doing the work who are ultimately the engine behind the initiative.

Hard ROI	Costs
	Error Rates
	Rejection of submissions
	Rework
Soft ROI	Employee Engagement
	Company Morale
	Staff Loyalty
	Less Absenteeism

Ideally, both are assessed and used together – in general, Soft ROI benefits alone are more difficult to build a solid business case from.

In this paper, we look at the benefits in solving the issue of data inconsistency for Utilities – the value proposition has some very tangible Hard ROI metrics, which we will focus on and also include analysis of how the indirect benefits of soft ROI can be considered in conjunction.

METRICS FOR ROI WITHIN THE UTILITIES INDUSTRY

The full range of potential ROI metrics is extensive and can be considered within several focus areas. These are as follows:

- Number of people involved in tasks
- Time to complete tasks
- Quantity of items processed
- Quality of submitted work

We have established that one of the main focus areas of this process, is to reduce the number of rejections so quantifying this over time is a critical metric. This is a representation of the quality of data being processed. We are also interested in proving if efficiencies can be calibrated for time taken as well as the number of people involved. We also expect that as these improve, more data will be able to be processed so the quantity of assets being digitised is also recorded.

The table below shows a sample table with data being recorded every quarter.

	NO. OF PEOPLE			TIME (HOURS)		QUANTITY				QUALITY		
	Internal Staff (Survey)	External Survey (ASP)	Internal Staff (Validation)	Time Taken (Average)	Oversight Time (Managers)	Data Extraction	No. of Submissions	New Assets Digitised	Design Automation	Number of Rejections	Upload Quality	General Feedback
Q1 2015												
Q2 2015												
Q3 2015												
Q4 2015												
Q1 2016												
Q2 2016												
Q3 2016												
Q4 2015												

Sample table to quantify key metrics over time.

PEOPLE-BASED METRICS

People-based metrics enable us to quantify how many staff members, on average, are needed to complete the capturing and validating of the Asset Information.

- **Internal Staff (Survey/Design)**
  Internal staff are tasked with performing surveys onsite and doing the CAD design – an

example could include a new land development. Historically, the data could have been captured on paper or extracted and updated in legacy software packages. This leads to large amounts of manual processing for the corporate GIS.

As the process become more efficient, the average number of staff needed to complete a job will reduce – this is a clear ROI metric that needs to be captured.

- **External Staff (ASP's)**
  Accredited Service Providers (ASP's) perform similar tasks and play an increasing role in the asset information capture process. Traditionally, different external contractors will use different software packages to achieve a task with different quality of outputs. As this is standardised, the efficiencies need to be captured in terms of average number of ASP's needed to complete a job.

- **Internal Staff (Validation)**
  Validating standards and details of designs and documentation after they have been submitted without control, usually leads to a back and forth process to get errors corrected. As well as considering the number of rejections, we also need to capture the average number of staff working on this process.

TIME BASED METRICS

Time based metrics are a classic means of quantifying efficiencies, and ultimately the cost savings of a process as multiplying the number of hours saved by the relevant hourly rate of pay gives an instant hard dollar figure.

- **Average Time Taken**
  The general efficiency of automating the design and drafting process as well as preventing rejections with the live validation tools will produce improvements in the average time taken to complete a job. This needs to be captured to show trends over time.

- **Time taken on Oversight**
  As submissions are sent back to be corrected, management figures are often drawn into the process, adding a cost which is often not officially documented in dollar figured but expressed in terms of frustration. The number of hours spent in this process will reduce as the framework is utilised, making this a key metric.

- **Data Extraction**
  In cases where the extraction of data is a manual process from multiple sources, investing in automating the process makes a huge impact and can easily be measured as a key ROI.

QUANTITY-BASED METRICS

Quantity-based metrics expand on the time based parameters. As production becomes more efficient, more assets can be digitised in a given time, representing a key indicator of ROI.

- **Number of Submissions**
  As efficiencies continue to grow, more time will be available to the survey team so the number of submissions can increase. This is a key metric to track.

- **New Assets Digitised**
  The ability to quickly add new records for undocumented assets found in the field but not in the current data store is critical. As the task of digitising the assets becomes less arduous, the quantity of new assets can be tracked.

- **Design Automation**
  Speed of production is critical to everyone in the process, especially the ASP's. The smart tools can be implemented easily to improve this and the number of design components created with asset data can be quantified as a measure.

QUALITY-BASED METRICS

The number of rejections is the most intuitive metric to grasp. It is also critical to ensure that quality is not being compromised as speed of production improves.

- **Number of Rejections**
  This is the key metric to quickly show how the system produces efficiencies. The live error checking ensures that the submissions are pre-validated so rejections drop significantly. As the number of rejections decreases, every contributor to the process feels the benefits, both financially and in terms of relieving frustration.

  The error types are detailed in the appendices.

- **Upload Quality**
  Ensuring that the final submission is uploaded with sufficient quality for quick processing by the GIS team is highly valuable as it enables real time availability of information for the extended teams. The quality can be rated 1 to 5.

- **General Feedback**
  The general customer satisfaction survey of rating how likely someone is to recommend a service to a colleague has become a well-established method of measuring value and can be implemented for this process as an overall quality indicator.

ANALYSIS OF ROI (HARD + SOFT)

The most intuitive component to tie into direct dollar savings, (classic ROI), is the measurement of time saved. The basic equation is simple for the initial calculation – it can be enhanced to cater for the lack of disruption, but this can often be achieved more effectively by adding supplemental information to the same graph.

By supplemental information, we refer to data which helps to expand on the details of the trends being illustrated. There is always a concern that enhancing efficiencies will cause negative effects in quality and other areas – the supplemental data is critical for investigating this and illustrating the status (good or bad). In general, we position the data with the following analysis criteria.

- Hard dollars
- Hard Indicators
- Indirect indicators (soft ROI)

The example illustrated in the graph (on figure 3) shows the main hard dollar indicator of average time taken improving in efficiency over time. This is an obvious calculation using the formula below.

ROI = (time saved) * (hourly rates)

The number of rejections in this case illustrates that the improvement in time is not compromising quality. This can also be illustrated with other parameters and the number of rejections is, of course, also a valid parameter for hard dollar calculations.

The New Assets Digitised parameter refers to new assets discovered while onsite and uploaded into the corporate data store. This trend in the example below is be as positive as the others – this could be an indicator that there is further refinement needed in motivating staff for these procedures. In this case, we are using this as an indirect indicator to the Employee Engagement component of Soft ROI.

The application of the analysis parameters is customised for each scenario to ensure that the relevant trends are being illustrated. The main question that needs to be answered is when the ROI will become effective and which segments of the business will benefit.

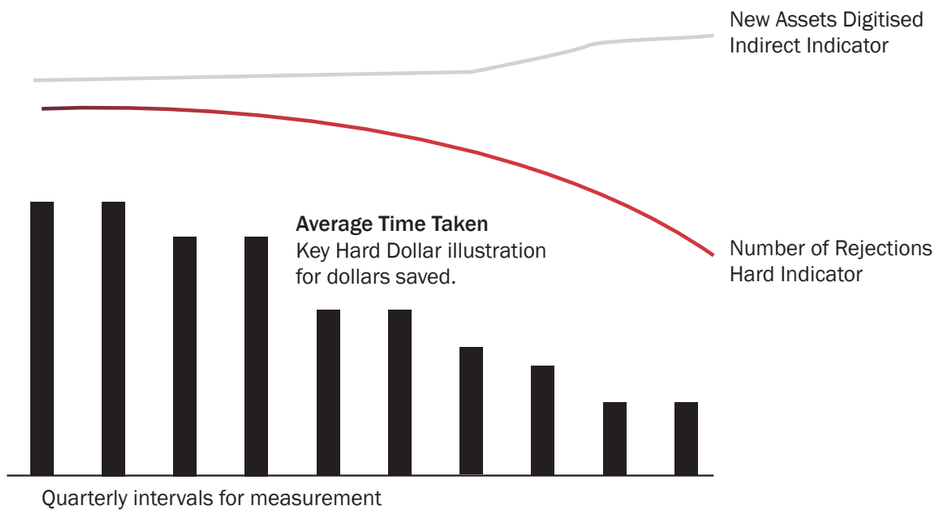


Fig 3. Dashboard view of ROI

CONSIDERATIONS BEFORE IMPLEMENTATION

The realistic scenario is that there is usually a backlog of data to be processed. This can be housed in multiple formats and locations and will often need to be translated into a consistent standard, so that it can be consumed by the enterprise system.

Some of the formats are listed below – while these are all different and contain individual complexities, they tend to represent the same information. This enables a consistent data store to be formed – the example below is a simplified overview of the process for converting legacy proprietary format and importing the data into the corporate data store.

- PDF
- Paper (soft copy)
- Proprietary formats (DWG, DGN, TAB, Smallworld, ESRI, Integraph etc)
- In-house formats (legacy customisation)

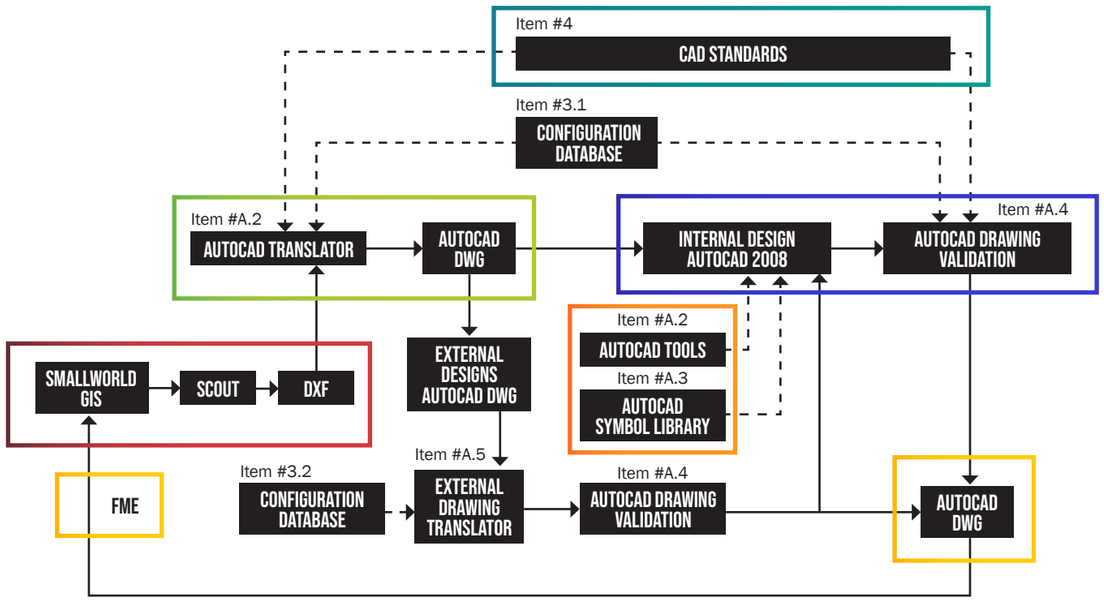


Fig 4. Sample workflow incorporating data from multiple formats.

IMPLEMENTATION, TIMELINES + LICENCING

There are several logistical considerations to be managed when it comes to rolling out a new workflow for the extended team(s). The technical details can be worked out with a series of discovery sessions. The next two considerations are:

- Project Plan for phasing
- Licencing options of the customised software for both internal and external staff.

Each project is unique and the timing/phasing is worked out to suit. Depending on the state of the current records, an exercise in data cleansing may be required, followed by setting up the smart tools. These can be rolled out to different groups over different time periods with ongoing training and mentoring provided.

The licencing of the smart tools can be managed through the use of different models. The most popular is for the licences to be owned by the utility but made available to the ASP's (Accredited Service Providers). This offers all parties a consistent set of tools which is constantly updated based on feedback.

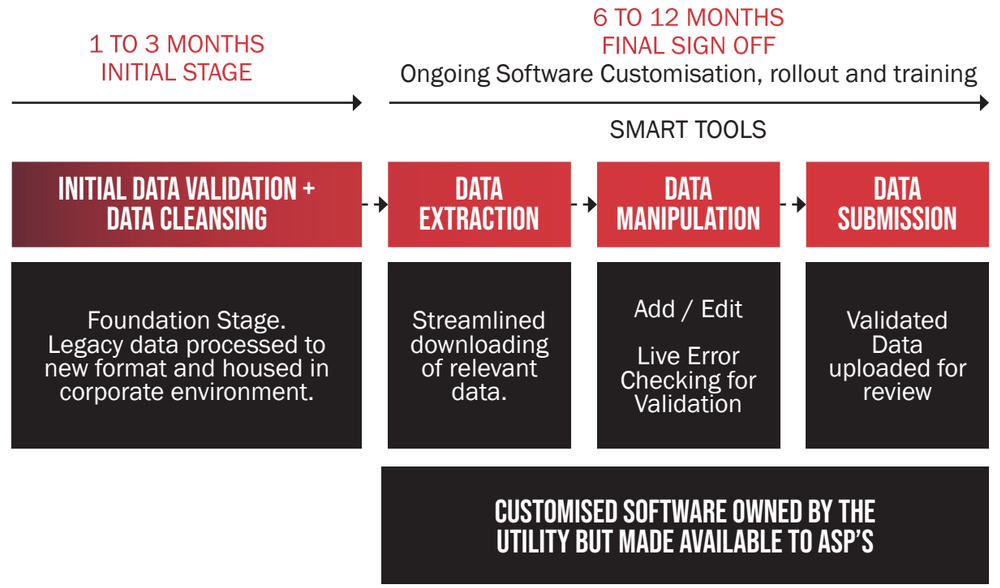


Fig 5. Sample rollout and licencing model

The example above shows a sample rollout plan where timelines are set for the different phases of the project. With this timeline, realistic expectations can be set on when to expect impacts. The ROI measurement tools can then be positioned correctly.

CONCLUSION

Smart tools present an ideal solution for enabling a single point of truth for Asset Management, enabling internal and external groups to interact with the data across multiple types of events. While there are obvious long term benefits to the general business, the costs for implementation are significant so the return on investment parameters need to be positioned appropriately.

ROI will always remain an ambiguous parameter to measure as business benefits are more complex than the basic dollars saved per transaction formula. The key to implementing a successful ROI measurement process is to consider the different potential focus areas, and position these within the relevant analysis criteria of soft and hard ROI measurements. This can be summarised into a dashboard view so that stakeholders can monitor progress and interrogate details for specific areas.

As technology continues to evolve and general industry continues to adopt standards such as BIM, the expectations for connected Asset Data will become more demanding. We cannot control the future of the standards and cannot predict the future of the technology that will be used in the next five to ten years but, we are able to ensure that the data is maintained with a Single Point of Truth so that it can be reliably applied to any standard or platform.

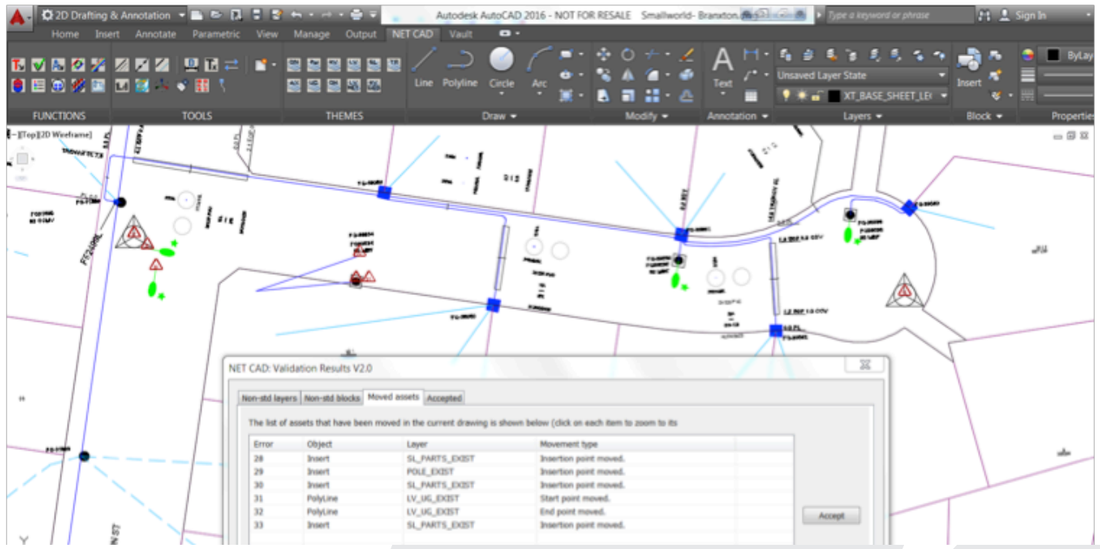
APPENDIX 1: ERROR TYPES

Errors are highlighted in real-time to enable users to correct on the fly. The errors are given a priority of 1 to 4; 1 being 'critical' – any drawing which has a 1 or 2 Error is rejected by GIS, and requires the user to 'Fix'.

The errors are constantly evolution based on interaction and new challenges. As long as the criteria can be described, the automation can be tailored to suit. In general, they tend to fit into the following four categories:

CAD Errors	• Layers • Line Styles • Line Types • Text Styles • Xreferences
Standard Errors	• Geometry • Missing or Invalid Asset Numbers • Missing or Invalid Attributes • Missing or Invalid Titleblock Information • Non Standard Symbology • Non Standard Layer • Non Standard Line Style • Non Standard Text Style
Connectivity Errors	• Underground Cable • Overhead Line
Asset Numbers	• Duplications • Invalid or missing parameter

The software then enables users to navigate the errors with capacities to resolve them and provide reports. A sample screenshot is shown below.



APPENDIX 2: SAMPLE REPORT

Reports are generated automatically and tailored to suit formats. Below is a sample for a basic scenario showing the summary and one of the error lists.

Platform	AutoCAD
Validated Drawing	C:\Users\darrenm\Desktop\PD10229-1xref.dwg
Standard Drawing	C:\Program Files\Standards\<Client Name>_CAD_Standards.dwt
Standard Drawing Version	4.2
GIS Compliance	No
IE CAD Standards Compliance	No
Validation date	14/09/2017 15:08
Validated by	darrenm
Total Errors	16
Count of New Features	23
Count of Modified Features	0
Count of Deleted Features	0
Selected Error Messages	P1 P2

CAD ERRORS

ERROR ID	SEVERITY	DESCRIPTION
CAD_ERR_2	P2	(113) Linetype A1.001_SITE PLAN_E0Boundary is invalid and not to standard.
CAD_ERR_3	P2	(113) Linetype A1.001_SITE PLAN_E0Dash - 1_5mm is invalid and not to standard.
CAD_ERR_4	P2	(113) Linetype A1.001_SITE PLAN_E0IMPORT-X-SURVEYa0ACAD_ ISO04W100 is invalid and not to standard.
CAD_ERR_5	P2	(113) Linetype A1.001_SITE PLAN_E0IMPORT-X-SURVEYa0DASHED is invalid and not to standard.
CAD_ERR_6	P2	(113) Linetype A1.001_SITE PLAN_E0IMPORT-X-SURVEYa0LT2 is invalid and not to standard.
CAD_ERR_7	P2	(113) Linetype A1.001_SITE PLAN_E0SETBACK is invalid and not to standard.
CAD_ERR_8	P2	(113) Linetype A1.001_SITE PLAN_E0Staging Line is invalid and not to standard.
CAD_ERR_9	P2	(113) Linetype Boundary is invalid and not to standard.
CAD_ERR_10	P2	(113) Linetype EXMAIN is invalid and not to standard.
CAD_ERR_11	P2	(113) Linetype NEWCAB1 is invalid and not to standard.
CAD_ERR_12	P2	(113) Linetype NEWCAB3 is invalid and not to standard.
CAD_ERR_13	P2	(113) Linetype NEWCAB4 is invalid and not to standard.
CAD_ERR_14	P2	(113) Linetype NEWCAB5 is invalid and not to standard.
CAD_ERR_15	P2	(113) Linetype NEWMAIN1 is invalid and not to standard.
CAD_ERR_16	P2	(113) Linetype REMMAIN1 is invalid and not to standard.

APPENDIX 3: ERROR LISTS

The complete error lists are extensive and can be provided on request. Below are two samples, the Asset Numbering Errors and CAD errors.

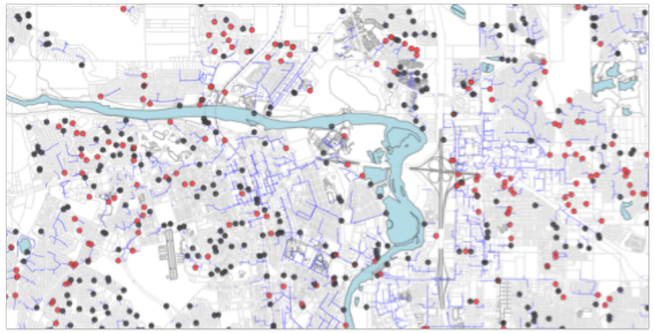
ERROR NO.	SEVERITY	MANDATORY (Y/N)	CATEGORY	DESCRIPTION
300	P1	0	Asset Numbering Errors	Asset Number value is empty for Block B$ on layer L$
301	P2	0	Asset Numbering Errors	Asset Number value of AN$ for Block B$ on layer L$ not found in Ellipse
302	P2	0	Asset Numbering Errors	Asset Number value AN$ returned by Ellipse not found in the drawing
303	P1	0	Asset Numbering Errors	Failed to connect to ellipse
304	P1	0	Asset Numbering Errors	Failed to begin SOAP message
305	P1	0	Asset Numbering Errors	Failed in preparing Start Request
306	P1	0	Asset Numbering Errors	Failed in build credentials
307	P1	0	Asset Numbering Errors	Failed in start service
308	P1	0	Asset Numbering Errors	Failed in build Request Parameters
309	P1	0	Asset Numbering Errors	Failed in build End element in assignOPIds
310	P1	0	Asset Numbering Errors	Failed in build End element in assignOPIds
311	P1	0	Asset Numbering Errors	Failed in end SOAP message in assignOPIds
312	P1	0	Asset Numbering Errors	Failed in Asset Validation
313	P1	0	Asset Numbering Errors	Duplicate Asset Number AN$ found for more than one assets of type FT$

CAD ERRORS

ERROR NO.	SEVERITY	MANDATORY (Y/N)	CATEGORY	COMMENT	DESCRIPTION
100	P3	-1	CAD Errors		Dimstyle with invalid name found. DS$
101	P3	-1	CAD Errors	Font Name	Dimstyle property PROP$ value is different for Dimstyle DS$. Current Value = CV$, Expected Value = SV$
102	P3	-1	CAD Errors	Linetype	Dimstyle property PROP$ value is different for Dimstyle DS$. Current Value = CV$, Expected Value = SV$
103	P3	-1	CAD Errors	Text height	Dimstyle property PROP$ value is different for Dimstyle DS$. Current Value = CV$, Expected Value = SV$
104	P1	0	CAD Errors		Layer with name L$ is invalid and is not standard.
105	P3	-1	CAD Errors	Color	Layer property PROP$ value Is different for layer L$. Current Value = CV$, Expected Value = SV$
106	P3	-1	CAD Errors	Freeze	Layer property PROP$ value is different for layer L$. Current Value = CV$, Expected Value = SV$
107	P3	-1	CAD Errors	Lock	Layer property PROP$ value is different for layer L$. Current Value = CV$, Expected Value = SV$
108	P3	-1	CAD Errors	On	Layer property PROP$ value is different for layer L$. Current Value = CV$, Expected Value = SV$
109	P3	-1	CAD Errors	LineWeight	Layer property PROP$ value is non standard layer L$. Current Value = CV$, Expected Value = SV$
110	P3	-1	CAD Errors	PlotState	Layer property PROP$ value is different for layer L$. Current Value = CV$, Expected Value = SV$
111	P3	-1	CAD Errors	LineType	Layer property PROP$ value is different for layer L$. Current Value = CV$, Expected Value = SV$
112	P3	-1	CAD Errors	PlotStyleName	Layer property PROP$ value is different for layer L$. Current Value = CV$, Expected Value = SV$
113	P2	0	CAD Errors		Linetype LT$ is invalid and not to standard.
114	P3	0	CAD Errors		Textstyle TS$ is invalid and not to standard.

ERROR NO.	SEVERITY	MANDATORY (Y/N)	CATEGORY	COMMENT	DESCRIPTION
115	P3	0	CAD Errors	Font Name	Textstyle property PROP$ value is different for Text-style TS$. Current Value = CV$, Expected Value = SV$
116	P3	-1	CAD Errors		Text height is invalid and not to standard
117	P3	-1	CAD Errors		Object found on paper space in drawing DWG$
118	P1	0	CAD Errors		There are no new assets to validate
119	P1	-1	CAD Errors		Drawing is missing header information required for GIS Import
120	P1	0	CAD Errors		XRefs are present in this drawing

APPENDIX 4: DATA ANALYSIS (GIS IN OPERATION)



STORMWATER OUTFALLS

Stormwater outfalls colour coded by material.
(Concrete is displayed as red)

This is achieved because the “Pipe Material” field is filled with consistent attributes. In this case, we are filtering for the text ‘CONCRETE’ to isolate concrete.

WASTEWATER PIPES

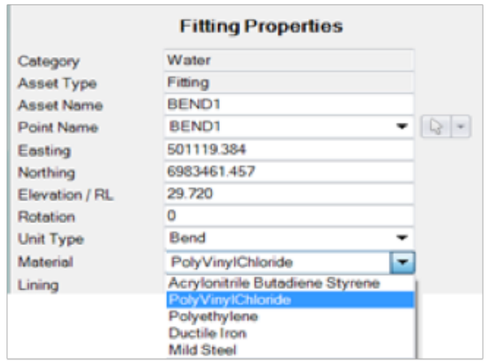
Same date set with the Wastewater layers turned on and pipe size colour coded.

This is achieved because the “Pipe Size” field is filled with consistent numerical data in the correct units.

DATA FIELDS – WHY GIS WORKS

In the first of the previous examples, we filtered and applied colour thematic analysis for a text type “CONCRETE” in stormwater outfall material.

If records in this data source had been misspelt, left blank or used inconsistent abbreviations (“Conc” etc.), then the analysis process is rendered ineffective.

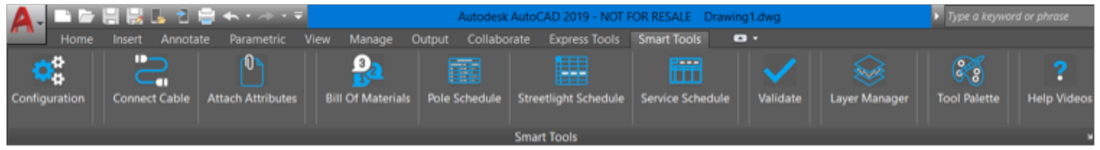


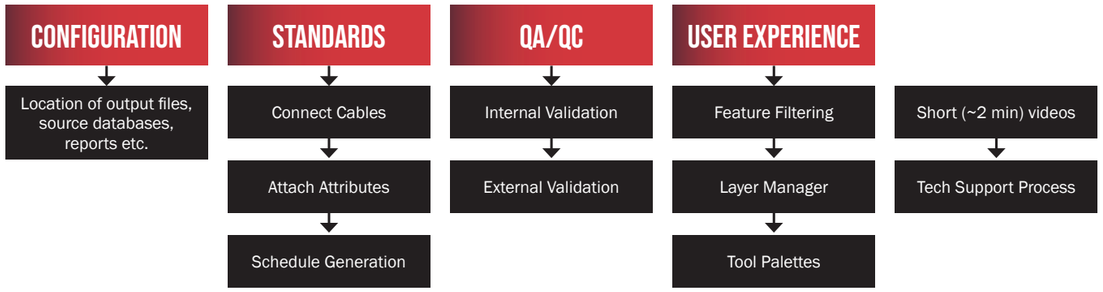
APPENDIX 5: SMART TOOLS

A2K Technologies Smart tools have been custom developed to enable interaction and data validation against standards with Asset Information Owners, GIS Professionals, BIM Managers as well as Designers and Surveyors.

The ideal scenario is to get the data set up correctly on the design/construction and as-built phases so that the schema and structure are in synch with the Asset repository standards from the start. Smart Tools address this by automating and simplifying the design and engineering functions with tailored workflows. These automatically enforce the asset information using the relevant database structure to enable the automated data synchronisation process.

The user interface is customised for individual workflows with tutorials and help documentation integrated within the rollout to ensure adoption and success.





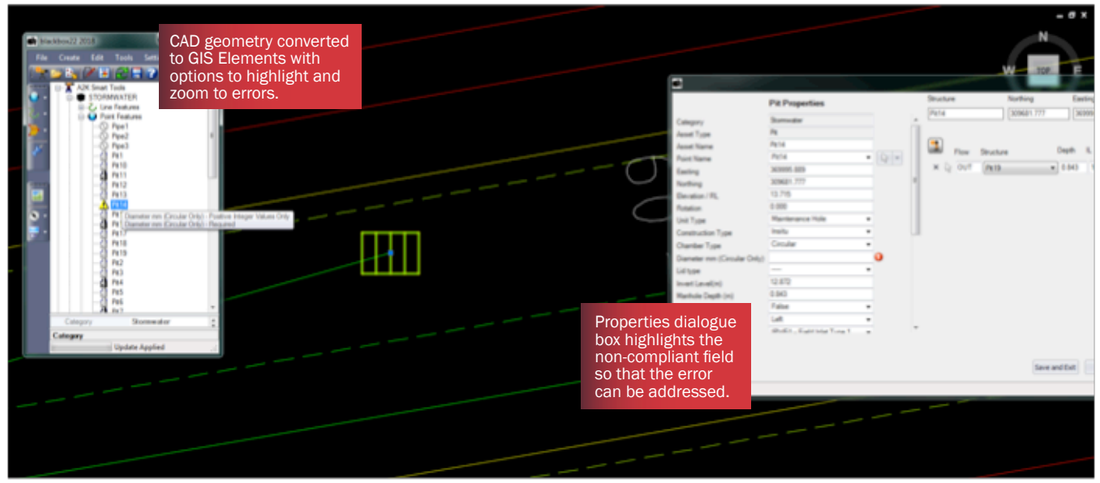
The initial geometry creation/conversion component of the workflow is usually done in the CAD environment with the integration of the validation tools ensuring the correct data standards are adhered to. Further reporting and interrogation of the data can be performed within the CAD environment or externally (for Managers and other non-CAD users).

The workflows can also include PDF files with Artificial Intelligence process in place to interpret the extracted geometry and apply relevant data which is then put through rigorous validation processes.

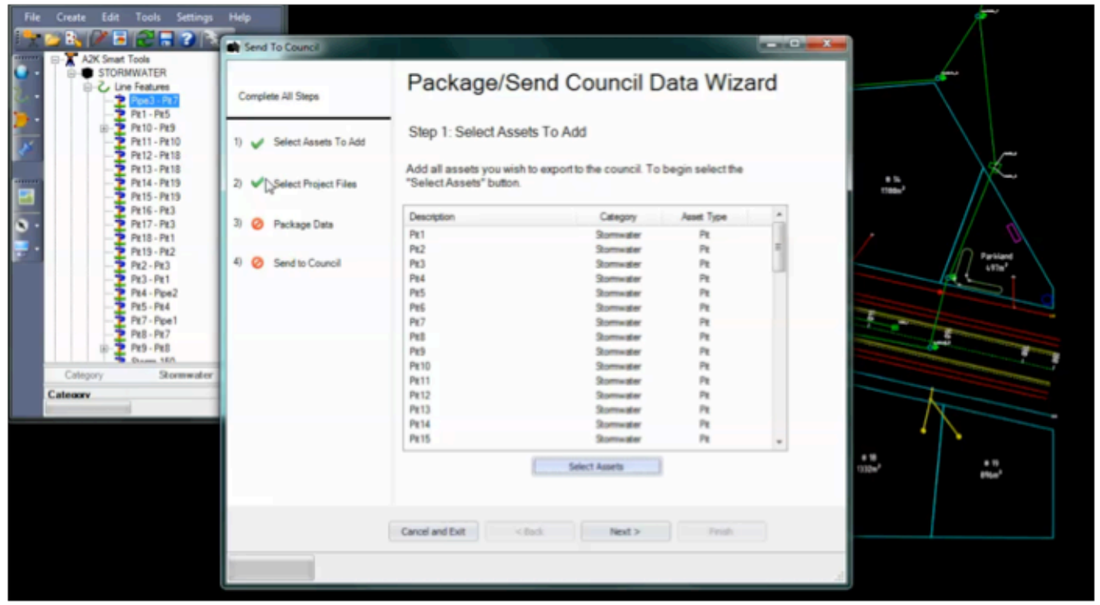
5.1 SAMPLE SCENARIO BASED ON VALIDATION OF DATA FOR COUNCIL SUBMISSION

This scenario shows some of the highlights in the process of converting As-built drawings into validated rich data entities that can be consumed automatically by the corporate GIS and Asset Management system.

Intelligent GIS elements are formed by converting existing CAD geometry or by creating the entities manually using tailored tools. Live error checking against defined standards is available throughout the process to the specific area that do not comply with the criteria.



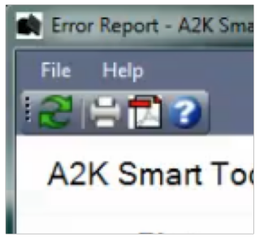
When validation is complete, the data (complete with relevant reports) is packaged so it can be submitted to the relevant internal or external department.



Sample of packaging report configured to sbmit data to the local Council.

5.2 REPORTING

Reporting on the data begins with the basic listing of non-complaince errors and continues with more thorough details on Assets, including financial calculations as well as variance reporting on the same assets over time. Samples of these are included below:



The Standard error report which lists all errors that need to be addressed before submission. This report is included in the final submission.

Variance Report

	A	B	C	D	E	F	G	H	I	J
1		Project Variance								
2										
3										
4	Current Date:	10/15/2018		ADAC_4_2						
5	Project 1:	demo		Submit Date:	11/10/2018					
6	Project 2:	Demo 2		Submit Date:	0///1/2014					
7										
8		Property Name	Project 1 Value	Project 2 Value	Pass/Fail	Message				
9										
10	Stormwater									
11	Pit									
12	Pit1	Category	Stormwater	Stormwater	Yes	Pass - Values Are Equal				
13		Asset Type	Pit	Pit	Yes	Pass - Values Are Equal				
14		Asset Name	Pit1	Pit1	Yes	Pass - Values Are Equal				
15		Unit Type	Manhole	Manhole	Yes	Pass - Values Are Equal				
16		Point Name	Pit1	Pit1	Yes	Pass - Values Are Equal				
17		Easting	370069.816415011	370069.816	No	Fail - Values Are Not Equal				
18		Northing	309675.056585722	309675.057	No	Fail - Values Are Not Equal				
19		Elevation / RL	12.771	12.771	No	Fail - Values Are Not Equal				
20		Rotation	0	0	Yes	Pass - Values Are Equal				
21		Construction Type	Insitu	Prefabricated	No	Fail - Values Are Not Equal				
22		Chamber Type	Circular	Circular	Yes	Pass - Values Are Equal				
23		Diameter mm (Circular Only)	225	225	Yes	Pass - Values Are Equal				
24		Width mm (Rect Only)	600	600	Yes	Pass - Values Are Equal				
25		Length mm (Rect Only)			Yes	Pass - Values Are Equal				
26		Extensions mm (Extended Only)			Yes	Pass - Values Are Equal				

The Project Variance report allows details of asset information to be monitored over time. The sample shown above highlights in red the categories that have changed. This report is based in Excel and can be customised extensively.

AR-1 FINANCIAL ASSET REGISTER

Subdivision / Project Name: A2K Smart Tools
RC / TCC Contract No.
Consent Holder:
Certifying Engineer:
Company:

Streetscape / Reserves

Asset	Measure		Rate	Value
Trees	0	number of	123	0
Gardens	13774	Total Area (m²)	123	1694202
Street Structures		Total Value Only		0
Reserve Structures		Total Value Only		0
Other (not listed above)		Total Value Only		0

Total for Streetscape/Reserves 1694202

Transportation

Asset	Measure		Rate	Value
Carriageway Pavement/Surfacing	0	Total Area (m²)	0	0
Kerb & Channel	751.07	Total Length (m)	345	259119.15
Berm incl Landscaping		Total Value Only		0
Paths (Foot, Cycle, Dual)		Total Value Only		0
Vehicle Crossings	0	number of	0	0
Sumps	0	number of	0	0
Sump Leads	0	Total Length (m)	0	0
Lighting (Streetlight, Uplight, Other)	0	number of	0	0
Signs and Marking		Total Value Only		0
Other (not listed above)		Total Value Only		0

Total for Transportation 259119.15

Stormwater

Asset	Measure		Rate	Value
Mains	400.8	Total Length (m)	12	4809.6
Manholes	12	number of	23	276
Rodding Eyes	0	number of	0	0
Connections	76.23	number of	12	914.76
Outfalls	0	number of	0	0
Other (not listed above)		Total Value Only		0

Total for Stormwater 6000.36

Wastewater

Asset	Measure		Rate	Value
Mains	184.65	Total Length (m)	234	43208.1
Manholes	4	number of	0	0
Rodding Eyes	0	number of	0	0
Connections	96.51	number of	546	52694.46
Pump Stations	0	number of	0	0
Other (not listed above)		Total Value Only		0

Total for Wastewater 95902.56

Water Supply

Asset	Measure		Rate	Value
Mains	187.92	Total Length (m)	123	23114.16
Ridermains	0	Total Length (m)	0	0
Hydrants	0	number of	0	0
Valves	2	number of	0	0
Connections	74.06	number of	23	1703.38
Water Meters	5	number of	0	0
Other (not listed above)		Total Value Only		0

Total for Water Supply 24817.54

Summary

Total for Streetscape/Reserves	1694202
Total for Transportation	259119.15
Total for Stormwater	6000.36
Total for Wastewater	95902.56
Total for Water Supply	24817.54
Total Value of Assets	**2080041.61**

The Financial Asset Register tabulates all Assets and applies predefined rates to the quantities so that dollar figures can be extracted. This allows for sub-categorization and extensive customisation.

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