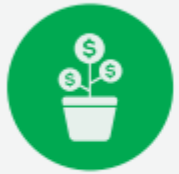
ARVENSIS CONSULTING

IOT SOLUTIONS

FOR HEAVY AND CIVIL ENGINEERING INDUSTRIES

ARVENSIS CONSULTING IOT SOLUTIONS SPECIFIC FOR INDUSTRY

IoT Asset Tracking and Monitoring solutions are proving their value to a New Zealand Heavy and Civil Engineering firms by providing on-demand visibility of high-value assets combined with data analytics to better improve productivity and reduce costs through having better information and performance of their assets.



ASSETS TO BE TRACKED

Track high-value assets, see their current locations and whether they are at their expected location.

Set alerts for unauthorised use or movement detection for after hours notifications.

Recovery mode for real-time continuous updates.

APPLICATION PLATFORM

Various platform features and application to suit your needs. Instantly switch from monitoring to asset recover as and when needed.

Instant reporting, scheduling or historical data available immediately. Make informed decisions with up-to-date information

NETWORK CONNECTIVITY

Arvensis Consulting's IoT Asset Tracking solution is network neutral enabling you to select your own service provider or to go with our connectivity provider.

Cellular 2G/3G/4G, LoRaWan, LTE, IoT-NB, CAT-M1 or Satellite connectivity options to connect any solution conceivable.

DEVICE

Choose from a range of devices to suit different deployment options and use cases from our various equipment manufacturers.

Stand-alone battery powered devices, to powered with battery backup devices are available with a range or peripherals.

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NET ECONOMIC BENEFITS ASSUMPTIONS FOR ASSET TRACKING

NET ECONOMIC BENEFITS ESTIMATES: UNCERTAINTY LEVEL - **MEDIUM**
NET BENEFIT SCENARIO: LOW (NPV) **$96m**; BASELINE (NPV) **$191m**; HIGH (NPV) **$287m**

Benefits assumptions	Source
$1,412m of fixed assets in the heavy & civil engineering sector	Statistics New Zealand (2014 data)
$6.47 revenue per dollar of fixed assets	Calculated from Statistics New Zealand 2014 data
1% improvement in revenue per dollar of fixed assets with better tracking and placement of assets	Estimate based on interviews and judgment
Costs assumptions	
$500,000 sensors and systems deployment cost per business	Estimate based on interviews and judgment
Annual operating cost 10% of capital cost	Estimate based on judgment
Uptake assumptions after 10 years	
Technology adopted by all firms with 50+ employees (69 firms)	Estimate based on interviews and judgment; Statistics New Zealand 2015 data
Benefits calculated on proportion of sector revenue estimated to be generated by firms with 50+ employees (78% of sector employment)	Estimate based on interviews and judgment; Statistics New Zealand 2015 data

*Data sourced from Statistics New Zealand, digitalnation.nz Accelerating a Connected New Zealand and New Zealand IoT Alliance

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ARVENSIS CONSULTING CIVIL ENGINEERING ASSET SOLUTION

Arvensis Consulting offer various solutions to manage various assets

- **Basic IoT Solutions**
  - IP67 rated housing for all weather environments.
  - Integrated High Sensitivity GPS with built in Low Noise Amplifier (LNA).
  - Cellular connectivity solutions specially designed for IoT devices.
  - Built-in sensors that offer a range of monitoring capabilities:
    - 3D Accelerometer, Battery Monitoring, GPS tracking and Geo-Fencing, Internal Battery Backup, Sleep mode when not in use, Data Logging for a variety of parameters, internal memory storage. 1 year to 10 year battery life depending on device and reporting frequency.

- **Mid-Level IoT Solutions**
  - A mix of IP67 rated housing for all weather devices and rugged ABS plastic housing for in-cab mounting.
  - Wire-in power units for 8v to 36v input voltages with on-board battery backup.
  - Integrated GPS with multiband Cellular modem for 2G, 4G, LTE, NB-IoT connectivity.
  - Digital inputs and outputs with analogue monitoring and switched power output for external devices.
  - Driver Identification for RFID reader, Driver ID, I-Button or Wiegand interfaces and keypad to enable immobilisation for unauthorised operators
  - A range of built-in sensors for accident data logging, Rollover detection, high impact detection, Geo-fencing, ignition detection etc.

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ARVENSIS CONSULTING CIVIL ENGINEERING ASSET SOLUTION

- **High-Level IoT Solutions**
  - A mix of IP67 rated housing for all weather devices and rugged ABS plastic housing for in-cab mounting.
  - Wire-in power units for 8v to 45v input voltages with on-board battery backup.
  - Integrated GPS with multiband Cellular modem for 2G, 4G, LTE, NB-IoT connectivity and optional Iridium satellite covera
    - Automatically switch between terrestrial coverage areas to satellite coverage when in remote areas.
  - Multiple digital inputs and outputs including ignition detection with internal buzzer for configurable audible alerts.
  - Accident and rollover detection that includes 3 axes accelerometer detection for harsh driving events.
  - Geo-fencing capabilities that allows for implementation of arrival and departure alerts, no-go or keep-out zones with audible or visual output controls.
  - DMCAN peripheral port for RFID, Driver ID reader, key pad devices.
  - Flash memory to store over 50,000 records when out of coverage areas.
  - Ability to detect when the asset is not in use and switch over to an extremely low power standby mode and enter a low reporting mode.

- **Specialist IoT Solutions**
  - A non-powered device of rugged ABS plastic construction for easy assembly requiring no screws, prefect for tracking packages.
  - Ultra compact with 6 month tracking battery life, rechargeable via micro-USB cable with light, temperature and humidity sensors.
  - Anti-tamper sensing and Auto-APN to allow the device to be pre-configured so that it can be shipped world-wide with a single SIM

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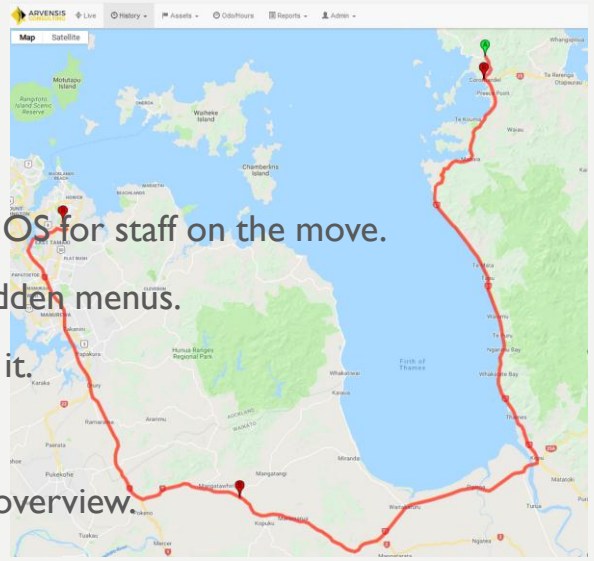
WEB PORTAL AND ANALYTICS



- Ability to monitor all assets in real time via a live online portal as well as a mobile app for Android and IOS for staff on the move.
- Easy to use with a "What You See Is What You Get" interface. Click the icon, get the information. No hidden menus.
- A portal that has been carefully designed to deliver the information you need most and when you need it.
- Plug and Play to empower the end-user to easily set-up devices with an easy-to-use layout.
- Timeline feature for alerts, events, activities are all recorded in the Timeline for an instantaneous visual overview.
- Virtual Logbook to manage personal trips vs. business trips or setup up your own categorisation criteria.
- Reports with ready to use templates or create your own. Download a report in CSV, Excel, PDF or HTML format.
- Set maintenance schedules and reminders for specific requirements based on odometer, engine run hours or a timeframe.
- Assign assets to projects, contraction sites, individual departments with ease.
- Create virtual Geo-fences across multiple locations to track entries and exits, speed limits, unauthorised movements.
- Alerts can be setup in second with pre-made alert templates or easily create you own custom alerts for virtually any eventually.
- Daily coverage view for an instant snapshot or your assets daily movements, identify overlaps and improve routing and efficiency.
- Consolidate telemetry data with your Big Data analytics environment using raw TCP, JSON HTTP or direct from device to you.
- With additional peripheral devices connected you can further monitor assets such as fuel bowsers, compressors, trailers, etc. gsoil moisture, worker safety, or weather stations deployed on remote sites.
- Remote alarm monitoring of equipment sheds on construction sites. Set remote alarms for movement, asset tampering, temperature deviations, entry/exit into unauthorised areas, tank level changes. With email, SMS or Webhooks (data direct to a 3rd party control room system) allows a client to immediately identify specific events and notify their security staff, police or site managers

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CONNECTIVITY OPTIONS

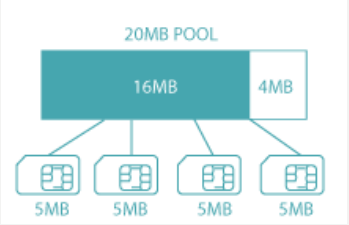
- Arvensis Consulting has partnered with M2M One for Spark connectivity and Vodafone for IoT specific connectivity.
- A customer is able to provide their own SIM cards from a provider of their own choosing if they so wish to. Any SIM's supplied by a customer must be optimised for IoT connectivity.
- With Arvensis Consulting providing the SIM cards we take the hassle off your hands with SIM setup, configuration. We are also able to pass on any volume discounts that we receive if we supply the SIM's.
- Arvensis Consulting offer two models to choose from:
  - **Group Plan - Data Pool:** Choose a bundle data plan and share the data pool across all connections. Great for companied with lots of devices and regular changes taking place.
  - **Individual Plan – Cap SIM:** Each SIM has a specific data plan. Connectivity stops once the data cap is reached or increase the data cap ad hock. Great for static connections where devices are unlikely to be moved around or the correct plan has been established. Ideal for an organisation with less than 50 devices.

The 2 models are explained further on the next page.

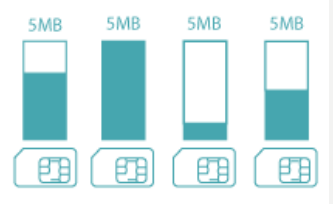
DATA PLAN COMPARISON

Data Bundle Model		Individual Data SIM Model	
Benefit	**Description**	**Benefit**	**Description**
Cost-efficient	Groups all your data into a single pool, so each connection can go over its data inclusion without incurring overage charges (as *long as you haven't exhausted your total pool*).	Simple	Straightforward pricing – you pay a small monthly fee for each connection and the fixed data plan required.
Easy to manage	Straightforward pricing – you pay a small monthly fee for each connection and overall data pool cap.	Affordable	Fixed costs so you know exactly what you are paying for. Complexity arrises from having multiple individual and different data plans.
Data Pool Flexibility	If your SIMs exceed the total pooled allowance, they will still keep operating but will result in excess usage charges.	CAP Guarantee	Each SIM has an individual monthly fixed data allowance, when the SIM reaches it's allowance the data plan is disabled.
Discounts	Additional discounts are available with terms for 36, 48 and 60 month contracts.	Low usage	Recommend this plan when the average data usage per month is below 30MB.

4X 5MB SIM CARDS EACH HAVE INDIVIDUAL DATA 5MB ALLOWANCES



4 X 5MB SIM CARDS GIVES YOU A FLEXIBLE POOL OF 20MB TO SHARE.



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THINGS TO KNOW

- IoT Data Plans are for use with machine to machine applications and solutions only (this does not include data via handsets). Data plans range from 0.5MB through to 50Gb for extreme users, we can assist you with selection.
- All data sessions will be rounded initially to 1KB; any data over 1KB will be rounded up to the nearest KB; rating occurs every 20 minutes or at the end of the data session.
- Exclusions on IoT Data Plans include: video calling, roaming, in-flight roaming, fax MAIL and calling premium numbers.
- Applicable out of bundle charges: Data overage charges apply once data pool in the Data Bundle Plan is fully utilised.
- An early termination fee may apply if the IoT Data Plan is terminated early. Only applicable to termed contracts.
- Arvensis Consulting do not install the devices in your vehicles, assets or equipment as we are not certified or approved to do this. Arvensis Consulting will supply you with a detailed installation guide if you wish to install them yourself or arrange for the devices to be installed with an approved agent.
- All devices supplied will be preconfigured, setup in the portal and ready for use as soon as the device is power on.
- If you prefer to supply your own SIM cards, you need to ensure the SIM's are sent to Arvensis Consulting so they installed into the devices and configured with the device prior to sending the devices off to you.
- All devices are supplied with a 12 month manufacturers warranty, certain exclusions apply.
- There is a lead time for device ordered as the units are manufactured to order and not necessarily supplied from the same manufacturer.
- No 2 solutions are the same. Every customer has different requirements and in many cases multiple differing requirements and different requirements may require different connectivity solution.

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CONCLUSION

- IoT solutions will greatly benefit Heavy and Civil Engineering firms with improved visibility of their assets and monitoring data sets to allow for better strategy, planning development and management of their assets.
- Theft of construction equipment is on the rise with the New Zealand Police advising Heavy and Civil Engineering companies to look to Tracking and Monitoring of their assets as solutions to aid the recover stolen assets. When integrating IoT capabilities with tracking devices, these industries can leverage valuable analytics data to their benefit as well as peace of mind.
- While IoT devices are relatively low cost, the true value of IoT is found in what is done with the collected data. This information is highly valuable for companies wanting to solve business problems with real time data while driving sustainable and profitable outcomes.

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