

## Capability Statement – Dam monitoring

Viotel's IoT systems are used for monitoring dams and water reservoirs. Recently Viotel was awarded the contract to monitor Watercare's hydrodams in the Auckland region in New Zealand. Our technology has been developed to enable Industry 4.0 – the Internet of Things (IoT) – low-power, inexpensive distributed sensors that regularly upload data to the cloud for processing, analysis and display and are capable of local (edge) computing.



The Viotel system has been designed to meet the needs of dam safety engineers, asset manager/owners, operators, environmental managers, regulators, the board and the community: reliable online and ontime data, alerts and alarms within seconds of an event and full audit trails.

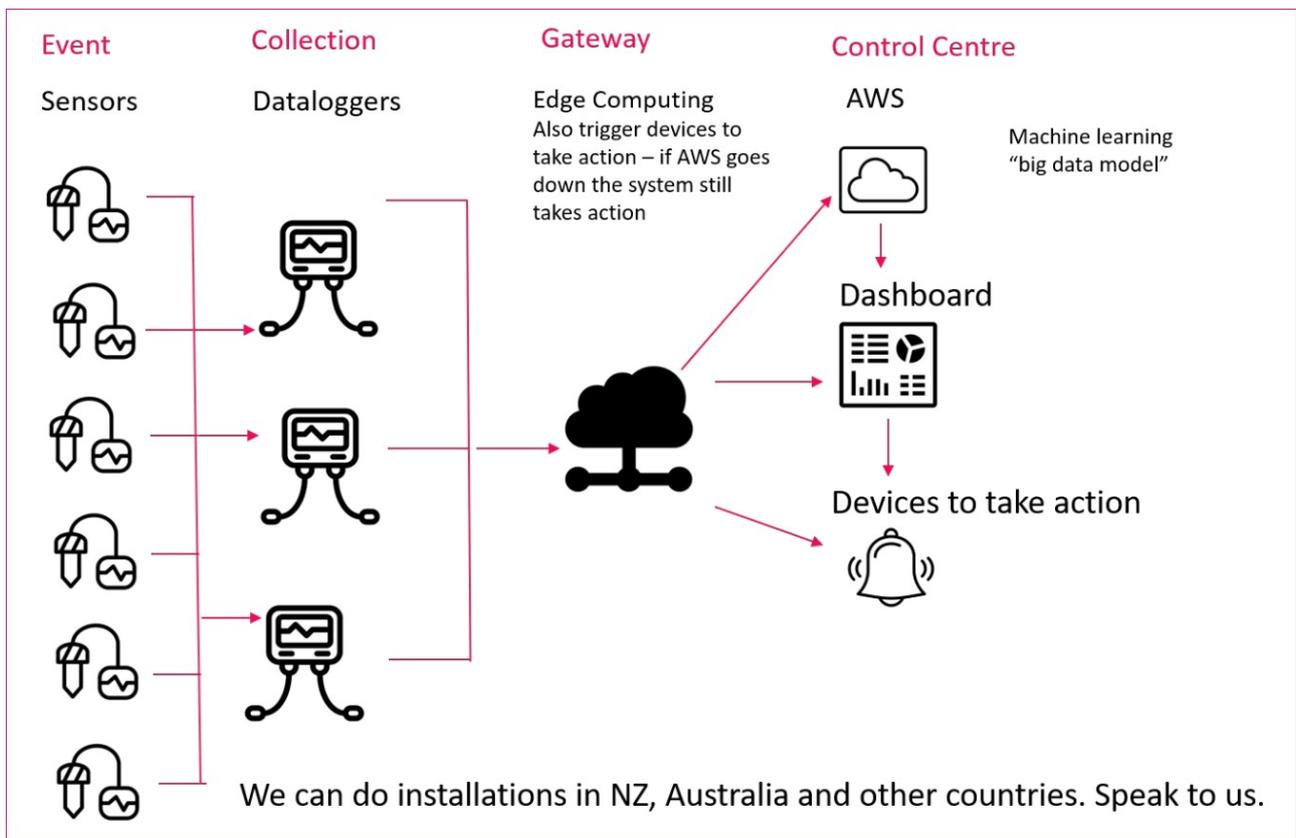


Typical sensors used for dam monitoring include piezometers (both vibrating wire and 4-20mA types), extensometers, seepage, temperature, tilt and seismic (ground motion) sensors, all of these form part of the Viotel monitoring system. ShapeArrays (Shape Accelerometer Arrays) and video camera feeds can also be incorporated. Piezometer, extensometer and tilt measurements are taken regularly (minutes to hours), while the seismic sensors give continuous ground motion measurements. The Piezometer, extensometer and tilt nodes are ultra-low power, and can either use internal long-life disposable batteries or very small integrated solar panels for lifetimes of >5 years between routine maintenance visits.



Seismic sensors generate much more data and thus require higher power – typically small solar panel installations or permanent electrical power.

Data are streamed to the cloud using either mobile phone/data (3G/4G or low-power CatM1) or satellite networks. For fault-tolerant communications even in case of a damaging local earthquake, mobile phone/data networks are used as the primary method, with automatic switching to the secondary (and more expensive) satellite data communications to a remote landing site. Edge computing nodes are sometimes used to provide local alerts and alarms (flashers, sirens, etc.) within seconds even if Internet connections are completely cut off.



Viotel's cloud platform has been built in partnership with Amazon Web Services, using high security certificate exchange to validate connections and encrypted data flows. Here data is processed and stored, and the on-line dashboard provides clear data metrics and access to the historical data.