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Build, Scale and Manage Integrated and Interoperable IoT Solutions

An overview of the capabilities of the Reekoh product suite and the benefits they bring to IoT solutions from POC to production
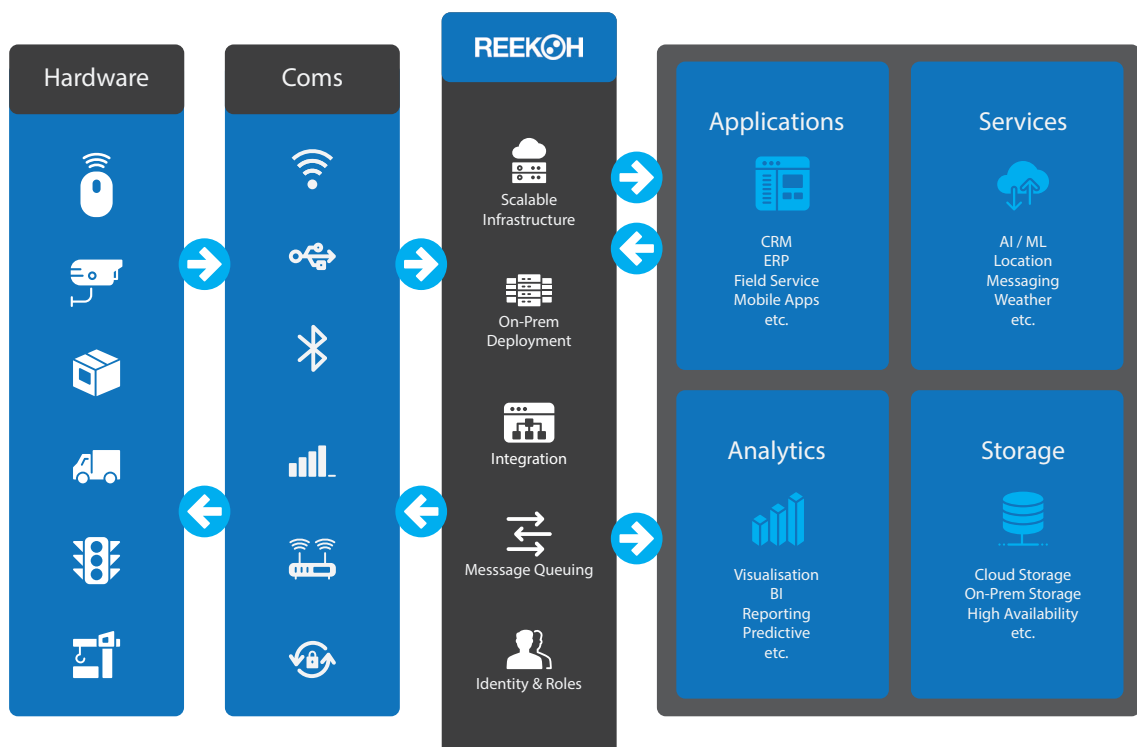
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Executive Summary

Reekoh is the leading open integration platform purpose-built for the Internet of Things.

Using Reekoh's open Plugin framework and Marketplace, together with best-of-breed components and intuitive data workflow design tools, customers can significantly reduce enterprise integration complexity, time and cost for IoT projects, products and solutions.

Reekoh delivers increasing value to customers as they move from the rapid iteration stages of early trials, through to large-scale production deployments.

Leveraging existing devices, networks and systems gives customers a more assured place to begin delivering on IoT strategies. Reekoh provides this capability through Plugins that can be used to integrate with these existing solution components, as well as with new ones that are required for the solution to grow and mature.

Reekoh provides a level of future-proofing for customers entering the fragmented and fast-moving IoT sector, allowing them to move ahead with projects quickly and with more certainty of ongoing capability and platform relevance as new protocols, devices, networks and security options become available.

Hardware	Coms	REEKOH		
		Scalable Infrastructure	Applications	Services
		On-Prem Deployment	CRM ERP Field Service Mobile Apps etc.	AI / ML Location Messaging Weather etc.
		Integration	Analytics	Storage
		Messsage Queuing	Visualisation BI Reporting Predictive etc.	Cloud Storage On-Prem Storage High Availability etc.
		Identity & Roles		

The importance of integration to the Internet of Things

The Internet of Things (IoT) is one of the mostly hotly discussed and hyped waves of technology evolution. For decades, under other names such as industrial automation, telematics or M2M, connected devices and data intelligence have been a part of how some industry segments know more about what is happening with their infrastructure and how to automate certain tasks to improve efficiencies.

Now, with elements such as dedicated wireless connectivity for small data packets, low-cost electronics, access to affordable production and manufacturing, cloud infrastructure and as-a-service intelligence and compute power, the IoT is gaining massive traction worldwide across all industry verticals and segments.

This has seen an explosion in vendors who are serving the various parts of the "IoT Solution Value Chain"; chipsets, devices, networks, security, platforms and applications. The market is crowded and confusing, with fragmented solutions, components and vendors, even though it is still in a relatively early stage of maturity when it comes to solid business cases and outcomes.

Even in these early stages, where many customers are still at the proof-of-concept (POC) stage of implementing their IoT strategies (or even where those strategies are being defined), customers need to be planning for how they deal with this crowded and fragmented ecosystem. This applies to not just the technical aspects, but also their vendor and partner selection.

"The biggest IoT technology challenges for those that have already implemented IoT are cybersecurity, integration and managing business requirements. However, orchestration of workflows and processes looms as a major concern for those planning to implement IoT."

Gartner. March 2016

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IoT Customer Journey

Operational Efficiency	Business Intelligence	Business Transformation
Pointed IoT Solutions	**Integrated IoT Solutions**	**Integrated IoT Businesses**
"End-to-end" tools used to ingest, store, and display data	Integration platforms connecting IoT data to existing IT business systems and processes, with data available cross business units	Enablement platforms where data is a component of broader service and product offering
Outcomes focused on reporting , monitoring and alerting	Outcomes focused on actionable business insights	Outcomes focused on new lines of business and revenue streams
Using Reekoh's Dashboard Studio, alerting and messaging workflows, and common industry, low-cost tools for analytics and storage	Using Reekoh's full IoT integration platform capabilities, Pipeline Studio and integrations available through Marketplace	Using Reekoh Platform API, repeatable template Pipelines and assets, integrating with billing systems, operations platforms and customised user applications

We know that integration is a critical piece of the IoT solution puzzle, as we've already seen this played out with the adoption of the cloud. The advent of the API came as a result of a need for greater interoperability and connection between cloud systems and applications – reducing the complexity of data being able to move freely and easily, breaking it out of silos and getting it to where it made the most sense and created the most value. Having a capability to enable device data to work closely with existing business systems and processes is a logical next step for this approach to integration and interoperability, and is even more important when it comes to IoT.

Why is IoT integration so important?

• Fragmentation will get worse, not better, particularly with devices, protocols and networks

• IoT requires flexibility - one size does not fit all

• Companies will need to leverage existing investment in IT and OT

• Avoiding vendor lock-in can accelerate IoT adoption and reduce cost

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Who is Reekoh designed for?

Direct Customers

- are developing IoT solutions for themselves internally, either for cost-reduction (early maturity), revenue generation (later maturity), or improved customer experience

- already have existing investment that can be leveraged

- already understand integration capabilities vs. bespoke development (build vs. buy)

How Direct Customers buy from Reekoh
Direct customers typically license a single Reekoh tenant for their organisation, with additional device pricing based on volume. Customers may license and provision additional tenants under the same Reekoh account if required (e.g. new business units or internal product divisions).
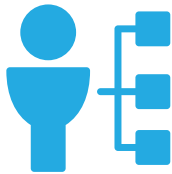
System Integrators

- are providing solution design, implementation and support services to end-customers

- have a technology stack focus already (e.g. Microsoft, Salesforce) and are bringing new elements to the stack to enable IoT capability

- are currently partnered with existing IPaaS products and need an IoT-focused toolset that keeps within their integration frameworks and engagement models for customers.

How System Integrators buy from Reekoh
SI's will typically license a Reekoh tenant for each customer, with the associated device pricing based on volume, unless they begin to repeatedly provide the same solutions as a managed service.

Managed Service Providers

- are service providers offer a solution to direct customers when the customer doesn't want or need to manage the Reekoh platform themselves.

- provide all management, services and support

How MSP's buy from Reekoh
Reekoh offers an MSP Program with specific terms and pricing for MSP's to work from and build into their own commercial models with their end-customers. MSP's must only use tenants under this agreement for the purpose of selling a managed service to end-customers, and not to other service providers.

Solution Vendors

- are owners of existing products that can benefit from being integrated into the Reekoh ecosystem. These could be device manufacturers, application developers, network providers, etc.

- may want to quickly enable an "integration capability" for the customers of their product, where providing this capability would increase the value of their product, customer experience or revenue generation opportunities.

How Solution Vendors buy from Reekoh
Solution Vendors will typically license a single tenant from Reekoh that will be used in their product's tech stack (which is hidden from their end user). They will then agree to pricing on volume of connected devices.

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Use Cases

While being a horizontal platform that delivers an underlying IoT integration capability to any scenario, there are a number of uses cases that have already been aligned with the kind of outcomes that Reekoh provides.

Example use cases (not limited to those listed)

🏙️	**Smart City**	City councils and land corporations looking to ensure interoperability and open data accessibility between numerous vertical solutions (e.g. lights, parking, bins, water) supplied by different vendors across a period of time. Enabling common standards for the industry such as Hypercat when individual solutions and platforms don't have a common method for standards application or maintenance.
🔄	**Energy / Water Metering**	Local governments, utility companies or metering service providers that need to deal with multiple hardware scenarios that mix legacy installations and communication modules with newer IoT devices. Accelerated capabilities to deal with data conversion and transformation across multiple device types, and integration into various stakeholder systems.
🏭	**Industrial**	Companies that have existing legacy systems collecting vast amounts of data (e.g. SCADA) and need a way to unlock data from silos and transform / move / integrate into modern IT and OT systems. Opportunities also for then cost-effectively introducing new IoT devices and sensors in other areas of the business.
🚗	**Connected Field Service**	Organisations with equipment that can self-report issues to expedite and automate tasks such field service resource scheduling, spare parts ordering and predictive maintenance reporting. Reporting can be integrated with existing field service features of many of the leading CRM or ERP systems.
◈	**Asset Monitoring**	Asset owners who need a common platform for managing data from across a wide variety of stationary and mobile assets within their business, incorporating live data services (e.g. location, weather, analytics).

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"We predict that through 2018, half the cost of implementing IoT solutions will be spent on integration.

Therefore, we recommend that application leaders responsible for IoT project implementations prioritize their investment in integration technologies and skills to ensure that they are sufficiently prepared to address the wide range of integration requirements needed to assemble end-to-end IoT business solutions."

Gartner Market Guide for IoT Integration (featuring Reekoh)
October 2017

Reekoh's core capabilities

The Reekoh Platform and Marketplace

Reekoh's core offering is made up of two major linked components; the **Platform** and the **Marketplace**. When a customer licenses Reekoh, they gain access to both of these components.

The Platform and Management Console

The underlying Platform is an enterprise-grade, highly scalable and available message routing system that securely ingests, transports and delivers data between devices and applications.

We have designed the platform to be extremely modular in its architecture, as well as with the way we present the integration capabilities to users. From a user interface and key function perspective, there are several core modules that are available to use immediately as part of the platform. As our product expands, new modules will be added to the platform; some of which will be free, while others may be a paid add-on.

Platform Modules

Platform API	All aspects of the platform are accessible via API, which allows users to build custom applications on top of Reekoh core functionality, including orchestration of automated provisioning marketplaces
Device Management	• Maintain a register of devices that securely communicate with the platform • Synchronise with external device management systems or device master records • Manage device metadata • Manage device commands • Manage device groups
Marketplace	• Browse the library of integration Plugins, and install required Plugins • Browse saved Pipelines and Commands

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Platform Modules (continued)

Pipeline Studio™
- Visual design tool for building IoT data workflows
- Configure installed Plugins to connect to the relevant services and accounts
- Embed workflow logic using Filters
- Powerful data transformations with Data Converters
- Configure automation through Triggers and Device Commands
- Configure Datasets for building visualisations
- Share Pipelines through the Marketplace as Reference Architecture/Patterns

Dashboard Studio™
- Build rapid data visualisations based on Datasets that are part of a Pipeline
- Create custom Dashboards and choose from a variety of visualisation or chart types based on Datasets
- Share Dashboards with other users, or external stakeholders for ease of access to data

Security
- Create and manage X.509 Certificates for deployment to devices and security/encryption of device-to-cloud communications
- Whitelist IP Addresses that can connect to the platform for better network security

Logs
- Track and audit activity on all Platform resources and device events for greater visibility and security
- Pluggable log module for integration with external logging and event handling tools

Identity and Access Management
- Manage user access
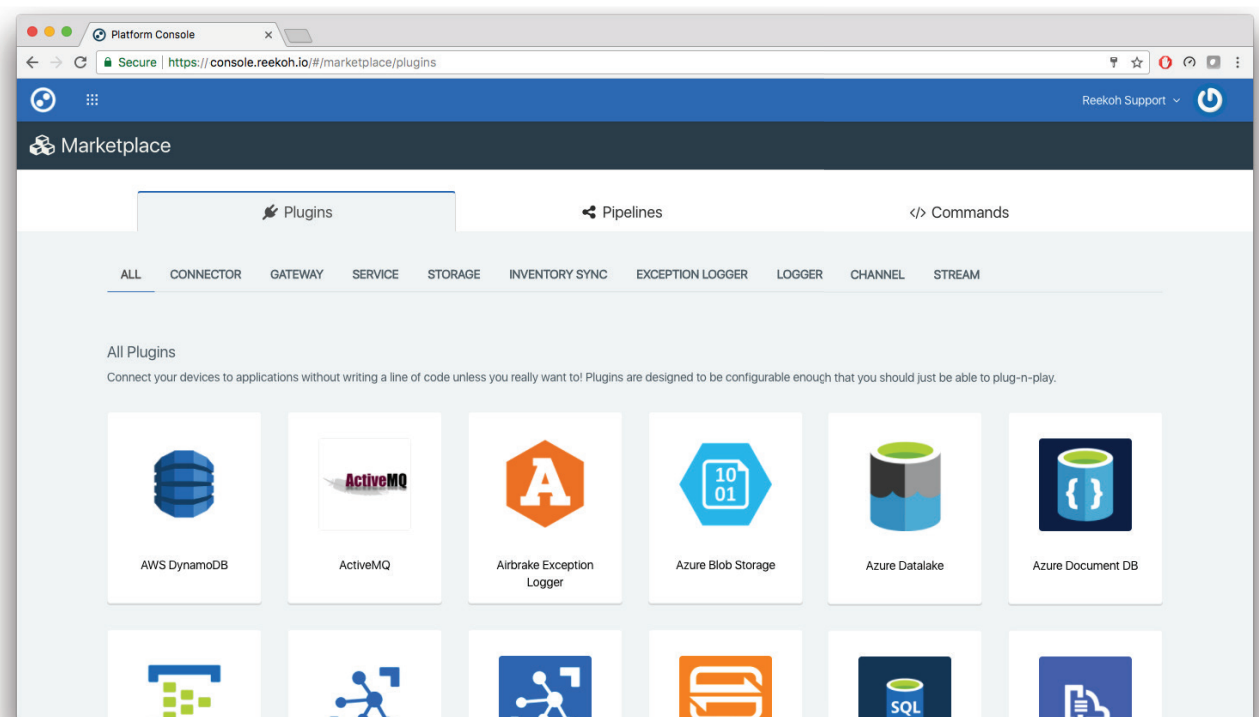- Create, assign and manage fine-grained User Roles and Permissions

More modules are being added over time to bring additonal core functionality to customers

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The Marketplace

The Reekoh Plugin Marketplace is more than just the technical mechanism through which integrations and assets are utilised on the platform, it's also the way that Reekoh customers are exposed to the broader IoT ecosystem.

Reekoh's Marketplace provides plugins to all areas of the IoT solution value chain; device makers, network providers, application vendors and more. Customers who are looking for other vendors to fill certain gaps in their solution design can find pre-integrated and ready-to-go components through the Marketplace and accelerate their partner selection and vendor engagement.

The Reekoh Plugin framework is open for developers to use in creating their own Plugins. This could be to integrate a proprietary API or component, or to simply modularise a customer's IP and make it a repeatable asset for future use. Developers can choose to keep Plugins private, or to have them published to the Marketplace (pending Reekoh QA and approval processes).
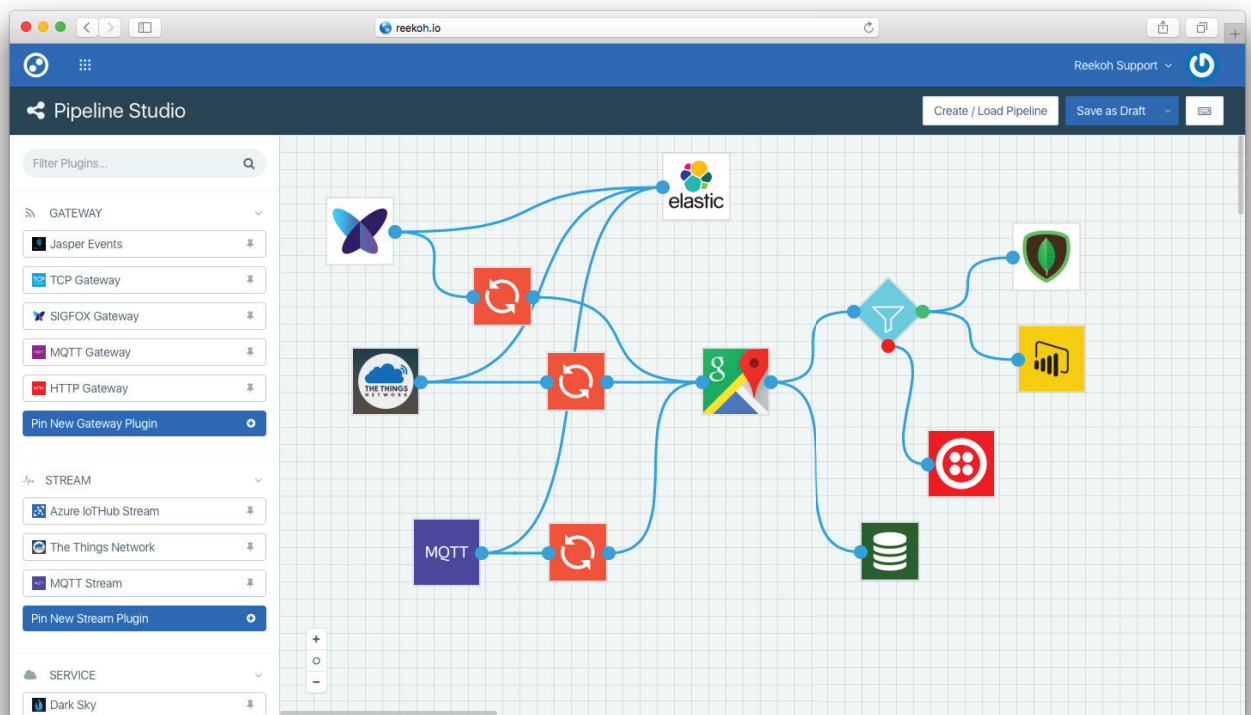

"Reekoh is quite unlike anything else on the market. In the M2M/IoT space we see lots of companies trying to provide a single closed solution where Reekoh opens up the entire IoT."

James Mack, General Manager, M2M One

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Designing IoT Workflows with Reekoh Pipeline Studio™

Reekoh Pipeline Studio™ is the tool where it all comes together for Reekoh users. Simply put, Pipelines are workflows that control how IoT data flows intelligently through the Reekoh platform.

Using Pipeline Studio™, users are able to visually work with Plugins that have been installed from the Marketplace, connecting and configuring them in ways that can be specific to applications or business requirements. Multiple Pipelines can run simultaneously, allowing for a wide range of possibilities.

Native Pipeline Objects

As well as Plugins from the Marketplace, users can also take advantage of Native Objects within Pipeline Studio that are built into the platform. These objects are:

- **Converters** – allows for incoming data to be converted in any way required, including field mapping, value conversion or complex data manipulation

- **Filters** – logic-based filtering that only passes data through the Filter based on certain parameters, with options to start new data workflows from both "true" and "false" conditions

- **Datasets** – unique dataset storage to be use specifically for creating visualisations within Reekoh Dashboard Studio™

- **Triggers** – points in a Pipeline that send a pre-configured Device Command to a single device or group of devices, often as a result of a particular outcome from a Filter or a request coming in from an external application (see App to Thing)

Multi-directional Data Flow

Pipelines can be designed to facilitate the flow of data, as well as actions to be taken on that data, in a number of ways:
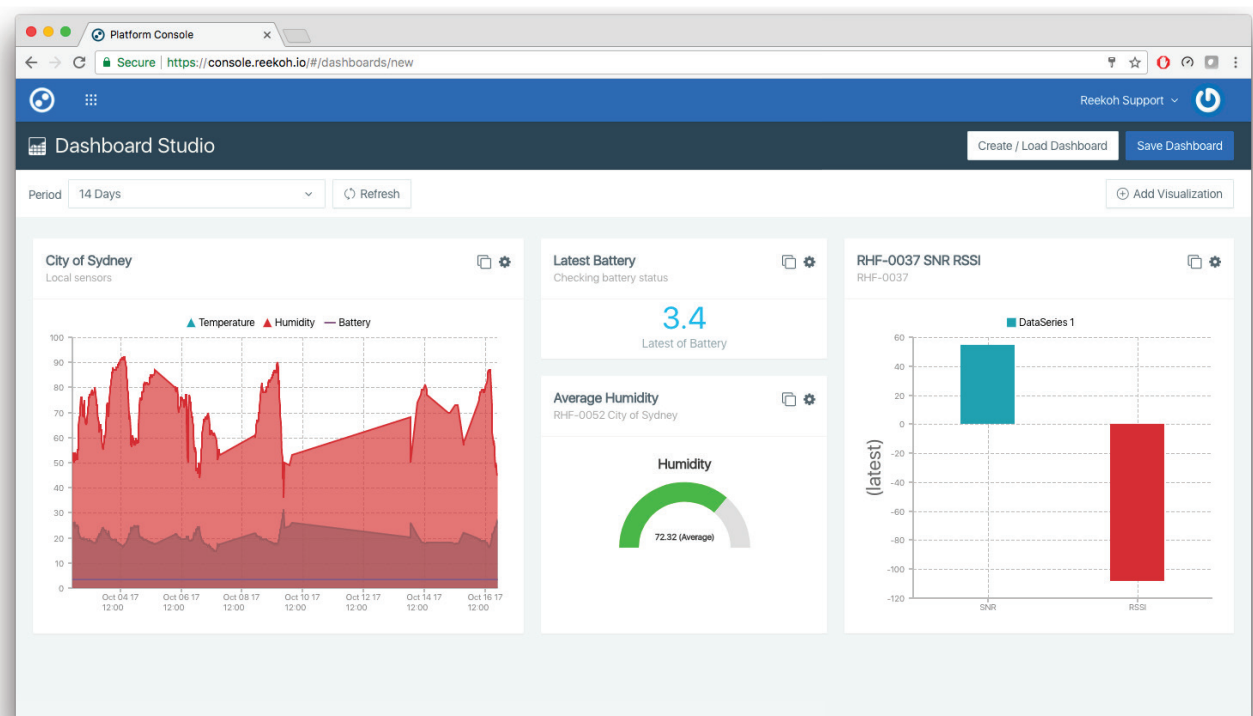
- **Thing to App** – data coming in from devices and channeled through to an application or endpoint

- **App to Thing** – a request being sent from an application outside of Reekoh, through the platform and out to a specific device or group of devices

- **Thing to Thing** – a Device Command being triggered based on a request coming from a device

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Building rapid visualisations with Reekoh Dashboard Studio™

One of the first requirements that most commonly form part of IoT solution requirements is the ability to visualise data in one form or another. For many "IoT platforms", this is the core feature they provide and require the user to stay within their "stack" to access the visualisation capability. Reekoh's integration platform gives the user the ultimate level of choice in choosing the right visualisation tool for the task. However there are times early on in the IoT project roll-out (typically in the POC stage) when fast, built-in visualisation is a highly valued feature.

Reekoh has developed Dashboard Studio™ as a way to enable this capability while maintaining the value of the integration model for IoT solution development.

Using the native Dataset object in Pipeline Studio, users can create "micro storage" points along a data workflow, capturing data in a secure container that is used for the sole purpose of powering a Visualisation with the Dashboard Studio™ tool (for broader storage options, users can take advantage of the many Storage Plugins available in the Marketplace).
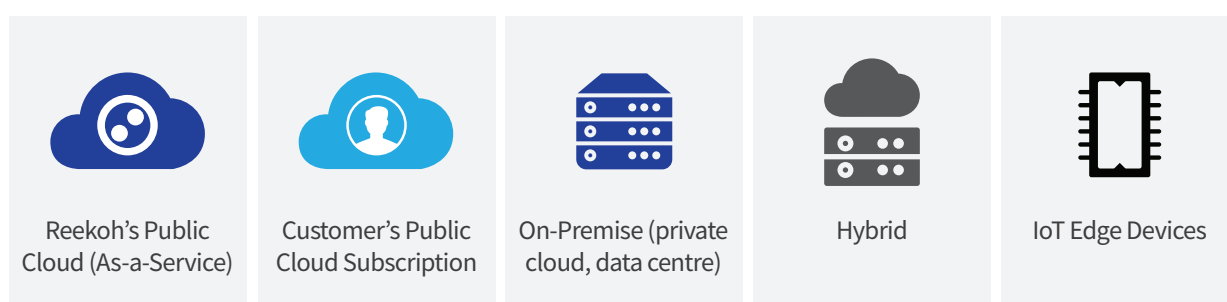

In Dashboard Studio™, users can configure the layout of a Dashboard which is then populated with Visualisations. These can take the form of many chart and visualisation types, and are configured to look at a particular Dataset that exists on any Pipeline under that particular Reekoh account.

Dashboards are then shareable to external users for ease of data consumption. For example, a Reekoh user can quickly build Dashboards for executive stakeholders, business line managers, operations or support staff, each with their own particular interests and needs.

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Features of the Reekoh IoT Integration Platform Suite

Using containers to supercharge performance and portability

Using open source Container technology (Docker, Kubernetes), the Reekoh Platform can run in a number of infrastructure scenarios:

Reekoh's Public Cloud (As-a-Service)	Customer's Public Cloud Subscription	On-Premise (private cloud, data centre)	Hybrid	IoT Edge Devices

Containers also give greater flexibility for developer when building Plugins and components for the Reekoh platform. Developers can make use of any development language, code libraries and modules, with all components bundled together and deployed in a single Container.

Security by Design

Security is a high-priority for any IoT solution, and Reekoh has implemented a wide range of security measure and best in its product suite.

Security Features

Top 10 OWASP	Our web applications have been designed and implemented to take into account the Top 10 OWASP vulnerabilities and are compliant.
Password Handling	We use best practices in handling User Information including credentials/passwords.
Public Key Infrastructure	Built-in PKI enables secure device-to-cloud connections and communications through public key cryptography and data encryption.

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Security Features (continued)

Open API

Open APIs for Data Ingestion (Gateways) enables developers to add an authentication layer on top of the protocol for device connections and data verification.

Encryption

All data that passes through within the Pipelines are encrypted at flight. Packets are encrypted using AES 256-bit and then signed with SHA-256 hashing algorithm as they pass internally through the Pipeline and the different Plugins where the packets are processed. This way, all data is verified to be authentic as it transitions from one plugin to another. Pipelines and plugins also use secure connections to the messaging layer of the platform which takes care of the routing of packets.

Secrets Management

Sensitive data (configurations and other credentials) are safely stored on Reekoh's secure secrets management back-end.

Transient Data

Reekoh does not store any Device/Sensor data in our servers/databases (outside of Pipeline Dataset objects). Device data is transient in Reekoh and it is the end-users who have ultimate control over where the device/sensor data resides. Reekoh only stores the configuration data for Plugins.

External Security Auditors

Reekoh has also engaged Entersoft Pty Ltd as its External Cybersecurity Auditor, and has received certificates of compliance from Entersoft for its applications and security methods.

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Modular components for maximum flexibility and future

Plugins

At its core, Reekoh is a modular platform. This manifests itself in all aspects of the platform architecture, but critically in the use of Plugins to bring ultimate choice and flexibility to users. Successful IoT implementations are able to leverage partners and the solution ecosystem in order to utilise the best components for the specific use case. Reekoh's Plugin model allows for the rapid, modular and reusable integration of these components as is needed through the life-cycle of the project.

Avoiding vendor lock-in with IoT is particularly important to be able to achieve the right mix of components in a solution. When it comes to platforms, there is often a range of devices, protocols and networks that are supported, with storage and visualisation tools built-in to perform those basic tasks. Having the ability to rapidly move with whatever tools, devices and services are needed to prove each stage of an IoT business case is a huge advantage to customers.

Add-on Modules

Reekoh's platform delivers functionality through a number of Modules. Some are built-in and are part of the core platform (e.g. Device Management, Pipeline and Dashboard Studios, Marketplace) while others are Add-on Modules that expand the core capability for customers in certain areas.

Over time, more modules will be added to the platform, and even be opened up for developers to build their own modules. This will be particularly useful for Managed Service Providers or Solution Vendors that add integration capability to their existing products using Reekoh.

"With Reekoh's interoperability capabilities, it's easier for our clients to integrate data with their own existing sustainability reporting, workflow and facility management systems – and to realise savings in both water and money"

Guenter Hauber-Davidson, Managing Director, WaterGroup Pty Ltd

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When is Reekoh Useful?

Simple POC's and trials

For some, having an integration capability in an early stage proof-of-concept or trial may seem to overstepping what is required to achieve a desired outcome. However, being able to select the right components for a POC, and indeed for any stage of an IoT project, is extremely valuable.

As well as looking at technical capabilities, a large part of the reason for undertaking an IoT POC is to prove a business case to the organisation. A successful business case will need to include a pathway for moving from POC to trial and then onto production or scale deployment, all with an understanding of the cost implications of how those stages are rolled out, and how to mitigate costs as requirements change.

Reekoh enables customers running trials to begin very quickly with basic Pipelines that connect one type of sensor to applications, databases or visualisation tools. Some of these components will already be within an organisation, so there are time and costs savings when leveraging existing investment. If not, then Reekoh provides the basic building blocks to achieve fast results, such as Pipeline Datasets and the Dashboard Studio™ for building rapid visualisations as part of the IoT data workflow design.

As the project matures, or are new decision points are reached in terms of new types of hardware required, new software tools, or new business requirements, that relationship moves from one-to-one, to many-to-one (multiple device types to a simple application layer), to many-to-many (many device types to a more complex application layer).

Reekoh is uniquely placed to handle that level of change and flexibility, and builds in cost saving and risk mitigation from the early POC stage to give it every chance of success. There is a commercial structure in place to also allow for this to happen in a highly cost-effective way for small projects, and then provide further value as the project scales (while at the same time reducing re-tooling costs).

Managing fragmentation at scale

As an IoT integration platform, Reekoh is purpose-built to handle the deep fragmentation that exists within the IoT ecosystem. Managing multiple device types, protocols, networks and security models is complex enough for other non-integration-focused platforms, but this is compounded when having to also deal with the options on the application layer.

As projects and solutions scale, and new business requirements come into play that require the use of new devices, the potential for fragmentation grows. Managing this fragmentation at scale, while not disrupting existing implementations, is a critical design factor in choosing the right vendors and partners to work with.

Adding integration capability to an existing product, powered by Reekoh

Many solution vendors are now looking at IoT as a way to expand the capability, value and customer reach of their existing products. These products can be in areas such as retail, metering, industrial, device management, video analytics and many more.

For some vendors, integrating their existing product into Reekoh, and exposing their product data to the depth of endpoints and solutions represented in the Reekoh Marketplace, instantly builds new features and capabilities that they haven't had to build themselves. They are then able to immediately offer integration to their end customers, opening up new possibilities, revenue opportunities and markets.

For others, it's more a case of being able to manage a broader set of IoT devices, where previously they had been limited to a particular set of hardware or protocols. Opening up the ability to bring in data from new sources, while keeping much of their application logic untouched, is a significant hurdle that can be removed.

Vendors are able to offer all of this under their own brand, thereby strengthening their position in the market and value of their product to customers.

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