

Name: Autoscaling of monitoring resources		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Metrics for resource usage (CPU, memory, disk io) 	<ul style="list-style-type: none"> To use the right number of resources for the monitoring platform, ITRS have developed a service that automatically can scale the amount of server resources up and below, depending on the resource usage. When the demand for resources is high, the Autoscaling service can add resources, and when the demand decreases it can lower the resources, in order to save processing power and energy. 	<ul style="list-style-type: none"> A more resource effective monitoring platform
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Being able to lower the amount of total resource usage for the monitoring platform, due to only increase resources on demand. This can lower power and energy usage. 	
Integration constraint(s):	<ul style="list-style-type: none"> Kubernetes cluster is required for the Autoscaling service to run. 	
Intended user(s):	<ul style="list-style-type: none"> Any organization running a datacenter or computer network. 	
Provider:	<ul style="list-style-type: none"> ITRS Group 	
Contact point:	<ul style="list-style-type: none"> Robert Claesson <rclaesson@itrsgroup.com> 	
Condition(s) for reuse:	<ul style="list-style-type: none"> The Autoscaling service is built to fit any type of datacenter or computer network. 	

Latest update: 2021-09-30



Name: Data collection for power usage		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Power metrics from servers, containers and PDUs 	<ul style="list-style-type: none"> Collect metric data from servers, PDUs and UPS units to export for data analysis, smarter power usage, lower power costs and billing. 	<ul style="list-style-type: none"> Power monitoring Data exporting for analysis Alerting, graphing, dashboarding
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Monitor and analyze power usage and use data for billing. Export power usage for analysis and resource planning 	
Integration constraint(s):	<ul style="list-style-type: none"> - 	
Intended user(s):	<ul style="list-style-type: none"> Organizations running datacenters or computer networks 	
Provider:	<ul style="list-style-type: none"> ITRS Group, Comsys, hi5 	
Contact point:	<ul style="list-style-type: none"> Robert Claesson <rclaesson@itrsgroup.com> 	
Condition(s) for reuse:	<ul style="list-style-type: none"> Can be re-used in any datacenter using Comsys, ITRS and hi5 products. 	
<i>Latest update: 2021-09-30</i>		

Name: Optimized Telco EDGE Cooling		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Customer needs for EDGE telco sites 	<ul style="list-style-type: none"> New telco solution like 5g demands small and medium telco edge data centers widely spread around. This leads ,maintenance of these becoming a critical OPEX components. 	<ul style="list-style-type: none"> Comparison of diffent cooling technology concepts CAPEX, OPEX and maintenance.
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Lower TOC based on rather small day one increased CAPEX, but significantly lower maintenance costs. Even improved energy efficiency and increased uptime. 	
Integration constraint(s):	<ul style="list-style-type: none"> Granlund EDGE Telco solution 	
Intended user(s):	<ul style="list-style-type: none"> Telcos 	
Provider:	<ul style="list-style-type: none"> Granlund Oy 	
Contact point:	<ul style="list-style-type: none"> https://www.granlund.fi/ 	
Condition(s) for reuse:	<ul style="list-style-type: none"> Negotiable with Granlund partners 	
<i>Latest update: <2021-09-29 ></i>		



Name: Commercial product called Echidna		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> ▪ All component measurement ▪ 	<ul style="list-style-type: none"> ▪ A system that includes all the components from Hi5 together ▪ 	<ul style="list-style-type: none"> ▪ The system generates invoice source data with the actual consumption from measurement resources
Unique Selling Proposition(s):	<ul style="list-style-type: none"> ▪ Invoice documentation based on agreements and consumption of resources. Used for invoicing ▪ Price logic module and creation of agreement ▪ By customer or project ▪ Chargeback by day or month ▪ Creates source data for invoicing ▪ Can create invoices in financial system through API and xml ▪ 	
Integration constraint(s):	<ul style="list-style-type: none"> ▪ Require one or more data source modules created by Hi5 in the AutoDC project 	
Intended user(s):	<ul style="list-style-type: none"> ▪ Industry/company that need more automation and control over the actual consumption to be able to invoice or distribute costs correctly 	
Provider:	<ul style="list-style-type: none"> ▪ Hi5 (Advania) 	
Contact point:	<ul style="list-style-type: none"> ▪ https://www.hi5.se/ 	
Condition(s) for reuse:	<ul style="list-style-type: none"> ▪ A commercial product. 	

September 29, 2021



Name: Data source components and agreement data		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> ▪ Data from vendor / application (API) ▪ Xml/csv files 	<ul style="list-style-type: none"> ▪ Contract management with pricing ▪ Component with integration to API from OP5 ▪ VmWare integrations component ▪ Import of generic files ▪ Module for PDU and UPS, kWh usage 	<ul style="list-style-type: none"> ▪ Data that other systems can use. ▪ Invoice documentation
Unique Selling Proposition(s):	<ul style="list-style-type: none"> ▪ Link between pricing and agreements that automatically provide a current value ▪ Possible to use metrics by source from API from ITRS OP5 (GHz, CPU, RAM, Disk, kWh etc.) ▪ Automatic metric collection by application/system from vmware ▪ File import for gathering resource usage in AutoDC that has no API access ▪ Log energy consumption by energy source (solar or grid) and based by application/server (kWh) 	
Integration constraint(s):	<ul style="list-style-type: none"> ▪ ITRS OP5 for Op5 data collection ▪ Vmware vSphere, for vmware data collection ▪ Comsys UPS / PDU for data collection 	
Intended user(s):	<ul style="list-style-type: none"> ▪ Source data for business logic ▪ People/software using API:er as a data source ▪ Data can be used for decision support by other applications (e.g. where to put load, based on CO2 usage per GHz Cpu used) 	
Provider:	<ul style="list-style-type: none"> ▪ Hi5 (Advania) 	
Contact point:	<ul style="list-style-type: none"> ▪ https://www.hi5.se/ 	
Condition(s) for reuse:	<ul style="list-style-type: none"> ▪ Available to everyone in the project. Outside the project, it is a component that is part of a commercial product. 	

September 29, 2021

Name: Passive Free Cooling Solution		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> High temperature water from Immersion Cooling Units 	<ul style="list-style-type: none"> Free cooling solution based on heat pipe and passive cooling without pumps or fans. No moving parts and no powerconsumption for cooling 	<ul style="list-style-type: none"> Concept Prototype solution
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Cooling solution without moving parts requiring no maintenance. Free cooling solution without any energy input for compressor, fan or pump 	
Integration constraint(s):	<ul style="list-style-type: none"> - 	
Intended user(s):	<ul style="list-style-type: none"> Datacenter operators 	
Provider:	<ul style="list-style-type: none"> Swegon 	
Contact point:	<ul style="list-style-type: none"> Carl-Ola Danielsson 	
Condition(s) for reuse:	<ul style="list-style-type: none"> Can be used in any datacenter running high temperature immersion cooling. 	
<i>Latest update: 2021-09-30</i>		

Name: Privacy preserving of control algorithm		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> A control algorithm 	<ul style="list-style-type: none"> Homomorphic encryption system 	<ul style="list-style-type: none"> The system that can take control signals and do compute in a encrypted format
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Proof of concept demonstration of privacy preserving control algorithm for edge data center based on homomorphic encryption. Protected data or algorithm between control provider and user of controlled equipment 	
Integration constraint(s):	<ul style="list-style-type: none"> Require the white paper for description and open source software 	
Intended user(s):	<ul style="list-style-type: none"> Industry/company that need to protect algorithm and data 	
Provider:	<ul style="list-style-type: none"> RISE AB 	
Contact point:	<ul style="list-style-type: none"> https://www.ri.se/ 	
Condition(s) for reuse:	<ul style="list-style-type: none"> Reference to author and RISE 	
<i>September 29, 2021</i>		

Name: Microgrid DC with Mixed Energy Storage with complementary model		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Microgrid DC 	<p>The microgrid DC can be used to test and study various load balancing approaches. It is equipped with both electrical and thermal storage plus local electrical production by PV-panels. The available system model and control interfaces enables both simulation and real world testing for entities interesting in evaluating the possibility of Microgrid enabled datacenters.</p>	<ul style="list-style-type: none"> Model and control interface of the microgrid DC.
Unique Selling Proposition(s):	<ul style="list-style-type: none"> The possibility of using thermal and electric energy storage in combination with local PV-production and free cooling creates a unique platform for testing load balancing concepts for future EDGE DC scenarios. The accompanied model also enables the possibility to create large-scale implementation with a large population of DCs. 	
Integration constraint(s):	<ul style="list-style-type: none"> The complexity of the installation (almost) requires on-site presence to configure and execute tests. 	
Intended user(s):	<ul style="list-style-type: none"> Researchers and companies that needs access to a real world EDGE-DC test platform. 	
Provider:	<ul style="list-style-type: none"> RISE 	
Contact point:	<ul style="list-style-type: none"> www.ri.se 	
Condition(s) for reuse:	<ul style="list-style-type: none"> Commercial service through RISE 	

Latest update: September 2021



Name: Interface to RISE ICE's CFD model		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> RISE real-time CFD models 	Possibility to access the CFD from external programs to perform load-balancing control	<ul style="list-style-type: none"> An API to the model
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Access to the unique real-time CFD model to perform studies and control, air-flow and heating studies faster than real time. 	
Integration constraint(s):	<ul style="list-style-type: none"> Will need require a powerful server to run the CFD simulation and programmer skills to create the connection. 	
Intended user(s):	<ul style="list-style-type: none"> Data center designers and operators. Researchers and engineers that studies air-flow in datacenters. 	
Provider:	<ul style="list-style-type: none"> RISE 	
Contact point:	<ul style="list-style-type: none"> www.ri.se 	
Condition(s) for reuse:	<ul style="list-style-type: none"> The API is free to use. The underlying simulation framework (CFD-model) might be used for non-commercial use through agreement with RISE. 	

Latest update: September 2021



Name: Automated ML Data Pipeline		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Sensory data from HVAC equipment, environmental data (temperature, humidity, etc), energy cost data, etc. 	<ul style="list-style-type: none"> An automated process for ML-based predictive modules. The framework includes data extraction, training, model creation, approval, monitoring and validation components. 	<ul style="list-style-type: none"> Models for predicting temperature, energy cost, etc for multiple zones within a facility.
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Collect, analyze, train and produce prediction models. Monitor and maintain the model accuracy. Predict a range of environmental or cost states. Deploy on-prem or in the cloud. 	
Integration constraint(s):	-	
Intended user(s):	<ul style="list-style-type: none"> Organizations running datacenters or other commercial facilities. 	
Provider:	<ul style="list-style-type: none"> Mariner Partners Inc 	
Contact point:	<ul style="list-style-type: none"> Alex Petrovic <alex@marinerpartners.com> 	
Condition(s) for reuse:	-	
<i>Latest update: 2021-09-30</i>		

Name: Predictive Supply Air Temp Optimization		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Sensory data from HVAC equipment, temperature and/or cost predictions. 	<ul style="list-style-type: none"> Use ML prediction models to determine the optimal set instructions of to alter operations of the HVAC Air intake/outtake modules based on predicted system states. 	<ul style="list-style-type: none"> Set of specific instructions for the HVAC / BAS system.
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Collect, and analyze HVAC operational states. Predict the near-future comfort / environmental states. Determine the most optimal set of changes to minimize the energy cost and maintain the ideal environmental conditions. Continuous / iterative operations. 	
Integration constraint(s):	<ul style="list-style-type: none"> - 	
Intended user(s):	<ul style="list-style-type: none"> Organizations running datacenters or other commercial facilities. 	
Provider:	<ul style="list-style-type: none"> Mariner Partners Inc 	
Contact point:	<ul style="list-style-type: none"> Alex Petrovic <alex@marinerpartners.com> 	
Condition(s) for reuse:	<ul style="list-style-type: none"> - 	
<i>Latest update: 2021-09-30</i>		



Name: Cost-responsive Supply Air Temp Optimization		
Input(s):	Main feature(s)	Output(s):
<ul style="list-style-type: none"> Sensory data from HVAC equipment, temperature readings and cost predictions. 	<ul style="list-style-type: none"> Use combination of algorithms to determine the optimal set of instructions to alter operations of the HVAC Air intake/outtake modules based on predicted energy costs. 	<ul style="list-style-type: none"> Set of specific instructions for the HVAC / BAS system.
Unique Selling Proposition(s):	<ul style="list-style-type: none"> Collect, and analyze HVAC operational states. Predict the near-future comfort / environmental states. Determine the most optimal set of changes to minimize the energy cost. Continuous / iterative operations. 	
Integration constraint(s):	<ul style="list-style-type: none"> - 	
Intended user(s):	<ul style="list-style-type: none"> Organizations running datacenters or other commercial facilities. 	
Provider:	<ul style="list-style-type: none"> Mariner Partners Inc 	
Contact point:	<ul style="list-style-type: none"> Alex Petrovic <alex@marinerpartners.com> 	
Condition(s) for reuse:	<ul style="list-style-type: none"> - 	
<i>Latest update: 2021-09-30</i>		

