Introducing

freshtime 3
Infratab

Condition-Intelligent Perishables™
Answering "Fresh?"
"How Fresh?"
"What's Next?"

Beta: Q4 2023
Availability: Q1 2024

Introducing freshtime 3 Infratab

IoT Condition-Intelligent Sensor Solutions for Perishables

IoT RF conventional sensing

- Temperature • Alerts • Logs
- Humidity • Shock *New*
- Attach-Detach additional sensors *New*

RF passive-active (hybrid) sensor tags: RAINFC+3rd RF *New*
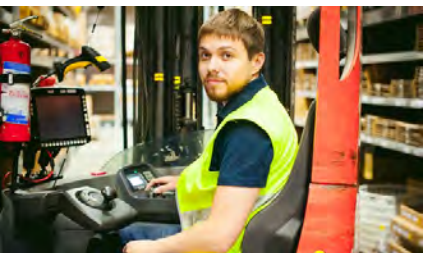
Real-time IoT RF condition sensing

- Shelf-life • Wear-Tear • Performance

Timeline tracking of the condition of business events

- Sensor-condition-event-vision-audio associations
- Blockchain data sharing *New*

GS1   Answering "How fresh?"
      In training for answering "What's next?"

RAIN RFID   NFC   *New* BLE   *New* LoRa   *New* NB-IoT LTE-M

Beta: Q4 2023
Availability: Q1 2024

Summary

Infratab's business is making perishables, things with measurable wear-tear, and things with measurable performance—condition-intelligent.

Infratab's IoT sensor tags, edge and cloud software, services, APIs, and most importantly, data and data analytics enable perishable lovers to:

Answer "How fresh?", "Best flavor?", "Service when?' and more.

In a world of climate insecurity, fragile global supply chains, food-scarce populations, Infratab solutions start with conventional RF sensing and add real-time condition monitoring—increasing perishable yield, reducing loss, and enabling pay-for-condition—simply, inexpensively, and with few changes, if any, to operations.

Advantages: condition-delivered matches condition-ordered; visibility into perishable condition after power outages; smarter risk assessments for banking and insurance; warranty resolution; buying, selling, paying by outcome, on-the-spot; and smart, ready-to-be acted upon, data.

BENEFITS

1	2	3	4	5
Increased yield	Reduced loss/waste by business & consumer	Brand reputation, customer satisfaction	Score-carding supplier & partner performance	Disaster preparedness

NOTE: Condition has a different meaning depending upon perishable type: • shelf life or freshness for foods, • efficacy or potency for pharma and adhesives, • serviceability for machines, performance for containers, • flow for meters, and • health for people.

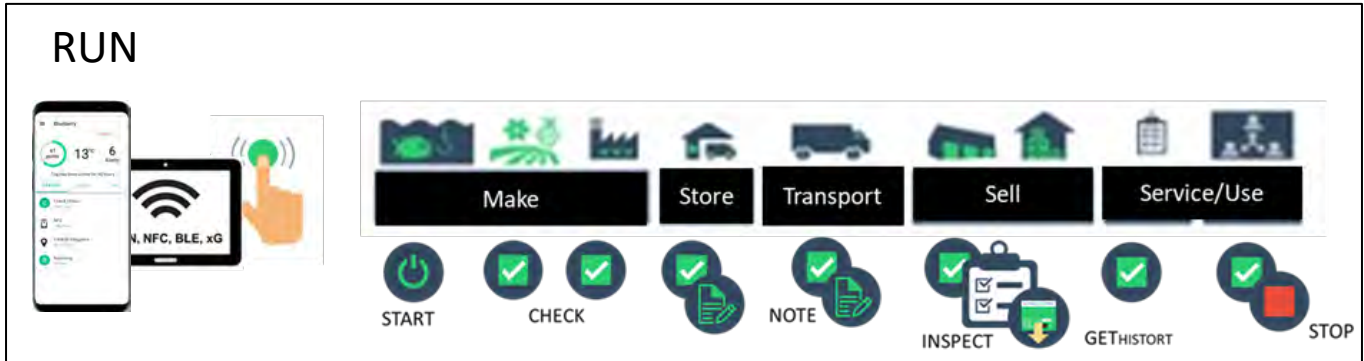Infratab uses "fresh" to cover all items whose condition can be measured.

3   (Infratab video)

Infratab Products, Services, Solutions

Condition Measured, Visible, Managed, Trusted

Condition-intelligence starts with defining customer experience (7-day vase life at sale), and then allocating remaining shelf life among life segments. Benefit: knowing how fresh-now versus planned; predicting condition at sale; taking action if needed.

Perishables-grown

Prep	First Mile	Supply Chain	Last Mile	Use
Field Condition	Harvest Day	Transport	Sell	Enjoy
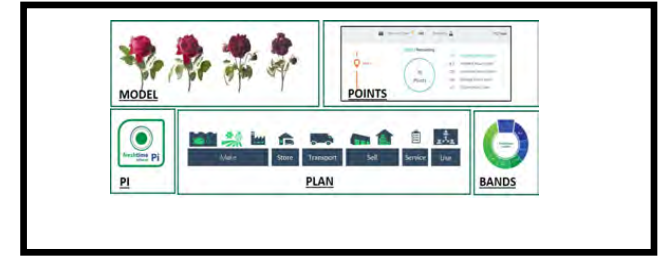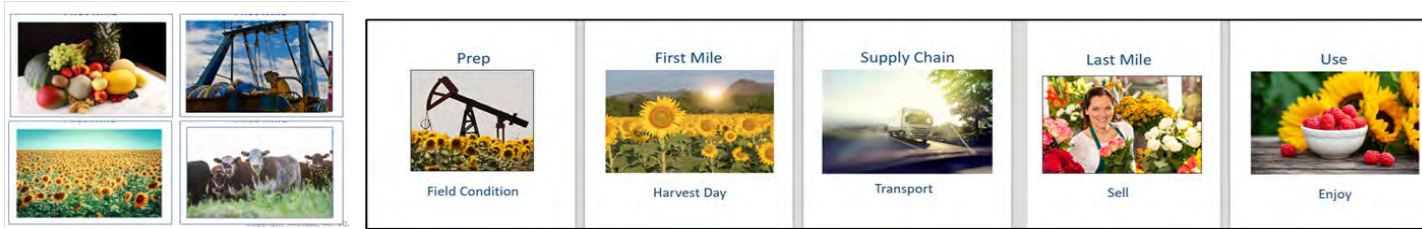
HOW: A simple concept: perishable life starts at 100 & ends at 0,
measured by a simple tag that tracks, in real-time, life-used and life-left in Points.

Perishables-made

Prep	First Mile	Supply Chain	Last Mile	Use
Prepare Ingredients	Manufacture	Transport	Dispenser Receive-Store-Mix	Vaccinate

CONDITION ANALYTICS

Infratab
Answering "Is it fresh?"

Value Add—Condition Visibility

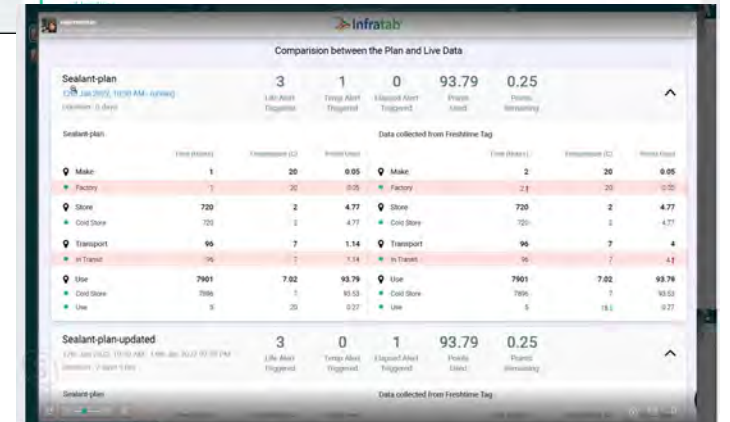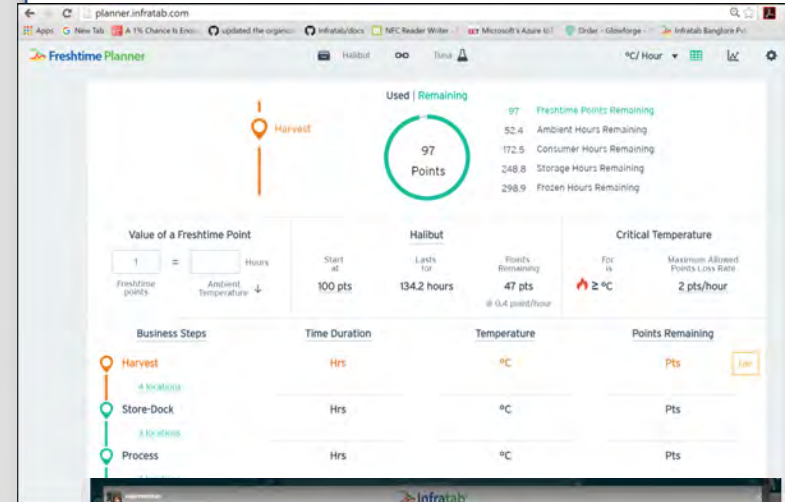Trusted condition monitoring means mimicking the spoilage characteristics of an item. It does not mean getting a temperature now and then.

Condition depends upon initial product characteristics, processing parameters, packaging characteristics, and environmental conditions that a product is exposed to from production to final user. Of importance to food, drugs, diagnostics, flowers, paint etc. is the temperature, and often, humidity and other conditions.

Infratab's preferred model to expressing temperature dependence is the Q10[1], extensively used by the drug and food industries and in food science and biochemistry literature. Other models can be supported.

CONDITION: CHAIN - PREDICT

Packaging

Containers

Smart Agriculture
Buildings, Vehicles
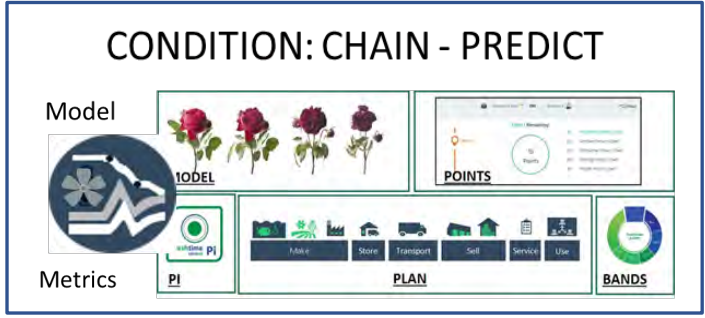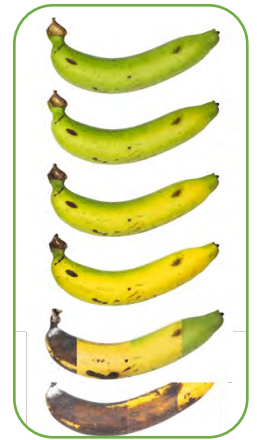
Using Infratab condition models & metrics,
make visible the % of life and hours-used & left.

[1] NOTE: Q10 is defined as the ratio of reaction rate constants at temperatures differing by 10 °C.

Value Add—Business Savvy Condition

Condition is not monitored in a vacuum—it has a business context

Actionable Data, Immediate
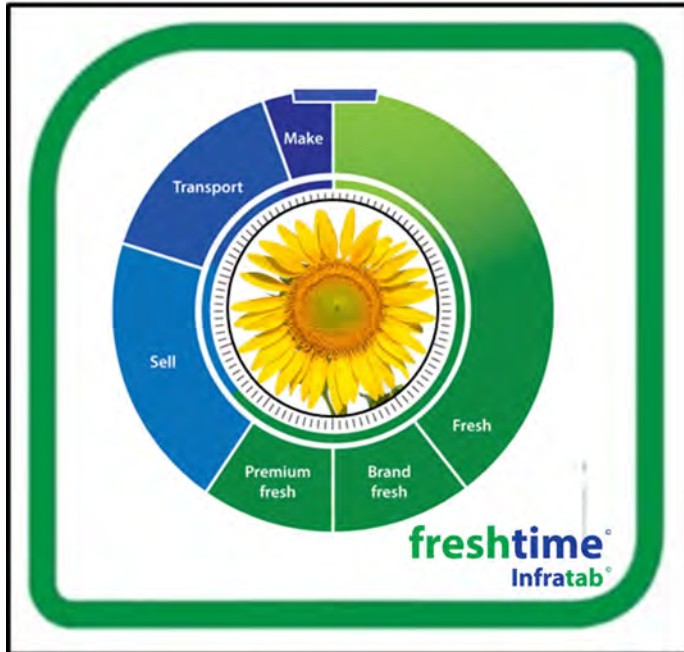
A simple concept. Perishable life starts at 100 at birth and ends at 0, the perishable's quality end of life (Best Before.) At each sensing, shelf-life is calculated—expressed as a percentage of life used and remaining (Points.) Points are automatically converted to days/hours at the sensed temperature.

Freshtime tags track Points used and left by process, business step or custody owner and compare actual vs. planned. Early alerts are triggered—when things are trending wrong.

Value Add—Managing Fresh

Global Enterprises

Mid and small business

Artisans

MEASURING fresh
KNOWING fresh
TRUSTING fresh
PREDICTING fresh
COMPARING fresh
HANDLING fresh
TRANSPORTING fresh
VALUING fresh
PRICING fresh
PAYING for fresh
PRESERVING fresh
RECALLING non-fresh
TASTING fresh
SELECTING fresh
EATING/USING PREFERRED fresh
RESELLING-SHARING UNWANTED fresh
NOT WASTING fresh
ANALYZING fresh, and

Service Providers

Consumers

ENJOYING fresh while cutting loss, increasing supply, reducing carbon emissions, and providing new opportunities to those who cherish quality.

Value Add—Consumer Satisfaction

Whether for current products or new ideas—sharing likes, insights, trends

Liking the taste. Knowing "How Fresh."

Value Add—Things Working Together Smartly

Condition-intelligent perishables are artificial intelligent (AI) perishables

Reducing Data Clutter
Flagging what is key to the activity at hand, with or without a cloud

Inventory

Premium	(blue)
Farm Fresh	(green)
Ready	(yellow)
Act Now	(orange)
Challenged	(red)
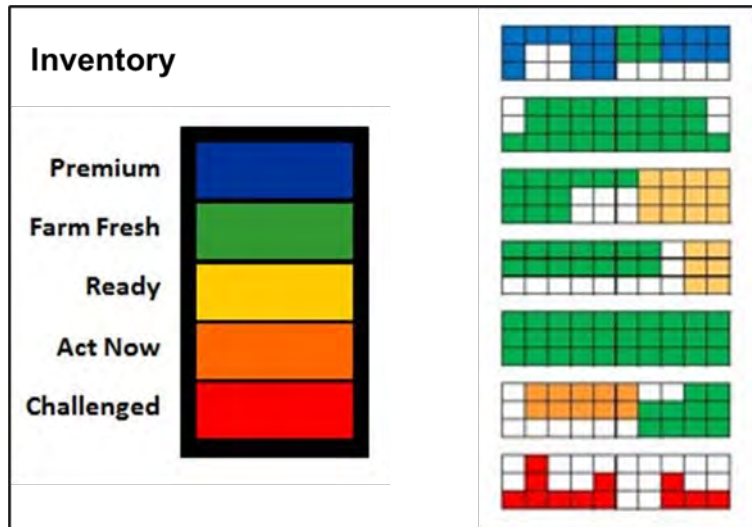
When perishables, whose condition is visible, are grouped depending upon where they are, and what decisions are to be made, insights arise.

- ingredient efficacy is known prior to production,
- transport routing decisions include perishable condition desired by buyer,
- suppliers are scorecarded,
- business predictions are finetuned, and
- perishable digital twins emerge.

Groups: • pallet, • shipment, • pallets in a reefer, • batch of ingredients, • cold storage room • boat fish run, • flower bouquet, • fresh food delivery
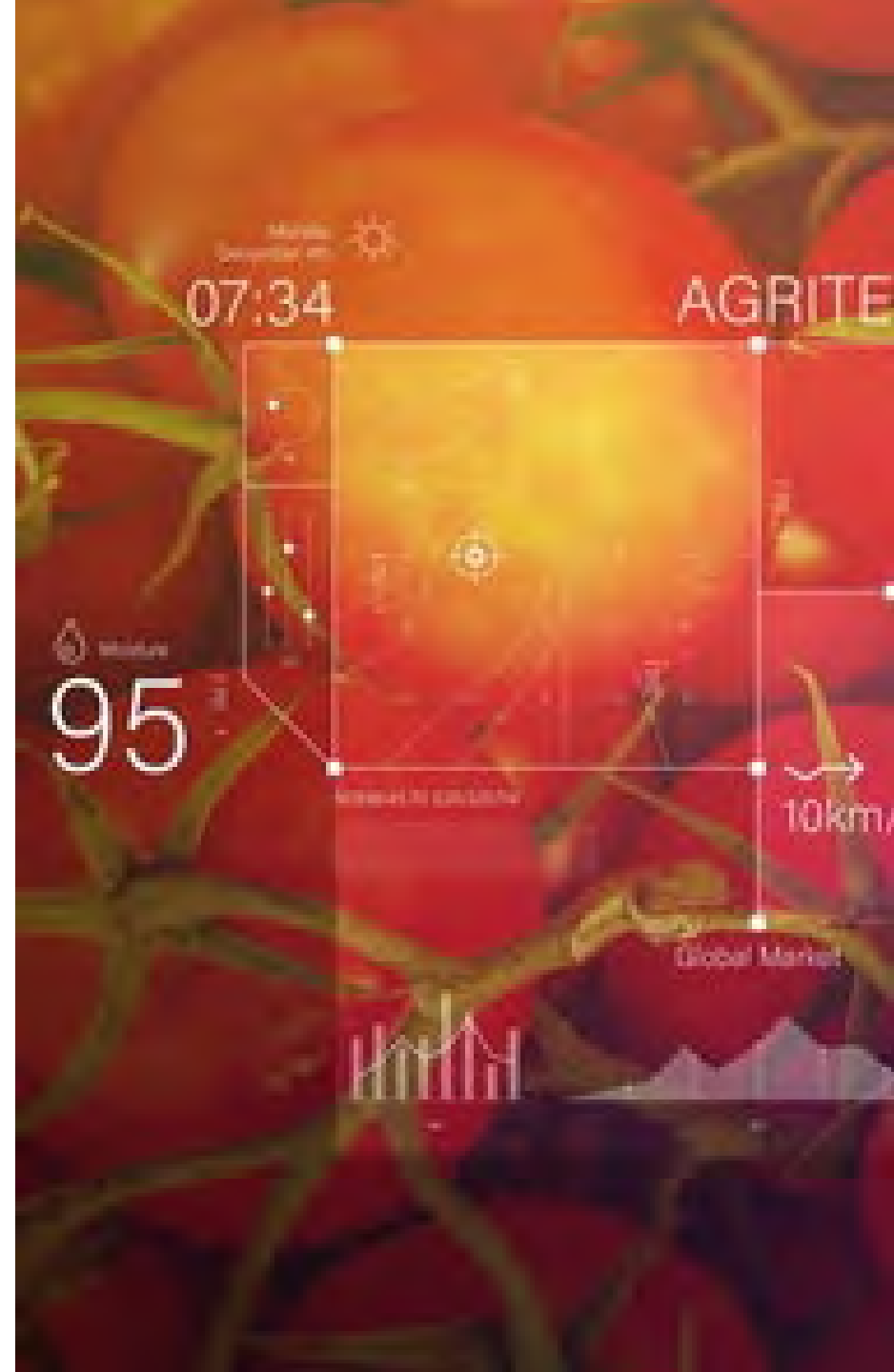
Value Add—Perishable Protectors

Perishable packaging affects condition. So do the processes used in making perishables. And the vehicles and routes used for transport.

Infratab's Perishable Condition Protector Focus:

- machines which make/process perishables
- packages which protect perishables
- shelf-life extenders which lengthen life
- food labs which ensure compliances
- transport carriers which move perishables

When perishable condition:

- is known at the point of sale, and is shared by retailer with perishable brand owner, supply chain performance can be scorecarded,

- when a brand owner can share private data about perishable life at sale with breeders and operations staff, processes can be finetuned and competitive advantage realized, and

- when the elapsed time associated with perishable *enablers* can be tracked, data collected can be used to construct the perishable's digital twin.

It's this collection and sharing of data, from multiple sources, in near-real-time, that Infratab defines as *condition-intelligence*.

Value Add—Trusting "How Is It?"

Three *musts* for trusted condition • sensing device must be accurate;
• perishable brand owner must be responsible for the condition model;
• sensing interval must match the spoilage rate of the tagged item.

Enabling technology. Infratab's business is trusted, condition-intelligent perishable data. In delivering this data, Infratab has a unique opportunity. This opportunity results from the introduction by Arm of its chip product line of RFsensorSoCs (system on a chip.) In these chips, key components of Infratab's patented tag architecture have been miniaturized and combined, resulting in a large number of tag designs similar to Infratab's patented tag architecture.

Additionally, an open-source real-time operating system (RTOS) for Arm RFsensor SoCs has been introduced by Arm, Amazon, Google, Meta, Microsoft and others.

The commonality of the Arm RFsensor SoC and RTOS affords Infratab licensing opportunities targeting accuracy of sensing and data integrity.

NOTE: In a prior life, Quarterdeck, (QDEK), Infratab founders and developers were responsible for the innovation of adding multi-tasking and windowing to the PC operating system. It now adds a condition-intelligent environment to IoT sensors

Value Add—Sharing "How Fresh?"

Condition-intelligence (AI for perishables): real-time, actionable, sharable
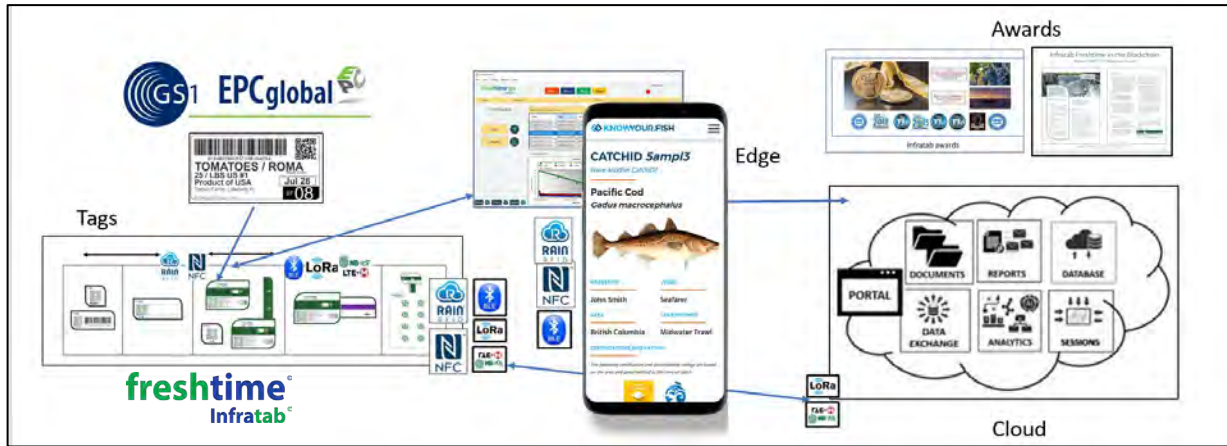
Infratab's power rests in the Freshtime tag, tag firmware, and tag control software resident in tag, edge and cloud (the razor blade.) Together they provide trusted, business context, capture and timely pickup, delivery, notification, and analysis of perishable data.

When stored either on the Infratab cloud portal or in a blockchain, tag events can be viewed, analyzed and shared among partners as well as sent to company internal systems. When trusted, blockchained business transactions can be bought, sold and paid.

ARM RFSensor SoC

NOTE: Tags edge, and cloud all support data vocabularies: GS1 for business, Infratab for condition, market-specific, and company private

Value Add—Condition-Intelligent Solutions

Covid-19 Last Mile Vaccine efficacy	Sea Bass, Sea Bream - Blockchain	Women's Fashion Wardrobing	Food Home Delivery From grocer to consumer
WHERE: US Rural America **CHALLENGE:** Vaccine efficacy early alerts; inventory mgt	**WHERE:** Greece Boat-Processor-Store-Consumer **CHALLENGE:** Seafood track-trace; retailer "sell now"	**WHERE:** US Buyer's home **CHALLENGE:** 66% Internet purchases are returned are worn	**WHERE:** Greece: grocer **CHALLENGE:** local delivery performance
Flowers Which flowers fresher?	Alaska Salmon Condition worsening	Cut Fruit Retail store toss too great	Flower Market Vase life at receiving
WHERE: CA & Ecuador to NJ **CHALLENGE:** Truck vs. air	**WHERE:** ALASKA boat-pack **CHALLENGE:** Too much life lost from boat to packhouse	**WHERE:** GHANA, SPAIN, NL **CHALLENGE:** 56% store toss	**WHERE:** KENYA-NL **CHALLENGE:** Efficiency/Life
Nicaragua Lobster Artisans Over harvesting	Grapes Shefl life used-harvest day	Berries in RPCs Rejects at grocer DC	Express Delivery Transport performance
WHERE: Nicaragua **CHALLENGE:** Limit traps; sell artisan lobster to Norway	**WHERE:** California **CHALLENGE:** Temperature swings	**WHERE:** US Brand-Retail DC **CHALLENGE:** Reverse logistics; RPC recovery	**WHERE:** EU Express Deliver **CHALLENGE:** Packaging

Sea bass, when delivered from store to customer, is 1 day fresher than expected.

Alaska Salmon: Elapsed time from boat unload to packing house caused 20+ points shelf life lost; to fix change pick-up time; open pack house earlier.

Flowers: CA-NJ vs ECUA-NJ; vase-life used and remaining compared by growers and routes to answer "Can 7-day vase life be guaranteed? " Yes, for some growers.

Cut Fruit, EU and Ghana, processor to retail store: Shelf life-monitoring reduced toss rate by 50% for Ghana product; toss rate was then same as EU product.

Kenyan flowers: Status of air cargo known at receiving in minutes rather than the 8 hours allotted.

Grapes: Temperature out of precooler determines life lost/day in storage life lost: >1%/storage day.

Condition-Intelligence Benefits
No matter whether small business, global enterprise, service provider or consumer.

- Knowing ingredient freshness prior to production ensures consistent product quality.

- Consistently delivered freshness enhances brand loyalty

- Freshness-based pricing rewards caring

- Freshness-based traceability adds business value to compliance regs

- Least freshness inventory management and transport routing,

- Transport carrier and routes "condition-handling" scorecards,

- Better assessment of risks related to power-outages,

- Faster, more efficient, and profit-generating reverse logistics,

- Insurance policies incentivized for preventing losses.

Traceability
FDA Food Safety (FSMA)
Smarter Food Safety

TradeTech Blockchain
Cross Border Payments
Paying for Outcome

Value Add—Condition Intelligent Business Analytics

Infratab Freshtime™ in a Nutshell					
	Prep	**1ˢᵗ Mile**	**Supply Chain**	**Last Mile**	**Consumer**
Key Performance Indicators (KPIs)	Measuring the value of real-time condition data				
PARTNER SCORECARDS **Yield** Reduced loss % Extended life % Extended life (days) Location & reefer temperature efficiency Packaging life (days) Supply's freshness % FEFO inventory loss % **Quality** Variety/grade % Pricing increase % **Climate** Product loss change Diesel usage change Circularity increase	**Strategy:** collect data for tracking and modeling a field by growing season (digital twin) **Business: Yield** by boxes/season/acre; boxes/season/variety/breeder; **Revenue change:** $/season/acre **Measurement: Statisticsts/week/season** for temperature, humidity, light, water quality, utility usage, more **Performance: Points-Left** (shelf-life) at delivery of ingredients and supplies to field, when used, (seedlings, pesticides, nutrients); **Sustainability:** number ofvobjectives met **Evaluation: Comparison** by season, grower, growing regions, fiield, variety	**Strategy:** track perishable condition from harvest to ship by grower/field/week **Business:** % loss/discount (box)/grade; average Points-Used/box; revenue % change/grade when condition-based pricing used; $ value of 1 hour life **Measurement:** stats/week by location temperature/elapsed time; product temperature, time, life/bizStep **Performance:** precooler effiency; FEFO inventory management by % sold/tossed **Evaluation:** scorecard grower: average Points-Used (box)/harvest day/season; storage: average % life used/storage day	**Strategy:** track performance of carrier and transport routing **Business:** transport Points-Used/budget; carbon emission used, based upon Points-Used and Left per trip; revenue % change when Points is included in carrier pricing **Measurement:** % rejects: temperature logging vs. Points **Performance:** # transport threshold alerts triggered; average Points-Used/shipment **Evaluation:** scorecard transport carrier by Points-Used and Freshtime PI (metric including inspector evaluation, % damage; paperwork, Points-Used; disposition)	**Strategy (Brand):** at truck unload, track discount, reject % when condition known by brand at DC receive; **Business (Brand, Transport, DC):** increase in boxes sold (condition monitoring vs. temperature log); revenue % increase; # of recalls, $ value of blockchain at handover **Performance (DC):** DC routing by grade/Points-Left, store #, store location, customer life prefererence; **(retailer):** Points-Left at receiving, and store floor in; % toss, donated **Evaluation:** scorecard produce dept; food bank donation boxes/life left	**Strategy:** use timelined data sharing among grower, brand, retailer for visibility into customer satisfaction and engagement **Business:** # of consumer purchases; # of service calls **Performance:** # user feedback, complaints, # of users accessing Internet for data about tagged perishable **Evaluation:** consumer preferences by geographic location, ethnicity, age

US FDA-GS1 Smarter Food Safety

Tracing fruits, vegetables, seafood, deli-salads from make to sale

In November 2022, the US FDA released its Smarter Food Safety traceability regulations. Co-incidentally, GS1 released specifications for complying to these regulations.

GS1 is the standard setter for identifying and describing products, locations, assets, logistics, and documents, used in barcode and RFID labels. These standards are the underlying foundation for identifying, authenticating, and tracking (what, where, when, and why)—used globally for buying, selling, paying.

Infratab's tags and software are GS1 compatible. They add "how is".
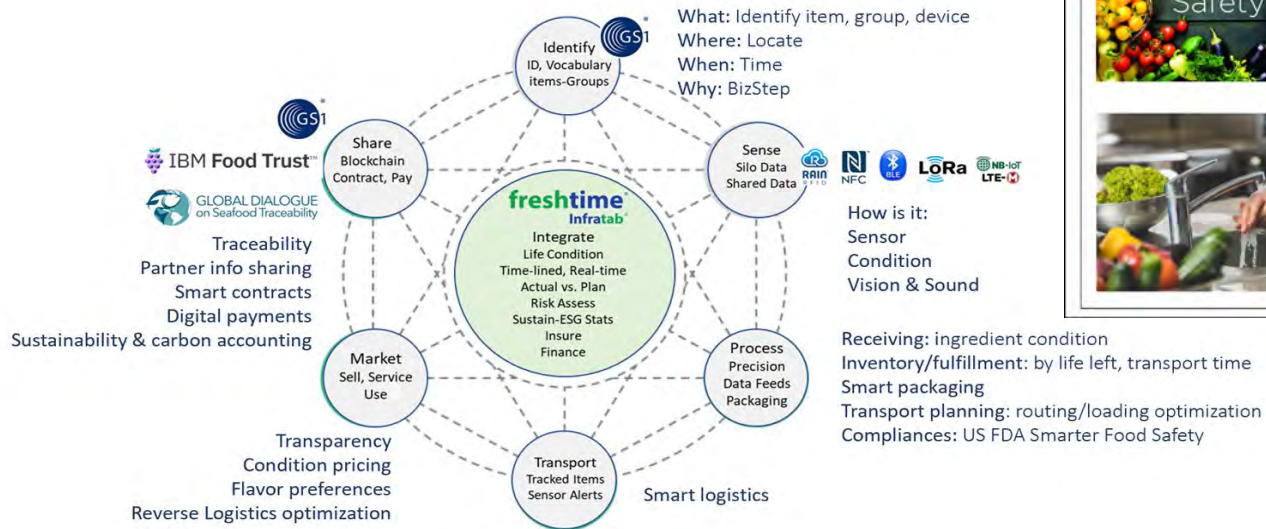
What: Identify item, group, device
Where: Locate
When: Time
Why: BizStep

How is it:
Sensor
Condition
Vision & Sound

Receiving: ingredient condition
Inventory/fulfillment: by life left, transport time
Smart packaging
Transport planning: routing/loading optimization
Compliances: US FDA Smarter Food Safety

Condition-Intelligent Traceability

Enabling compliance to US FDA Smarter Food Safety while adding condition-intelligence

Infratab Freshtime can be either an add-on to current traceability solutions or a total solution. The value add: process alerts at critical points, known freshness at delivery, less time to do paperwork, scorecards, plan vs. actual analytics

What: Identify item, group, device
Where: Locate
When: Time
Why: BizStep

How is it:
Sensor
Condition
Vision & Sound

Receiving: ingredient condition
Inventory/fulfillment: by life left, transport time
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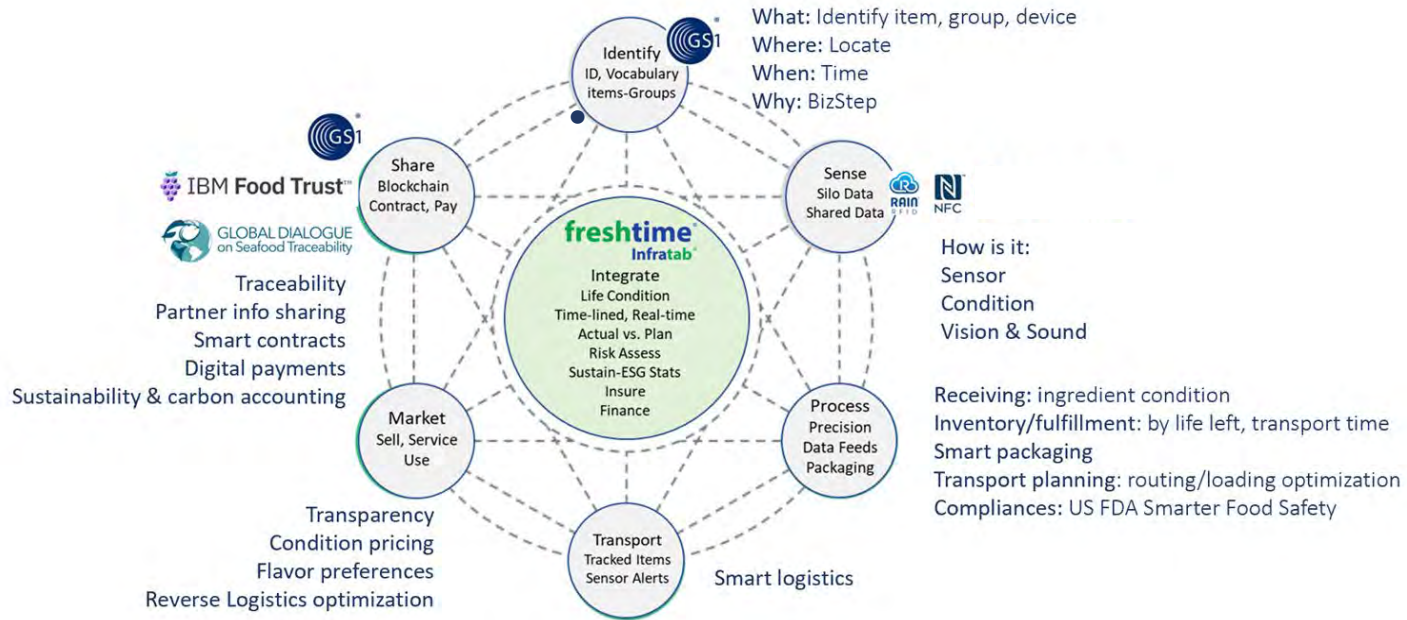
US FDA Food Traceability Rule - November 2022	
Food Traceability List	**Details**
Cheeses, other than hard cheeses	Made from pasteurized milk: fresh soft or soft unripened, soft ripened or semi-soft; made from unpasteurized milk, other than hard cheese
Shell eggs	
Nut butters	
Cucumbers	Fresh
Herbs	Fresh
Leafy greens	Fresh, fresh cut
Melons	Fresh
Peppers	Fresh
Sprouts	Fresh
Tomatoes	Fresh
Tropical tree fruits	Fresh
Fruits (fresh-cut)	Fresh-cut
Vegetables other than leafy greens	Fresh-cut
Finfish	Fresh and frozen, histamine-producing species, species potentially contaminated with ciguatoxin, species not associated with histamine or ciguatoxin
Smoked finfish	Refrigerated and frozen
Crustaceans	Fresh and frozen
Molluscan shellfish, bivalves	Fresh and frozen
Ready-to-eat deli salads	Refrigerated

Condition-Intelligent Seafood Traceability
Seafood Wild Caught & Aquaculture Traceability: Track-Trace-Share

USE CASE: Traceability – Wild Caught—Alaskan Halibut

Jumpstart Seafood Traceability provides a set of customized tags, edge devices, cloud services for

- Capturing (Track),

- Picking up, delivering, and notifying of incidents (Trace), and

- Reporting, analyzing and sharing data (Share),

about the condition of Alaska Wild Caught Halibut—from catch to sale

.

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Seafood Traceability: Alaskan Halibut-Wild Caught

Infratab Playbook: Vessel to Processor—Track-Trace-Share

LIFE SEGMENTS: Prep, 1st Mile

Parties
BLUEBIRD Seafood
Tristar
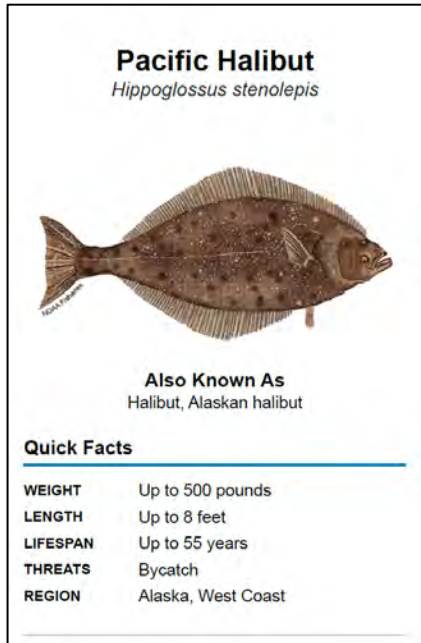
Commodity
Commodity: Pacific Halibut
Alaska, Wild Caught
Species Info: Alaskan Halibut

Vessel
Vessel Name: Blueboat1
ADFG Vessel Permit:
Vessel Info: Blueboat1

Gear
Gear Type: Longline
Gear Info: Longline

Geographic Region
Country: US
State: Alaska (AK)
Catch Areas: 4A
Region: Info

Pacific Halibut
Hippoglossus stenolepis

Also Known As
Halibut, Alaskan halibut

Quick Facts

WEIGHT	Up to 500 pounds
LENGTH	Up to 8 feet
LIFESPAN	Up to 55 years
THREATS	Bycatch
REGION	Alaska, West Coast

Use Case
Use Case: Alaskan Halibut-Wild Caught
Use Case Type: Catcher Vessel< 60', >60', Processor Vessel, Sports Boat, Artisan

Activity
Activity: Catch.Halibut.AK.4A.Blueboat1-Tristar.2023-Wk14
Activity Type: Track

Life Segment

Prep	1st Mile				Supply Chain

Last MIle

Consumer

Critical Tracking Events

PO Confirm	Catch: Depart, Catch (Commission), Land (Despatch Advice), Deliver	Receive Adv. (Decommission), Return Tags

Scenario

Vessel Prep PO, Permit, POConfirm, Get Ready → Vessel Depart (Port, Date) → Catch Elapsed Time (Trip Days Catch Days) → Vessel Land, Deliver (Port, Date) → Processor Receive, Store, Prep-Transform

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6/7/2023
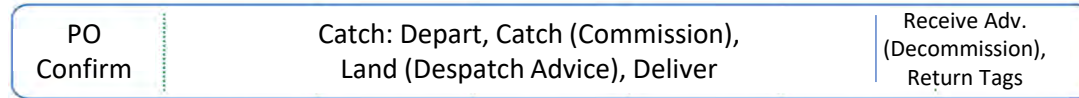
Enabling Technology
Intellectual Property

Infratab's intellectual property includes company and product trademarks, copyrights and U.S., European and international patents. All are focused on RF-sensor tag, edge, and cloud.

Infratab Intellectual Property

55 patents: 27 countries
- IoT RF sensor 2-module tag & SoC architecture
- IoT RF sensor physical tag design: multiple RF transponders, long tag, connected tag
- IoT RF-sensor-condition-chain tag firmware & tag-edge control software
- Shelf life & condition monitoring in-tag, in the edge and in the cloud
- Condition-metrics: Freshtime Points
- Cold chain segment tracking in-tag and edge
- Audio-visual associations
- Tag security and access: private and public

United States - 7
United States -1 (pending)
Canada
Mexico
Brazil (pending)

Belgium Denmark Finland
France-3 Germany-3 Iceland
Italy Ireland-3 Luxembourg-2
Monaco Poland Spain-3 Sweden
Switzerland-3 The Netherlands-3
Turkey UK-3 EU (pending)

South Africa
Australia New Zealand
Taiwan India Hong Kong-3

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Enabling Technology

INFRATAB PATENT PORFOLIO BY FEATURE

DESCRIPTION	TAG	SYSTEM	METHOD
BASIC SENSING			
Cloud		√	√
Edge		√	√
Communication Interface		√	
Tag Hardware	√		
Radio Frequency	√		
Security	√		
Indicator	√		
Power Management	√		
Electronic Device	√		
Sensor	√		
Tag Software - Basic Sensing	√		
Basic Sensing	√		
Location		√	√
Physical Design	√		
CONDITION INTELLIGENCE			
Condition		√	
Metrics		√	√
Multiple RF	√		
Tag Software - Condition	√		
Inheritance		√	√
Custody		√	√
Audio Visual		√	√
Inference		√	√
Physical Design	√		

INFRATAB PATENT LIST - July 2021

Publication Number	Country	Title	Status	Date
US 5,442,669	United States	Perishable Good Integrity Indicator	Issued	15-Aug-95
60/566,019	United States	RFID Integrity Indicator Tag for Perishable Goods (Provisional)	Filed	27-Apr-04
US 7,495,558 B2	United States	Shelf-Life Monitoring Transponder System	Issued	24-Feb-09
US 7,764,183 B2	United States	Apparatus and Method for Monitoring and Communicating Data Associated with a Product	Issued	27-Jul-10
US 7,982,622 B2	United States	Apparatus and Method for Monitoring and Communicating Data Associated with a Product	Issued	19-Jul-11
US 9,946,904 B2	United States	Apparatus and Method for Monitoring and Communicating Data Associated with a Product	Issued	17-Apr-18
US 10,467,444 B2	United States	Apparatus and Method for Monitoring and Communicating Data Associated with a Product	Issued	5-Nov-19
US 11,093,721.B2	United States	Apparatus and Method for Monitoring and Communicating Data Associated with a Product	Issued	17-Aug-21
US 9,719,754 B2	United States	Inference Electronic Shelf Life Dating System for Perishables	Issued	18-Jul-17
US 2018 0129948 A1	United States	Inference Electronic Shelf Life Dating System for Perishables	Published	10-May-18
EP 13845612.4	EU	Inference Electronic Shelf Life Dating System for Perishables	Published	2-Oct-14
WO 2014059048 A9	PCT	Inference Electronic Shelf Life Dating System for Perishables		
EP 1 741 074 B1	EU	Shelf-Life Monitoring Transponder System — Denmark, Finland, France, Germany, Ireland, Luxembourg, Monaco, Spain, Switzerland, The Netherlands, United Kingdom	Issued	6-Mar-13
		Shelf-Life Monitoring Sensor-Transponder System		

INFRATAB PATENT LIST - July 2021

| Publication Number	Country	Title	Status	Date
EP 2 523 147 B1	EU	France, Germany, Ireland, Italy, Luxembourg, Poland, Spain, Sweden, Switzerland, The Netherlands, Turkey, United Kingdom — Shelf-Life Monitoring Sensor-Transponder System	Issued	2-Nov-16
EP 3 179 222 B1	EU	France, Germany, Ireland, Spain, Switzerland, The Netherlands, United Kingdom, Belgium, Iceland	Issued	17-Apr-18
2009210394	Australia	Shelf-Life Monitoring Transponder System	Issued	23-Aug-12
PI 051 0106-9	Brazil	Shelf-Life Monitoring Transponder System	Pending	
2,563,524	Canada	Shelf-Life Monitoring Transponder System	Issued	22-Mar-10
1178652B	Hong Kong	Shelf-Life Monitoring Transponder System	Issued	11-Aug-17
13105577.5	Hong Kong	Shelf-Life Monitoring Transponder System	Issued	24-Apr-18
16101284.5	Hong Kong	Inference Electronic Shelf Life Dating System for Perishables	Issued	4-Feb-16
252526	India	Shelf-Life Monitoring Transponder System	Issued	21-May-12
Mexico 374006	Mexico	Shelf-Life Monitoring Transponder System	Issued	9-Feb-10
NZ 551687	New Zealand	Shelf-Life Monitoring Transponder System	Issued	10-Jun-10
2006/8855	South Africa	Shelf-Life Monitoring Transponder System	Issued	27-Feb-08
I373010	Taiwan	Shelf-Life Monitoring Transponder System	Issued	21-Sep-12

Enabling Technology

Condition Models: the science behind the calculations

Basis of Kinetics. The shelf life of most products depends on initial products characteristics, processing parameters, packaging characteristics and environmental conditions a product is exposed to from production to the final user. Of importance to food, drugs, diagnostics, flowers, paint etc. is the temperature, and in some cases, the humidity the product is exposed to. For fresh roasted ground coffee, the oxygen level in the package is also a factor. With liquid products in an impermeable jar, can or pouch, the major factor is temperature abuse.

S. Arrhenius was the first in 1887 to study the basis for the increase in rate of reactions. He developed an empirical approach showing that the rate increase as an exponential function of temperature. The steeper the slope the more sensitive to a temperature change was the reaction. Dr. Labuza with Dr Marc Karel at MIT, under contract from the DOD and NASA, showed that the Arrhenius relation can be applied to both foods and drug stability.
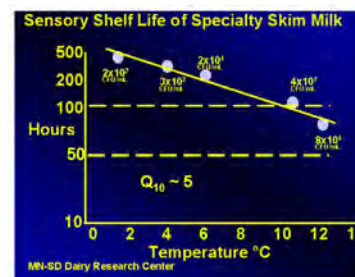
An alternative way of expressing temperature dependence, extensively used by both the drug and the food industry and in the food science and biochemistry literature, is the Q10 approach. Q10 is defined as the ratio of the reaction rate constants at temperatures differing by 10 °C. Equivalently Q10 has been defined as the change of shelf-life Qs, i.e., the time for the product to reach an unacceptable level when t stored at a temperature higher by 10 °C. This Q10 approach is Infratab's preferred model for the monitoring of perishable shelf life by Freshtime tags.

Theodore P. Labuza, PhD
Infratab Chief Scientist

University of Minnesota,
Morse Alumni Distinguished Teaching Professor of Food Science & Engineering

Honors and awards: International Association of Food Engineering 2011 Lifetime Achievement Award; Institute of Food Technologists (IFT), Fellow, Register Davis Award for food packaging 2006; Nicholas Appert Award, Marcel Loncin Research Prize, Babcock Hart Nutrition Award-1988; University of Helsinki, Finland President's Award-1998; World Innovation Foundation Elected Fellow-2004; ISI Most Highly Cited Scientists List in Agriculture and Food Science.

Pharmaceuticals. 2000, Vaccine Stability and the Use of Time-temperature Integrators for Monitoring the Cold Chain in Distribution.

Ted has published two hundred seventy-seven refereed scientific-journal publications in food technology, shelf-life and/or product dating. Dr. Labuza's papers have been cited over twenty-eight thousand four hundred fifty-one times, putting him in the three hundred most-cited researchers in the US in the fields of biochemical, chemical and food engineering.

Infratab Freshtime Sales Channels

Supply Chain

Infratab Jumpstart Life Cycle
"How fresh?", "How is it?" "What if?"

Industrial Iot

Adding machine performance into perishable management

GS1 Supply Chain Resellers
Food, Pharma, Industrials, Logistics

PARTNERS: global distributors
GS1 solution providers, barcode & RFID label converters,, RFID reader companies
Market Organizations

Early Adopters, Influencers
Perishables & Their Spaces: Insights

PARTNERS: Innovators: midsize businesses
universities, USDA, shelf-life extenders, perishable test labs, packagers

Industrial IoT Resellers
Precision Ag, Smart Things

PARTNERS: Innovators; AI analysts
Ag: breeders, crop protectors, precision machines, satellite imaging, utility trackers, shelf-life extenders, urban farms
Industry: machine preventive maintenance

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Infratab Freshtime Services

Perishable data services, condition analytics, device management, tag & software partner services

Infratab Freshtime Services

Infratab
Answering "Is it fresh?"
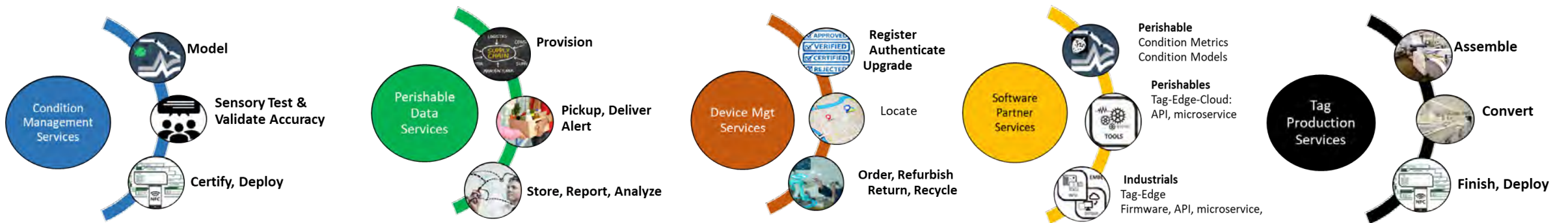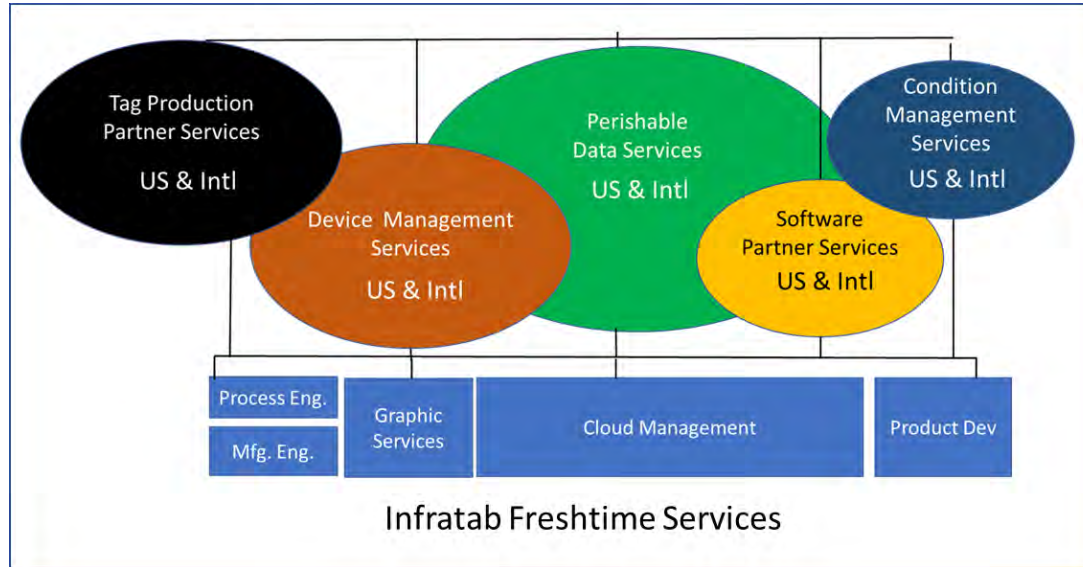
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