

# The Evolution of Reefer Operations

MCI Reefer Conference 2025



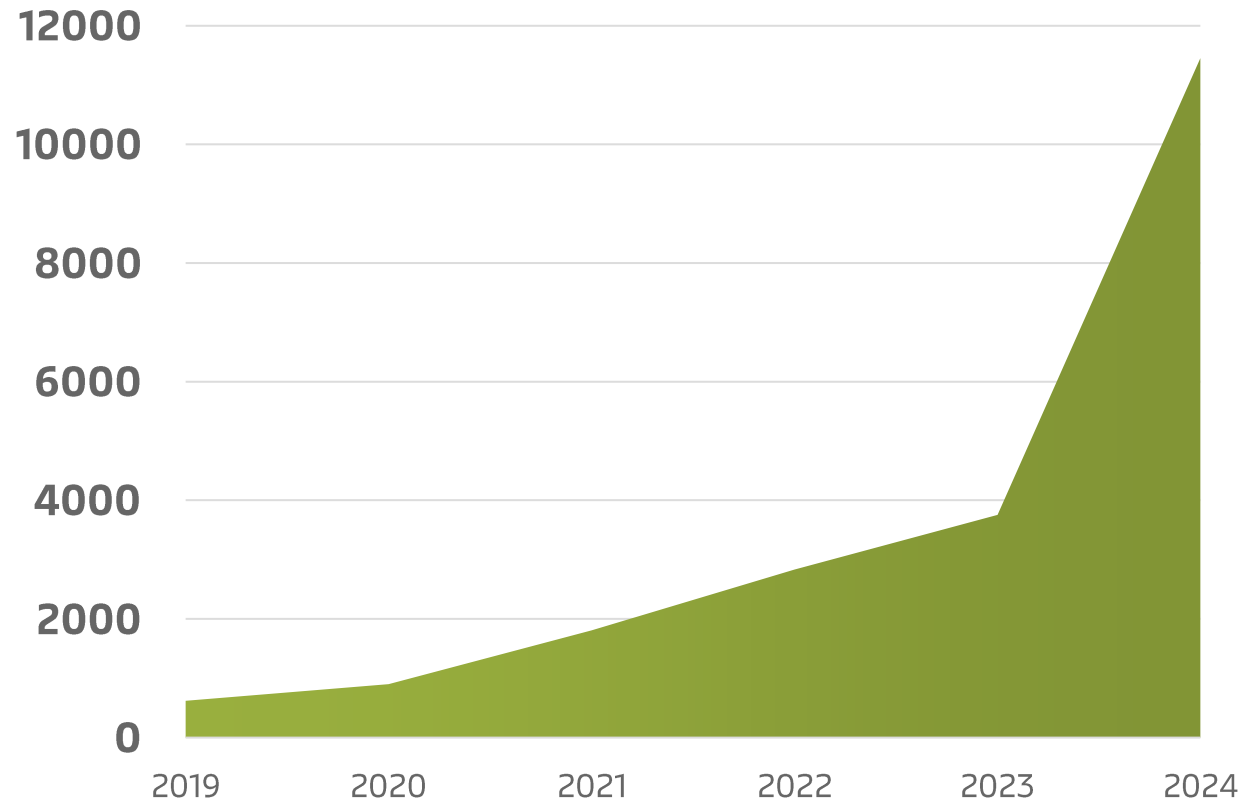


# Smarter Reefer Service

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# Star Cool E-learning Modules completed per year



Star Cool  
E-learning  
is free!





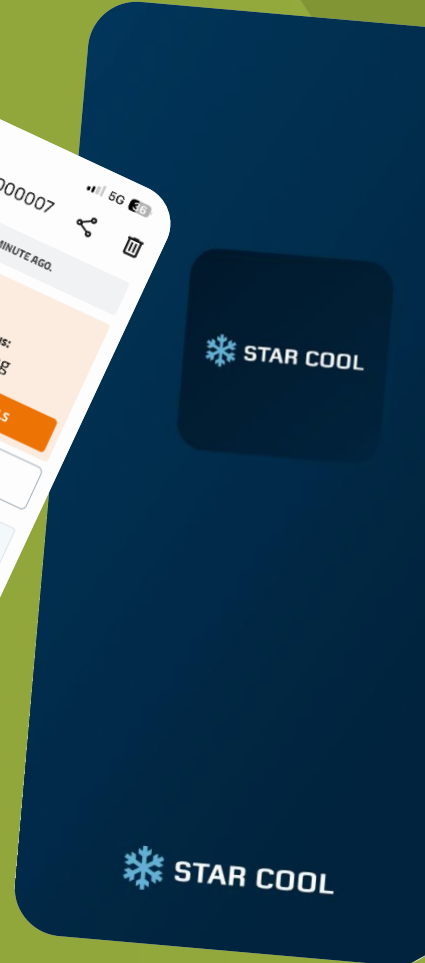
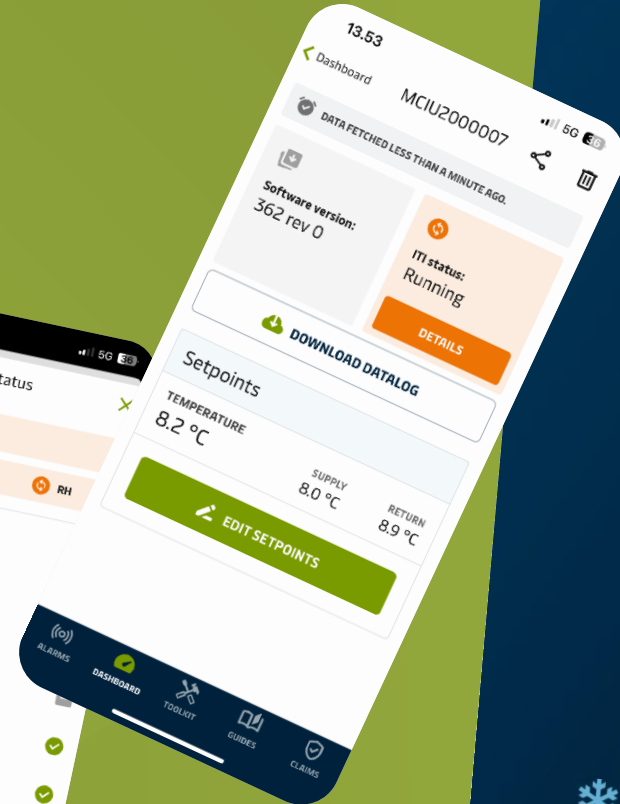
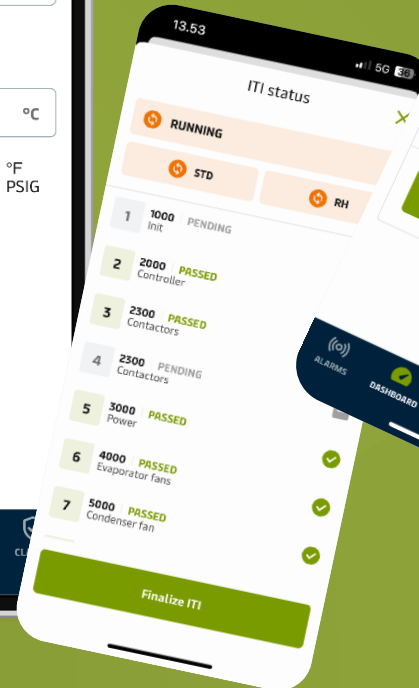
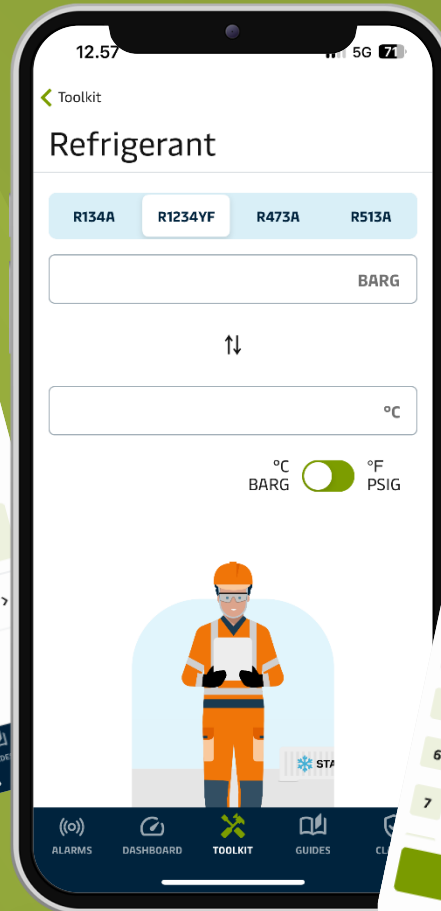
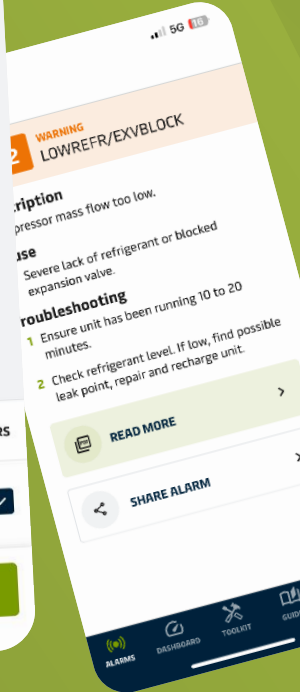
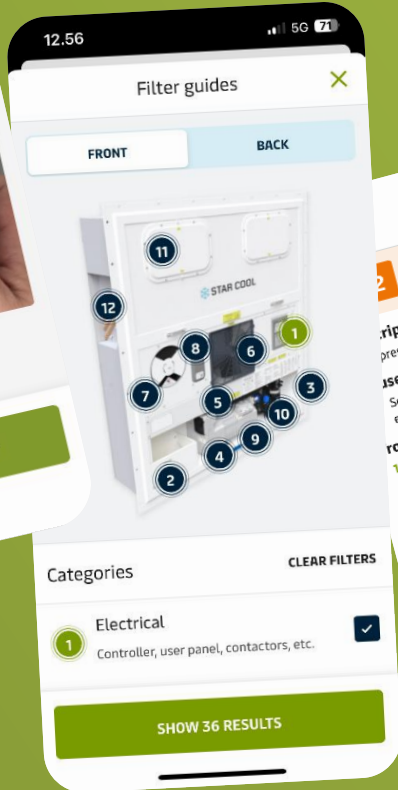
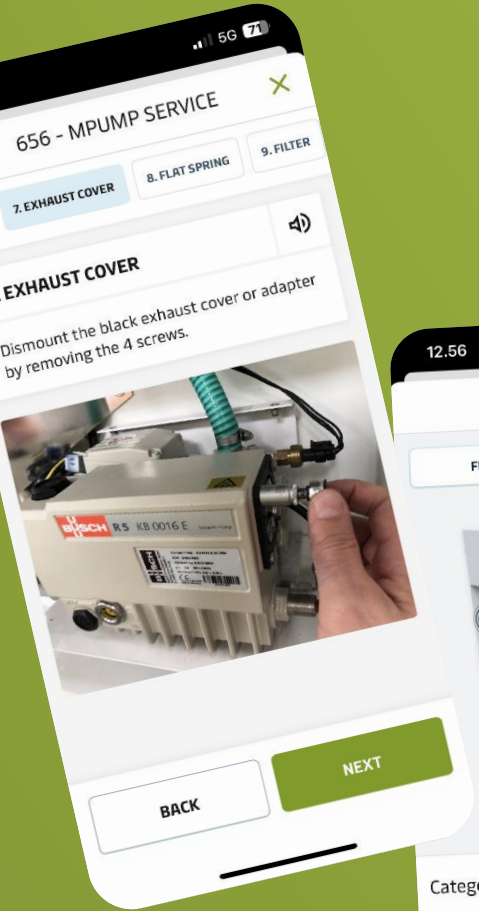
# Onsite training

Last year alone we had  
**1759 participants** in our  
onsite classes.

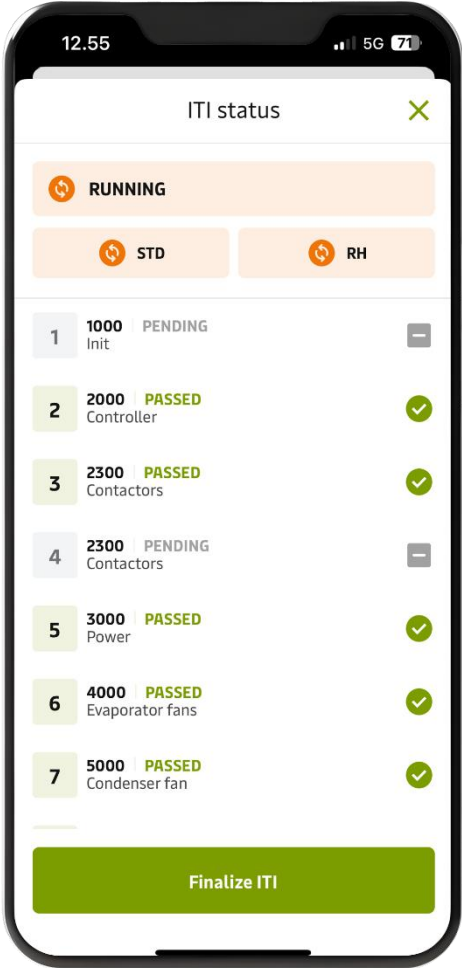
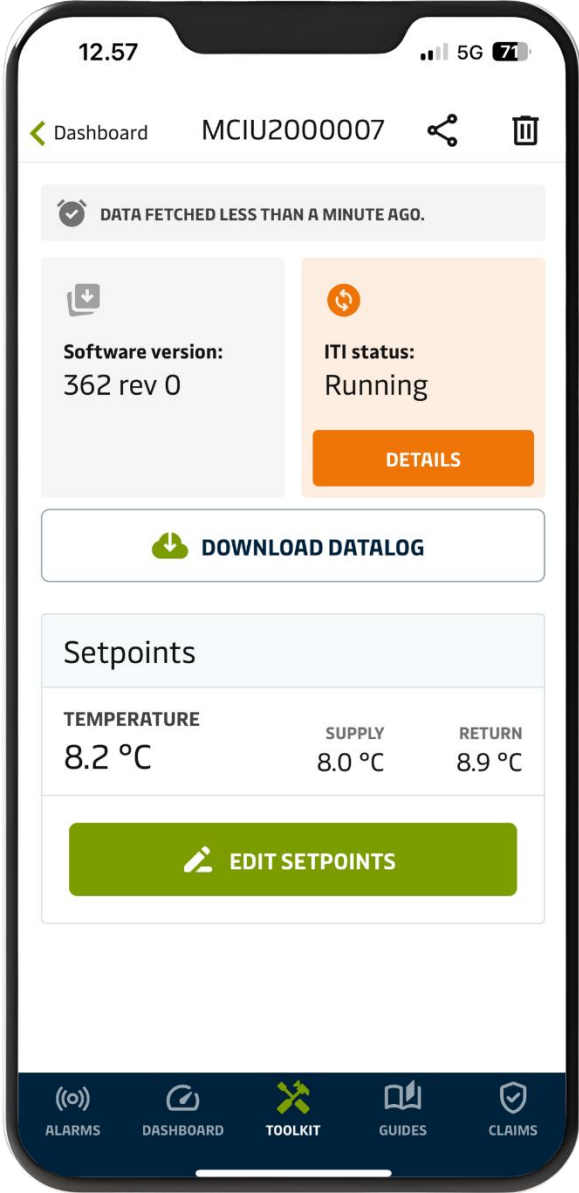
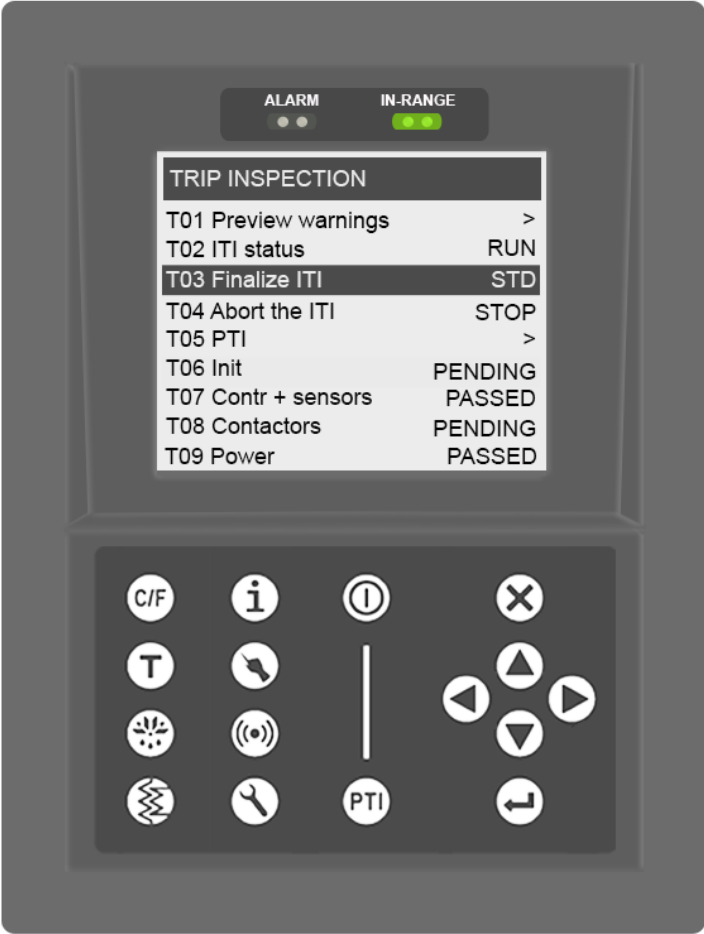


# Star Cool Service App

Service in your pocket




# Star Cool service app





## Monitoring refrigerant loss and claims

646		Low refr. charge
Description	Loss of charge (LoC) detected	
Cause	<ul style="list-style-type: none"> <li>Wrong controller configuration</li> <li>Service valves not fully closed</li> <li>Pressure transmitters are faulty</li> <li>Connector plug(s) damaged</li> <li>Damage to the compressor</li> <li>Blocked refrigerant flow</li> <li>Not sufficient refrigerant</li> <li>Blocked air flow due to evaporator fan grille.</li> </ul>	
Trouble shooting	<ol style="list-style-type: none"> <li>Check the configurat compressor. Go to t of lines F10, F11, F1</li> <li>Check all the compr back seated positio</li> <li>If alarm 603 or 62</li> <li>Check the controll damaged. Check t controller cabinet</li> <li>Check that the pr mounted correctl</li> <li>Check that the s the naming on t</li> <li>Unplug the blac corrosion. Repl</li> <li>Measure resist 4.5 Ohm. If be</li> <li>Check for any dryer, recent</li> <li>Follow the va <a href="https://medi">https://medi</a></li> <li>Check the re test to chec charging 4. <a href="https://me">https://me</a></li> <li>If the cont evaporator be require</li> </ol>	
Criteria	System has l	
Controller action	Log	
Consequence	Loss of cool	
Elimination	Power cycli	
Log data	Parm 1	
	LoC	



MAERSK  
CONTAINER INDUSTRY

667      Refr leak detected																															
Description	Software error.																														
Cause	<ul style="list-style-type: none"> <li>When upgrading from software 358_00 to a later 358 error can in rare cases cause the unit to stop running 358 are not effected by this error.</li> </ul>																														
Trouble shooting	1. Downgrade software to 357_XX (any revision) and then software version.																														
Criteria	Controller software is upgraded from 358_00 to a newer																														
Controller action	Unit stop.																														
	<table> <tr> <td>Log</td> <td>X</td> <td>Alarm</td> <td>X</td> <td>Alarm</td> </tr> </table>	Log	X	Alarm	X	Alarm																									
Log	X	Alarm	X	Alarm																											
Consequence	Alarm 668 is triggered.																														
Elimination	After downgrade and upgrade of software is complete, the																														
Log data	<table> <tr> <th>Part 1</th> <th>Part 2</th> <th>Part 3</th> <th>Part 4</th> <th>Part 5</th> </tr> <tr> <td>1=Standstill outdoor (1)</td> <td>Tamb</td> <td>Pdis</td> <td></td> <td></td> </tr> <tr> <td>2=Standstill indoor (1)</td> <td>Tavg</td> <td>Psuc</td> <td></td> <td></td> </tr> <tr> <td>3=Standstill indoor (2)</td> <td>Tavg</td> <td>Psuc</td> <td>Psuc ref.</td> <td></td> </tr> <tr> <td>4=LOC (heater)</td> <td>On time hours</td> <td>CapReq %</td> <td>Vexp %</td> <td>Psuc</td> </tr> <tr> <td>5=LOC</td> <td>On time hours</td> <td>CapReq %</td> <td>Vexp %</td> <td>Psuc</td> </tr> </table>	Part 1	Part 2	Part 3	Part 4	Part 5	1=Standstill outdoor (1)	Tamb	Pdis			2=Standstill indoor (1)	Tavg	Psuc			3=Standstill indoor (2)	Tavg	Psuc	Psuc ref.		4=LOC (heater)	On time hours	CapReq %	Vexp %	Psuc	5=LOC	On time hours	CapReq %	Vexp %	Psuc
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5=LOC	On time hours	CapReq %	Vexp %	Psuc																											

862

## WARNING

LOWREFR/EXVBLOCK

### Description

Compressor m

Cause

- Severe lack of expansion v

859

## ALARM

LOW REFR. CHARGE

### Description

Loss of charge (LoC) detected on non-yf unit during PTI.

## Troubleshooting

1. Ensure unit minutes.

Cause

2. Check refrigerant leak point, re



### Alarm

- Pressure transmitters and/or solenoid coils wired or mounted incorrectly.

- Connector plug(s) damaged.

- Damage to the compressor valves or valve plates.

 Alarm

 Alarm



- Using system self-diagnostics, the Star Cool unit can indicate when a lack of refrigerant is detected
- This logic can also be used to verify refrigerant claims in service
- Allowing system indicators to predict if a loss has occurred, and provide a limit on the volume of refrigerant that should be allowable
- Cost control potential for customers and warranty

# Integration and Learning from Big Data

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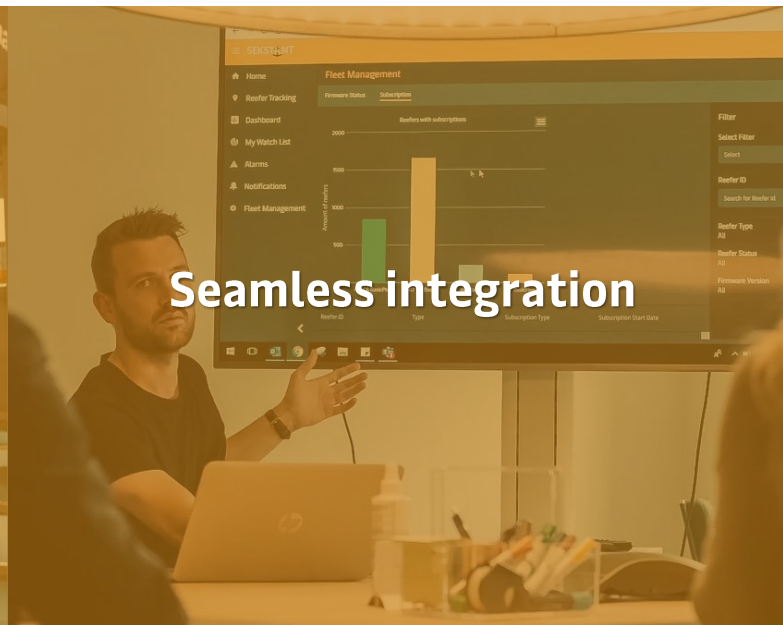


# +160,000

**Star Cool reefers are Sekstant equipped across 20+ customers**



**Efficient operation**



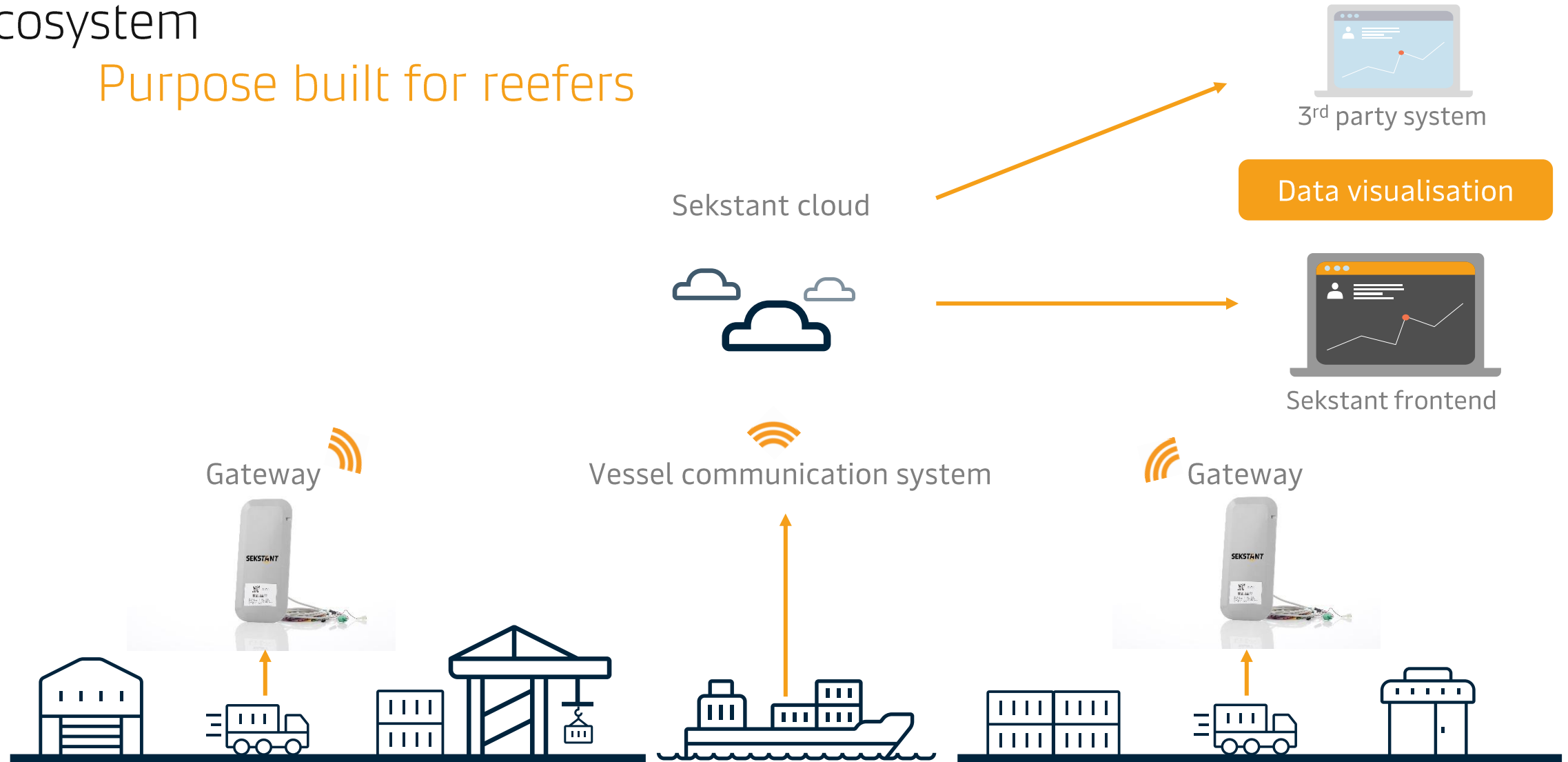
**Seamless integration**



**Fast feedback loops**

# Ecosystem

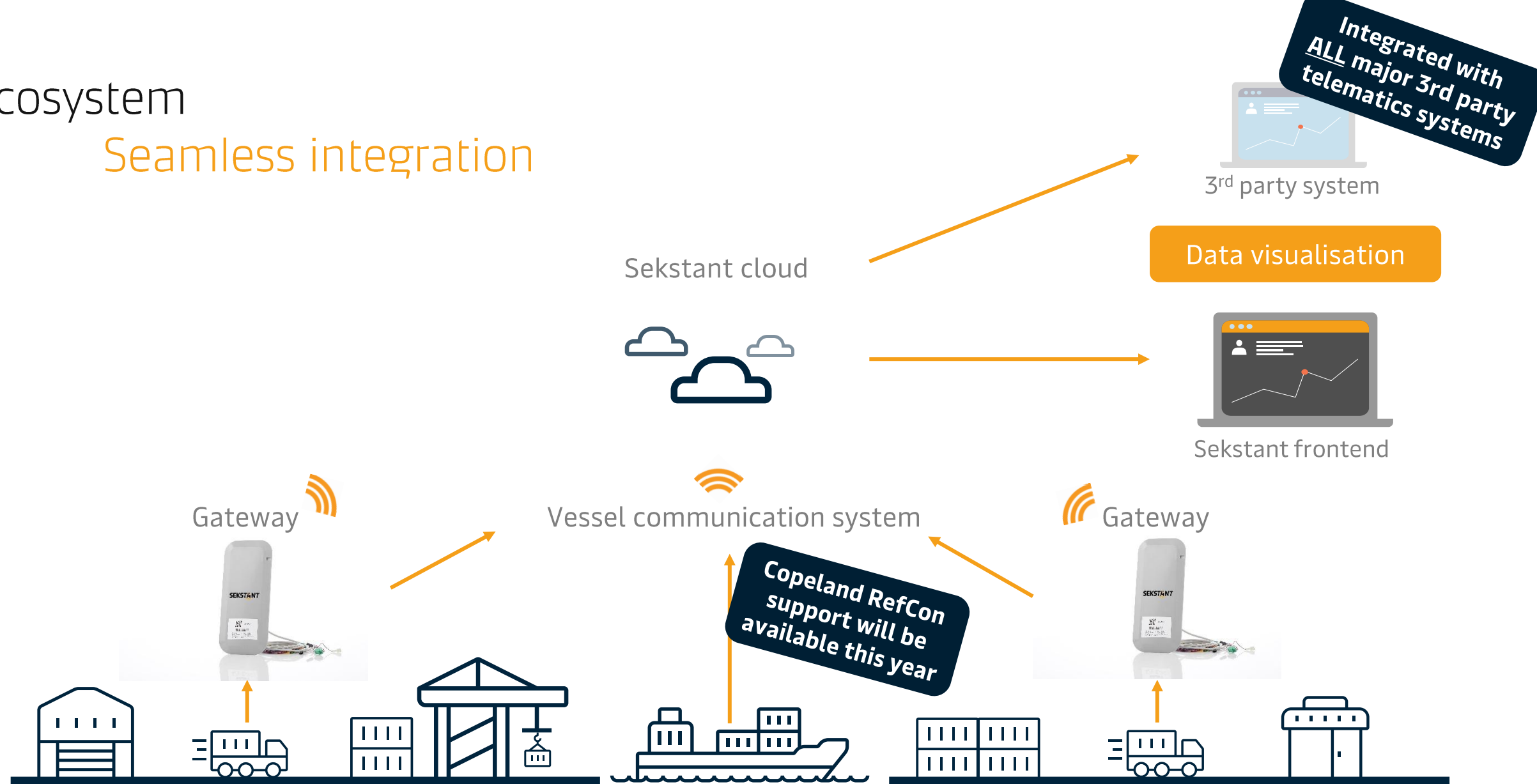
Purpose built for reefers





# Ecosystem

## Seamless integration



# Measuring the insulation value of the Reefer Box

Through data gathering, we can estimate the insulation capability of the reefer box from energy input from the reefer unit.

A newly produced MCI Box will have an insulation value of **42 watt per Kelvin**.

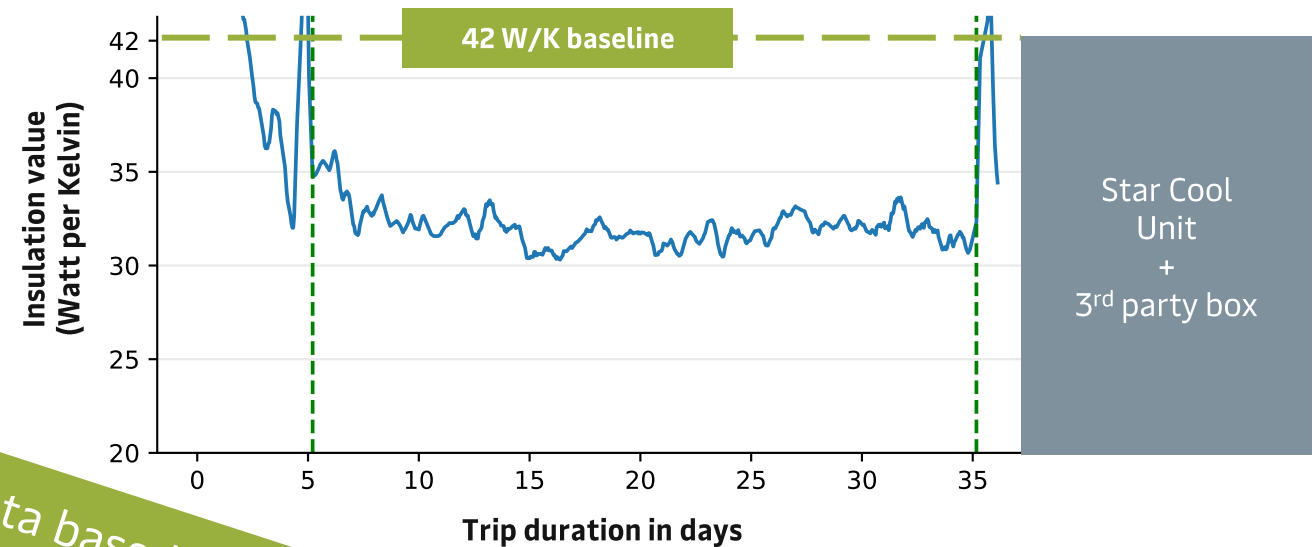
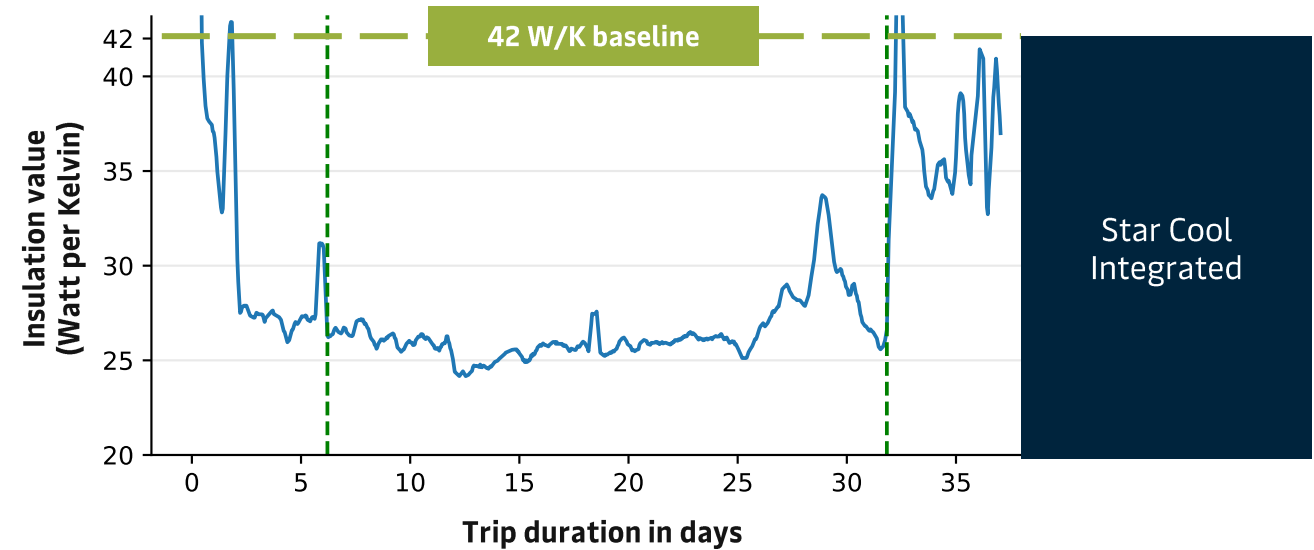
## Learnings

A reefer insulation performs better while stowed on vessel!

Input into potential energy savings.

Quality measure of MCI boxes of general fleet and over time.

Potential usage in out-fleet strategy and quality control of impact damage repairs.



Data based on  
**+150 trips**



# New features

**01**

Standard integration  
with 3rd party vendors

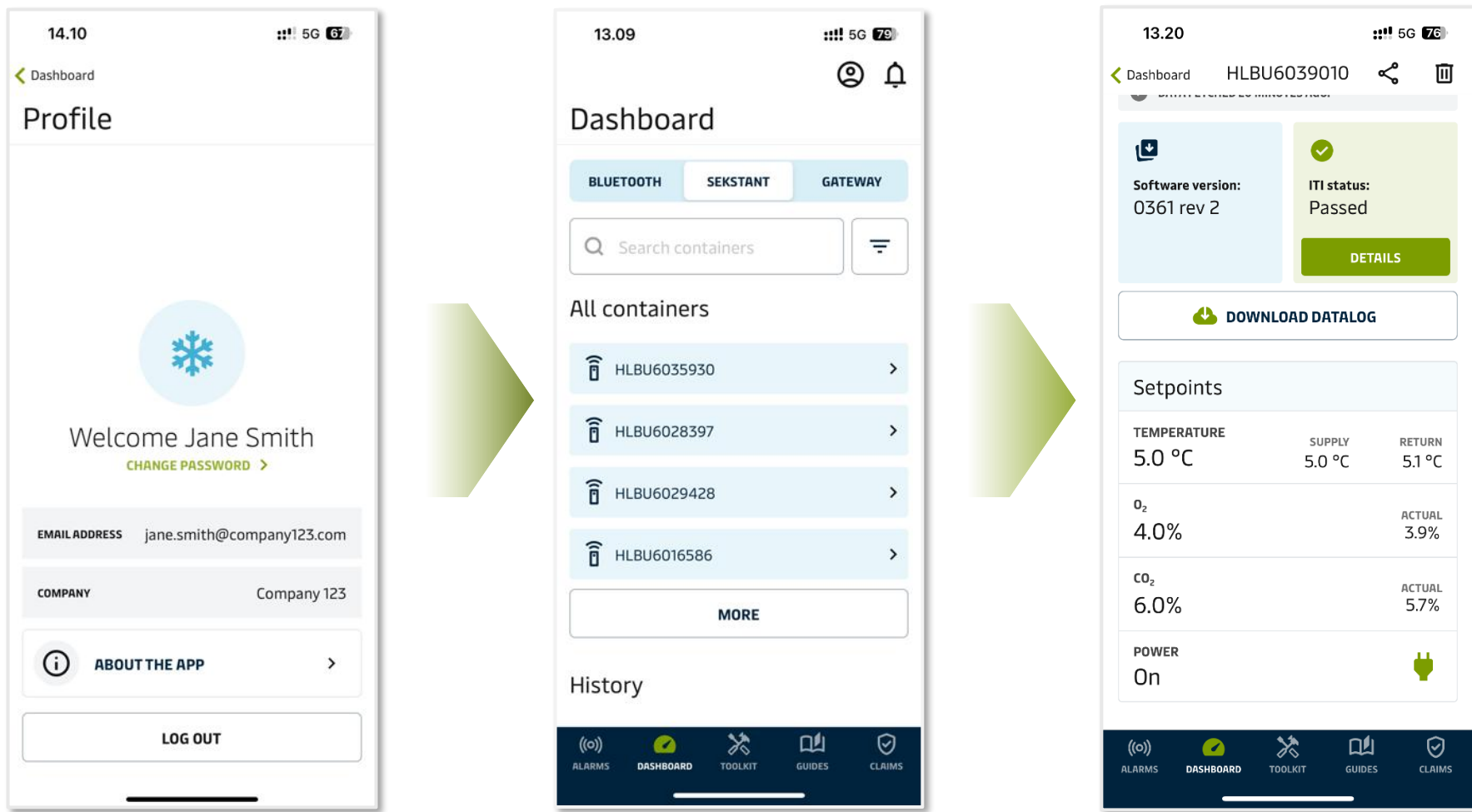
**02**

More intuitive software  
update of the controller –  
automatic software update

**03**

Mobile access to  
Sekstant data – from  
Star Cool Service App

# Mobile access to Sekstant data





# MCI will trial repair guidance with service providers

Based on MCI quality information and Sekstant data, MCI has developed an AI algorithm that can guide technicians towards which repairs they should perform.



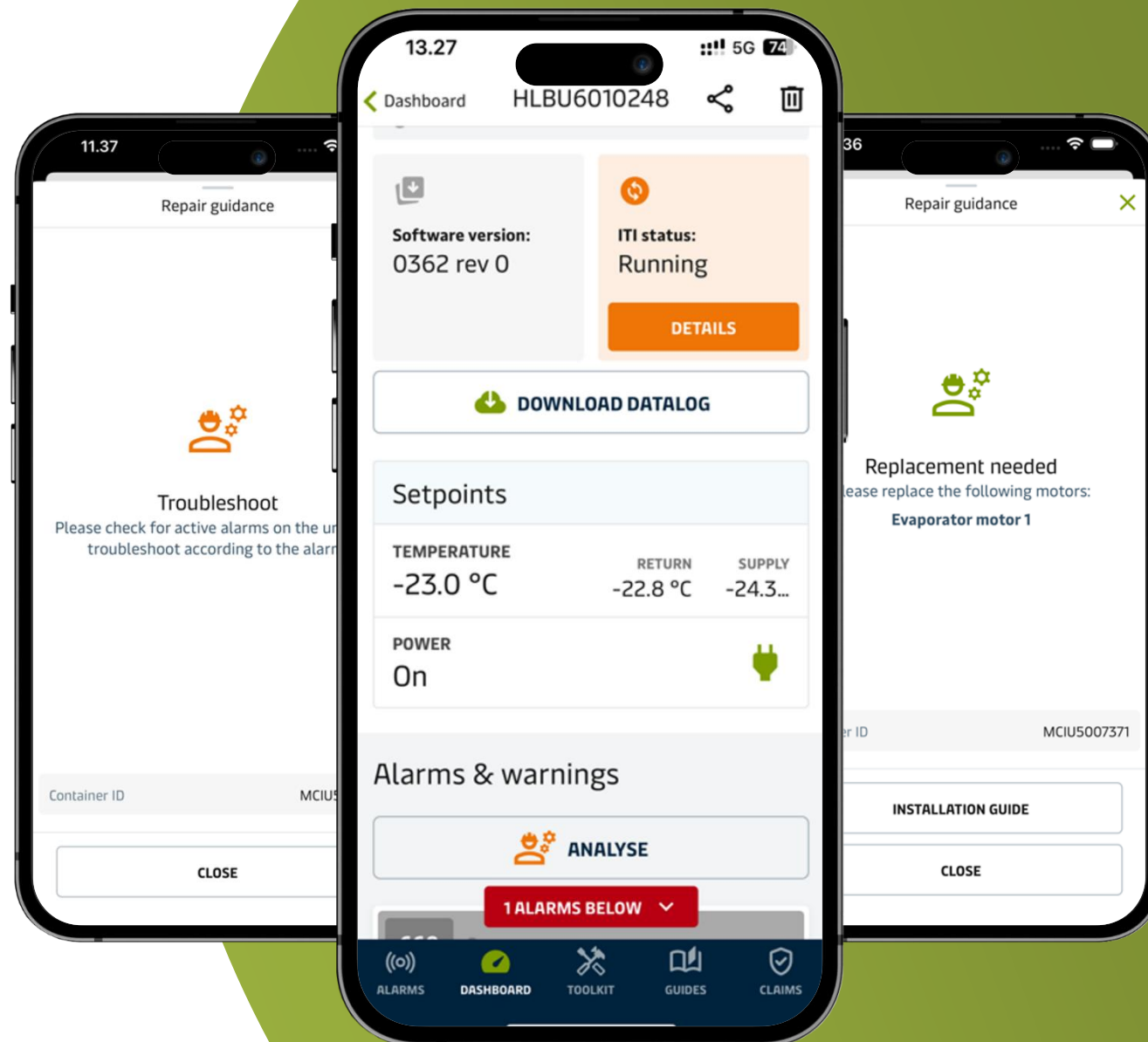
## Better Repairs Faster

Less trained technician will perform more correct repairs



## Troubleshooting

Less time spent on troubleshooting equipment

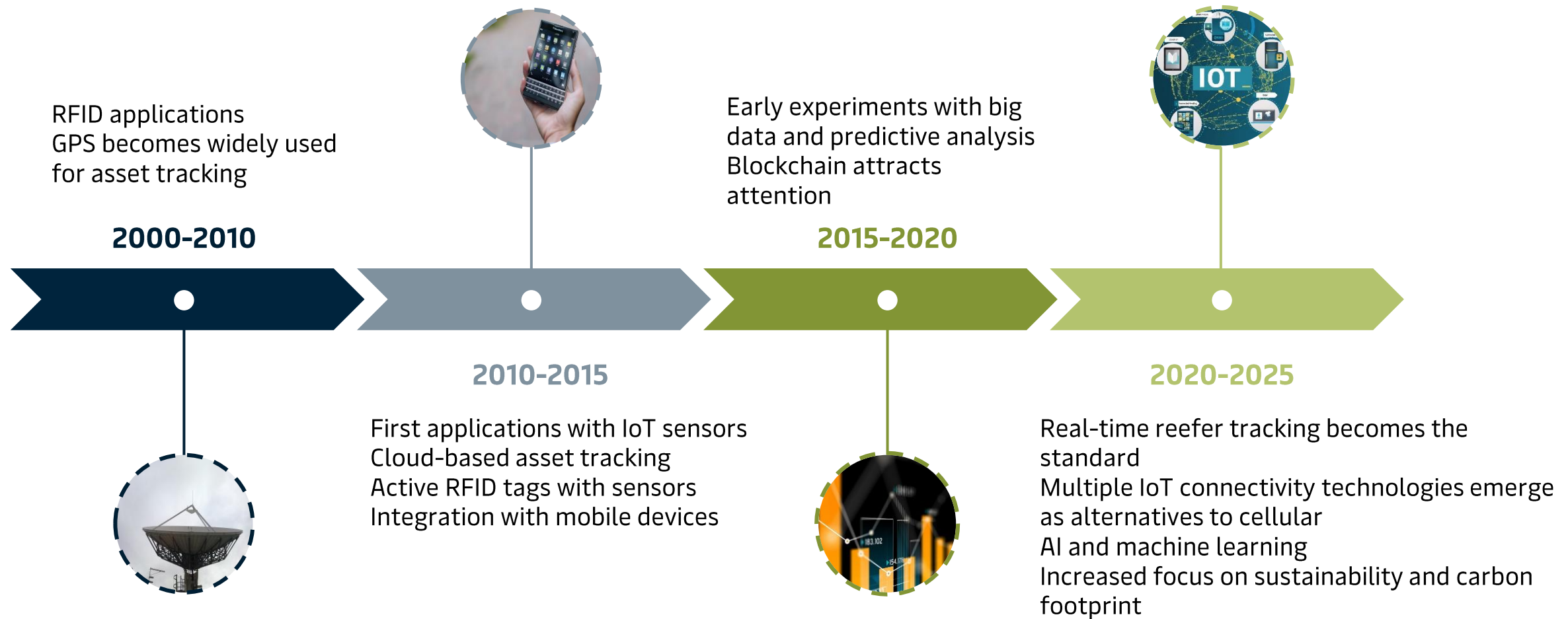


# Reefer Operation of the Future

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# Technologies shaping reefer operations





# How can technology be used to further improve Star Cool operations?

## Fraud Prevention

*Protecting against tampering, theft and fraudulent activities using technology and security protocols*



Tamper detection using sensors



Serial number management



Intrusion detection in cargo space and machine

## Process Optimization

*Enhancing efficiency in handling, maintenance, and logistics through automation, real-time monitoring, and streamlined workflows*



Data-driven decision making



Mobile app for service technicians



Intelligent Trip Inspection (ITI)

## Documentation & Compliance

*Ensuring adherence to SOPs and industry regulations through processes, accurate record-keeping, and audit trails*



Accurately documenting energy consumption



SOP and work order compliance in service

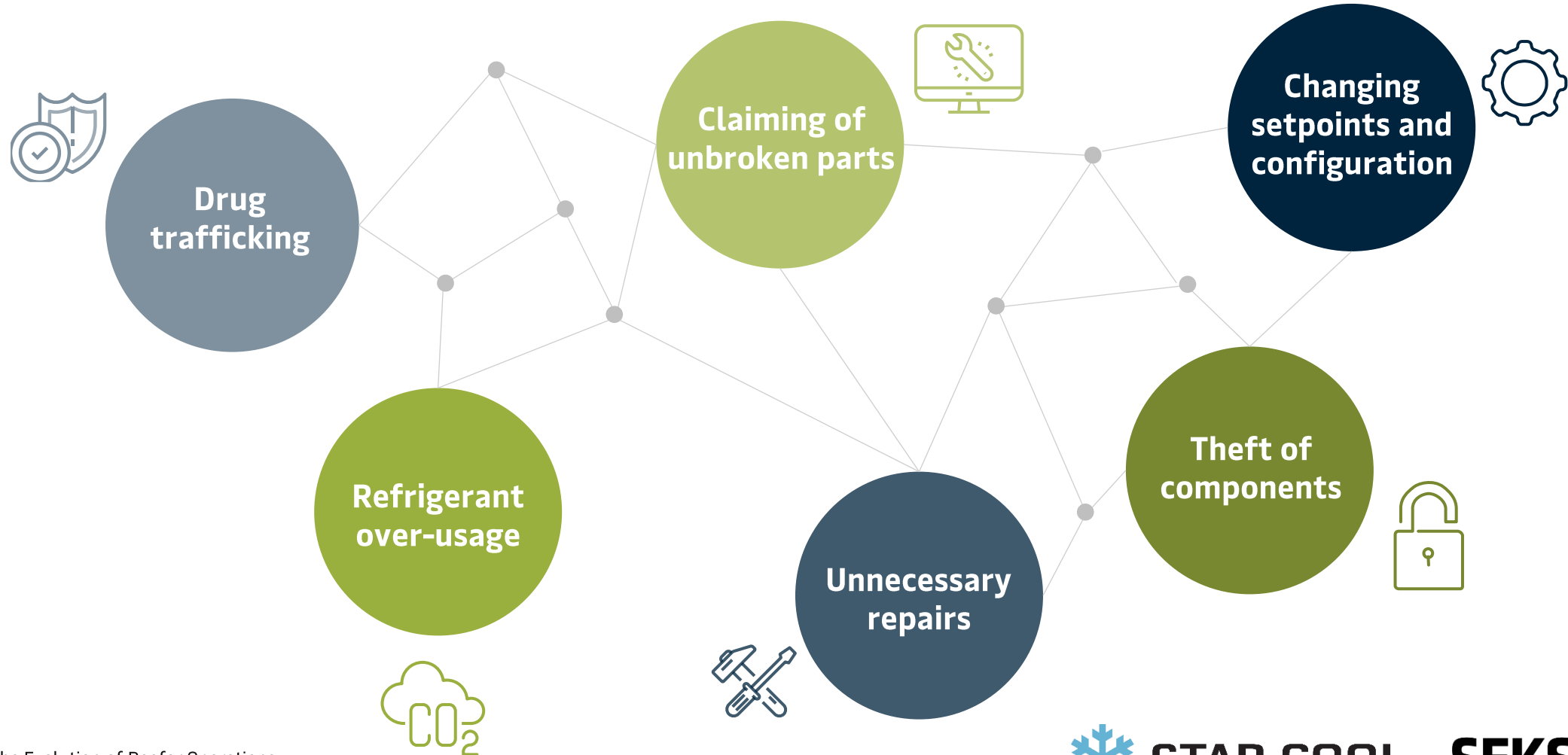


Usage-based charging and insurance schemes



# Fraud prevention

What are the most common types of fraud in operations?



# Process optimization

*Streamline operations, reduce downtime, improve resource allocation*



## **New opportunities:**

- Service provider access to Sekstant data
- Repair guidance in Sekstant App
- Calibration of USDA sensors using Sekstant App instead of laptop

## **Possibilities for the future:**

- Reefer health indication
- Advanced spare parts inventory management
- Automatic, digital work orders and checklists
- Seamless configuration of controller settings after repairs



# Documentation & Compliance

- Tamper-proof datalogs and cold treatment reports
- Authentication required for making certain changes to the reefer controller
- Accurate reports on energy consumption
- Serial numbers and work order management
- Usage-based insurance
- Service staff training records and certification for certain types of repairs/operation





# Moving into a digitized cold-chain future together