Needs Analysis - i4 Combination CO and Smoke Detector

OVERVIEW

Project: i4 CO and Smoke Detector Launch
Project Description: There are no other system-connected combination CO and Smoke detectors in the commercial and residential spaces. This course will help build awareness of the new product along with it's value.
Objectives:
- Business Goal: Assist with meeting the revenue goal of $500k in the first year.
- Project Goal: Prospects will understand what the new product is and what value it provides while providing Continuing Education Units (CEUs).

Audience: Distribution partners, dealers, end-users, and installers.
Constraints:
- No budget
- 3-week development period
- 30-minute training course
- Must be ready 1 week after product launch

Roles:
- Sponsor: Mary Foster (Product Offering Leader)
- Project Lead: Dave Maas (instructional Designer)
- SMEs: Doug Hoeferle (Product Offering Mgr.)

DATA COLLECTION PLAN

Sources:
- Interview with Product Offering Manager
  - Purpose: gain knowledge of product feature and benefits
- Interview with Channel Marketing Manager
  - Purpose: gain knowledge of how best to deliver message to prospects
- Interview with Lead Engineer
  - Purpose: gain knowledge of product installation, testing, and maintenance
- Survey existing customers
  - Purpose: gather VOC (prospects needs, how the new product can provide solutions, and best delivery methods of information)
- Materials:
  - Installation manual
  - Data sheet
  - Presentation to Sales team
  - Product brochure
  - Wiring diagram

DATA ANALYSIS

Data analysis is completed to answer there 3 specific questions:
1. Dp prospects understand the product features?
2. Do prospects understand the product benefits/value?
3. Do prospects have a general understanding for product installation, testing, and maintenance?

Product Features
- Single device that detectors CO and smoke
- Built-in sounder
- 2- and 4-wire versions

- Photoelectric smoke sensor and an electrochemical CO sensor
- “EZ Walk” feature
- RealTest function for CO test
- SENS-RDR smoke sensitivity
- 4 LED indicators
- 10-year CO cell life
- Field-replaceable CO sensor

Product Benefits/Value
- Reduces the amount devices needed to protect a building/house
- Increases CO sales (overcome homeowner objections, holistic life safety solution)
- Simplifies installation (less equipment and wire; lower install time and money)
- Extends RMR for security service subscribers
- Reduces nuisance alarms

Product Installing, Testing, and Maintenance
- Install: do’s and don’ts
- Wiring: panel to fire panel, module to detector, detector to detector
- Testing: EZ Walk, SENSR-RDR, and RealTest
- Maintenance: CO cell replacement, smoke camber cleaning

RECOMMENDATIONS

Training Solution:
Create an online self-paced e-learning course for distributors, dealers, end users, and installers that meets the following learning objective:

> By the end of this 30-minute course, learners will be able to explain the features, benefits/value, and technical details of the i4 Combination CO and Smoke system to their prospective customers in a 10-minute conversation to increase sales.

Supporting Goals:
- Locate support materials on company website
- Understand how both inside and outside sales can promote course
- Obtain CUE for course

Non-Training Solutions:
- Promote course through:
  - Email communications
  - Website
  - Sales
  - Webinars
  - Social media
  - Tech support

Outline: i4 Combo CO and Smoke Detector

- Intro
  - Learning objective
  - Course overview
  - Scenario
  - What is i4?
- Features
  - Single device that detectors CO and smoke
  - 2- and 4-wire versions
  - Photoelectric smoke sensor and an electrochemical CO sensor
  - 4 LED indicators
  - 10-year CO cell life and field-replaceable CO sensor
- **KNOWLEDGE CHECK**
- Benefits/Value
  - Reduces the amount devices needed to protect a building/house
  - Increases CO sales (overcome homeowner objections, holistic life safety solution)
  - Simplifies installation (less equipment and wire; lower install time and money)
  - Extends RMR for security service subscribers
  - Reduces nuisance alarms
- **KNOWLEDGE CHECK**
- Install
  - Do's
  - Don'ts
- Wiring
  - Module to fire panel
  - Module to detector
  - Detector to detector
- Testing
  - "EZ Walk" feature
  - RealTest function for CO test
  - SENS-RDR smoke sensitivity
- Maintenance
  - CO Cell
  - Smoke Chamber
- **KNOWLEDGE CHECK**
- Summary
  - Value of i4
  - Where to find resources
- Quiz
  - 10 questions

Storyboard (Test): I4 Combo Co and Smoke Detector

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
INTRO: Learning objective	Welcome to an introduction to i4, a system-connected combination carbon monoxide and smoke system. Click the Begin button to start the course.	An Introduction to i4	I4 detector and module and i4 logo.	
INTRO: Course overview	In this course, you will have the opportunity to learn what the unique i4 system is and how it delivers the most advanced and cost-effective carbon monoxide and smoke detection solution available. You'll also learn some of the technical basics of how to install, test, and maintain the i4 system. By the end of the course, learners will be able to explain the features, benefits, and technical details of the i4 Combination CO and Smoke system to their prospective customers to help boost sales. Upon completion, you will have the opportunity to take a quiz to test your knowledge and earn a certificate indicating course completion.	• Product Overview • Product Features • Value to your Business • Installing the System • Testing the System • Maintaining the System	n/a	
INTRO: What is i4?	So what is the i-4 system? Let's do a quick overview. Available in both 2 wire and 4 wire models, the i-4 detector is the first, low-voltage combination, carbon monoxide and smoke detector for use with conventional security and fire panels. The i-4 system is made up of the detector and a panel interface module that enables connection of detectors to the module using only 2 or 4 wires.	n/a	Detector and module with i4 logo	
FEATURES: Single device	the i-4 combines CO and smoke detection into 1 device that is not much larger than our i-3 smoke detector. This integrated approach is important to homeowners because many feel that multiple devices on the wall or ceiling will make their home look cluttered or unattractive. This leads them to object to including CO detection along with smoke detection in their home security systems. i-4's combination approach overcomes homeowner objections to 2 devices on the ceiling or a separate device located on the wall…helping you to increase your sales of CO monitoring products and services.	n/a	Animation of detector and module with i4 logo	
FEATURES: Photoelectric and electrochemical to reduce nuisance alarms	The intelligence of the i-4 detector also reduces smoke and carbon monoxide nuisance alarms by utilizing photoelectric smoke detection with smoothing algorithms and drift compensation and an accurate and reliable electrochemical carbon monoxide cell.	i4 Detector • Photoelectric smoke detection with smoothing algorithms and drift compensation • Electrochemical CO cell • **Reduces nuisance alarms**		

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
FEATURES: i4 Module	The other part of the system, the i-4 Interface Module, integrates up to 12 compatible devices to the security panels you are using today. It also gives added functionality to the system and allows for easy retrofits of existing installations without the need to pull additional wires to each device. The module works with our i-3 series smoke detector models that have built-in thermals and sounders, so your installations aren't limited to only combination detectors.	i4 Module • Integrates up to 12 devices to the panel • Adds functionality • Simplifies retrofits • Compatible with i3 Series smoke detectors - Thermal with sounder models (2WTA-B and 4WTA-B)	I4 module	
FEATURES: 4 LED indicators	The i-4 detector and module include several LED indicators that provide you instant visual information on what is happening with individual detectors and the loop. The green, red, and blue LEDs, indicate what is happening at the detector, and are also mirrored on the module. A blinking green LED tells you when the device or devices have power and are operational. A solid red LED indicates when there is a smoke event, while a blinking red LED indicates a smoke trouble condition. A solid blue LED indicates when there is a carbon monoxide event, while a blinking blue LED indicates a carbon monoxide trouble condition. The detector's purple LED is an Infrared LED that enables smoke sensitivity testing. Finally, the module's yellow LED indicates when you are in EZ Walk mode or if there is a wiring fault on the loop.	• Green LED (Blink only) Operational • Red LED (Solid/Blink) Smoke Alarm/Trouble • Blue LED (Solid/Blink) CO Alarm/Trouble or RealTest • Purple LED (Detector only) IR Sensitivity Reading • Yellow LED (Module only) EZ Walk or Wiring Fault	Detector and module, with animation of blinking lights	
FEATURES: 10-year CO cell life and field-replaceable CO sensor	The i-4 detector's carbon monoxide cell has a 6 year life. 30 days prior to end of life, an end-of-life timer will send a maintenance signal to the panel. The blue LED on both the detector and the module will blink, indicating a carbon monoxide trouble condition. If the trouble condition is not addressed, after a period of time an intermittent chirp will notify the homeowner. The i-4's field replaceable carbon monoxide cell can be replaced in under one minute. We will discuss how to replace the carbon monoxide cell in the maintenance section of this training.	CO Cell • 6-year CO cell life • CO end-of-life timer with chirp • Field replaceable	CO cell being removed	
KNOWLEDGE CHECK				

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
BENEFITS/VALUE: Reduces the amount devices needed to protect a building/ house	The house in our example includes a lower level with a fuel-burning appliance, a main level, and a second floor. This type of home would typically require 6 smoke detectors and 3 carbon monoxide detectors on 1 zone. The system would also require that all sounders activate in the event of a smoke or carbon monoxide alarm. So what does this typical application translate to in terms of devices and materials using separate smoke and carbon monoxide detectors? 3 carbon monoxide detectors, 6 smoke detectors, 9 back boxes to cut in, 4 spools of wire to run, and 1 relay module to install for a total of 23 parts. So how about using the i-4 system? i-4 significantly reduces the number of parts and associated labor required for this installation by combining the smoke and carbon monoxide detectors into a single device and using the i4 module to reduce the number of wires required from 8 to 2 or 4. This reduces the total number of parts to 16.	• 6 smokes • 3 CO detectors • 1 zone • **All sounders activated**	Picture of a house Animation of equipment being reduced	
BENEFITS/VALUE: Increases CO sales (overcome homeowner objections, holistic life safety solution)	The i-4 system makes it much easier for you to sell carbon monoxide detection services. Because it integrates the carbon monoxide and smoke detector in a single device, carbon monoxide detection can be added to any smoke detection system with no additional aesthetic impact, overcoming homeowner objections. i-4 also enables you to offer a holistic security and life safety solution that can provide homeowners with considerable peace of mind by protecting them from three of the most common dangers in the home: intrusion, fire, and deadly carbon monoxide gas.	Easier sale • Overcomes homeowner objections • Allows a holistic Life Safety sales approach with homeowners	Growth graphic	
BENEFITS/VALUE: Simplifies installation (less equipment and wire; lower install time and money)	Installing one device instead of two greatly simplifies installation of the i-4 system because it means you'll use less junction boxes and pull up to 75 percent less wire than when installing two separate devices. This significantly lowers your installation time and cost.	Two devices in one • Use less junction boxes • Up to 75% less wire than two separate devices • Lower installation time and cost	Exploded view of detector and junction box	
BENEFITS/VALUE: Extends RMR for security service subscribers	i-4 can also provide more value to your business by increasing customer retention. Studies have shown that customers who include Fire or carbon monoxide detection with their security system are less likely to cancel their service. That means extended recurring monthly revenue for you and your business.	• Customers less likely to cancel their security service • Extends RMR	Picture of security camera	
BENEFITS/VALUE: Monitored	The i-4 system's intelligence enables it to transmit distinct carbon monoxide or smoke alarm signals to the panel while only using 2 or 4 wires, allowing for the appropriate emergency response from the monitoring station.	• Transmits distinct CO or smoke alarm signal to the panel	Picture of i4 brain	
KNOWLEDGE CHECK				

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
INSTALL: Do's	First, let's talk about detector placement. We recommend carbon monoxide detection on every level of the house, within 10 feet of all sleeping areas, and in any room that contains a fuel-burning appliance. So looking at this house, with the i-4 system, we would recommend 1 combination detector on the main floor, 1 in the basement, 1 in the upstairs hallway (if it's within 10 feet of all bedrooms) and 1 in the top bedroom. Within the bedrooms and other living spaces, compatible i-3 smoke detectors could also be used. The i-4 detector can be placed on the ceiling or wall. We expect most installations will be on the ceiling. Some people think carbon monoxide detectors need to be placed close to the floor. This is incorrect. Based on its molecular weight, carbon monoxide is actually slightly lighter than air. When you consider the behavior of carbon monoxide gas, it typically rises from the point of production, a heat event, and then mixes evenly throughout the air as it cools. When placing the detector on the wall, it should be at least four inches down from the ceiling. When placing the detector on the ceiling, it should be at least 12 inches from any wall and 3 feet from the peak if in a vaulted ceiling location. We always recommended that you consult NFPA 72 and your local authority having jurisdiction for the placement and spacing requirements that apply to your locale.	• On the wall or ceiling: • Wall: No less than 4 inches down from ceiling • Ceiling: At least 12 inches from any wall. In a vaulted location, 3 feet from the peak • Consult NFPA 72 & local AHJ for placement & spacing	Thumbs up photo	
INSTALL: Don'ts	Now that we've looked at some placement dos, here are some don'ts. Remember, it is never recommended to place a detector: Within 10 feet of any cooking appliance; directly above a sink, stove or oven; next to a door or window; where airflow can be obstructed by furniture or curtains; outside or in a garage; or where dirt or dust can collect and block the sensor	• Within 10 feet of any cooking appliance • Directly above a sink, stove or oven • Next to a door or window • Where airflow can be obstructed by furniture or curtains • Outside or in a garage • Where dirt or dust can collect and block the sensor	Thumbs down photo	

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
WIRING: Module to fire panel	Now, let's look at wiring the module. The i-4 module uses 3 zones on the panel: a smoke zone, a CO zone and, for 2-wire systems, an optional maintenance zone. This maintenance zone allows distinct maintenance signals, such as dirty detector, or a freeze trouble condition. Remember, by code, carbon monoxide alarms must be reported on their own, non-fire zone. CO alarm, CO trouble or CO end-of-life will all be reported on the non-fire, CO zone. When wiring the i-4 module to the panel. You will wire the smoke alarm contacts, CO alarm contacts, and maintenance contacts. Wiring the maintenance zone allows the panel to receive a smoke maintenance signal which indicates a detector that requires cleaning, a detector that needs replacement, or a detector that is in freeze trouble. Wire the Smoke Power from the panel to the module similar to wiring a 4-wire smoke detector. The module needs Smoke power that resets when clearing a smoke alarm. i-4 detectors do not require non-resettable power for carbon monoxide because they preserve their carbon monoxide alarm state over a smoke alarm reset. The module has a dip switch that installers can use to configure the system. The first dip switch location is used to configure how the module will sound detectors in the Temporal 3 pattern. When in bell mode, connect the module to the panel bell out circuit. When in trigger mode, connect the module to a relay on the panel that indicates the panel is in smoke alarm. The second dip switch location is for 2-wire maintenance reporting. You can select to report maintenance or trouble issues to their own maintenance zone, or elect to report them to the smoke zone. The default setting is to report to the smoke zone. All panels can be programmed with auxiliary relays that activate upon an alarm condition. These provide outputs from the panel that can be connected to the module's CO trigger and smoke trigger inputs. The C-O trigger input allows a single module to have C-O silence, hush capability and allows multiple module installations to have all sounders activated in Temporal 4 pattern in the event of a CO alarm on any zone. The smoke trigger/ bell input allows a single module to have smoke hush capability and it allows multiple module installations to have all sounders activated in the Temporal 3 pattern in the event of a smoke alarm on any zone. This input can be connected to either the panel auxiliary relay or panel bell out circuit depending on the setting of the first dip switch. For instructions on programming the panel's auxiliary relays, please refer to the panel manufacturer's instructions for programming.	n/a	Animation showing module wiring	

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
WIRING: Module to detector	Now let's look at how the i-4 detector is wired to the module on a 2-wire system. The IDC terminals on the module are wired to the detector power in positive and negative terminals. The detector is then wired to the next detector on the loop and at the end of the loop uses either an end-of-line resistor or can be wired back to the module with the optional Style D terminals.	n/a	Animation showing module/detector wiring	
WIRING: Detector to detector	When additional detectors are included on the loop, you'll need to perform a detector to detector connection. The first detector is wired to the next detector and then the next and so on, on the loop. And again, at the end of the loop, you can use either an end-of-line resistor or the loop can be wired back to the module with the optional Style D terminals. Once again, when wiring the final detector at the end of the loop, you have the option to use an end-of-line resistor. Or you can wire back to the module with the optional Style D terminals. Lastly, to complete the installation wiring, the panel end-of-line smoke and CO resistors are connected to the module. For further instructions on wiring, please refer to the module and detector installation manuals.	n/a	Animation showing detector wiring	
TESTING: "EZ Walk" feature	First, let's take a look at how to perform the EZ walk loop verification test. Immediately upon system startup or 5 minutes after startup, to enter EZ walk mode, depress the test switch located on the module. This will put the system into EZ walk mode for 5 minutes. Each additional time you press of the test switch, you will add an additional 5 minutes to the test. The yellow LED on the module blinks to indicate the system is in EZ walk mode. At each detector, check to make sure the green LED is double-blinking. This indicates that the detector has been wired properly. If a detector does not double-blink green, check the wiring and restart the test. The system will automatically exit EZ walk mode when the test period has timed out.	• Step 1: Depress test switch on module. Blinking yellow LED Indicates EZ Walk mode. Each additional press adds 5 minutes. • Step 2: At each detector, check to make sure the green LED is double-blinking. • Step 3: The system will automatically exit EZ Walk mode.	Detector photo	
TESTING: RealTest function for CO test	RealTest is the i4 system's functional test to meet NFPA 720: 2010's functional test requirement for the carbon monoxide sensing cell. Before performing Realtest, please be sure to disable the panel or notify the monitoring station. To perform realtest, first depress the test switch on the detector. The Blue LED will blink indicating the detector is in test mode. Once the device has entered realtest mode, spray a small amount of canned CO into any of the 3 sensing holes on the front of the detector. The detector will then go into CO alarm with the blue LED lit within 10 seconds. This verifies the functionality of the carbon monoxide sensing cell.	• Step 1: Depress test switch on detector. • Step 2: Spray a small amount of canned CO into any of the 3 sensing holes. • Step 3: Detector will go into CO alarm within 10 seconds with blue LED lit.	Animation of testing	

SECTION	VO/AUDIO	TEXT	GRAPHICS	NOTES
TESTING: SENS-RDR smoke sensitivity	To perform smoke sensitivity test for the i-4, use the SENS R-D-R remote sensitivity reader (sold separately). First, press the round button to turn on the SENS R-D-R. It will display “READY” on it’s readout screen when on. Next, aim the SENS R-D-R at the detector’s Infrared LED. Wait for a beep to get the reading. The SENS R-D-R will then indicate the detector’s sensitivity to smoke on it’s readout screen.	• Step 1: Press the round button to turn on the SENS-RDR, it will display “READY” when on. • Step 2: Aim the SENS-RDR at the detector’s IR (purple) LED. Wait for a beep to get the reading. • Step 3: Reading indicated on SENS-RDR readout screen.	SENS-RDR photo	
MAINTENANCE: CO Cell	The life of the i-4 detector’s electrochemical carbon monoxide cell is 6 years. An i-4 carbon monoxide cell that has reached its end of life can be easily removed and replaced in the field. When you need i-4 carbon monoxide replacement cells, they will be available for purchase through Security Distributors. To replace the CO cell, remove the detector from its base by turning counter-clockwise. Locate the replaceable CO cell on the underside of the detector. Using your fingers, depress the two tabs holding the replaceable CO cell in place and pull upwards. Press a new CO cell, model number REPL-CO, into position until the two tabs lock in place.	• CO cell life is 6 years • CO cell is field-replaceable	Photo of cell being removed	
MAINTENANCE: Smoke Chamber	The i-4 smoke chamber can be easily removed for cleaning. To replace the smoke chamber, turn the top cover counter-clockwise and gently pull upwards. You will now have access to the smoke chamber, which can be pulled out for cleaning. When complete, align the two arrows on the smoke chamber with the tabs on the detector to put the smoke chamber back in place. Put the top cover back in place by gently turning clockwise.	Smoke chamber can be easily removed for cleaning	Photo of chamber being removed	
KNOWLEDGE CHECK				
SUMMARY: Value of an i4 system	This concludes an introduction to i-4. You should now know the basics of the i-4 combination smoke and carbon monoxide detection system, including how it can bring value to your business while increasing the life safety of your customers. You should also know basic information on how to install, test, and maintain the i-4 system.	• Product Overview • Product Features • Value to your Business • Installing the System • Testing the System • Maintaining the System	I4 detector and module and i4 logo.	
SUMMARY: Resources	If you would like more information on the i4 system, please visit system sensor dot com forward slash i4. Also, you can contact your local System Sensor sales person or local security distributor for information on purchasing the i4 system.	n/a	Website screenshot	
QUIZ	You now have the option to take a quiz and test your knowledge. If you receive an 80 percent or higher on the quiz, you have the option to print a certificate that verifies your completion of this course. To take the quiz, please press the quiz button. Thank you for taking the i-4 an introduction training.	Take quiz	Button	

1) How many wires go from detectors on the i4 loop to the i4 module?
   a) 6 or 8
   b) 4 or 6
   c) 2 or 4
   d) 1 or 2

2) How many zones does the i4 detector use on a panel?
   a) 1 or 2
   b) 2 or 3
   c) 3 or 4
   d) 2 or 3

3) The i4 Module is an optional accessory in the i4 System.
   a) True
   b) False

4) The i4 CO sensing cell is field replaceable at end of life.
   a) True
   b) False

5) i3 smoke detectors on the i4 loop can provide a Temp 4 CO alarm.
   a) True
   b) False

6) Compatible i3 and i4 detectors on the loop sound the appropriate Temp 3 or Temp 4 alarm in unison.
   a) True
   b) False

7) The life of the electrochemical CO cell is 6 years
   a) True
   b) False

8) At CO end of life, the detector will immediately notify the panel and it will chirp after how many days?
   a) 1
   b) 15
   c) 30
   d) 60

9) The i4 can provide maintenance signals for both smoke and CO trouble conditions?
   a) True
   b) False

10) I4 combination detectors cannot be placed on the ceiling because CO is heavier than air.
   a) True
   b) False

11) By law, carbon monoxide must be reported on its own, separate non-fire zone.
   a) True
   b) False

12) When using multiple modules, the system can be setup so that when one detector sounds, all sound.
   a) True
   b) False