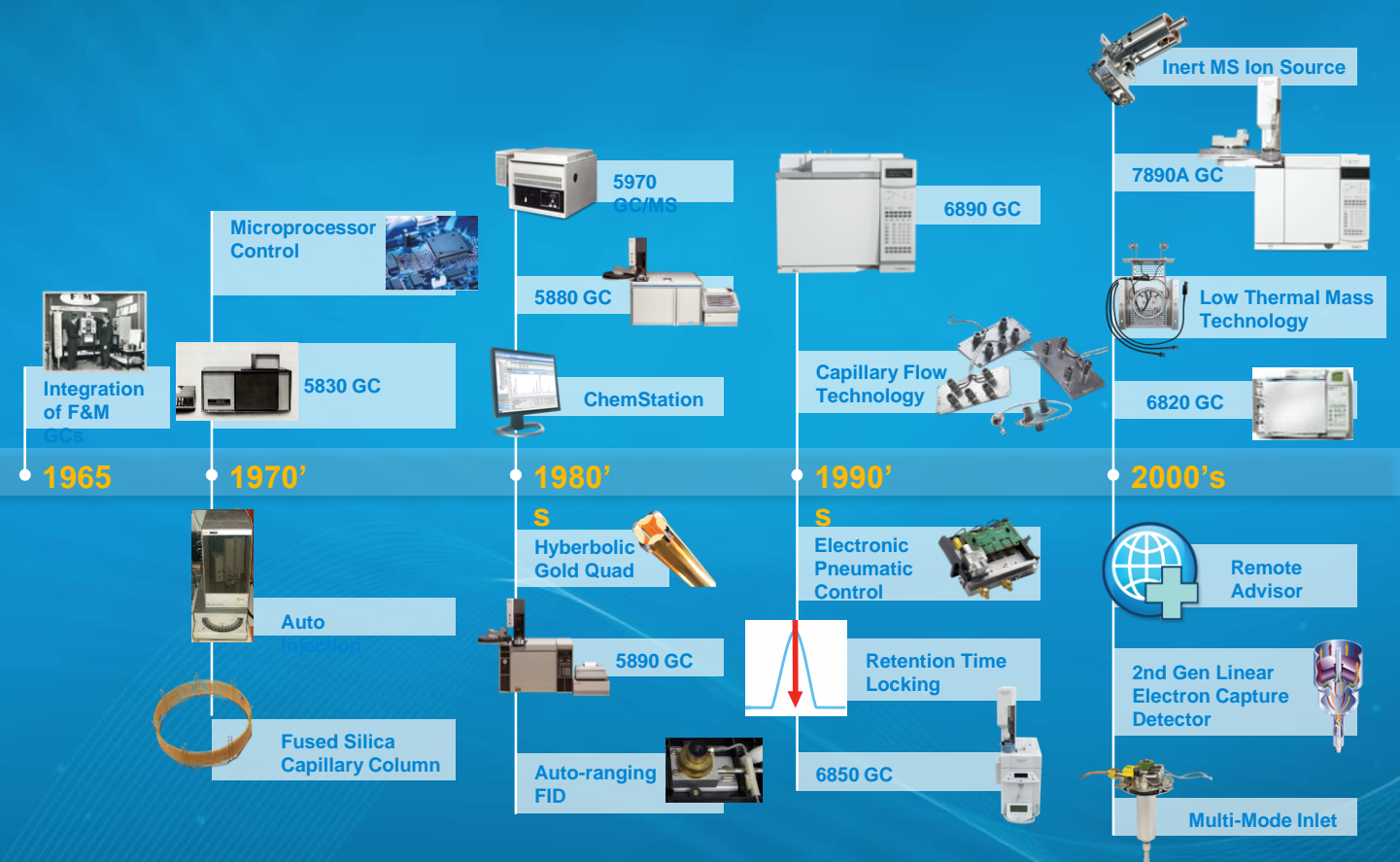


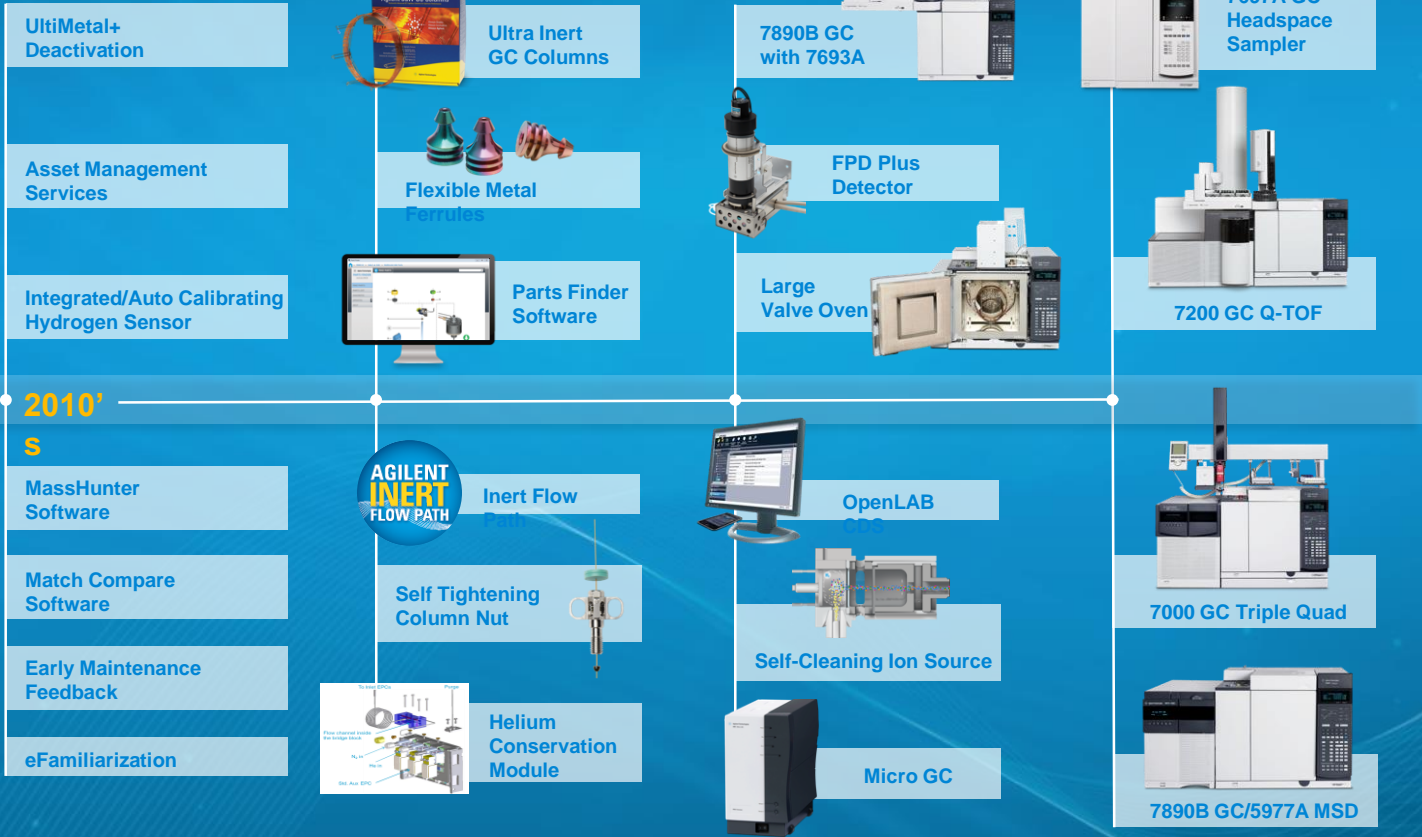
Innovative approach to  
Increasing GC & GC/MS  
Productivity.  
Next Generation, Intuitive GC

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Agilent Technologies









**AGILENT:  
DRIVING GC INNOVATION  
FOR OVER HALF A CENTURY**



**Agilent Technologies**

# Why is there a GC in your laboratory?

- Analyse samples
- Deliver Results
- Business or Legislative Requirement



# Challenges Facing the GC Lab

## Time for a Change



### Shifting Demographics

- Seasoned operators retiring; highly skilled replacements harder to find
- GC troubleshooting skills not necessarily located at point of use
- Operators assuming multiple responsibilities

### Challenging Economics

- Budgets squeezed, expectations increased



# The GC Community Voice

We listened and responded



## **Improve the User Experience**

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- Install and setup
- Use and maintain
- Make GC more practical for today's busy lab enterprise

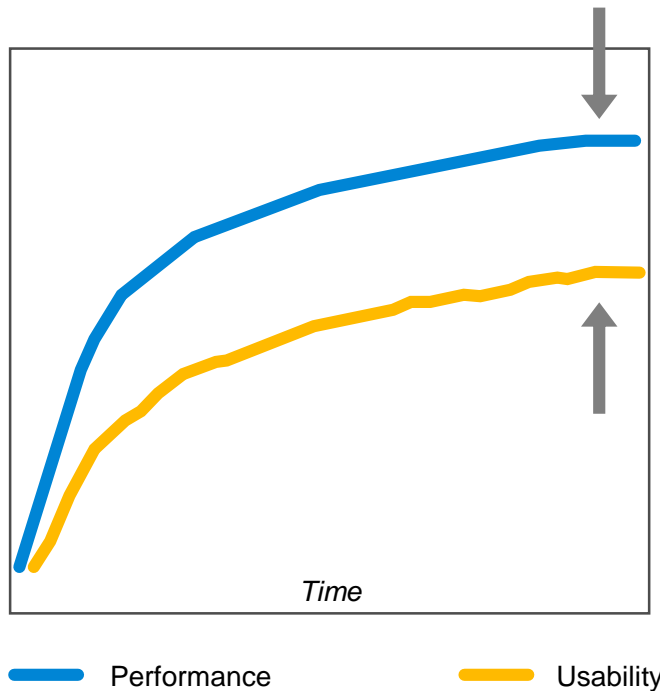
## **Prepare for Next Generation of Users**

---

*Its not only about better analytical performance – its about better lab outcomes*

# The GC Usability Gap

Usability lags features and performance



- Over the years, GC features and performance have matured and largely serve today's needs
- Usability has lagged and does not meet today's expectations, especially as expertise more scarce



# The GC Community Voice

Too much user intervention

## Operator Frustration

*“I’m spending too much downtime trimming columns, recalibrating, and maintaining GC systems.*

*That’s far too many billable samples we’re not running”*



# The GC Community Voice

Welcome to the real world



## Managing Challenge

*“Sometimes we can’t be sure what’s in a sample.*

*Our GC systems need to handle whatever comes through the lab, nasty or nice”*



# The GC Community Voice

Reduce complexity

## Optimizing Resources

*“We don’t have high level GC expertise at every site.*

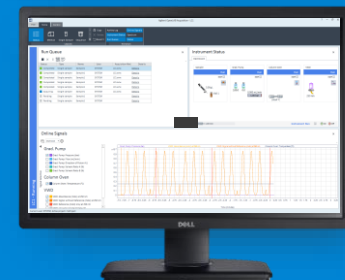
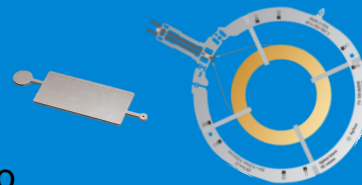
*So we need GCs that require less training and are easier to maintain, and troubleshoot from afar”*



“Make GC Easier...”

# Introducing Intuvo 9000 GC System

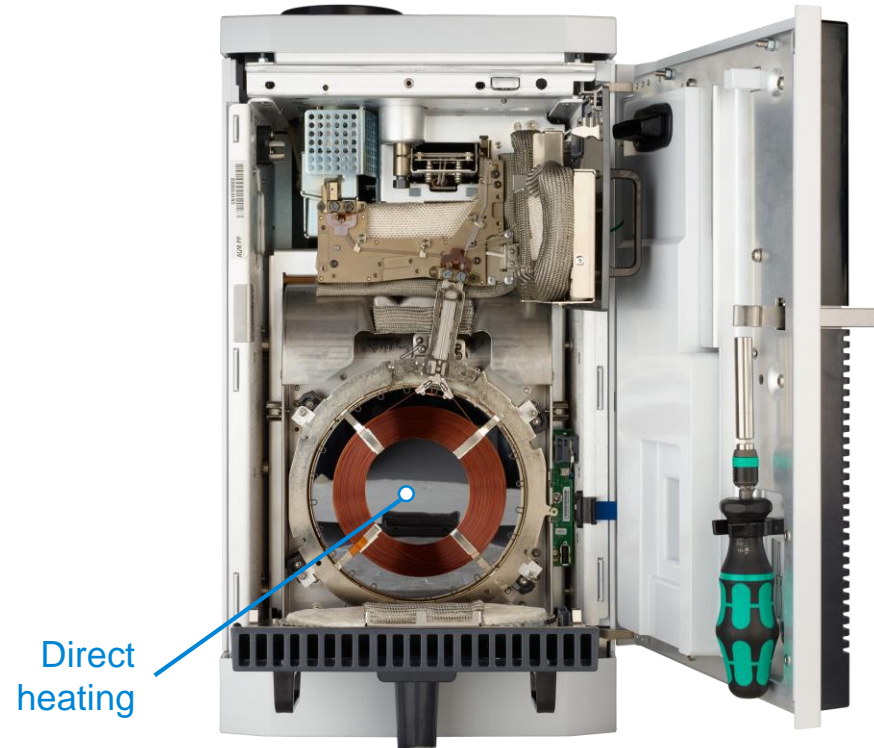
- A completely re-imagined integrated system of GC consumables, MS services and software
- New paradigm streamlining the way GC is done
- Better Business Outcome



Intelligent, Intuitive, Innovative. Intuvo.

# Innovating a New Path to GC Productivity

A whole new way to GC





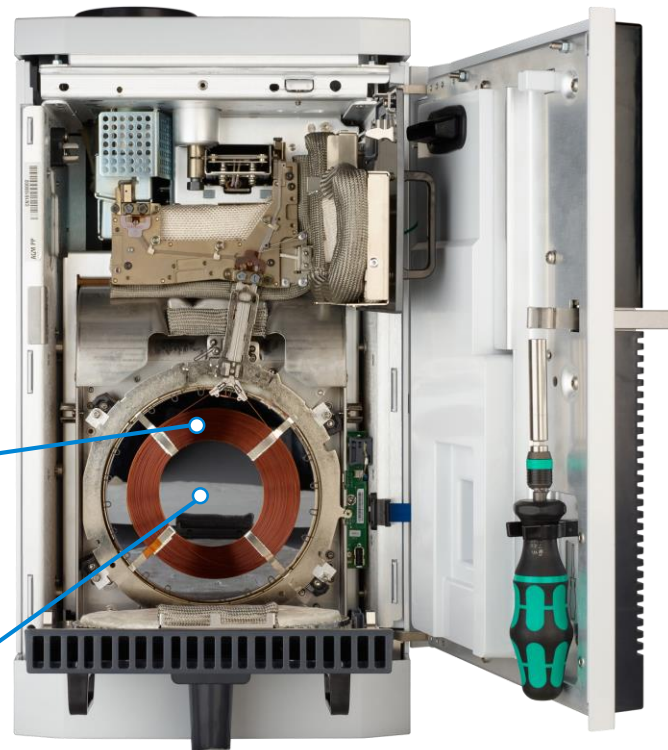
# Innovating a New Path to GC Productivity

A whole new way to GC



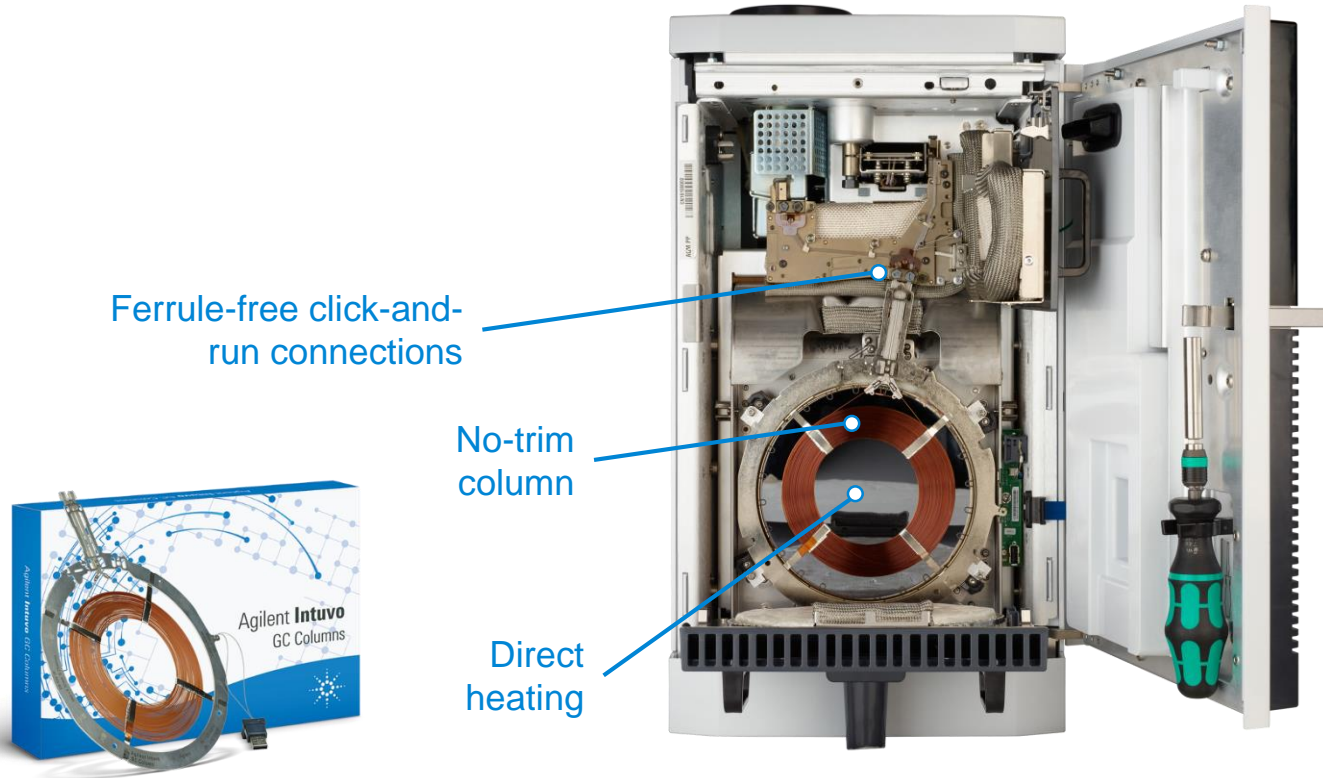
No-trim  
column

Direct  
heating



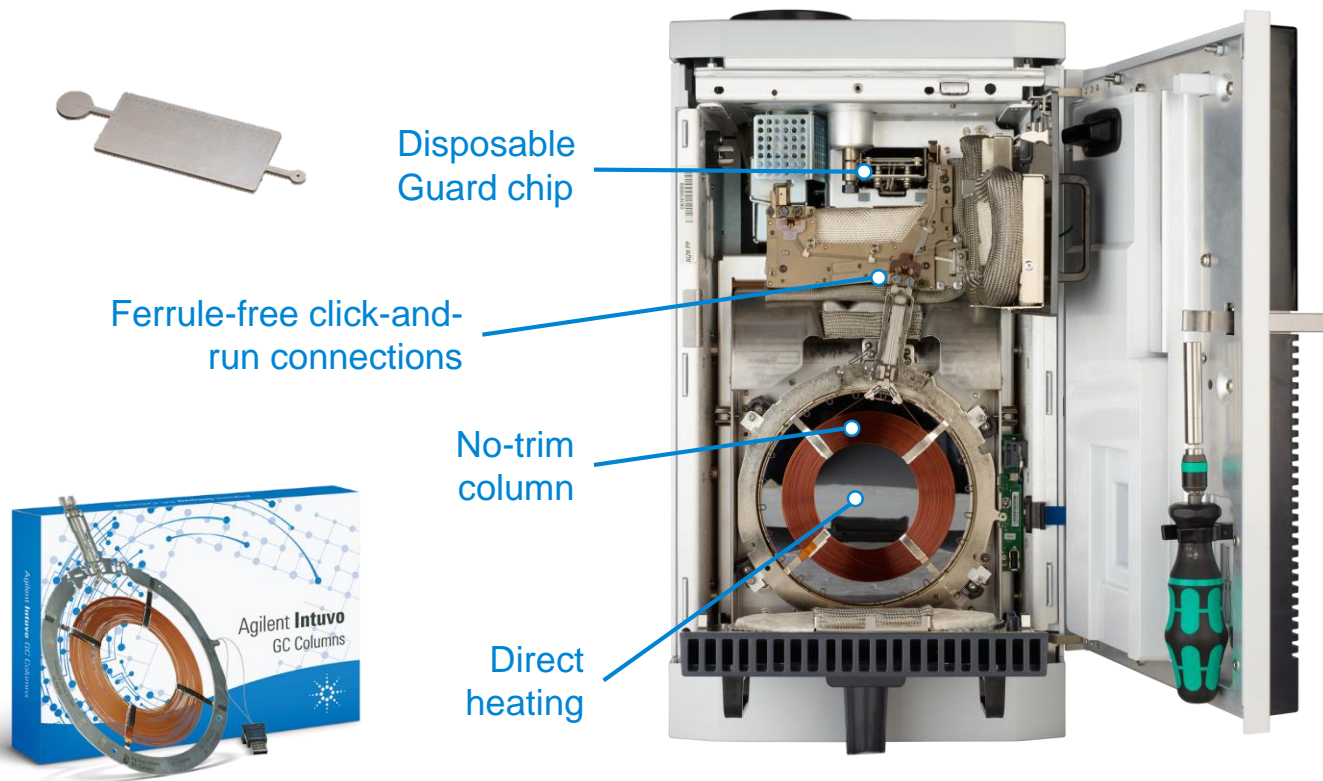
# Innovating a New Path to GC Productivity

A whole new way to GC



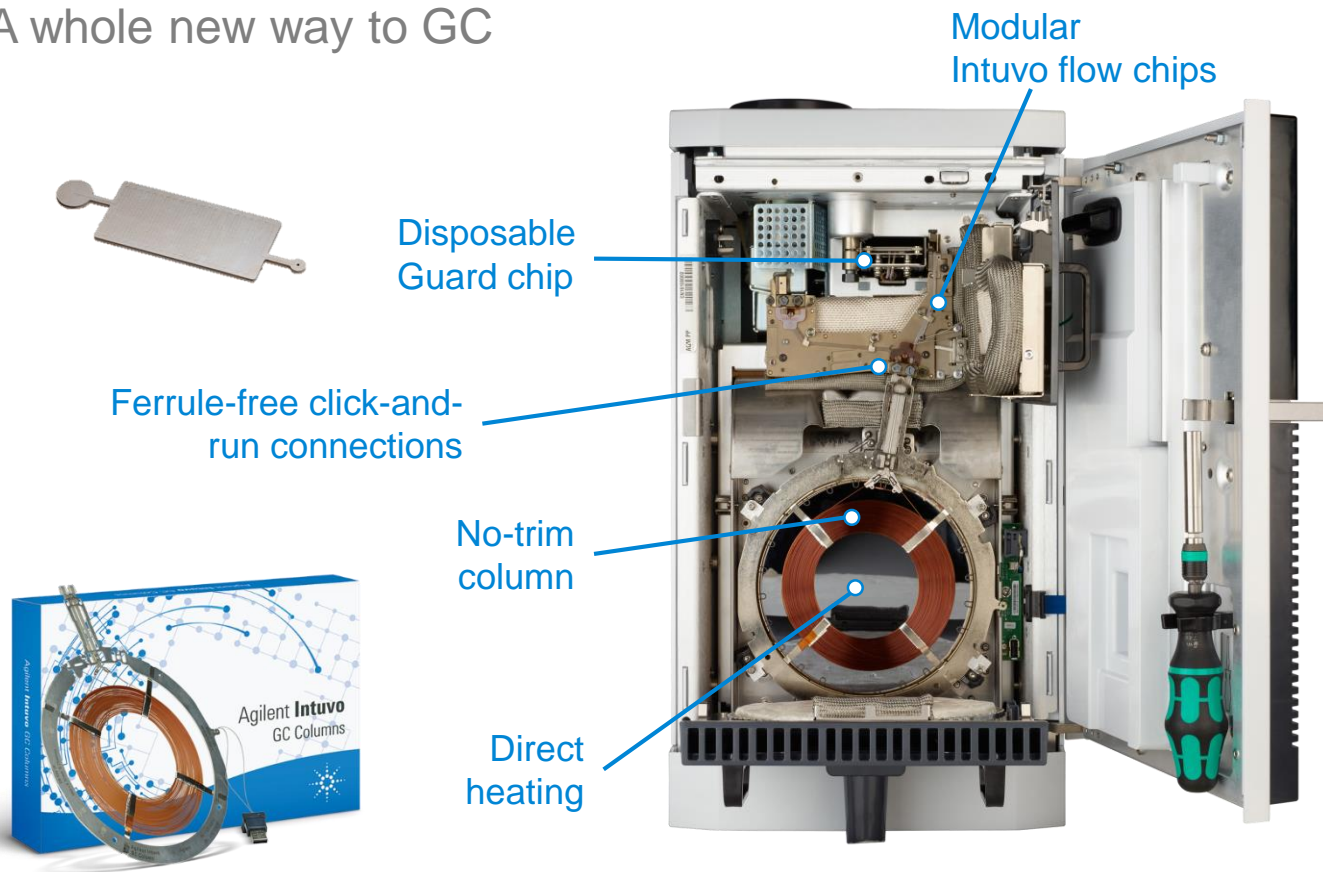
# Innovating a New Path to GC Productivity

A whole new way to GC



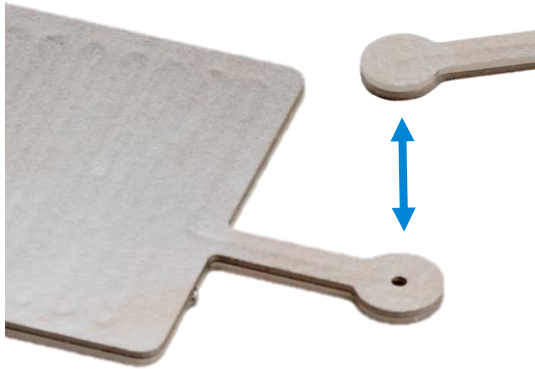
# Innovating a New Path to GC Productivity

A whole new way to GC



# Click-and-Run Direct Connections

Eliminating connection uncertainty



- No more ferrules
- Audible and tactile click lets you know connection is made
- One tool fits all!



- Easier to train
- Less unplanned downtime
- Fewer batch reruns and precious samples lost

# Intuvo Guard Chip and No-trim Columns

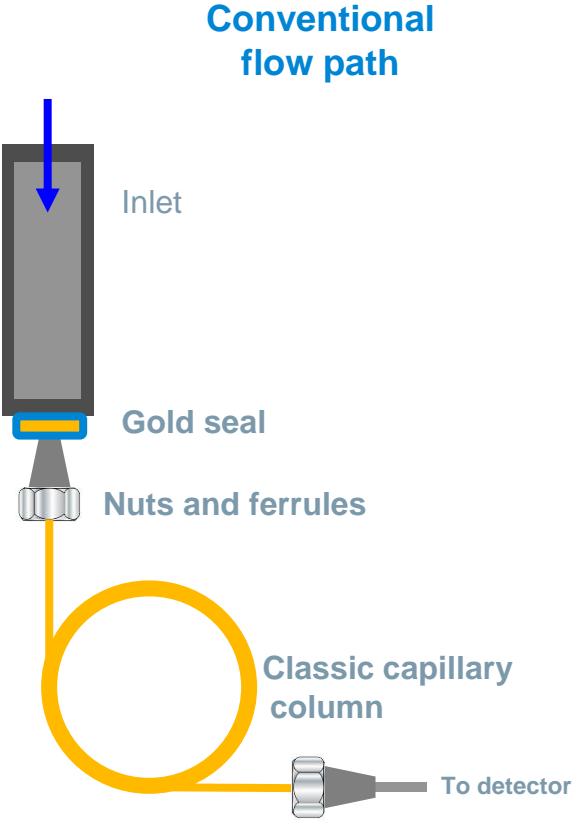
Running more, maintaining less



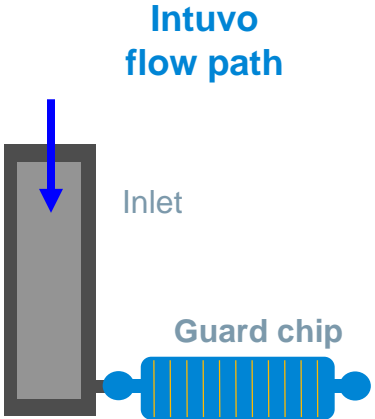
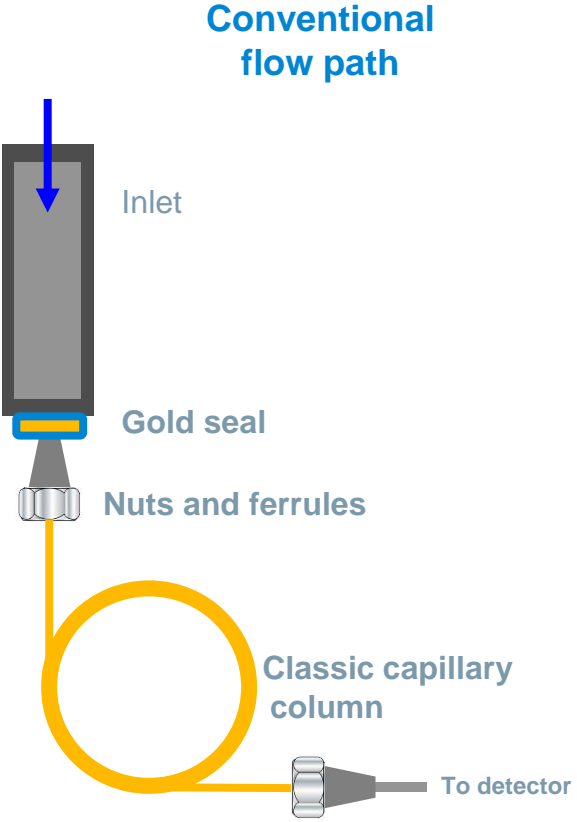
- Simple disposable design
- No column trimming
- Retention time reproducibility
  
- Reduced maintenance time
- Reduced recalibration and requalification
- Reduced unplanned downtime



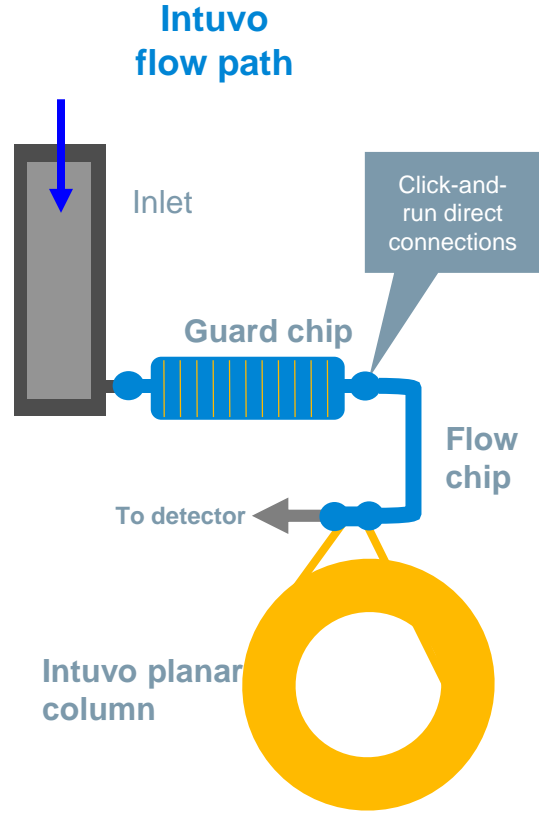
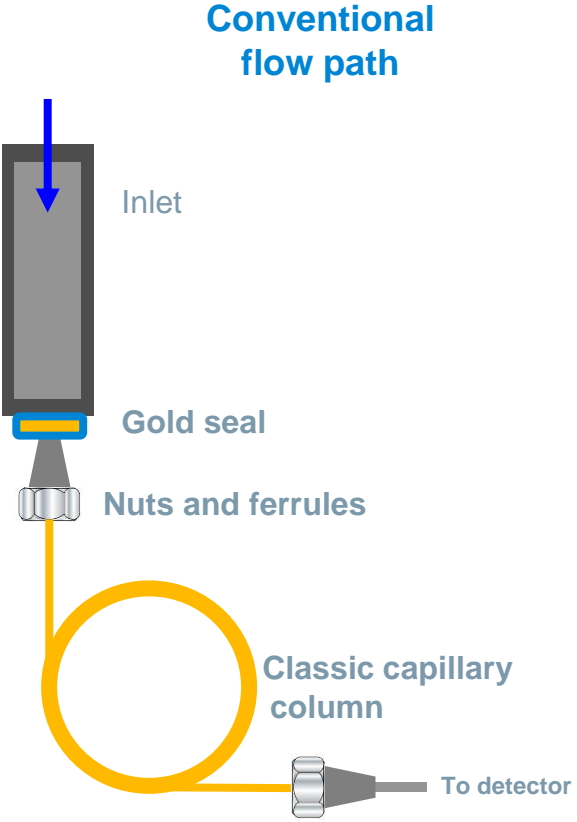
# Innovating the GC Flow Path



# Innovating the GC Flow Path

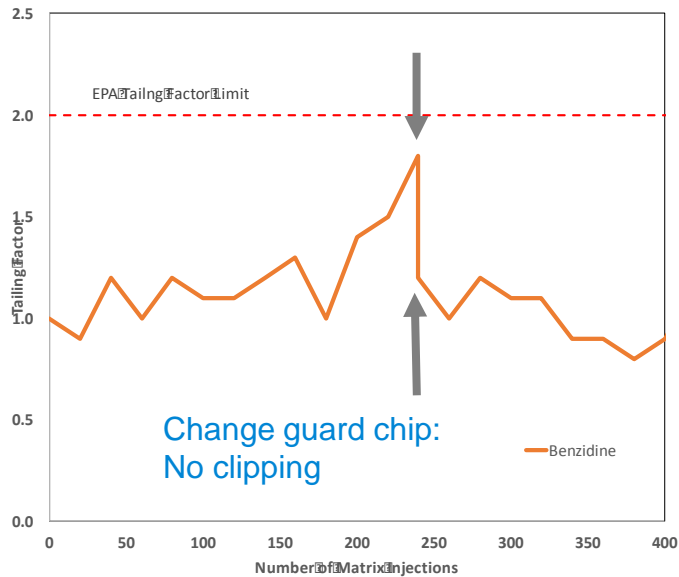


# Innovating the GC Flow Path



# Intuvo Guard Chip

Protect, don't repair

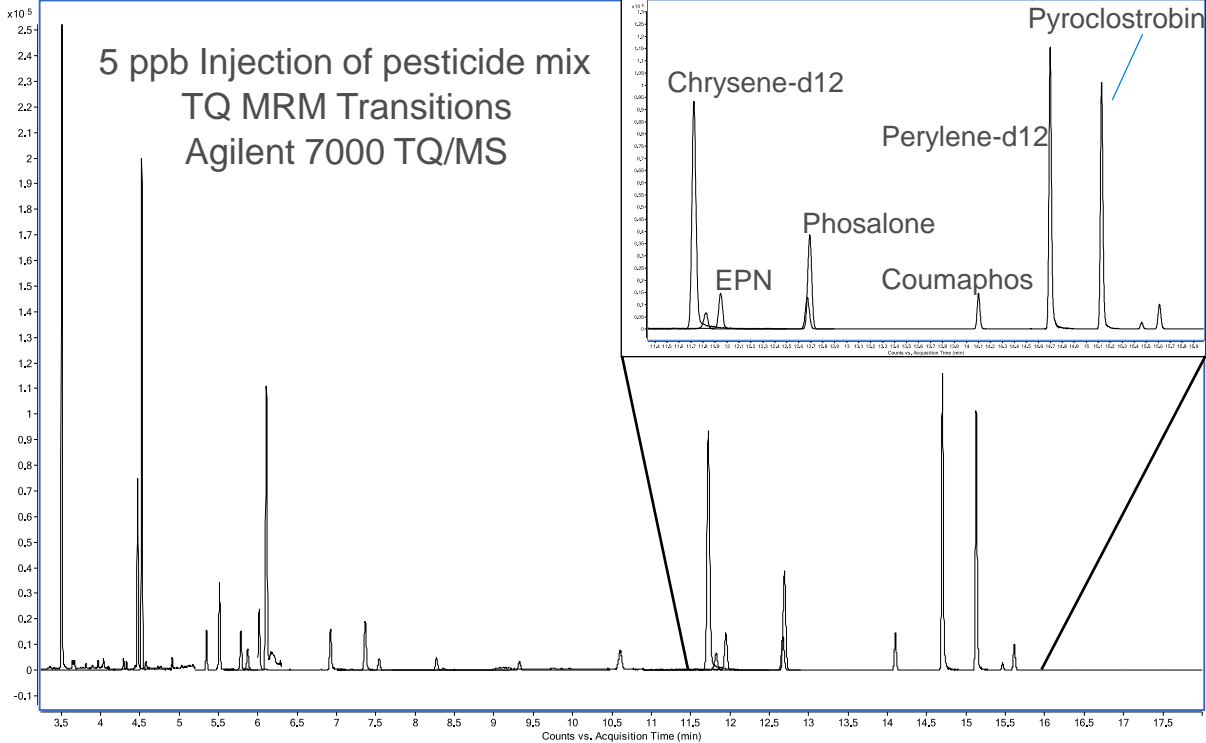


- US EPA 8270D SVOC in soil
- Tailing factor slowly increases during 240 soil extract injections
- Guard chip replacement restores analytical performance and extends column life



# Intuvo Inert Flow Path

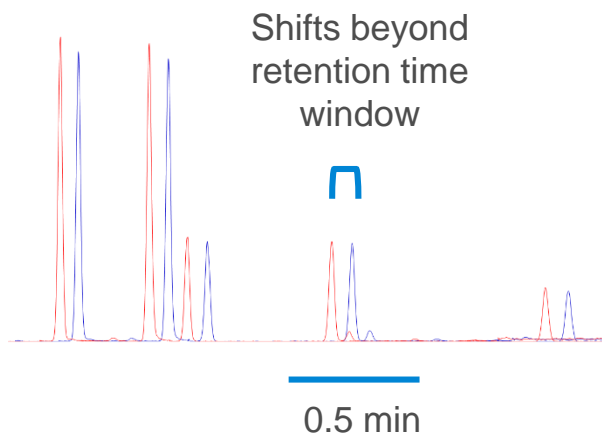
Optimized for active compounds



# Intuvo Guard Chip and No-trim Columns

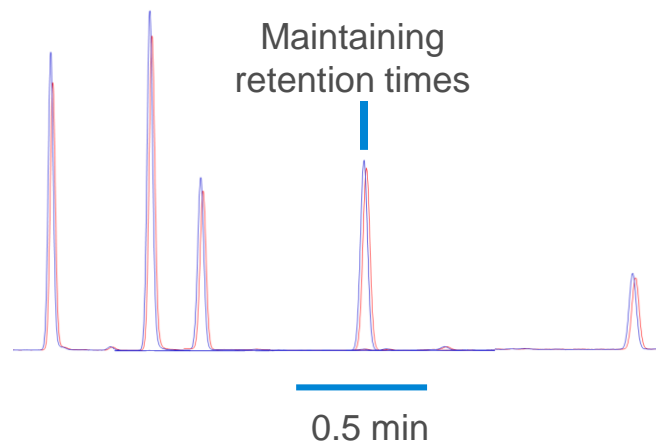
No retention time shifts after maintenance

## Conventional Column



Pesticide mix injected before and after 300 mm column trim

## Intuvo Column



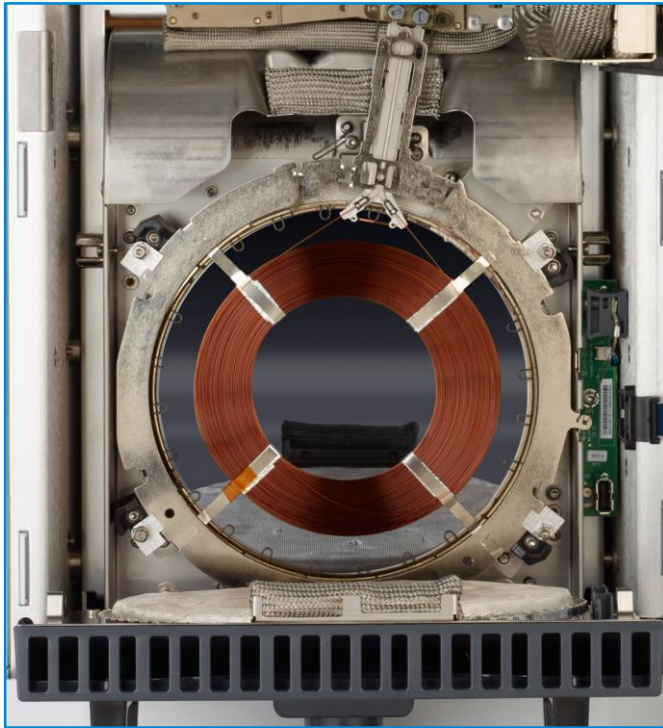
Pesticide mix injected before and after guard chip change





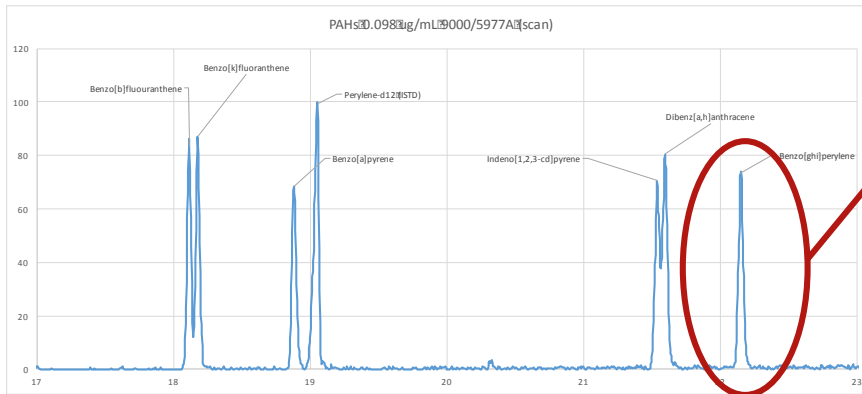
# Fast Direct Heating and Cooling

Every single minute counts

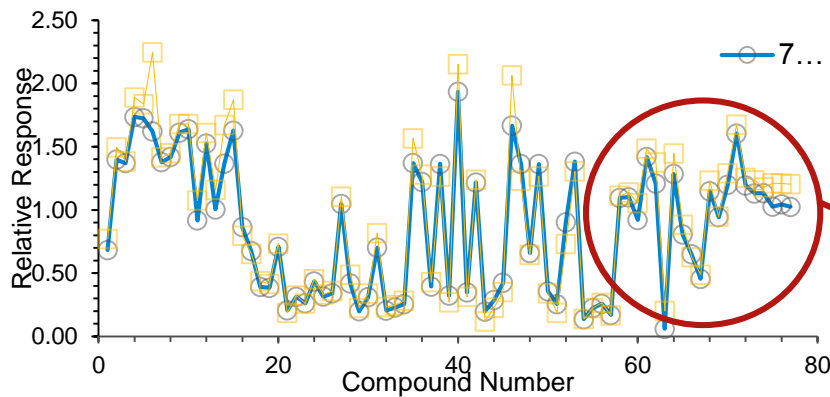
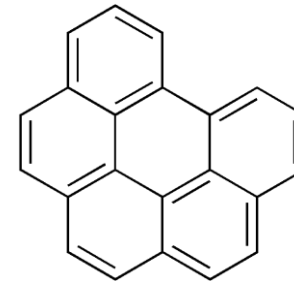


- Fast, efficient heating
- Ballistic cooling
- Smaller footprint

# Efficient, Even Direct Heating



Even high molecular weight compounds such as Benzo(ghi)perylene (mol wt 276 amu) have excellent peak shape

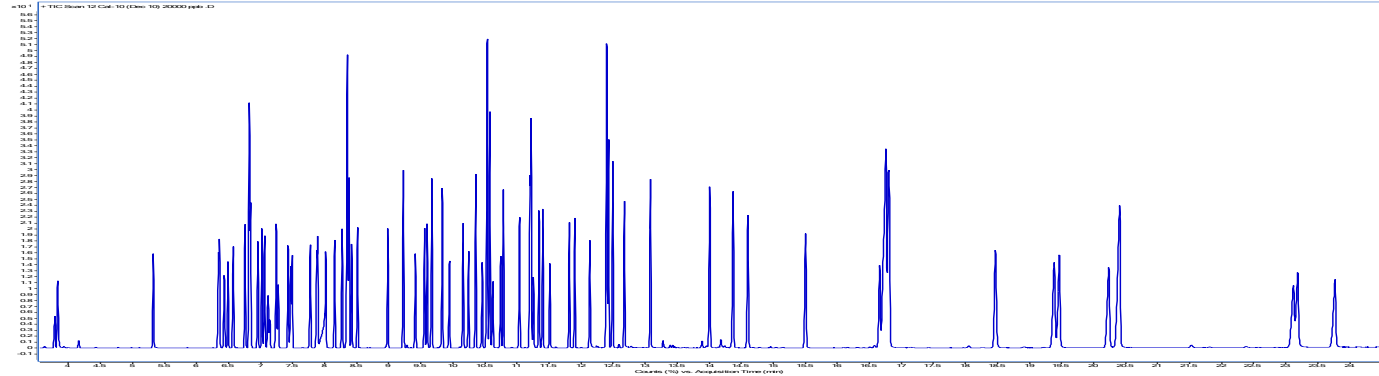
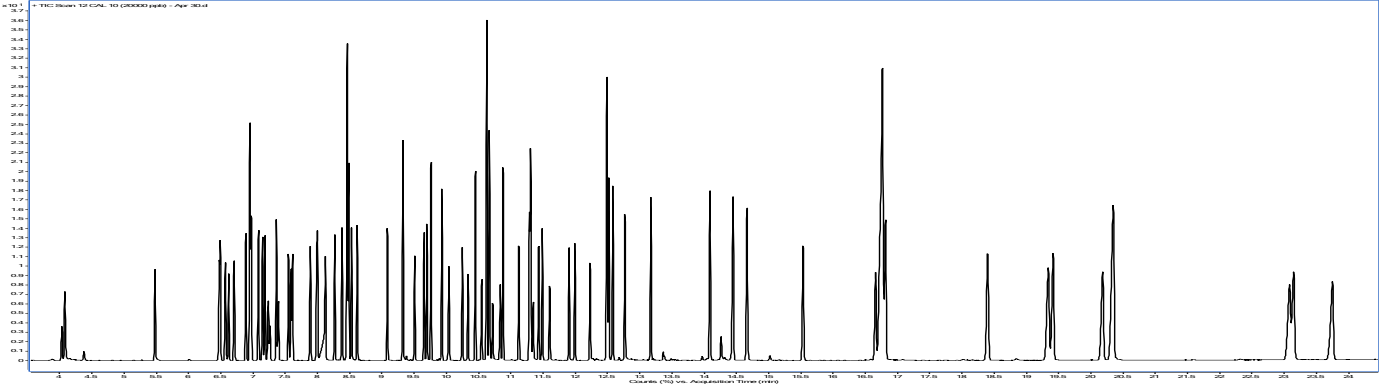


High molecular weight PAH compounds also have largely identical response factors

# Seamless Method Migration to Intuvo

Preserving method and SOP investments

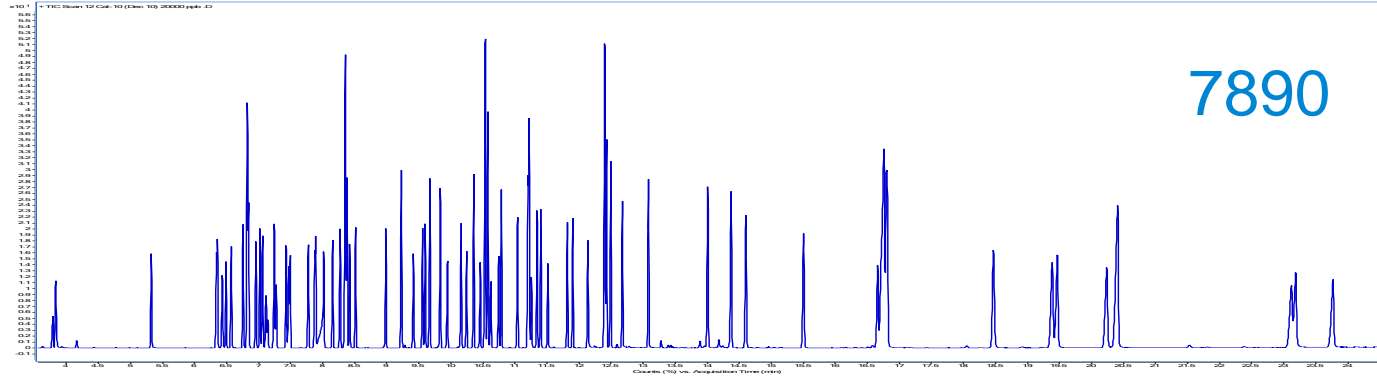
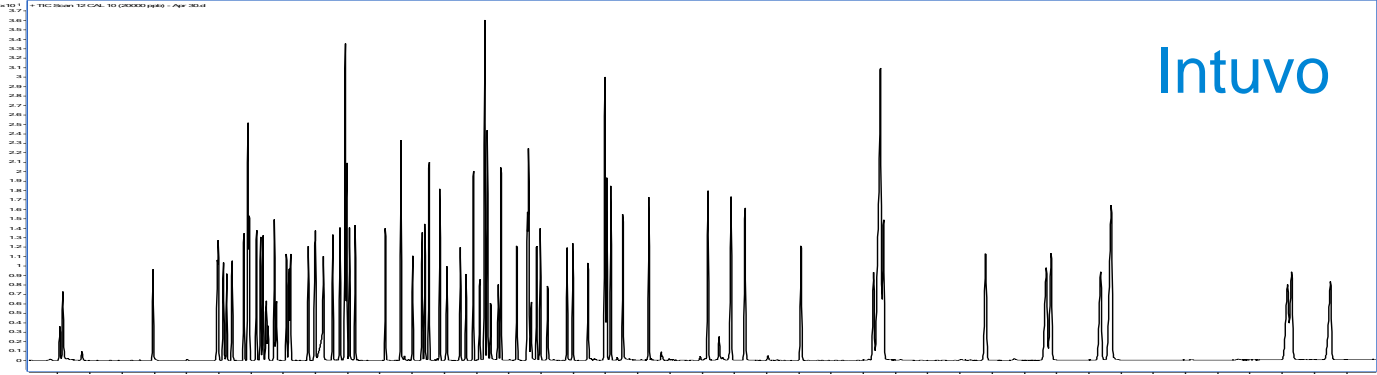
83 SVOC by US EPA 8270

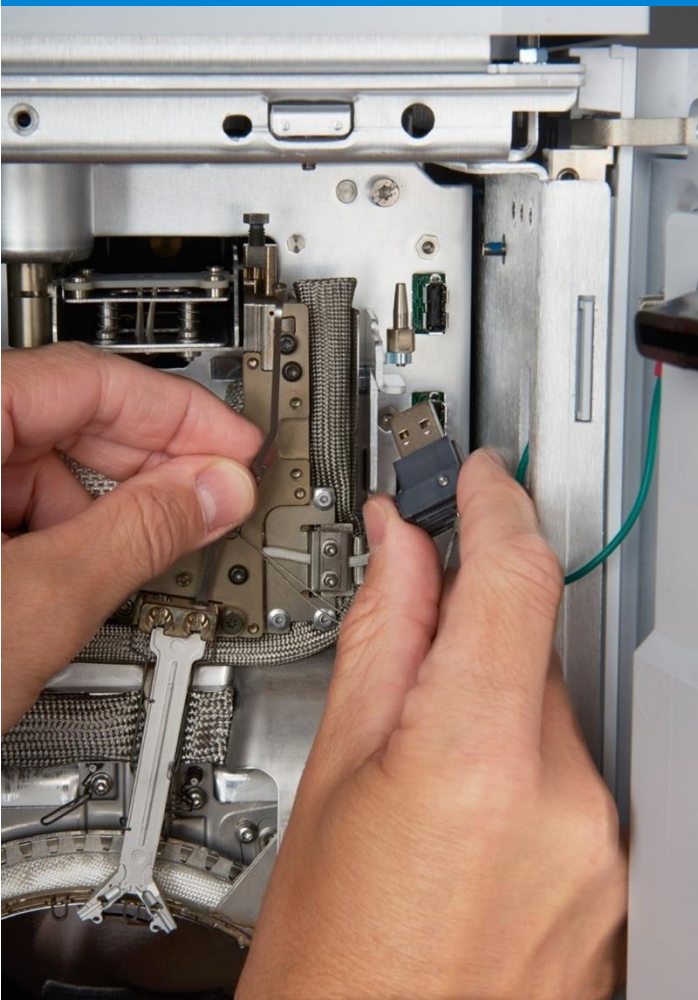


# Seamless Method Migration to Intuvo

No business disruption

83 SVOC by US EPA 8270





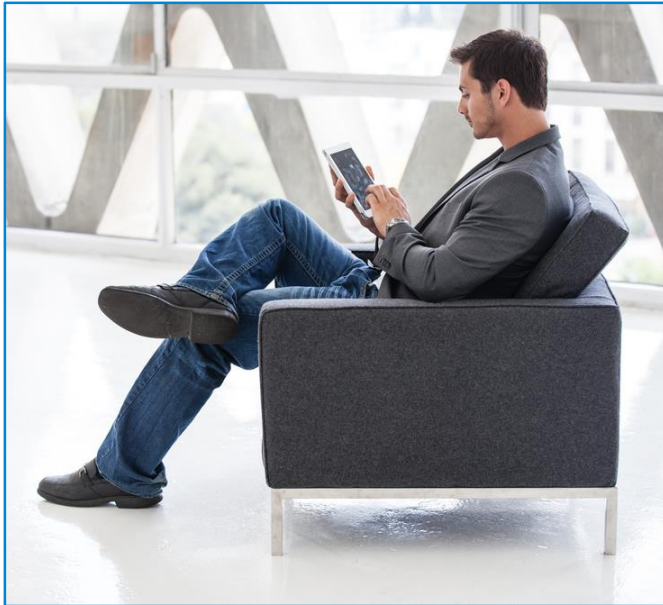
## Intuvo Smart Keys

Self aware

- Flow Chips and Columns
- Smart: Informs how Intuvo is configured
- Easy: Sets method context and parameter defaults – no complex calculators needed

# Accessing the Power of Innovation

Transforming the user experience



## Younger generation of Users

- Expectations of remote mobile connection
- Technology accessed through interactive graphic SW and apps

## Make technology accessible

- Interface meeting today's expectations



# Intuvo Graphical User Interface

- System status



## Intuvo Graphical User Interface

- System status
- Real-time chromatograms





## Intuvo Graphical User Interface

- System status
- Real-time chromatograms
- Step-by-step user maintenance and troubleshooting



## Intuvo Graphical User Interface

- System status
- Real-time chromatograms
- Step-by-step user maintenance and troubleshooting
- Finding parts fast



# Keep Connected

Tablet or ~~phone~~ connectivity

Check instrument and batch status remotely

Confirm laboratory operations while out of the laboratory

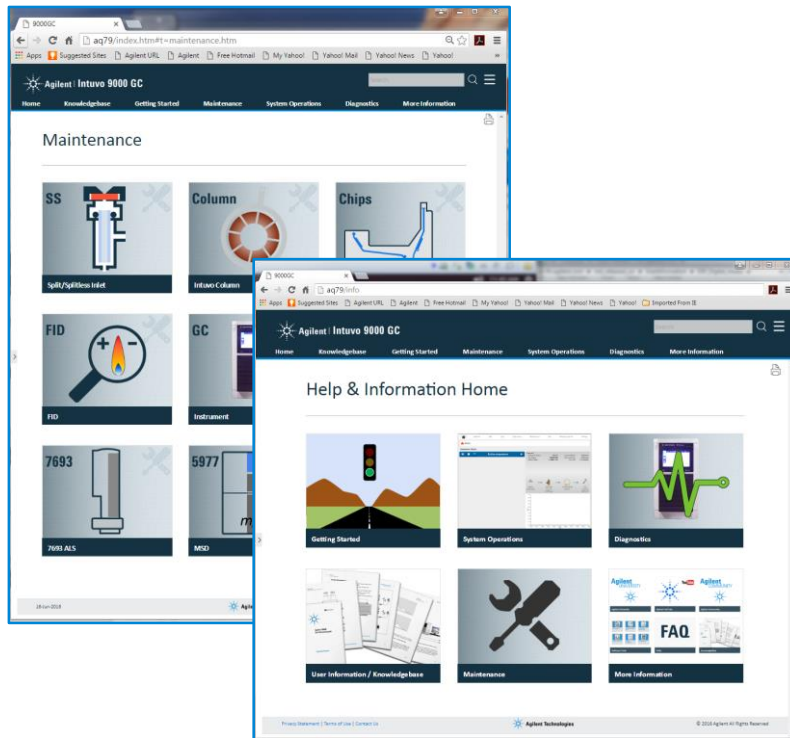
Connect to any instrument with a single mobile device

Go Mobile



# Internet of Things

A full suite of customer support



- Intuvo serves up a web homepage
- User help for Maintenance, troubleshooting and diagnostics
- Accessible through any approved PC or mobile device securely on internal network

# Innovating a New Path to GC Productivity

- Easier
- Faster
- Smaller
- Smarter
- Greener



Speed of Analysis  
and  
Recovery of High Boiling Point Compounds  
- Total Petroleum Hydrocarbons

# Intuvo GC Conditions for UFGC TPH Analysis

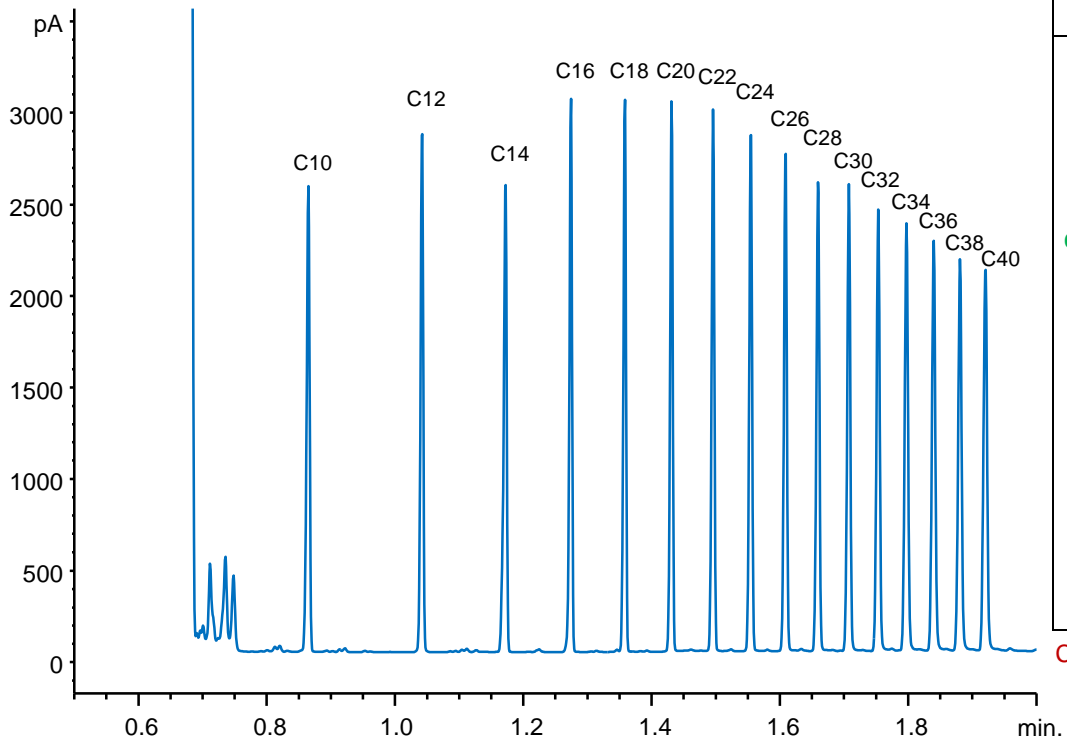
## Intuvo GC Conditions:

- ALS with 10  $\mu$ L syringe, 1  $\mu$ L injection
- SSL Inlet, splitless mode, 5190-2293 UI liner, 400 °C, Merlin Microseal
- Guard Chip, 350 °C
- D1 Flow Path, 350 °C
- DB-1ht column, 5 m x 0.32 mm ID x 0.1  $\mu$ m
  - helium carrier gas @ 10 mL/min constant flow
  - oven program, 40 °C for 0.5 min, 250 °C/min to 350 °C, hold 0.5 min
- FID, 350 °C

## TPH Samples - Certified Reference Materials from Bundesanstalt für Materialforschung und –prüfung (BAM)

- Soil and river sediment sample matrices
- Real samples with certified consensus TPH values
- Samples prepared in LFS using ISO 16703 protocol
  - Ultrasonic liquid/solid extraction, centrifuge fines, liquid/liquid cleanup, SPE final cleanup

# UFGC TPH Discrimination Performance Test

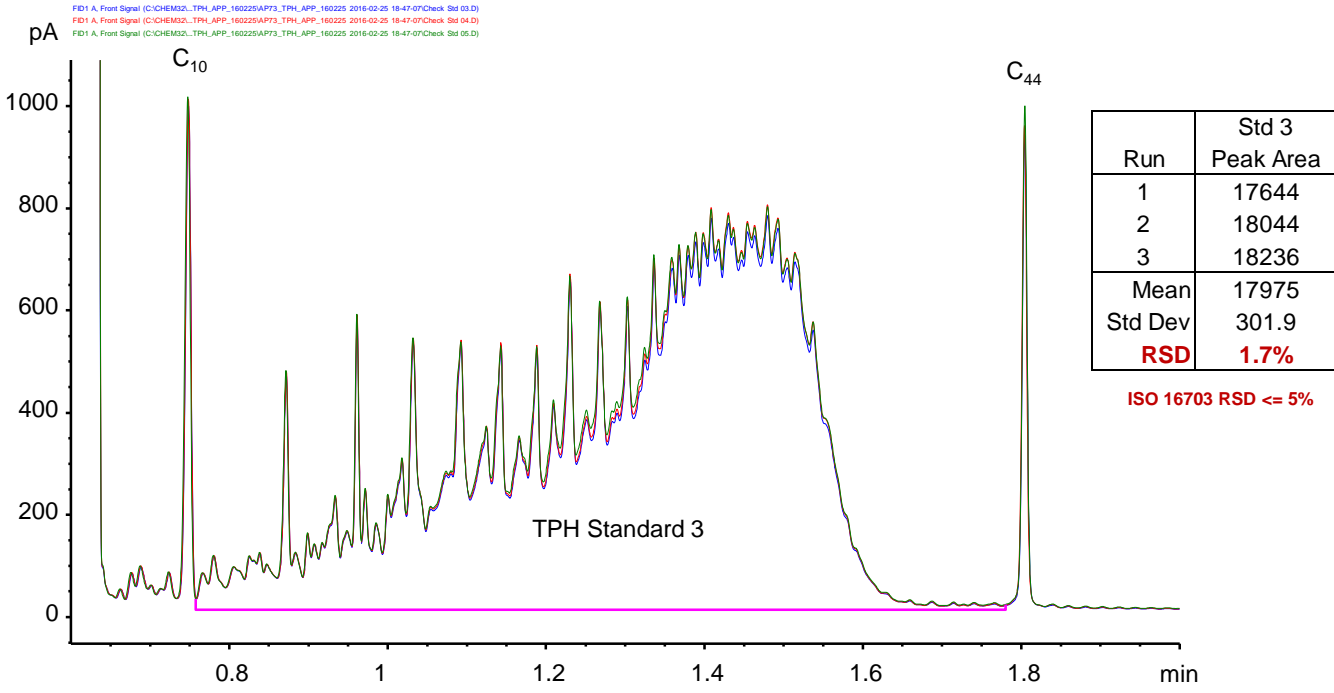


	Peak Area	Recovery
C10	861	0.98
C12	867	0.98
C14	877	0.99
C16	890	1.01
C18	875	0.99
C20*	882	1.00
C22	882	1.00
C24	882	1.00
C26	873	0.99
C28	846	0.96
C30	867	0.98
C32	859	0.97
C34	853	0.97
C36	853	0.97
C38	829	0.94
C40	817	0.93

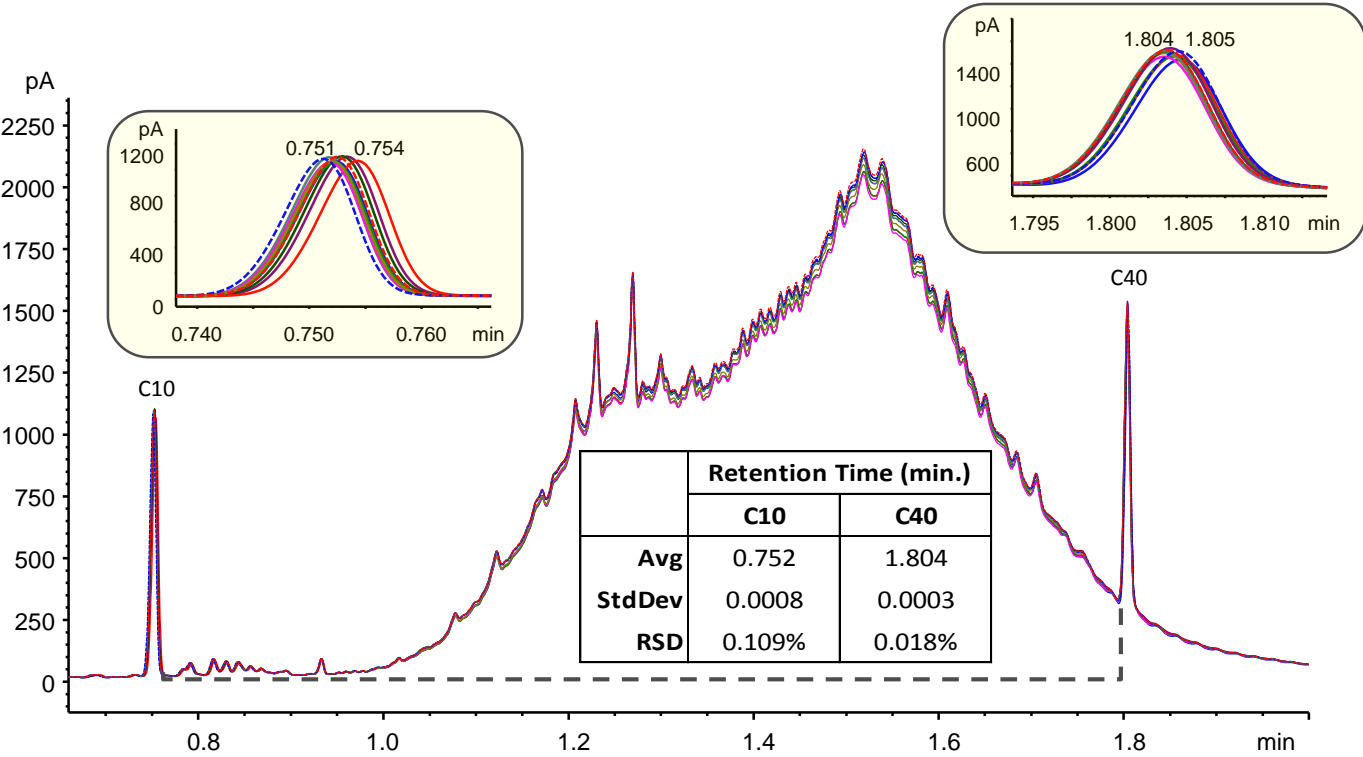
C40 recovery must be > 0.80



# UFGC TPH Repeatability Test – 3 Runs of Mid-Level Calibration Standard



# UFGC TPH Analysis in Soil – Sample Analysis Precision





QUESTIONS?





# DREAM BIGGER

AGILENT INTUVO 9000 GC SYSTEM



Agilent Technologies