The Allotrope 2023 Spring Connect Event

LC-UV Methods and Results Interoperability using ADF

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METHODS DATABASE

Acknowledgements

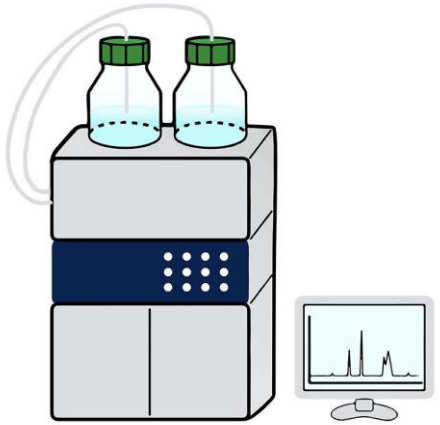
+ The extended project team

High Performance Liquid Chromatography (HPLC) instruments:

METHODS DATABASE

Pistoia Methods Database Project

Pistoia chartered a project to transform analytical methods into standardized, machine-readable instructions that can be stored centrally and shared across different vendors / models of HPLC-UV to execute the methods



Allotrope Data Format

Methods Database Timeline

METHODS DATABASE

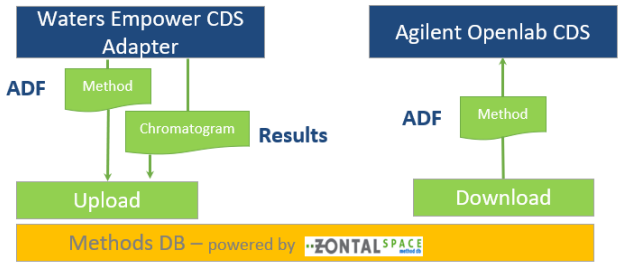
2018

HPLC-UV Data model

Building architectural solution and testing

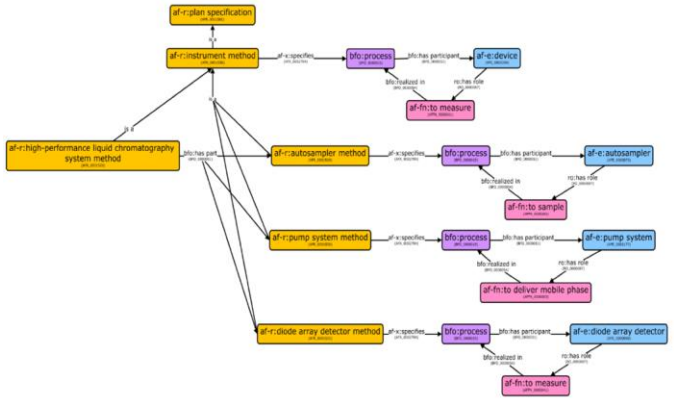
2021

Building ADF adapters



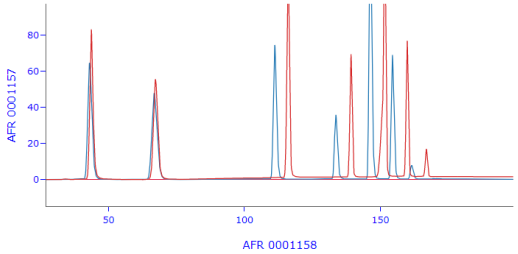
OpenLab CDS
Empower CDS.

Agilent 1260
Agilent 1290



2022

Scope extension: Result



Chromatograms and Peaks

2022 Testing

Digital, automatic methods transfer between CDSs and between collaborators

2023

Extension Instrumental coverage

Waters hardware

2024

Next Phase

More companies to implement

Methods DB Phase 1 Proof of Concept – Completed

Transfer methods using OpenLab CDS through ZONTAL Cloud

Objectives	Import and export methods using OpenLab CDS Transfer methods across Agilent 1260 and 1290 instruments Overlay OpenLab CDS data on ZONTAL Cloud
Results	1. Export and import gradient methods using OpenLab CDS 2. Export and import isocratic methods using OpenLab CDS 3. Transfer methods between Agilent 1260 and 1290 4. Import third party method on OpenLab CDS 5. Overlay Merck and GSK data

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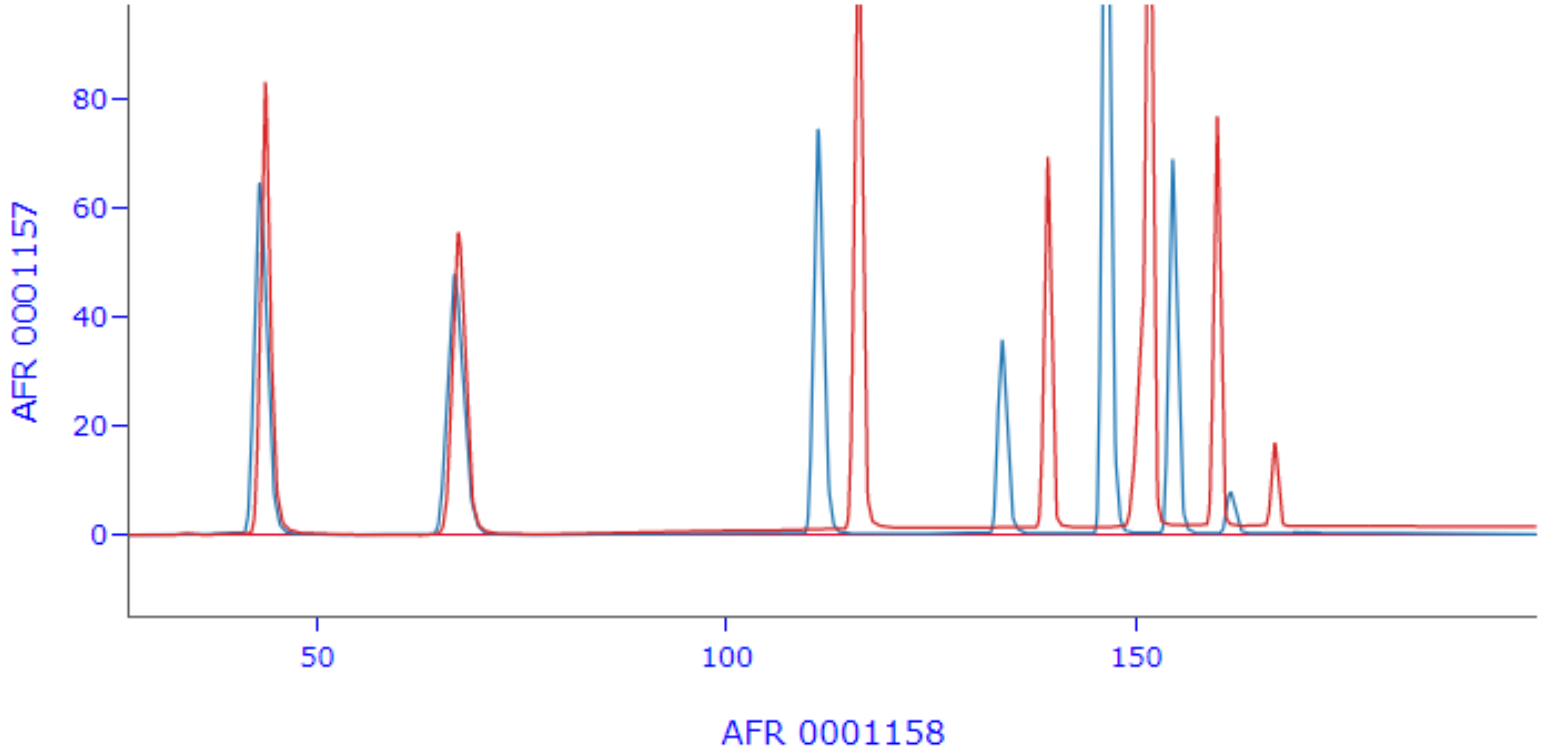
Methods Portability across Companies: Comparison

Method's transfer on Agilent 1290



MSD

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Methods DB Phase 2 Proof of Concept – Completed

Transfer methods between Empower CDS and OpenLab CDS through ZONTAL Cloud and Orbis Gateway

Objectives	Import and export methods using Empower, OpenLab CDS and vice versa Transfer methods across Agilent 1260 and 1290 instruments Submit sample set from ZONTAL cloud to Empower CDS Overlay Empower and OpenLab data
Results	1. Export and import gradient methods using Empower CDS 2. Export and import isocratic methods using Empower CDS 3. Transfer methods between Agilent 1260 and 1290 4. Transfer methods between Empower and OpenLab CDS 5. Import third party method on Empower CDS 6. Overlay OpenLab and Empower data 7. Sequence submission

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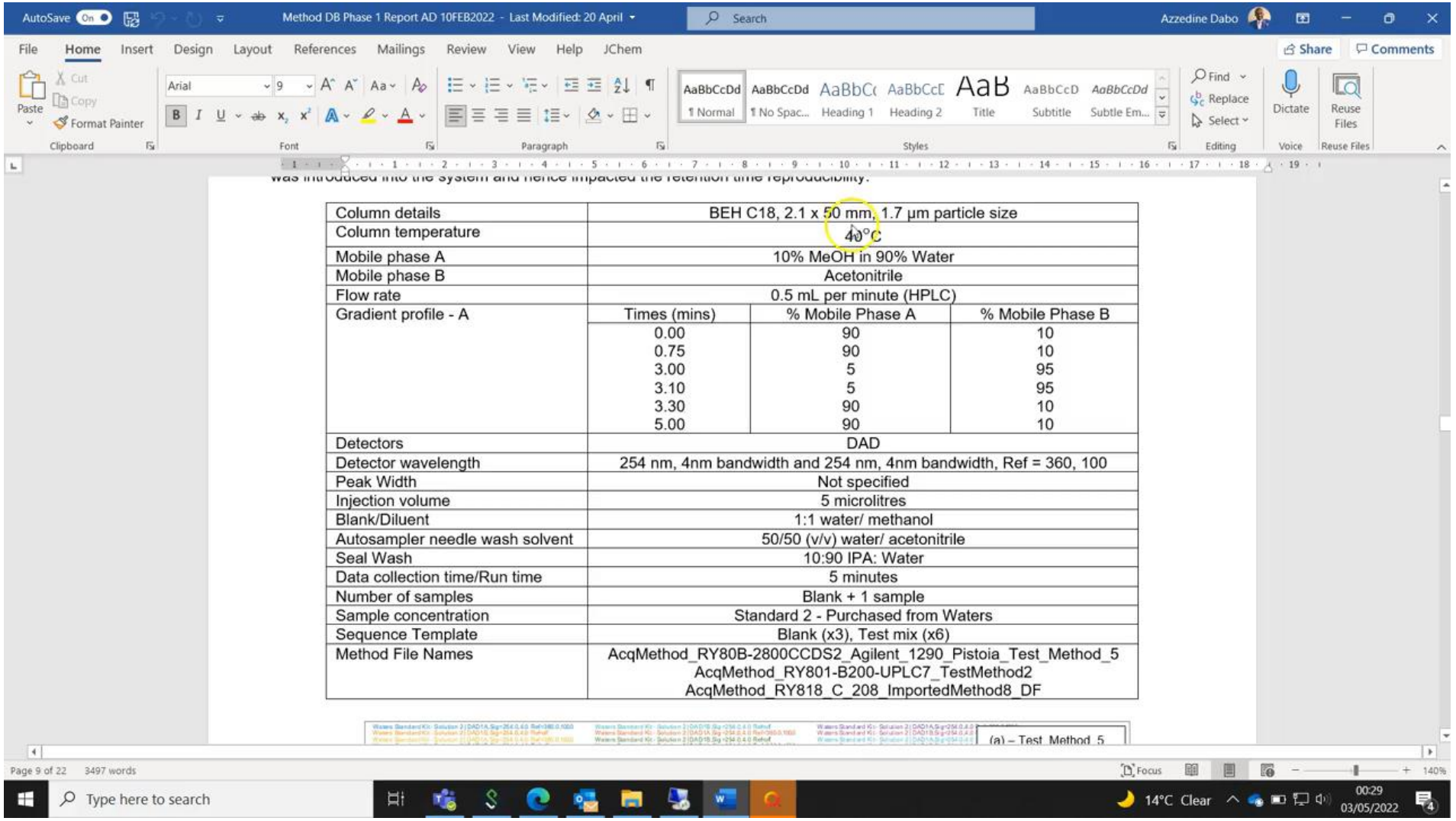
Methods DB Phase 2 Proof of Concept

Video Demo – Sequence Submission from ZONTAL to Empower CDS™



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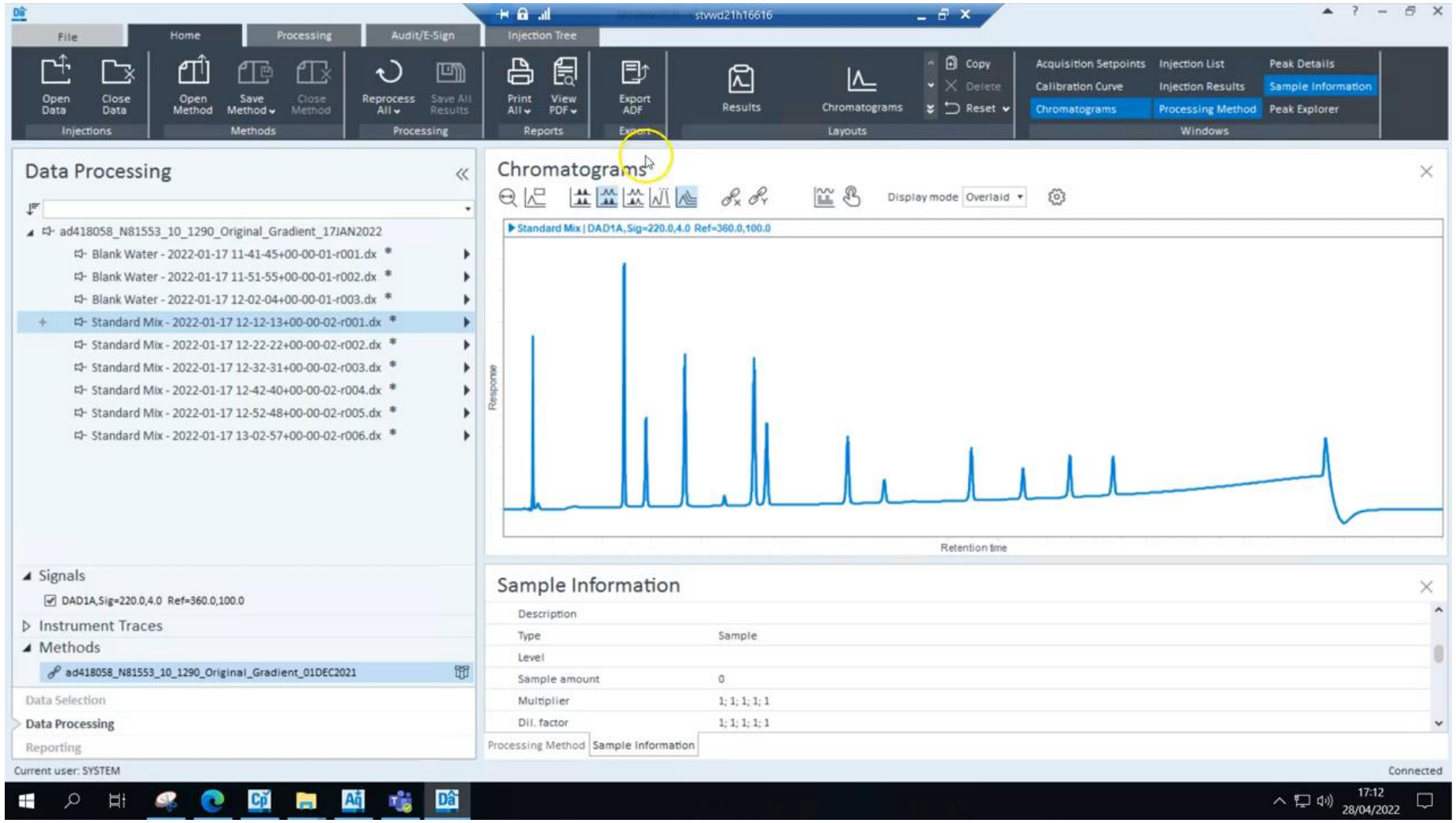
Methods DB Phase 2 Proof of Concept

Video Demo – Empower and OpenLab Data Overlay on ZONTAL Space



Phase 2 – Overlay of Empower and OpenLab CDS Data

Overlay of data collected on Agilent 1290 instrument using Empower and OpenLab CDS

The slight difference in peak height and retention time was expected as different lot of standards and mobile phases were used.

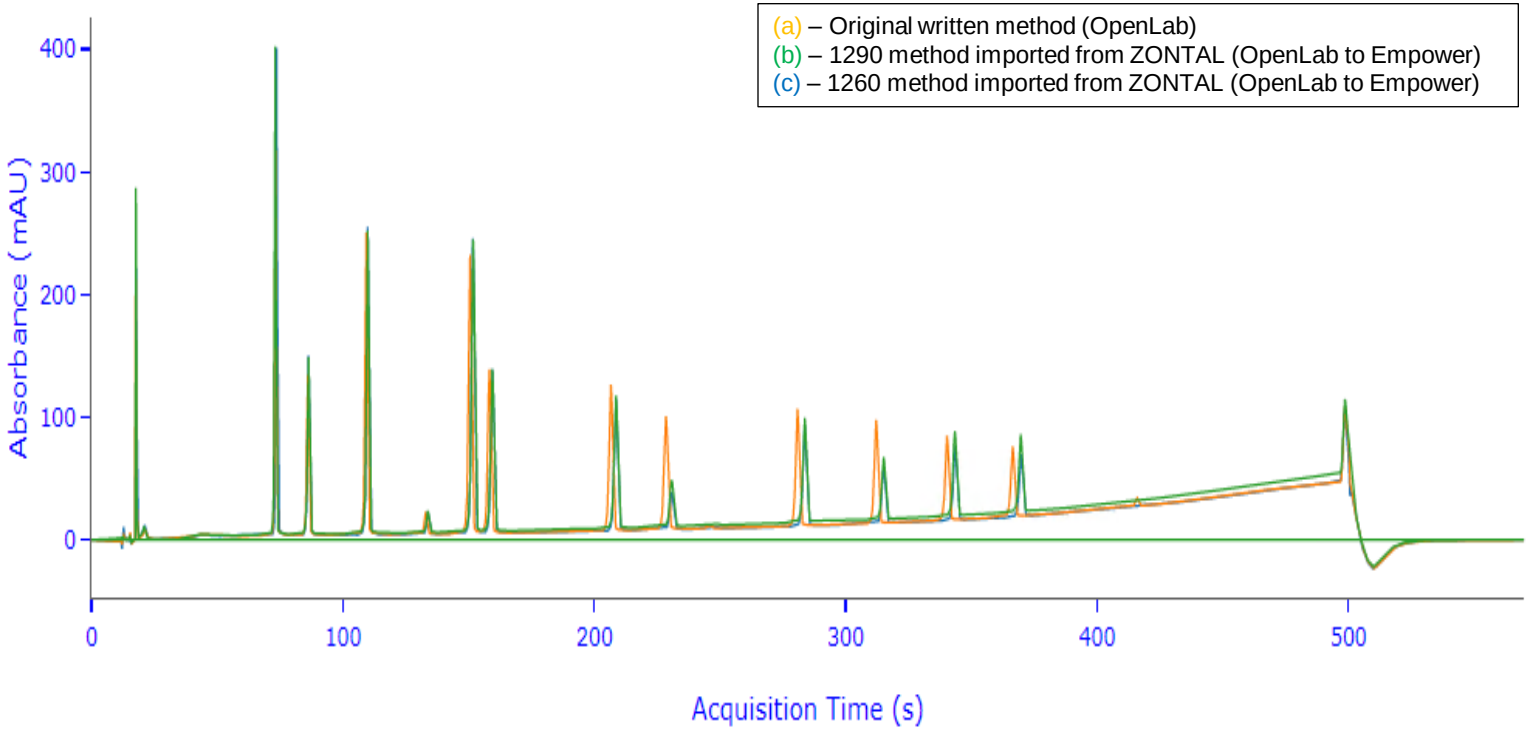


Figure 2: HPLC chromatogram overlay of non-GMP 8-minute generic method (1290 Instrument): (a) original written method on 1290 using OpenLab CDS, (b) 1290 method imported from ZONTAL on Empower CDS and (c) 1260 method imported from ZONTAL on Empower CDS

Methods DB Phase 3 Proof of Concept – Completed

Transfer methods using OpenLab CDS through the ZONTAL Cloud on a diverse set of instruments

Objectives	Import and export methods using OpenLab CDS Transfer methods across different Agilent Instruments (with different modules) Transfer methods from binary to quaternary pump
Results	1. Install OpenLab and ADF plugin on laptop to facilitate instrument control 2. Update the ADF plugin to support method transfer from binary to quaternary pump 3. Export and import gradient methods using OpenLab CDS 4. Transfer methods between Agilent 1290, 1260 and 1200 modules
Next steps	– Repeat the experiments on two diverse instruments in the US – Share findings internally and externally.

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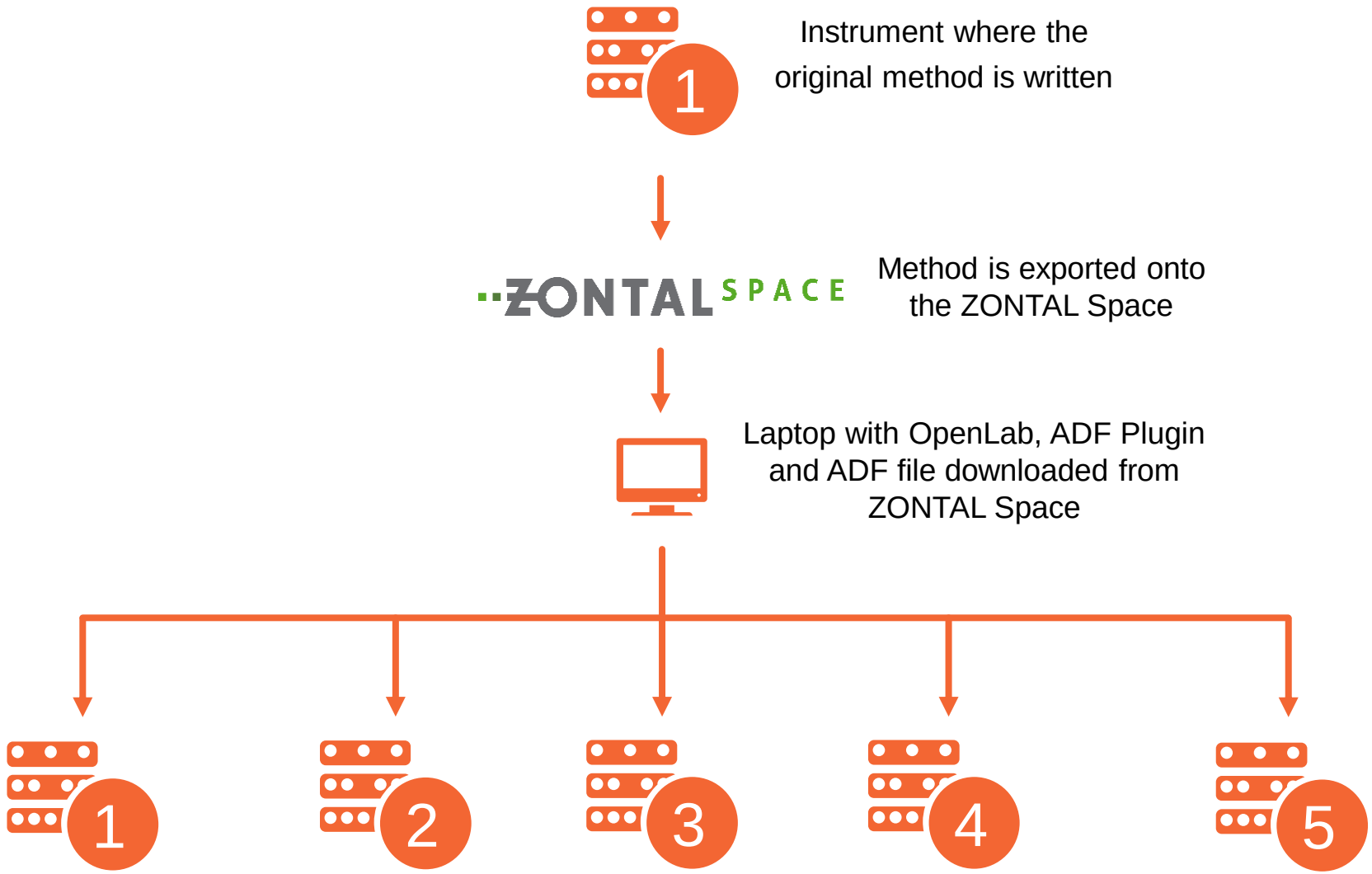
15 Minute Gradient Method Setup



ADF method files imported onto instruments with different modules stacking

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HPLC/UPLC Instrument Configuration

HPLC/UPLC Module Stacking

Module	Instrument 1: WU_STV11	Instrument 2: WU_S29	Instrument 3: STV_02	Instrument 4: S56 (Biopharma)	Instrument 5: LC2
Pump	G7120A: 1290 Infinity II Binary Pump	G1312A: 1200 Binary Pump	G7120A: 1290 Infinity II Binary Pump	G7111B: 1260 Infinity II Quaternary Pump	G1312B: 1260 Infinity Binary Pump
Injector	G7167B: 1290 Infinity II Multisampler	G1329A: 1100 Autosampler	G7167B: 1290 Infinity II Multisampler	G7167A: 1260 Infinity II Multisampler	G7167A: 1260 Infinity II Multisampler
Column Compartment	G7116B: 1290 Multicolumn Thermostats	G1316A: 1200 Thermostatted Column Compartment	G7116B: 1290 Multicolumn Thermostats	G7116B: 1290 Multicolumn Thermostats	G1316C: 1200 Thermostatted Column Compartment
Detector	G7117B: 1290 Infinity II Diode Array Detector	G1314B: 1200 Infinity Variable Wavelength Detector	G7117A: 1290 Infinity II Diode Array Detector	G7115A: 1260 Infinity II Diode Array Detector Wide Range (WR)	G4212B: 1260 Infinity Diode Array Detector

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15 Minute Gradient Method

Results and discussion

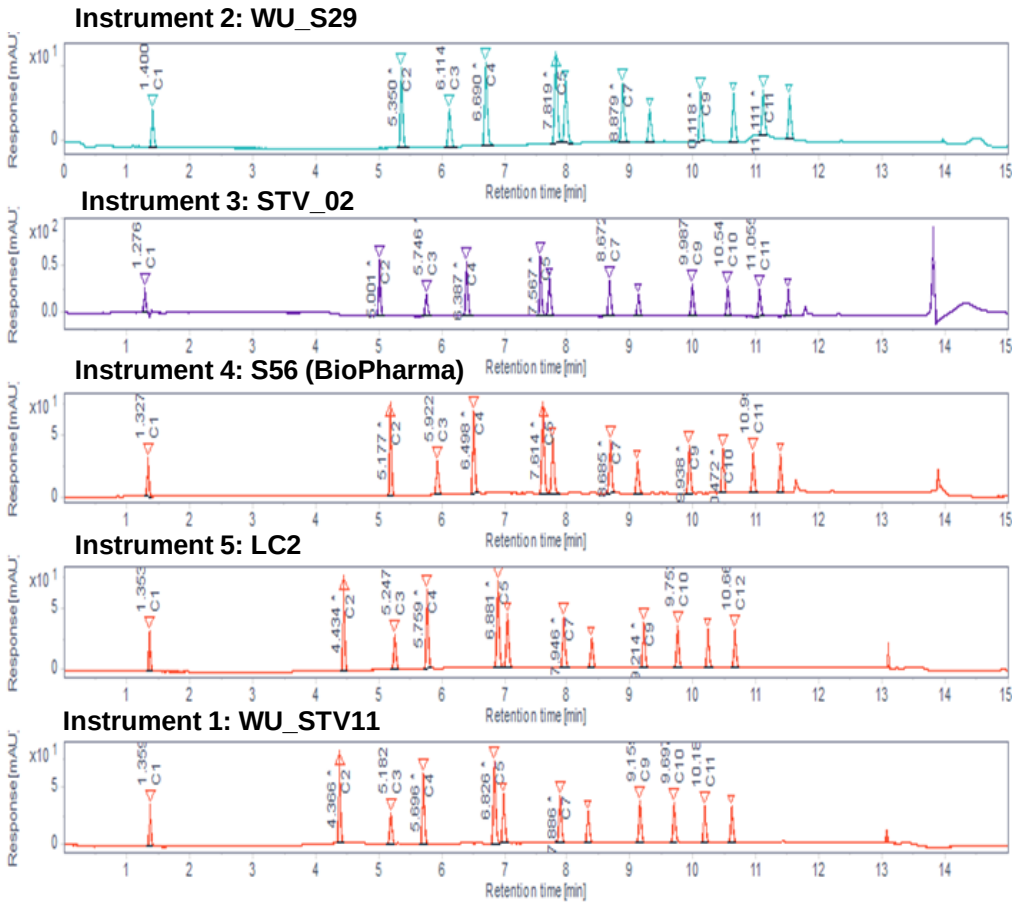

Figure 3: HPLC chromatogram of 15 minute CSH method collected on instruments 1 to 5.

- As shown in Figure 3, there the data collected on instrument 1 is comparable to instruments 2-5.
- The data obtain confirms our theory that the 1200/1260 has a lag in applying the gradient in comparison to the 1290 pump
- As expected, the same elution order was observed throughout all the 5 instruments.
- A slight change in difference in retention time was observed on various instruments but this was expected as each instrument will have a different dwell volume.
- The data proves that the ADF plugin can be used to transfer method across a wide range of Agilent HPLC/UPLC instruments.

Methods DB Phase 4 Proof of Concept – Completed

Transfer methods between different manufacturers (hardware and CDS)

Objectives	Transfer methods between Waters and Agilent Hardware Transfer method between Empower CDS and OpenLab CDS
Results	1. Transferred a gradient method between Waters Acquity and Agilent 1290 instrument (including autosampler temperature) 2. Transferred a gradient method between Empower CDS and OpenLab CDS 3. Overlay data acquired using both CDS
Next steps	– Draft article to share results with analytical community

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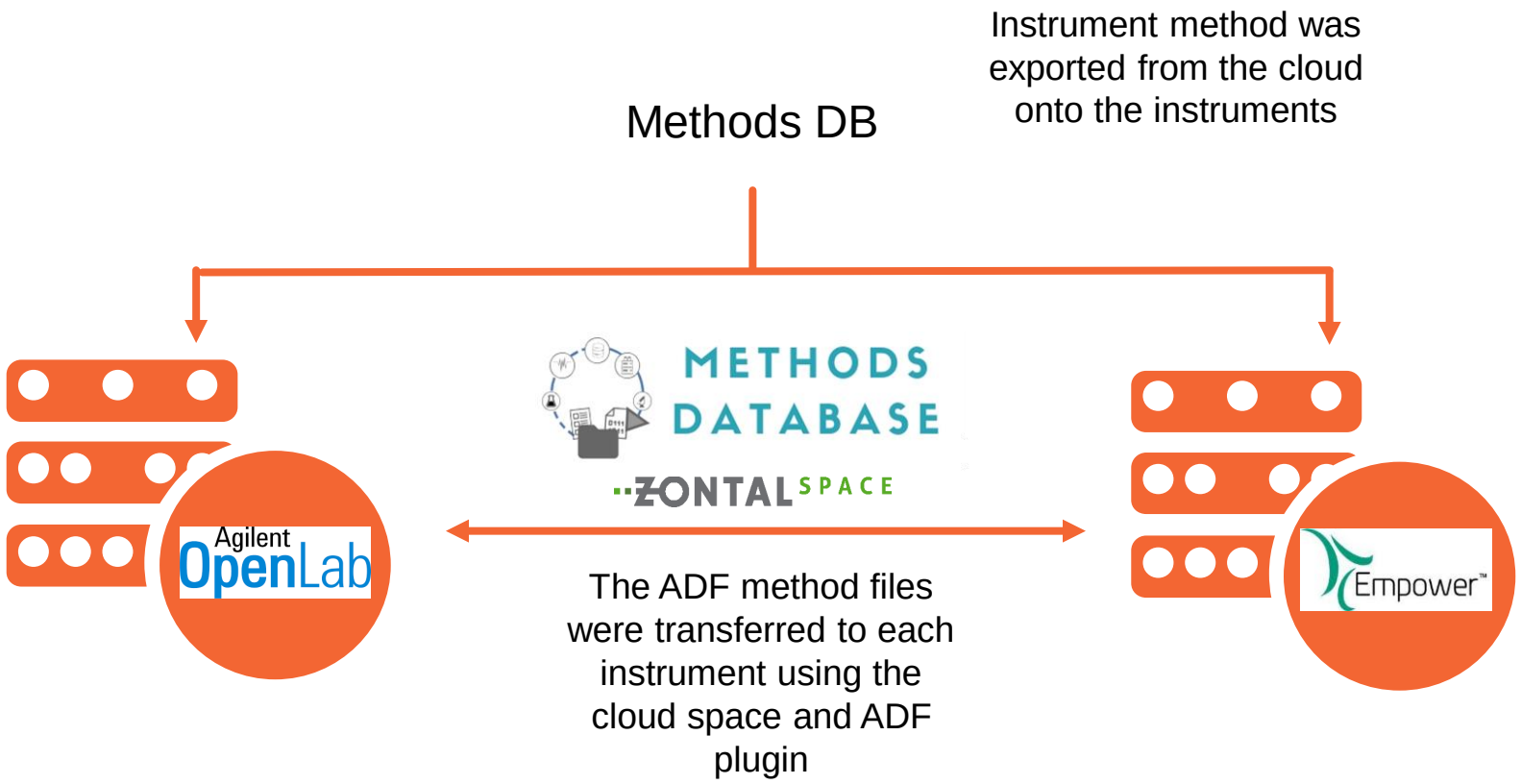
Phase 4 Step Up



ADF files were shared between the two different manufacturers using the Zontal Space

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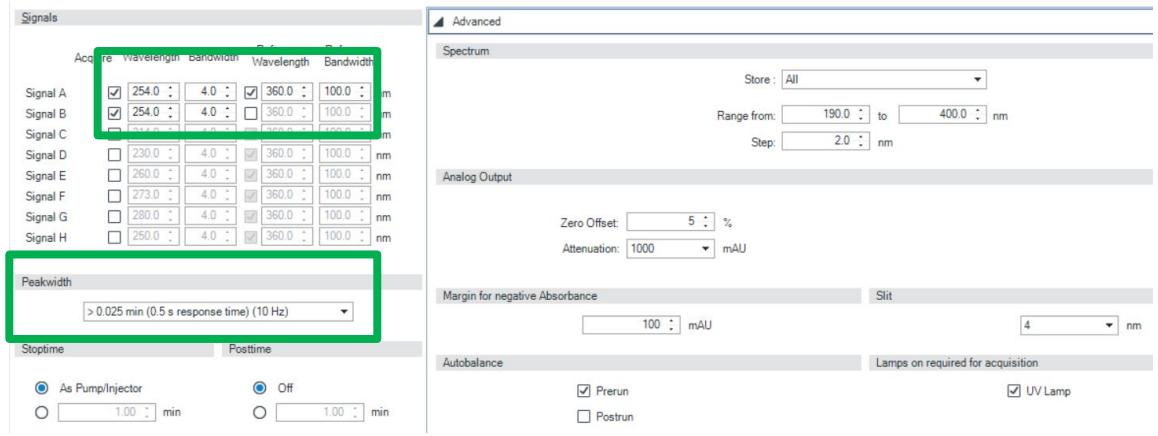
Instrument Configuration

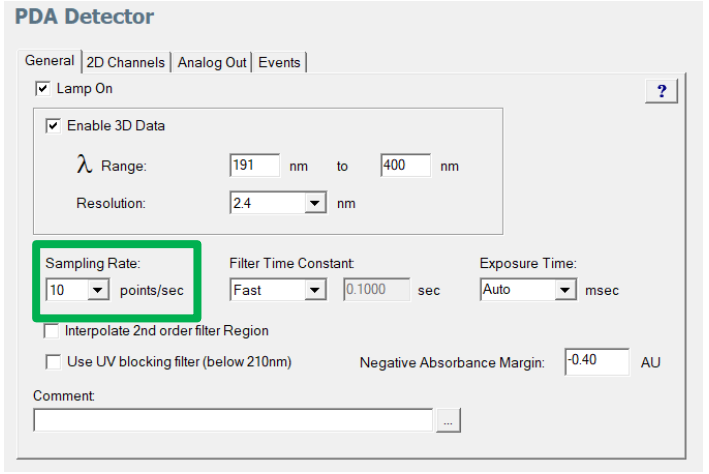
UPLC Module Stacking

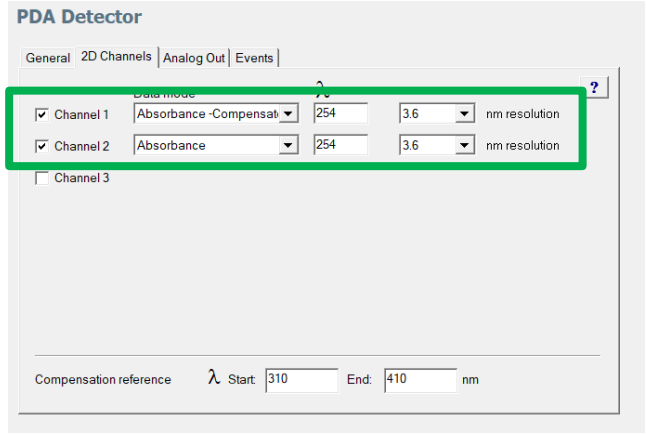
Module	Agilent Hardware WU_STV11	Waters Hardware WU_STV0188
Pump	G7120A: 1290 Infinity II Binary Pump	Acquity UPLC H Class Quaternary Pump
Injector	G7167B: 1290 Infinity II Multisampler	Acquity UPLC H Class Sample Manager FTN
Column Compartment	G7116B: 1290 Multicolumn Thermostats	Acquity UPLC H Class Column Manager
Detector	G7117B: 1290 Infinity II Diode Array Detector	Acquity UPLC Photodiode Array Detector

Method Comparison

Diode Array Detector: Photodiode Array Detector

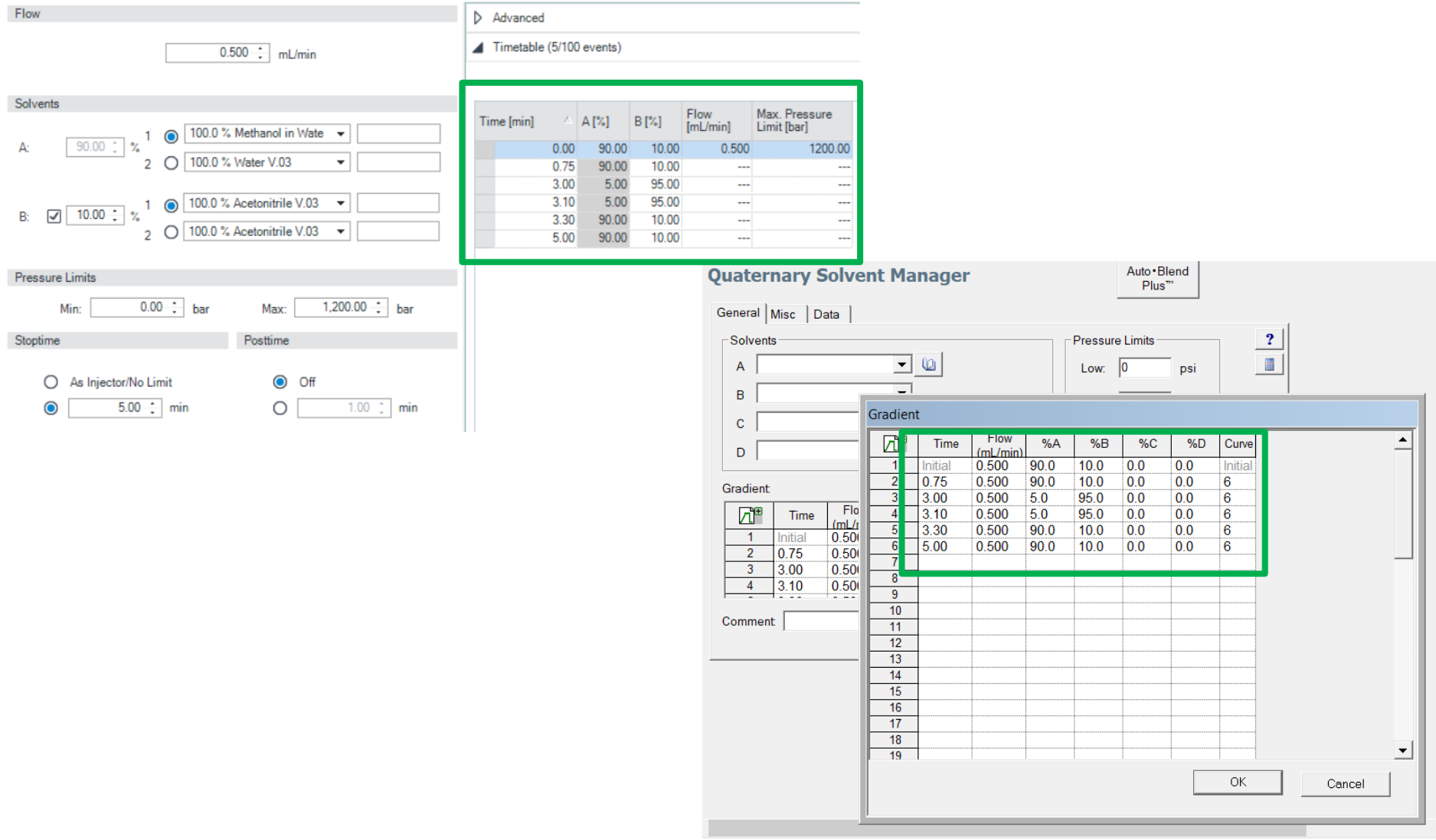






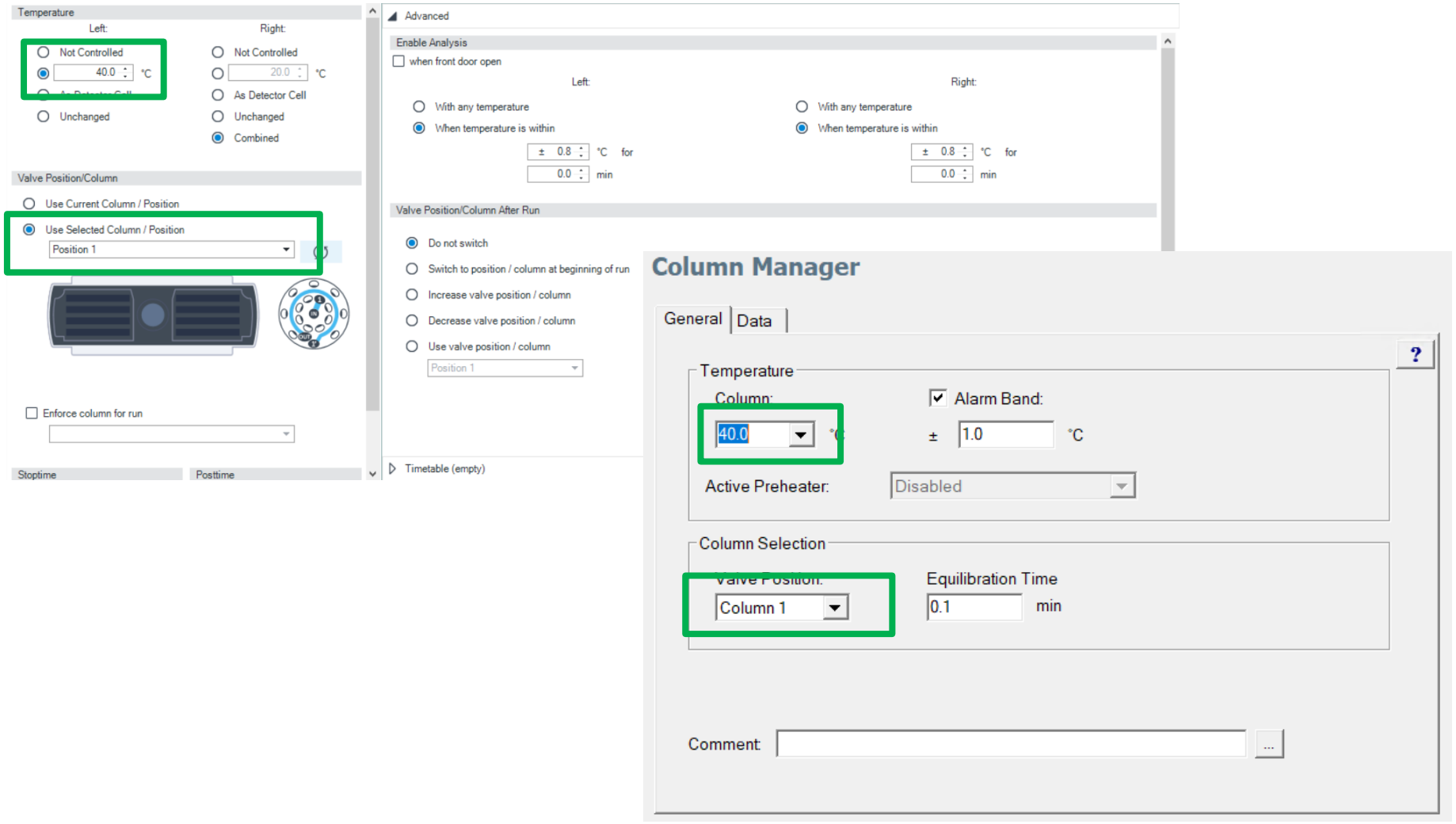
Method Comparison

Binary Pump: Quaternary Pump



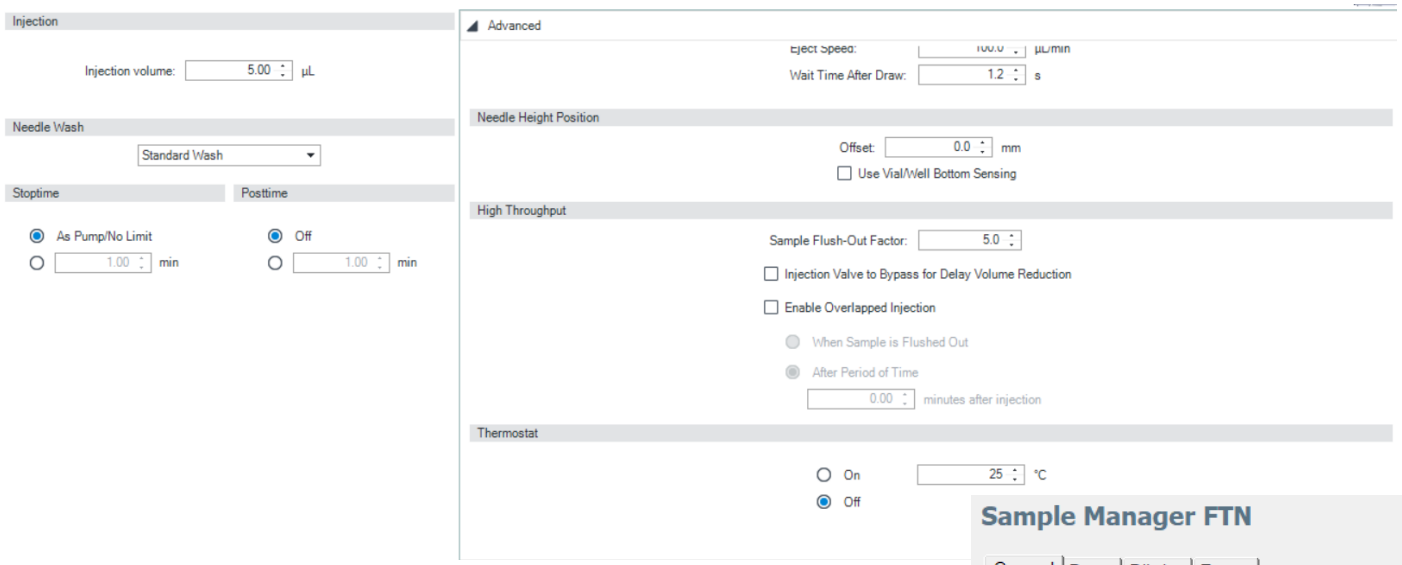
Method Comparison

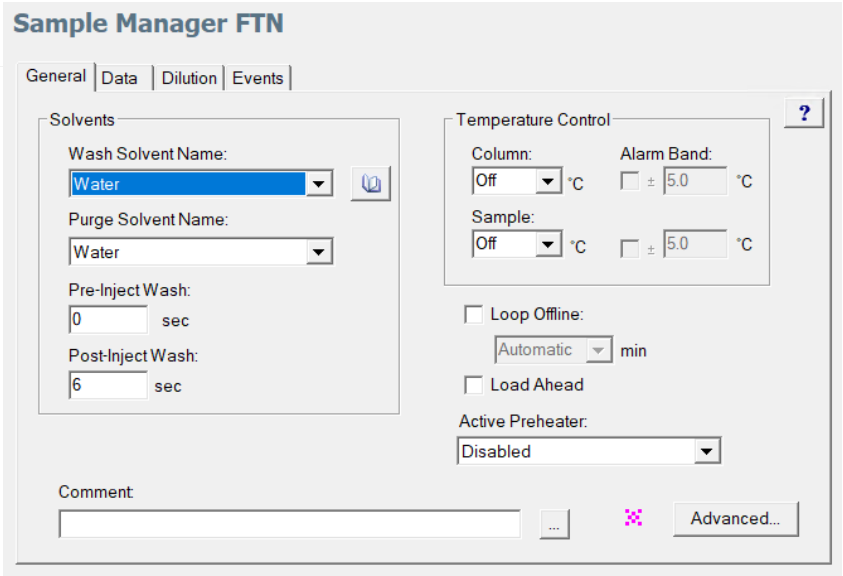
Column Compartment: Column Manager



Method Comparison

Multi sampler: Sample Manager





The injection volume in Empower is specified in the sequence table.
The ADF method file can also contain the auto sampler temperature which can be transferred across both manufacturers.

Phase 4 – Data from different vendors

Data Comparison on Zontal Space – Agilent and Waters Hardware

The difference in retention time between the two manufacturers is due the different dwell volumes of the instruments used to execute the method.

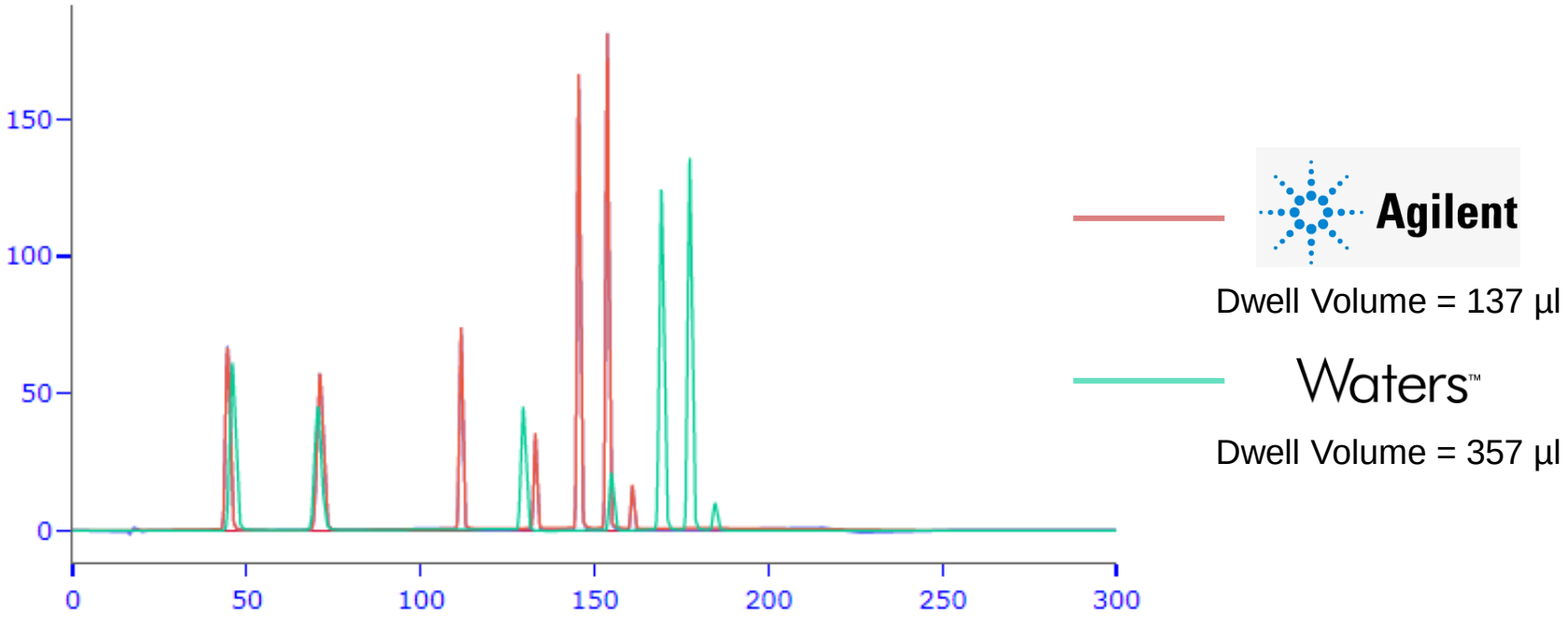
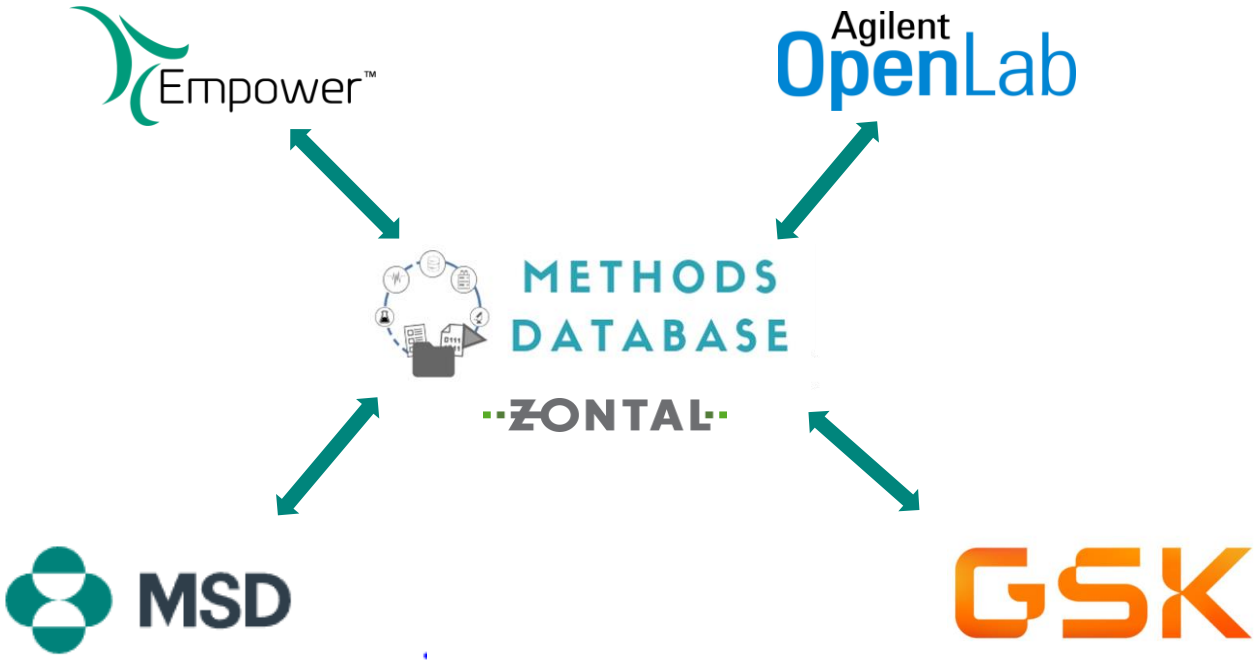


Figure 1: HPLC chromatogram comparison of the data collected Merck's gradient method on Agilent 1290 and Waters Acquity instruments at GSK.

Conclusion

- Method portability shown across
  - ✓ Different instrument vendors
  - ✓ Different chromatography data systems (CDS)
  - ✓ Different pharmaceutical companies



MERCK

How to get involved?

METHODS DATABASE

- Start implementation of the Methods Db
  - Lab/Instruments/Technical requirements
  - Interoperability across more hardware or software?
  - Own use case?
- Support the project/CoE

	NOW | 6 MONTHS	NEXT | 6+ MONTHS
Next Phase of POC	• Define next phase to test a different dimension, perhaps pharma to CRO • Documented plan for an implementable product • Publish specifications for more software companies to test • ROI calculator for Pharma companies • Calculation of pharma investment • Plan for sources of funding	• Efforts to launch implementable product • Additional software companies test in order to make product software agnostic • Involve new instrument company • Progress with columns + data analytics
Socialization	• Material plan to use broad-based marketing to socialize progress so far and upcoming plan • Publish webinar series from the day • Publish pharma test cases story in addition to June 2022 press release • Strengthen pitch with ROI and investment data • Bring together more pharma companies to join initiative • Tap into support of new Pistoia member, Charles River	• Bring together more pharma companies to join initiative • Proliferation through organizations to warrant future development • Gather contacts to target from Pistoia commercial partners • Identify mutual customers across businesses represented to expand to

Pistoia Alliance | accenture

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