



# ***United States & Co-Plaintiff States v. Google LLC***

Dr. Chris Culnane

Ex. No.

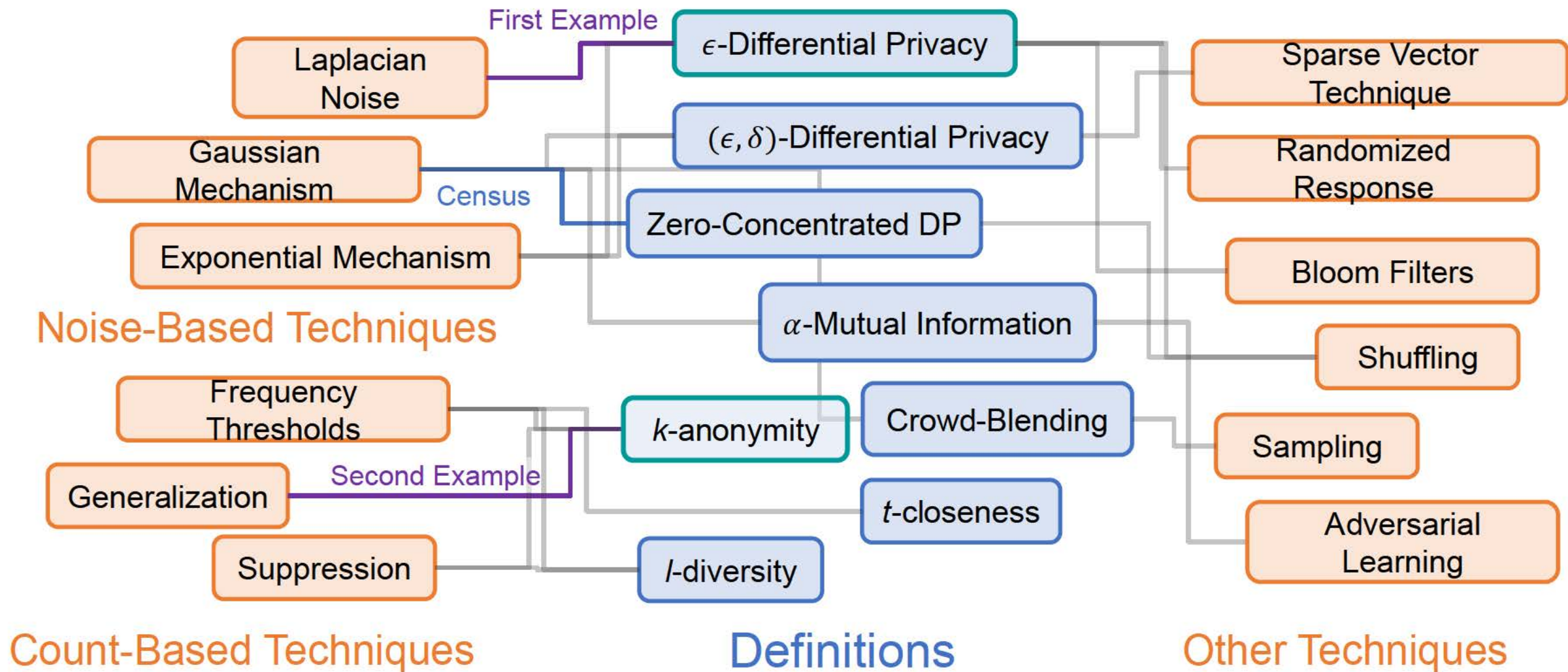
PXRD023

1:20-cv-03010-APM

1:20-cv-03715-APM



# Many Formal Privacy Definitions and Principled Techniques





## Dr. Culnane's Basis For Frequency Threshold Opinion

|                                                      | Dr. Culnane's DMA Submission                                                        | Dr. Culnane's DOJ Reports                                                             |
|------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Use Case Analysis                                    |  |    |
| Empirical Utility Analysis                           |  |    |
| Empirical Privacy-Enhancing Technique (PET) Analysis | Only Frequency Thresholding                                                         |  |





# Query Generalization Techniques Used by Google

## Spelling Correction & Query Rewriting



Query Intent: Taylor Swift's Birthday