

# 2020 PATENTLY-O PATENT LAW JOURNAL

## ***Parsing the Impact of Alice and the PEG<sup>1</sup>***

**Colleen V. Chien, Nicholas Halkowski, Maria He, and Rodney Swartz<sup>2</sup>**

### *Abstract*

*Almost two years have passed since the USPTO issued its January 2019 Patent Eligibility Guidance (PEG), itself a response to the Supreme Court’s Alice decision, and what many perceived as its destabilizing impact on the certainty of patent prosecutions. Leveraging new data releases, we report on trends in prosecution following the USPTO’s PEG and the Guidance on 112, finding 1) a decline in subject matter rejections and stabilization of subject matter appeals, 2) no discernable increase in 112 rejections, 3) no evidence that small entities were being left behind in Alice-impacted art units by forum shopping by large entities, 4) no noticeable decline in “medical diagnostic” or “software” applications following Alice or Mayo, and 5) more unique words in issued patent claims post Alice. The scripts and techniques we developed to navigate data discontinuities and a lack of labels and complete our analysis are included in this essay.*

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<sup>2</sup> Colleen V. Chien is a Professor of Law at Santa Clara University School of Law; Nicholas Halkowski is a 2020 J.D. graduate from Santa Clara University School of Law and first-year associate at Wilson Sonsini, Maria He is a 2020 Masters Graduate of the Masters in Business Analytics Program at the Leavey Business School at Santa Clara University, and Rodney Swartz, PhD is a patent agent, intellectual property associate at SRI International, and a third-year J.D. student at Santa Clara University School of Law; all are writing in their personal capacity.

### Introduction

Almost two years have passed since the USPTO issued its January 2019 Patent Eligibility Guidance (PEG).<sup>3</sup> As the prospect of near-term Supreme Court or Congressional action on Section 101 remains murky, it is worth taking stock of patent prosecution and application trends following the PEG, and also, the Office's accompanying Guidance on Section 112.<sup>4</sup> In this article, we report on quarterly trends in office actions and filings before and after the guidance. We build on earlier analyses reported in Patently-O<sup>5</sup> and the USPTO Office of Chief Economist's own report from earlier this year, *Adjusting to Alice*,<sup>6</sup> which found that the PEG was followed by decreases in both the likelihood of receiving a rejection and the uncertainty in patent examination.

It is thanks to the exciting continued releases of patent data from the Patent Office, collectively as part of the Open Data Portal (in beta),<sup>7</sup> that we can follow these trends in an attempt to understand the impact of policy. We commend the USPTO for its openness and transparency and encourage it to continue providing data and improving the coverage and the quality of

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<sup>3</sup> 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 1, 2019), available at <https://www.federalregister.gov/documents/2019/01/07/2018-28282/2019-revised-patent-subject-matter-eligibility-guidance>.

<sup>4</sup> *Id.*

<sup>5</sup> Colleen Chien, *The Impact of 101 on Patent Prosecution*, PATENTLYO (Oct. 21, 2018) [hereinafter *Impact of 101*], <https://patentlyo.com/patent/2018/10/impact-patent-prosecution.html>; Colleen Chien, *Piloting Applicant-Initiated 101 Deferral Through A Randomized Controlled Trial*, PATENTLYO (Jan. 29, 2019) <https://patentlyo.com/lawjournal/2019/01/patentlyo-deferring-patentable.html>.

<sup>6</sup> Andrew A. Toole and Nicholas A. Pairolero, *Adjusting to Alice*, Office of the Chief Economist IP Data Highlights (Apr. 2020), [https://www.uspto.gov/sites/default/files/documents/OCE-DH\\_AdjustingtoAlice.pdf](https://www.uspto.gov/sites/default/files/documents/OCE-DH_AdjustingtoAlice.pdf)

<sup>7</sup> Available at <https://developer.uspto.gov/api-catalog>

existing and future datasets, seeding not only research but patent data startups.

### *Methods*

Because patent data is administrative, and not designed for research and assessment, it is understandable that it requires additional data cleaning and processing. As to both office action and appeals data, discontinuities and quality issues (missing labels) in currently available datasets presented challenges to our analysis, which we overcame by developing a number of computational approaches described below.

For example, the dataset used in our original report, from the Office of Chief Economist (OCE),<sup>8</sup> has not been updated since 2017. We also ran into similar data availability issues with the USPTO Rejection API dataset. Table 1 in Appendix A summarizes our experience working with the various office action datasets. For the Office Action Data, ultimately, we settled on the USPTO Office Action Text Retrieval API available through the USPTO open data site.<sup>9</sup> The USPTO open data site is a publicly accessible site providing USPTO data through various APIs. The USPTO Office Action Text Retrieval API proved particularly useful for this work as it provided the full examiner text of each office action issued from 2008 to April 2020, however the coarse labels provided by the USPTO were not sufficient, particularly because they did not include 101 subject matter rejections separately broken out, or the 112 subsections, as in the original OCE dataset. Using keyword searching, which was optimized with random sampling, and aided by Google's BigQuery system, we were able to extract out rejection information for each office action in order to identify 101 subject matter rejections. The BigQuery code used to generate the graphs reported herein can be found in Appendix B. To ensure the data we reported was accurate we performed several sanity checks to confirm the

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<sup>8</sup> *Impact of 101*, *supra* note 5.

<sup>9</sup> USPTO APIs, <https://developer.uspto.gov/api-catalog> (last visited Nov. 1, 2020).

numbers reported for number of office actions per quarter, number of applications, number of issued patents were within reason.

For the Appeals data, the challenges were similar – though we were attempting to study the impact of the PEG, the relevant data was split over two datasets,<sup>10</sup> divided in time close to the time of the guideline change. In addition, no labels were provided, requiring 100+ hours of iteration and refinement of the keywords and queries to be used to find and isolate “101” subject matter rejections by a patent-bar qualified attorney and data scientist.<sup>11</sup> Additional methodological details are available upon request.

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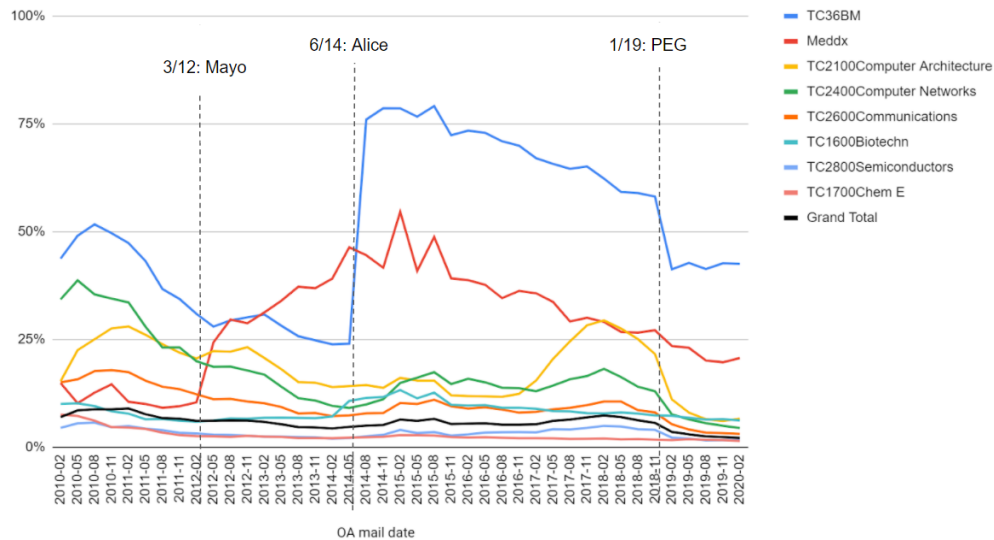
<sup>10</sup> PTAB Reading Room, *Final Decisions of the Patent Trial and Appeal Board* <https://e-foia.uspto.gov/Foia/DispatchBPAServlet> (covering decisions from July 1, 1997 through July 15, 2019) and <https://developer.uspto.gov/ptab-web/#/search/decisions> (described as the “new electronic warehouse for PTAB decisions. Appeal decisions issued on July 15, 2019 and AIA Trial decisions are available here PTAB will continue the migration of cases from the [PTAB Reading Room](#) to this page, so stay tuned for updates on the date range of decisions contained here...”) Another PTAB API v2 is available at <https://developer.uspto.gov/api-catalog/ptab-api-v2> but hasn’t been updated for over a year (last update: Sept. 25, 2019)

<sup>11</sup> False positives were the major problem, with “101” showing up incidentally (e.g. in the context of an address), in the context of rejections that were not raised but the examiner thought “should have been,” or in other ways.

## Results

### Decline in 101 Rejections and Stabilization of Appeals

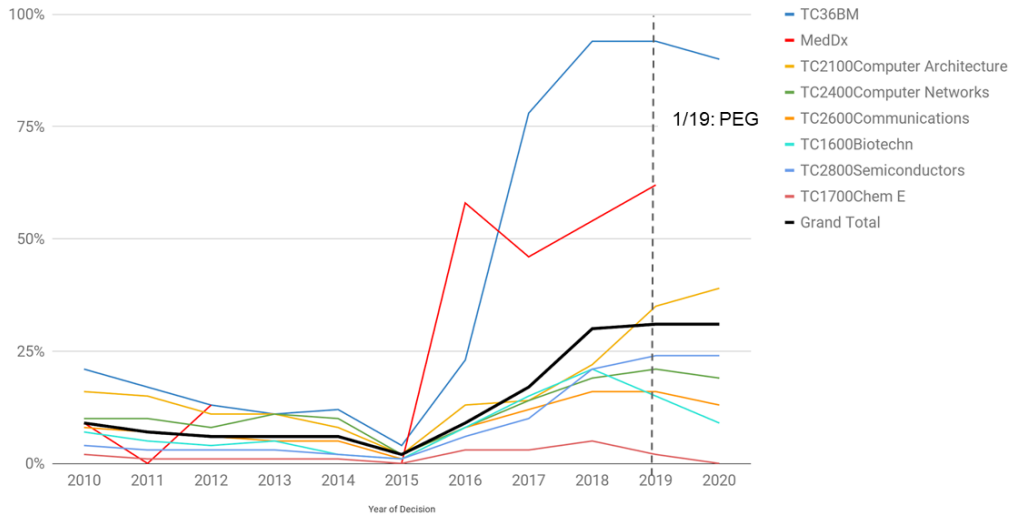
Fig. 1: Share of Office Actions with a Subject Matter Rejection



As shown in Figure 1, the prevalence of 101 subject matter rejections declined by 37% after release of the PEG, with absolute declines most dramatic among “software” applications.<sup>12</sup> However, ex parte appeal decisions that address 101 subject matter eligibility appeared to stem their rise, as seen in Figure 1A.

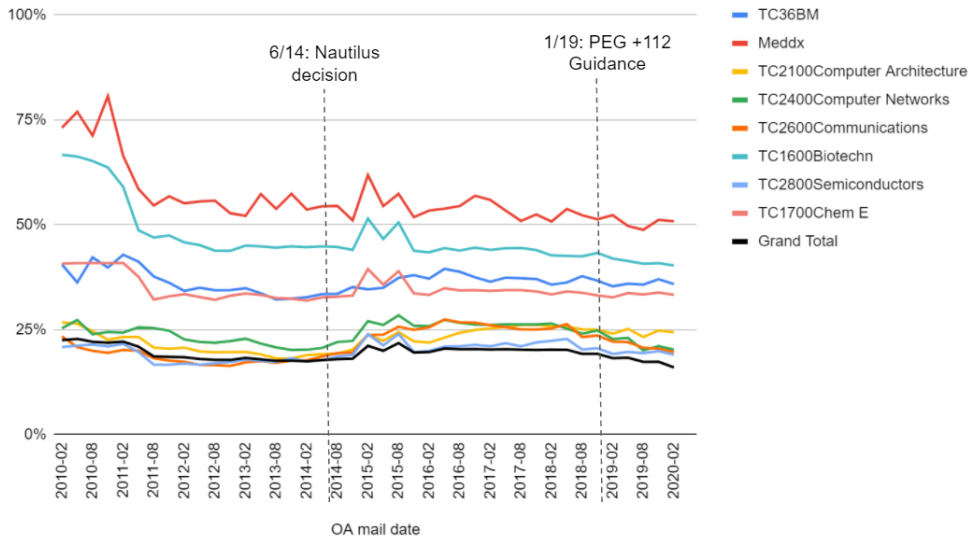
<sup>12</sup> Our definition of “software” is consistent with our earlier usages. See *Impact of 101*, supra note 5.

Fig. 1A: Ex Parte Appeals Decisions Addressing 101 Subject Matter



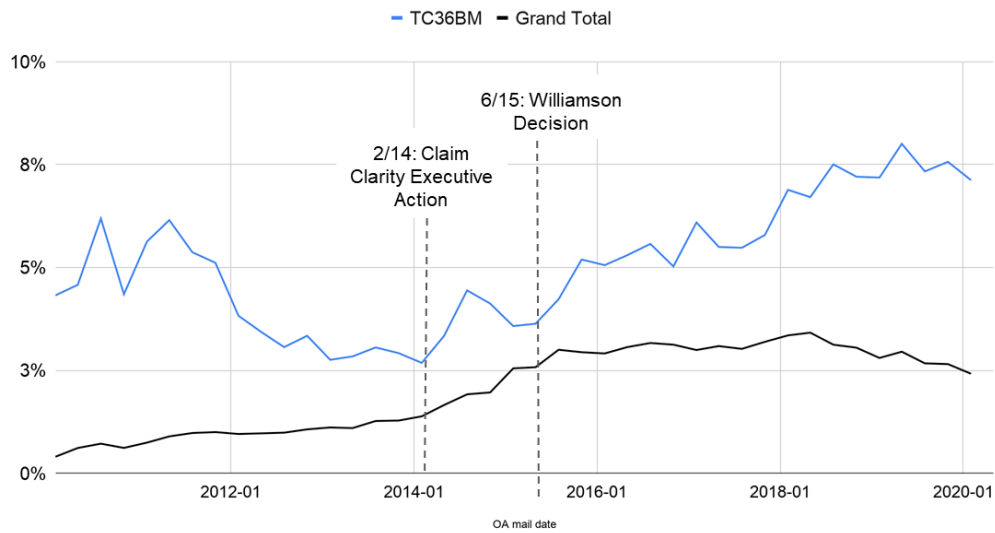
No Discernable Increase in 112 Rejections

Figure 2: Share of Office Actions with any 35 U.S.C. 112 Rejection



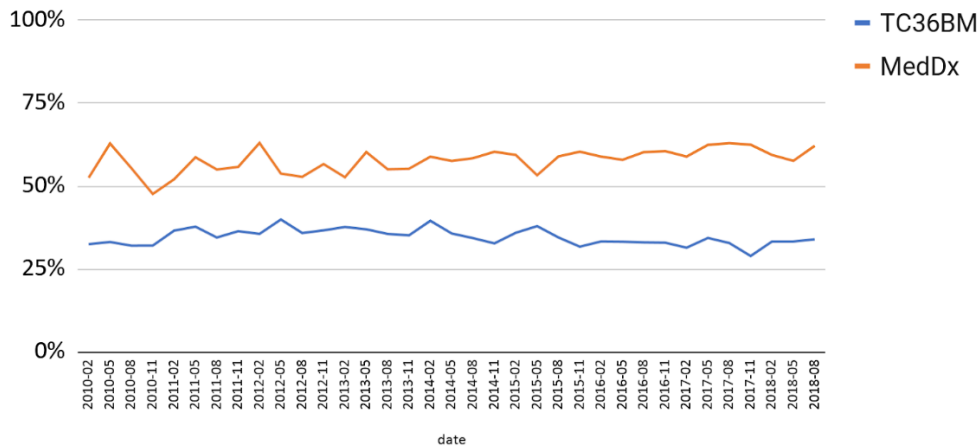
The 112 Guidance issued by the Patent Office in January 2019 described the use of 112(a), (b), and (f) to address functional claims in computer-implemented inventions. Following the 112 Guidance, we did not discern an increase in the examiner's application of 112 rejections, in general (Fig. 2) or at the subsection level, except in the case of 112(f) rejections as applied to "software" applications which have increased steadily since the USPTO's February 2014 Executive Action on Claim Clarity and Federal Circuit's June 2015 Williamson decision, both directed to functional claiming, from 2.7% in 1Q14 to 7.6% in 4Q19. (Fig. 2A)

Fig 2A: Share of Office Actions with a 112(f) Rejection



### Leaving Small Entities Behind Through Forum Shopping?

Fig. 3: Share of Applications filed by Small Entities for MedDx and TC36 Business Method

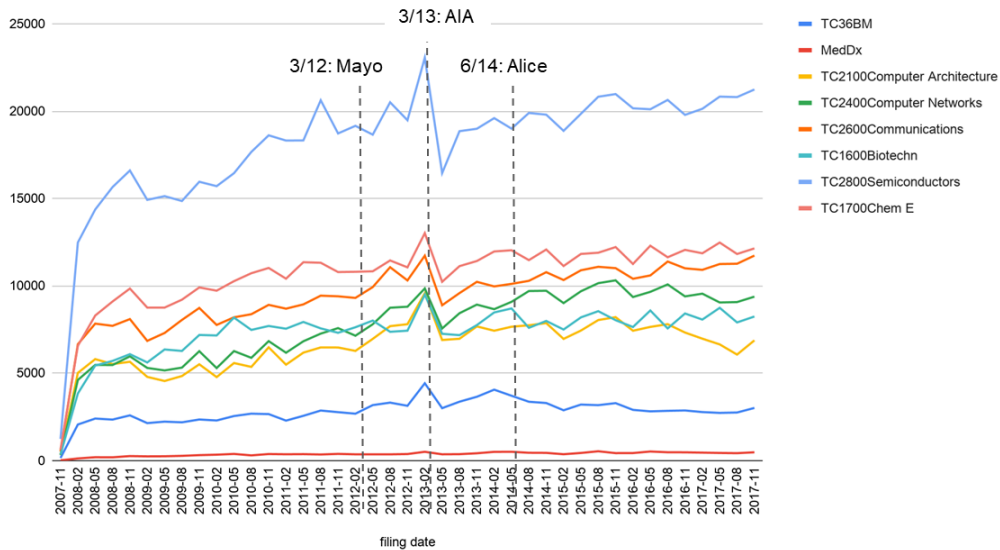


Some applicants have responded to elevated 101 rejection rates by using analytic tools to draft their claims in order to “forum shop” out of Alice-impacted art units. Though we cannot observe the use of these tools, it is plausible that their cost puts them out of reach of small and micro entities, and might, as a result, lead to a greater concentration of discounted applications in these art units. However, when we looked at the data, we found that the share of applications by discounted entities over time had not increased but rather, has stayed relatively steady among applications filed from 2010 to 2018. (Fig. 3)



## No Noticeable Decline in Medical Diagnostic and Software Applications following Alice or Mayo

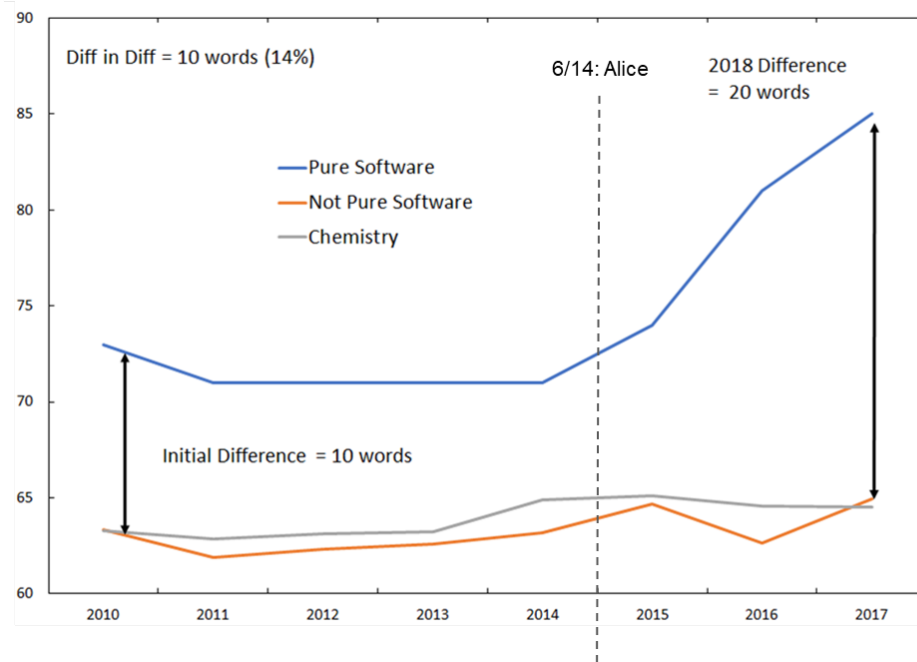
Figure 4: Number of Applications Filed by Quarter



One limitation of focusing solely on rejection rates is that they do not capture applications “never filed” due to the changes in law or policy. To gauge whether or not there was an “Alice” or “Mayo” “effect” on the number of applications, we looked for declines, in absolute and relative terms, among medical diagnostic and software technology applications, but found no such declines. (Fig.4) Although the PEG came out more than 18 months ago, we do not yet have a complete picture of application trends following the PEG, so cannot rule out that it was followed by increases in filings.

### More Words and Details in Issued Patents

Fig. 5: Average First Claim Unique Words



Another limitation of focusing on examiner behavior is that it does not take into account changes in applicant behavior and the dynamic therebetween. With the help of Rocky Berndsen, Peter Glaser, and William Gvoth of Harrity and Harrity,<sup>13</sup> we looked at the number of words included in patents filed after *Alice*. Applying a “differences in differences” approach, we found that the number of unique words in “software” patents relative to a baseline doubled from 10 additional to 20 additional words, consistent with the hypothesis that the *Alice* decision led to the addition of claim details. (Fig. 5) As patents filed after the PEG are granted, it will be worth seeing whether or not outcomes along this metric have changed.

<sup>13</sup> Harrity & Harrity, LLP, <https://harrityllp.com/> (last visited Nov. 1, 2020).

### *Conclusion*

The data indicate that, following the PEG, the prevalence of 101 subject matter rejections, and likely frustration associated with same, declined. At the same time, we did not find that 112 rejections increased noticeably to take their place, or that caselaw or the PEG resulted in sustained diminished filings. While we are not able to report on the impact of the PEG on filings and application “quality” (words and details), due to time effects, fortunately, the USPTO’s data releases should seed continued study and analysis of the impact of it and future guidance and court decisions.

## Appendix A

Table 1 - Dataset Information

Dataset (Link, Release Date, Source)	Coverage	Fields	Notes
USPTO OCE Office Action Dataset ( <a href="https://www.uspto.gov/learning-and-resources/electronic-data-products/office-action-research-dataset-patents">https://www.uspto.gov/learning-and-resources/electronic-data-products/office-action-research-dataset-patents</a> )	2008 to early 2017	Data breaks out general rejection type (101, 102, etc.) and subtypes (e.g., subtype of action raised, indicated by section paragraph of 35 USC or keyword) against application id and office action number. The dataset also includes indicators for Alice, Mayo, Bilski, etc.	USPTO specific data related to rejections only goes to 2017. The data breaks out rejection type and subtype which is very helpful.
USPTO Rejection API v2 ( <a href="https://developer.uspto.gov/api-catalog/uspto-office-action-rejection-api">https://developer.uspto.gov/api-catalog/uspto-office-action-rejection-api</a> )	Jun 2018 up to T-6 months.	Very similar fields to the USPTO OCE Office Action Dataset.	This dataset does help to extend the OCE's Office Action Dataset, but there appears to be a substantial number of applications that are not reported in either dataset during 2017.

<p>USPTO Office Action Text Retrieval API  <a href="https://developer.uspto.gov/api-catalog/uspto-office-action-text-retrieval-api">https://developer.uspto.gov/api-catalog/uspto-office-action-text-retrieval-api</a>)</p>	<p>2008 up to T-6 months</p>	<p>Provides the full text of the office action and also breaks out rejection text by type (e.g., 35 U.S.C. 102, 103, and 112) for more efficient queries.</p>	<p>Does not include a “101 subject matter rejections” label. The main challenge, and advantage, with this text dataset is that it is the raw office action text. Data extraction needs to account for the various ways an examiner can state the rejection of interest.</p>
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Table 2 – Summary of USPTO Subject Matter Eligibility Guidance

USPTO Memorandum	Issue Date	Notes
<p>May 2016 Update Memo</p>	<p>May 4, 2016</p>	<p>The memorandum addressed “(i) how examiners should formulate a subject matter eligibility rejection under § 101, and (ii) how examiners should evaluate an applicant response to such a rejection.”</p> <p>The memorandum emphasized <i>Diehr</i> in that a new combination of steps in a process may be patent-eligible, even though individually the steps are known and in common use.</p>
<p><i>Enfish</i> Memo</p>	<p>May 19, 2016</p>	<p>The memorandum contrasted <i>Enfish, LLC v. Microsoft Corp.</i> (decided May 12, 2016) with <i>TLI</i></p>

		<p><i>Communications LLC v. A. V. Automotive, LLC</i> (decided May 17, 2016).</p> <p>The memorandum highlighted that “when performing an analysis of whether a claim is directed to an abstract idea (Step 2A), <i>examiners are to continue to determine</i> if the claim recites (i.e., sets forth or describes) a concept that is similar to concepts previously found abstract by the courts. The fact that a claim is directed to an improvement in computer-related technology can demonstrate that the claim does not recite a concept similar to previously identified abstract ideas.”</p>
<i>Rapid Litigation Mgmt. Memo</i>	Jul. 14, 2016	<p>This memorandum addressed the U.S. Supreme Court and U.S. Court of Appeals for the Federal Circuit rulings in subject matter eligibility cases concerning life sciences method claims: <i>Rapid Litigation Management v. CellzDirect</i> and <i>Sequenom v. Ariosa</i>.</p> <p>The memorandum pointed out that “[t]hese cases do not change the subject matter eligibility framework, and the USPTO’s current subject matter eligibility guidance and training examples are consistent with these cases.”</p>
<i>McRo and BASCOM Memo</i>	Nov. 2, 2016	<p><i>McRo</i> found lip synchronization and facial expression animation using computer-implemented rules patent-eligible under 35 U.S.C. § 101. The memorandum reminded examiners that they “should consider the claim as a whole under Step 2A of the USPTO’s SME guidance, and should not overgeneralize the claim or simplify it into its ‘gist’ or core principles when identifying a concept as a judicial exception.”</p>

		For <i>BASCOM</i> , the Federal Circuit vacated a judgment of ineligibility as the district court erred for “failing to recognize that when combined, an inventive concept may be found in the non-conventional and non-generic arrangement of the additional elements.”
<i>Finjan and Core Wireless Memo</i>	Apr. 2, 2018	The memorandum confirmed that two recent U.S. Court of Appeals for the Federal Circuit were “consistent with a growing body of case law, including <i>Enfish</i> and <i>McRO</i> ” and consistent with the USPTO’s current subject matter eligibility guidance.
<i>Berkheimer Memo</i>	Apr. 19, 2018	The <i>Berkheimer</i> decision “[did] not change the basic subject matter eligibility framework as set forth in MPEP § 2106,” but it did clarify that whether something is “well-understood, routine, and conventional to a skilled artisan at the time of the patent is a factual determination.”  In light of <i>Berkheimer</i> , “[the] memorandum revised the procedures set forth in MPEP § 2106.07(a) (Formulating a Rejection For Lack of Subject Matter Eligibility) and MPEP § 2106.07(b) (Evaluating Applicant’s Response).”
2019 PEG	Jan. 7, 2019	The “2019 Revised Patent Subject Matter Eligibility Guidance” made two primary changes to how patent examiners apply the first step of the U.S. Supreme Court’s <i>Alice/Mayo</i> test, which determines whether a claim is “directed to” a judicial exception. At the same time, the USPTO issued guidance for the application of Section 112 (a), (b), and (f) to computer-implemented inventions that contain functional language.
Revised PEG	Oct. 17, 2019	The memorandum provided further explanation and examples in response to the comments received from the public.

## Appendix B

### SQL Script 1 — Main Code to Generate Rejection Data

```

WITH
cpc_table AS (
    SELECT
        application_number_formatted AS app_id,
        filing_date,
        (SELECT ARRAY_AGG(c.code) FROM pubs.cpc AS c) AS
cpc_codes

    FROM `patents-public-data.patents.publications` AS pubs
    WHERE country_code = 'US'
),

TechCenter_table AS (
    SELECT
        app_id,
        CASE
            WHEN ("C12Q1/6883" IN UNNEST(cpc_codes)) OR ("C12Q1/6886" IN
UNNEST(cpc_codes))
            OR ("G01N33/569" IN UNNEST(cpc_codes)) OR ("G01N33/571" IN
UNNEST(cpc_codes))
            OR ("G01N33/574" IN UNNEST(cpc_codes)) OR ("C12Q2600/106" IN
UNNEST(cpc_codes))
            OR ("C12Q2600/112" IN UNNEST(cpc_codes)) OR ("C12Q2600/118" IN
UNNEST(cpc_codes))
            OR ("G01N/2800" IN UNNEST(cpc_codes)) then 'MedDx'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'37') THEN 'TC3700MechE'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'362') THEN 'TC36BM'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'3661') THEN 'TC36BM'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'3664') THEN 'TC36BM'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'368') THEN 'TC36BM'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'369') THEN 'TC36BM'
            WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,

```



```

'361') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'363') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'364') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'365') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'366') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'367') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'29') THEN 'Designs'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'28') THEN 'TC2800Semiconductors'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'26') THEN 'TC2600Communications'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'24') THEN 'TC2400Computer Networks'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'21') THEN 'TC2100Computer Architecture'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'16') THEN 'TC1600Biotechn'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'17') THEN 'TC1700Chem E'
  ELSE 'Other' END as TechCenter_Name

FROM cpc_table
LEFT JOIN `chien-research.uspto_peds.uspto_peds` AS PEDS ON app_id =
CONCAT("US", patentCaseMetadata.applicationNumberText.value)

GROUP BY app_id, TechCenter_Name
),

rejections AS (
/* This creates a table that associates ifw_number with if contained a
101 non-statutory rejection*/
SELECT
text.obsoleteDocumentIdentifier[safe_offset(0)] AS ifw_number,
CONCAT("US", patentApplicationNumber[safe_offset(0)]) AS app_id,
submissionDate as mail_dt,
businessEntityStatusCategory[safe_offset(0)] AS entity_size,
inventionSubjectMatterCategory[safe_offset(0)] AS subj_matter_cat,
MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%112(A)%") OR
(UPPER(rej_text_all) LIKE "%112_FIRST%")

```

```

        OR (UPPER(rej_text_all) LIKE "%112_1ST%") OR
    (UPPER(rej_text_all) LIKE "%112_ FIRST%")
        OR (UPPER(rej_text_all) LIKE "%112_ 1ST%") THEN 1 ELSE
    0 END) AS rejection_112a,

    MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%112(B)%") OR
    (UPPER(rej_text_all) LIKE "%112_SECOND%")
        OR (UPPER(rej_text_all) LIKE "%112_2ND%") OR
    (UPPER(rej_text_all) LIKE "%112_ SECOND%")
        OR (UPPER(rej_text_all) LIKE "%112_ 2ND%") THEN 1 ELSE
    0 END) AS rejection_112b,

    MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%112(F)%") OR
    (UPPER(rej_text_all) LIKE "%112_SIXTH%")
        OR (UPPER(rej_text_all) LIKE "%112_6TH%") OR
    (UPPER(rej_text_all) LIKE "%112_ SIXTH%")
        OR (UPPER(rej_text_all) LIKE "%112_ 6TH%") THEN 1 ELSE
    0 END) AS rejection_112f,

    MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%Packard%") THEN 1 ELSE 0
    END) AS Packard,

    MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%Nautilus%") THEN 1 ELSE
    0 END) AS Nautilus,

    MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%35 U.S.C.
    101%SUBJECT_MATTER%") THEN 1 ELSE 0 END) AS rejection_101SM

    FROM `chien-research.uspto_pair.oa_text` AS text
    LEFT JOIN unnest(bodyText) AS rej_text_all
    GROUP BY ifw_number, mail_dt, app_id,
    businessEntityStatusCategory[safe_offset(0)],
    inventionSubjectMatterCategory[safe_offset(0)]
    ),

    main_table as (
    SELECT
        ifw_number,
        entity_size,
        MAX(CASE WHEN rejection_112a = 1 OR rejection_112b = 1 OR
    rejection_112f = 1 THEN 1 ELSE 0 END) AS rejection_112all,
        MAX(rejection_112a) AS rejection_112a,
        MAX(rejection_112b) AS rejection_112b,
        MAX(rejection_112f) AS rejection_112f,
        MAX(Packard) AS Packard,

```

```

    MAX(Nautilus) AS Nautilus,
    MAX(rejection_101SM) AS rejection_101SM,
    MAX(mail_dt) AS mail_dt,
    TechCenter_Name
FROM rejections
LEFT JOIN techcenter_table USING(app_id)
WHERE subj_matter_cat = "UTL"
GROUP BY ifw_number, TechCenter_Name, entity_size
)

SELECT
  EXTRACT(YEAR FROM mail_dt) as year,
  EXTRACT(QUARTER FROM mail_dt) as qtr,
  DATE(EXTRACT(YEAR FROM mail_dt), (EXTRACT(QUARTER FROM mail_dt)*3)-
1, 1) as date,
  TechCenter_Name,
  entity_size,
  SUM(rejection_112all) as number_112all,
  SUM(rejection_112a) as number_112a,
  SUM(rejection_112b) as number_112b,
  SUM(rejection_112f) as number_112f,
  SUM(Packard) as number_Packard,
  SUM(Nautilus) as number_Nautilus,
  SUM(rejection_101SM) as number_101SM,
  COUNT(*) as total_office_actions
FROM main_table
GROUP BY year, qtr, date, TechCenter_Name, entity_size

```

### SQL Script 2 — Code to Generate Application Counts by Quarter

*\*note: this was broken up into two steps. First data was extracted using a method similar to above. That data was then uploaded into BigQuery and then queried for the desired information.*

```

WITH
cpc_table AS (
  SELECT
    application_number_formatted AS app_id,
    filing_date,
    (SELECT ARRAY_AGG(c.code) FROM pubs.cpc AS c) AS
cpc_codes

```

```

        FROM `patents-public-data.patents.publications` AS pubs
        WHERE country_code = 'US'
    ),

    TechCenter_table AS (
        SELECT
            app_id,
            CASE
                WHEN ("C12Q1/6883" IN UNNEST(cpc_codes)) OR ("C12Q1/6886" IN
                UNNEST(cpc_codes))
                OR ("G01N33/569" IN UNNEST(cpc_codes)) OR ("G01N33/571" IN
                UNNEST(cpc_codes))
                OR ("G01N33/574" IN UNNEST(cpc_codes)) OR ("C12Q2600/106" IN
                UNNEST(cpc_codes))
                OR ("C12Q2600/112" IN UNNEST(cpc_codes)) OR ("C12Q2600/118" IN
                UNNEST(cpc_codes))
                OR ("G01N/2800" IN UNNEST(cpc_codes)) then 'MedDx'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '37') THEN 'TC3700MechE'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '362') THEN 'TC36BM'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '3661') THEN 'TC36BM'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '3664') THEN 'TC36BM'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '368') THEN 'TC36BM'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '369') THEN 'TC36BM'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '361') THEN 'TC36others'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '363') THEN 'TC36others'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '364') THEN 'TC36others'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '365') THEN 'TC36others'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '366') THEN 'TC36others'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '367') THEN 'TC36others'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
                '29') THEN 'Designs'
                WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,

```

```

'28') THEN 'TC2800Semiconductors'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'26') THEN 'TC2600Communications'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'24') THEN 'TC2400Computer Networks'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'21') THEN 'TC2100Computer Architecture'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'16') THEN 'TC1600Biotechn'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'17') THEN 'TC1700Chem E'
      ELSE 'Other' END as TechCenter_Name

      FROM cpc_table
      LEFT JOIN `chien-research.uspto_peds.uspto_peds` AS PEDS ON app_id =
CONCAT("US", patentCaseMetadata.applicationNumberText.value)

      GROUP BY app_id, TechCenter_Name
    ),

rejections AS (
/* This creates a table that associates ifw_number with if contained a
101 non-statutory rejection*/
      SELECT
          text.obsoleteDocumentIdentifier[offset(0)] AS ifw_number,
          CONCAT("US", patentApplicationNumber[offset(0)]) AS app_id,
          submissionDate as mail_dt,
          filingDate as filing_dt,
          businessEntityStatusCategory[offset(0)] AS entity_size,
          inventionSubjectMatterCategory[offset(0)] AS subj_matter_cat,
          MAX(CASE WHEN (UPPER(rej_text_112) LIKE "%112(A)%") OR
(UPPER(rej_text_112) LIKE "%112_FIRST%")
              OR (UPPER(rej_text_112) LIKE "%112_1ST%") OR
(UPPER(rej_text_112) LIKE "%112_FIRST%")
              OR (UPPER(rej_text_112) LIKE "%112_1ST%") THEN 1 ELSE
0 END) AS rejection_112a,

          MAX(CASE WHEN (UPPER(rej_text_112) LIKE "%112(B)%") OR
(UPPER(rej_text_112) LIKE "%112_SECOND%")
              OR (UPPER(rej_text_112) LIKE "%112_2ND%") OR
(UPPER(rej_text_112) LIKE "%112_SECOND%")
              OR (UPPER(rej_text_112) LIKE "%112_2ND%") THEN 1 ELSE
0 END) AS rejection_112b,

          MAX(CASE WHEN (UPPER(rej_text_112) LIKE "%112(F)%") OR

```

```

(UPPER(rej_text_112) LIKE "%112_SIXTH%")
      OR (UPPER(rej_text_112) LIKE "%112_6TH%") OR
(UPPER(rej_text_112) LIKE "%112_ SIXTH%")
      OR (UPPER(rej_text_112) LIKE "%112_ 6TH%") THEN 1 ELSE
0 END) AS rejection_112f,

      MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%Packard%") THEN 1 ELSE 0
END) AS Packard,

      MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%Nautilus%") THEN 1 ELSE
0 END) AS Nautilus,

      MAX(CASE WHEN (UPPER(rej_text_all) LIKE "%35 U.S.C.
101%SUBJECT_MATTER%") THEN 1 ELSE 0 END) AS rejection_101SM

FROM `chien-research.uspto_pair.oa_text` AS text,
unnest(sections_section112RejectionText) AS rej_text_112,
unnest(bodyText) AS rej_text_all
GROUP BY ifw_number, mail_dt, app_id, filing_dt,
businessEntityStatusCategory[offset(0)],
inventionSubjectMatterCategory[offset(0)]
),

main_table as (
  SELECT
    ifw_number,
    app_id,
    filing_dt,
    mail_dt,
    entity_size,
    MAX(rejection_112a) AS rejection_112a,
    MAX(rejection_112b) AS rejection_112b,
    MAX(rejection_112f) AS rejection_112f,
    MAX(Packard) AS Packard,
    MAX(Nautilus) AS Nautilus,
    MAX(rejection_101SM) AS rejection_101SM,
    TechCenter_Name
  FROM rejections
  LEFT JOIN techcenter_table USING(app_id)
  WHERE subj_matter_cat = "UTL"
  GROUP BY app_id, ifw_number, filing_dt, mail_dt, TechCenter_Name,
entity_size
)

SELECT

```

```
app_id,  
filing_dt,  
ifw_number,  
mail_dt,  
TechCenter_Name,  
entity_size,  
rejection_112a,  
rejection_112b,  
rejection_112f,  
Packard,  
Nautilus,  
rejection_101SM  
FROM main_table
```

Query to generate application count data:

```
WITH t1 AS (  
  SELECT  
    app_id,  
    filing_dt,  
    TechCenter_Name,  
    CASE WHEN entity_size = "N" THEN "LARGE" ELSE "SMALL" END AS  
entity_size  
  FROM `chien-research.uspto_pair.rejection_by_oa`  
)  
  
SELECT  
  EXTRACT(YEAR FROM filing_dt) AS year,  
  EXTRACT(QUARTER FROM filing_dt) AS qtr,  
  DATE(EXTRACT(YEAR FROM filing_dt), (EXTRACT(QUARTER FROM  
filing_dt)*3)-1, 1) as date,  
  techCenter_Name,  
  entity_size,  
  COUNT(*) as total  
FROM t1  
GROUP BY year, qtr, date, techCenter_Name, entity_size
```

*SQL Script 3 — Code to Generate Issuance Rate*

```

WITH
cpc_table AS (
  SELECT
    application_number_formatted AS app_id,
    filing_date,
    (SELECT ARRAY_AGG(c.code) FROM pubs.cpc AS c) AS
cpc_codes

  FROM `patents-public-data.patents.publications` AS pubs
  WHERE country_code = 'US'
),

TechCenter_table AS (
  SELECT
    app_id,
    CASE
      WHEN ("C12Q1/6883" IN UNNEST(cpc_codes)) OR ("C12Q1/6886" IN
UNNEST(cpc_codes))
        OR ("G01N33/569" IN UNNEST(cpc_codes)) OR ("G01N33/571" IN
UNNEST(cpc_codes))
        OR ("G01N33/574" IN UNNEST(cpc_codes)) OR ("C12Q2600/106" IN
UNNEST(cpc_codes))
        OR ("C12Q2600/112" IN UNNEST(cpc_codes)) OR ("C12Q2600/118" IN
UNNEST(cpc_codes))
        OR ("G01N/2800" IN UNNEST(cpc_codes)) then 'MedDx'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'37') THEN 'TC3700MechE'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'362') THEN 'TC36BM'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'3661') THEN 'TC36BM'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'3664') THEN 'TC36BM'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'368') THEN 'TC36BM'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'369') THEN 'TC36BM'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'361') THEN 'TC36others'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'363') THEN 'TC36others'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'364') THEN 'TC36others'
      WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,

```



```

'365') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'366') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'367') THEN 'TC36others'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'29') THEN 'Designs'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'28') THEN 'TC2800Semiconductors'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'26') THEN 'TC2600Communications'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'24') THEN 'TC2400Computer Networks'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'21') THEN 'TC2100Computer Architecture'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'16') THEN 'TC1600Biotechn'
  WHEN STARTS_WITH(patentCaseMetadata.groupArtUnitNumber.value,
'17') THEN 'TC1700Chem E'
  ELSE 'Other' END as TechCenter_Name

FROM cpc_table
LEFT JOIN `chien-research.uspto_peds.uspto_peds` AS PEDS ON app_id =
CONCAT("US", patentCaseMetadata.applicationNumberText.value)

GROUP BY app_id, TechCenter_Name
),

oa_table AS (SELECT
  app_id,
  filing_dt,
  CASE WHEN patentCaseMetadata.patentGrantIdentification.grantDate
IS NULL THEN 0 ELSE 1 END AS is_issued,
  patentCaseMetadata.patentGrantIdentification.grantDate AS
grant_dt,
  DATE_DIFF(patentCaseMetadata.patentGrantIdentification.grantDate,
DATE(filing_dt), day) AS days_pending,
  ARRAY_AGG(STRUCT(
    ifw_number,
    mail_dt,
    TechCenter_Name,
    CASE WHEN entity_size = "Y" THEN "SMALL" WHEN entity_size =
"N" THEN "LARGE" WHEN entity_size = "M" THEN "MICRO" END AS
entity_size,
    CASE WHEN rejection_112a = 1 OR rejection_112b = 1 OR

```

```
rejection_112f = 1 THEN 1 ELSE 0 END AS rejection_112all,  
    rejection_112a,  
    rejection_112b,  
    rejection_112f,  
    rejection_101SM  
    ) ORDER BY mail_dt ASC) AS oa_data  
FROM `chien-research.uspto_pair.rejection_by_oa` AS oa  
LEFT JOIN `chien-research.uspto_peds.uspto_peds` AS peds ON app_id =  
CONCAT('US', patentCaseMetadata.applicationNumberText.value)  
GROUP BY app_id, filing_dt, grant_dt, days_pending  
)  
  
SELECT  
    EXTRACT(YEAR FROM filing_dt) AS year,  
    EXTRACT(QUARTER FROM filing_dt) AS qtr,  
    DATE(EXTRACT(YEAR FROM filing_dt), (EXTRACT(QUARTER FROM  
filing_dt)*3)-1, 1) as date,  
    techCenter_name,  
    AVG(days_pending) AS avg_days_pending,  
    SUM(is_issued) AS count_issued,  
    COUNT(*) AS count_all  
FROM oa_table  
LEFT JOIN TechCenter_table USING(app_id)  
GROUP BY year, qtr, date, techCenter_name
```