Massachusetts Division of Health Care Finance and Policy
Application for All-Payer Claims Database (APCD) Data

Applications for APCD data must meet the requirements set forth in regulation **114.5 CMR 22.00: Health Care Claims Data Release** and any Administrative Bulletins promulgated under this regulation. The regulation and bulletins are available online at http://www.mass.gov/eohhs/gov/departments/hcf/regulations.html.
Information provided on pages 1-4 of this application will be posted on the internet for public comment.

A. APPLICANT INFORMATION	
Applicant Name:	Vinay Seth Mohta
Title:	Chief Technology Officer
Organization:	Kyruus, Inc.
Project Title:	Promoting Transparent Clinical Expertise
Date of Application:	April 2013
Project Objectives (240 character limit)	The team at Kyruus will use the APCD data to improve access to information about physicians' clinical experience. Specifically, Kyruus will to use the MA APCD data to display the relative volumes of the diagnoses and the procedures attributed to physicians. By displaying these relative volumes, healthcare professionals making referral decisions will have access to additional useful information about a physician's actual medical practice experience, improving transparency in the referral process.
Project Research Questions	Kyruus is requesting the multiple use file, and as such will develop a product that will be sold in the marketplace. Kyruus plans to pilot this application with clients, including hospitals and health systems in Massachusetts.

B. DATA REQUESTED

1. PUBLIC USE			
File	SINGLE USE* '08 – '09 – '10	REPEATED USE* '08 – '09 – '10	MULTIPLE USE* '08 – '09 – '10
Medical Claims	☐ ☐ ☐	☐ ☐ ☐	☐ X X
Pharmacy Claims	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Dental Claims	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Membership Eligibility	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Provider	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Product	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐

2. RESTRICTED USE			
File	SINGLE USE* '08 – '09 – '10	REPEATED USE* '08 – '09 – '10	MULTIPLE USE* '08 – '09 – '10
Medical Claims	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Pharmacy Claims	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Dental Claims	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Membership Eligibility	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Provider	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Product	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐

* The Division reserves the right to change proposed "use level" after review of this application.

Definitions:

- **Single Use**: Use of the data for a project or study.
- **Repeated Use**: Use of the data as an input to develop a report or product for sale to multiple clients or customers provided that it will NOT disclose APCD data. Examples include: development of a severity index tool, development of a reference tool used to inform multiple consulting engagements where no APCD data is disclosed.
- **Multiple Use**: Use of the data to develop a product or service that will be sold in the marketplace and will disclose APCD data. Examples include: a benchmark report produced by analyzing APCD data, a query tool to ease access to APDC data.

3. **Filters:** If you are requesting data elements from the Restricted Use dataset, describe any filters you are requesting to use in order to limit your request to the minimum set of records necessary to complete your project. (For example, you may only need individuals whose age is less than 21, claims for hospital services only, or only claims from small group products.)

File	Data Element(s)	Range of Values Requested
Medical Claims		
Pharmacy Claims		
Dental Claims		
Membership Eligibility		

Provider		
Product		

4. **Restricted data elements:** If you are requesting Data Elements from the Restricted Use dataset, list each restricted data element you are requesting on the attached Data Element List and explain why you need access to EACH Restricted Use data element for your project. Limit your request to the minimum data elements necessary to complete the project and be specific as to how each element relates to your proposed model/analytic plan. Add rows to this table as needed.

Restricted Data Element Name	**Restricted Data Element Description**	**Data File** (Medical, Pharmacy, Dental, Eligibility, Provider, Product)	**Justification** (reason this data element is necessary for your project)

C. PURPOSE AND INTENDED USE

1. Please describe the purpose of your project and how you will use the APCD.

Who is Kyruus?

Kyruus is a Boston-based big data start-up company that focuses on improving healthcare information technology by making data-driven applications for use by physicians and other healthcare professionals. At present, Kyruus uses data to serve the needs of several hospitals and health systems in Massachusetts and nationally.

What is the purpose of the project?

Kyruus will present to those making referral decisions the actual practice patterns of physicians. Kyruus wants to help further inform referral and patient routing decisions. We believe that this transparency in clinical experience data will improve both the patient and the physician experience.

How will Kyruus use the APCD data?

Kyruus will aggregate the APCD diagnosis and procedure data on a per physician basis. Users of the Kyruus application will be able to search for physicians who currently provide care to patients with the specific diagnoses and/or procedures for which care is being sought.

Kyruus already has 1 year of national claims data feeding its application. However, the addition of the robust APCD data will allow Kyruus to have the fullest possible coverage of Massachusetts physicians and aid in validating the information in these other databases as it relates to Massachusetts physicians.

The APCD data will be one of several data sources that will be made available to healthcare professionals when making referral decisions. Kyruus also has data on physician research interests, publications, hospital affiliation, practice locations, languages spoken, and gender. All these sources work in concert to give a fuller picture of a physician and broaden the basis on which decisions can be made.

2. Please explain why completing your project is in the public interest.

Kyruus aims to empower healthcare professionals with clinical information about the doctors to whom they refer patients. Kyruus hopes that these individuals will use Kyruus data, in addition to their own understanding of the healthcare ecosystem, to match patients with the physicians that are best suited to treat them. This will improve the referral process, making it more data driven and transparent.

In addition, physicians have expressed to us the frustration of being referred a patient inappropriately. We believe this application will assist in minimizing inappropriate referrals and thus improve physician satisfaction and decrease frustration. It provides a win-win for patients and physicians. The application is not designed or intended to replace clinical judgment but to provide a broader range of information on which to base a decision and thus expand choice.

On its most basic level, the Kyruus referral tool improves "health planning and resource allocation" (CHIA Regulations 114.5 CMR 22:00 b1) by aiding in the planning of patient routing and the allocation of physicians' time and energy. Interactions between physicians through referrals is one of the drivers of health care costs (Bodenheimer T., *Ann Intern Med.* 2005). This is due, in part, to its complexity: the typical physician needs to coordinate with 99 other physicians and 53 practices for every 100 Medicare patients (Pham HH, O'Malley AS, et al., *Ann Intern Med.* 2009). Published analyses of referral support tools in the medical literature have demonstrated the value of referral support tools:

- >50% improvement in patient referral adherence (Weiner M, et al, *J Gen Intern Med.* 2009; Fischer BS, et al. *Health Aff (Millwood)*. 2010).

- 80% decrease in inappropriate referrals (Kim-Hwang JE, et al, *J Gen Intern Med.* 2010).

Healthcare professionals that are making referral decisions can gain a clearer understanding of which physicians have experience in certain procedures or diagnoses related to the patient's condition and/or need. Clinical expertise is the single dominant reason for choice of a referral partner (Forest CB et al, *J Family Pract*. 2002; Javalgi R. et al, *J Health Care Mark*. 1993; Kinchen K et al, *Ann Family Medicine*. 2004).

As an example, if a hospital administrator working in the call center receives a call from a patient with Marfan syndrome looking for a doctor to see about heart palpitations, Kyruus application can facilitate finding a physician with experience treating ICD9 Diagnosis Code 759.82 (Marfan Syndrome), if the referring physician and patient want that to be a determining factor in the referral selection process. Without the Kyruus tool, this type of decision making could not be so readily achieved, even if both referring physician and patient felt it was an important decision point.

In addition to having an impact on planning and resource allocation, this product will make an "improvement in health care quality" (CHIA Regulations 114.5 CMR 22:00 b1) for certain areas of care. A survey of providers who used an eReferral tool reported "seventy-two percent of primary care providers reported that electronic referrals improved overall clinical care compared to prior methods," (Kim Y, et al, *J Gen Intern Med.* 2009). As another example, a study conducted by Dr. Robert E. Bristow of UC Irvine, recently written up in the New York Times (http://www.nytimes.com/2013/03/12/health/ovarian-cancer-study-finds-widespread-flaws-in-treatment.html?pagewanted=all) , shows that surgeons that operated on 10 or more

women a year for ovarian cancer saw better survival rate among their patients. The article notes that tragically, "most of the women in the study, more than 80 percent, were treated by what the researchers called "low-volume" providers — surgeons with 10 or fewer cases a year, and hospitals with 20 or fewer." Using the Massachusetts APCD data and the Kyruus referral application, doctors can route ovarian cancer patients to gynecologic oncologists that specialize in this treatment. In this way, the application contributes to achieving evidence-based care by providing data not previously readily available.*

*Kyruus is aware that not all patients see improved care from doctors that see higher volumes of a particular procedure. However, Kyruus wants to make relative volume data available to healthcare providers who are making referral decisions, so that they can use this information as one of many factors in directing a patient to another doctor.

3. **Attach** a brief (1-2 pages) description of your research methodology. (This description will not be posted on the internet.)

4. Has your project received approval from your organization's Institutional Review Board (IRB)?
   - ☐ Yes, and a copy of the approval letter is attached to this application
   - ☐ No, the IRB will review the project on _____
   - ☐ No, this project is not subject to IRB review
   - X No, my organization does not have an IRB and is not subject to IRB review

D. APPLICANT QUALIFICATIONS

1. Describe your qualifications to perform the research described or accomplish the intended use.

Kyruus is a big data start-up with the mission of improving healthcare information technology. We have a blend of technical sophistication and healthcare-specific analytic experience that allow for skillful navigation of massive influxes of data in healthcare.

Kyruus has a demonstrated ability to handle data

Kyruus has demonstrated an ability to handle massive amounts of data in an organized and efficient way. Presently, its master physician data base houses several billion data points on 2.2 million healthcare providers.

Kyruus has a demonstrated commitment to healthcare

Kyruus is dedicated to solving problems in healthcare, specifically problems in information technology at hospitals. At present, Kyruus is working with about a dozen hospitals and health systems in the areas of compliance and physician network development. Kyruus is also engaged in research projects focused on conflict of interest management with the Cleveland Clinic and with researchers at Harvard University.

Meet the team of entrepreneurs

Dr. Puneet Batra, the Chief Data Scientist at Kyruus, has 15 peer-reviewed, first-author journal articles and over 300 citations. He has also presented at 40+ conferences and seminars in the US and Europe, including the Aspen Institute, UC Berkeley, CERN, Harvard, Princeton, Stanford, and Yale. Dr. Batra is passionate about bringing big data technologies and analysis to healthcare.

Dr. Leon Goldman, MD is the Chief Privacy Officer at Kyruus. Dr. Goldman worked for many years as a general surgeon and educator. In 1999, he transitioned to the role of Chief Compliance and Privacy Officer at the Beth Israel Deaconess Medical Center in Boston. At BIDMC, Dr. Goldman was responsible for corporate compliance, research compliance, privacy, and conflicts of interest. Dr. Goldman now serves as the Chief Privacy Officer at Kyruus and oversees the privacy and confidentiality program. Dr. Goldman was named as a Kallman Executive Fellow at the Center for Business Ethics at Bentley University.

Julie Yoo, the Chief Product Officer at Kyruus, holds an MBA from the MIT Sloan School of Management as a Master's degree in Biomedical Enterprise from the Harvard-MIT School of Health, Sciences, and Technology. As demonstrated by her work at Generation Health and Knome, Julie has extensive experience in product development and is passionate about building products in the intersection of medicine and technology.

Vinay Seth Mohta, the Chief Technology Officer at Kyruus, has 11 patents relating to large-scale systems software. He has over ten years of experience in software development in entrepreneurial settings, and has held leadership roles at companies like Endeca Technologies and kayak.com. Mr. Mohta loves to use technology to build solutions to "impossible" problems.

Ryan Cleary is the tech lead of the dev ops team at Kyruus. Mr. Cleary has considerable experience in software development and cloud computing. Prior to joining Kyruus he worked for over seven years at Endeca and for over five years at Interdimensions Corporation. He holds a degree in aeronautical and astronautical engineering from the Massachusetts Institute of Technology.

Emily Nguyen, an analyst at Kyruus, is a graduate of Princeton University. She has experience handling large datasets, including large healthcare claims datasets, and experience working with hospital administrators to tailor products to their needs.

Christopher Schuch, a data scientist at Kyruus, is a recent graduate at the Massachusetts Institute of Technology. He has experience with large-scale data analysis in healthcare, including using unsupervised clustering techniques to identify physicians with similar diagnosis patterns.

Eliot Knudsen is a data scientist at Kyruus and a recent graduate of Carnegie Mellon where he majored in applied and computational mathematics. Mr. Knudsen has experience in handling large healthcare datasets, including health insurance claims and medical specialty taxonomies.

2. Describe the software you plan to use to analyze the data and the experience that the applicant's team members have in using that software.

   Kyruus will house the data in Hadoop and a Postgres SQL database. Analytics will be run locally in Excel and in R.

3. Attach résumés or curriculum vitae of the applicant/principal investigator, key contributors, and of all individuals who will have access to the data. (These attachments will not be posted on the internet.)

   Please see attached folder for resumes of key contrributors.

E. DATA LINKAGE AND FURTHER DATA ABSTRACTION

1. Does your project require linking the APCD to another dataset?
   YES X NO ☐

2. If yes, will the APCD be linked to other patient level data or with aggregate data (e.g. Census data)?
   Patient Level Data ☐ Aggregate Data ☐

   Kyruus will link the APCD to physician-level data.

3. If yes, please identify all linkages proposed and explain the reasons(s) that the linkage is necessary to accomplish the purpose of the project.

   Kyruus will link the APCD to a local copy of its master physician database, which gives a comprehensive overview of physicians. Information contained in the Kyruus master physician database includes industry interactions, publications, grants, clinical trials, patents, federal and state disciplinary actions, addresses, affiliations, specialties, clinical interests, board certifications, birth year, and a host of other data, including other insurance claims data. Through the union of the APCD and Kyruus datasets, we can achieve a unified view of both a doctor's clinical and professional activities.

   This unified view will be important in both Kyruus's pioneering web application that will help physician and hospital administrators make referral decisions. Kyruus's existing database can give an accurate representation of a physicians' research experience, education, and current practice location. Kyruus also has about one year's worth of hospital-based insurance claims for healthcare providers nationally. Kyruus hopes to unify its existing database with the Massachusetts APCD in order to ensure that data on Massachusetts physicians is complete and accurate.

4. If yes, specify the specific steps you will take to prevent the identification of individual patients in the linked dataset.

   Kyruus has no patient-identifiable data, only physician-identifiable data.

F. RE-RELEASE OF DATA

Applicants must obtain prior approval from the Division to publish reports that use APCD files. Applicants must provide the Division with a copy of any report at least 30 days prior to release to outside parties, including peer review and prepublication analysis by anyone other than the individuals named in this Application. The Division will review the report to ensure that the publication will not permit identification of an individual patient or permit identification of a specific payment by individual payer. The Division may prohibit release of reports that may permit identification of individual patients or specific payment by individual payer.

1. Describe your plans to publish or otherwise disclose any APCD data elements, or any data derived or extracted from such data, in any paper, report, website, statistical tabulation, or similar document.

APCD data elements will not be disclosed in their raw forms in any public forum on the internet or in print. Kyruus is willing to work with the state government to establish guidelines for the disclosure of APCD data derivatives but requests permission to disclose the following type of information derived from the APCD:

- **Show aggregates at the physician-level to clients**. For example, in the referral application, Kyruus would like to show the proportion of a physician's caseload consists of a particular type of procedure. At client organizations, physicians and hospital administrators, designated by their organizations, will have access to this data. The application will be password protected. Additionally, procedural data will be redacted to ensure patient privacy. If a physician has performed fewer than 11 of a given procedure in one year, Kyruus will not include the volume in the physician's profile.
- **Publish analytic results on our website or in business outreach material**. The aggregation of claims level data on a per-doctor basis is a novel approach to referrals, and Kyruus expects to learn a lot from the data, from our physician advisors, and from our clients. Kyruus will never publish raw APCD data, but Kyruus would like to publish the results of analysis conducted on the data.

2. Will the results of your analysis be publicly available to any interested party? Will you charge a fee for the reports or analysis? Please describe how an interested party will obtain your analysis and, if applicable, the amount of the fee.

Kyruus does not plan to make the results of its aggregation and analysis public and will instead work with clients to develop optimal solutions. We will charge a fair market fee for the software application. Interested parties may contact us to receive Kyruus services.

3. Will you use the data for consulting purposes?
   YES ☐ NO X

4. Will you be selling standard report products using the data?
   YES ☐ NO X

5. Will you be selling a software product using the data?
   YES X NO ☐

6. If you have answered "yes" to questions 3, 4 or 5, please (i) describe the types of products, services or studies; (ii) estimate the number and types of clients for which the data will be used and (iii) describe any rerelease of data by your clients.

Software
Kyruus will use physician-level aggregates of the APCD data to feed a referral management tool

that allows doctors and other designated healthcare system personnel to identify doctors with a specific clinical experience.

G. USE OF AGENTS OR CONTRACTORS

Third-Party Vendors. Provide the following information for all agents and contractors who will work with the APCD data.

Company Name:	NONE
Contact Person:	
Title:	
Address:	
Telephone Number:	
Fax Number:	
E-mail Address:	
Organization Website:	

1. Will the agent/contractor have access to the data at a location other than your location or in an off-site server and/or database?
   YES ☐ NO ☐

2. Describe the tasks and products assigned to this agent or contractor for this project.

3. Describe the qualifications of this agent or contractor to perform such tasks or deliver such products.

4. Describe your oversight and monitoring of the activity and actions of this agent or subcontractor.
