It is our vision that structured, coded, ONC standardized data inclusive of anatomic pathology, proteomic and genomic testing results are available to the researcher in i2b2 for research in Precision Cancer Medicine(PCM) During this two year project, Nebraska Medicine(NM) will develop, test and deploy extensions to ONC terminology standards SNOMED CT and LOINC in order to resolve terminology deficiencies for encoding of synoptic pathology data for five common cancer types as specified in College of American Pathologists(CAP) Cancer Protocols and Biomarker Templates (CAPcp). CAPcp are considered the gold-standard for the diagnosis, staging and treatment planning of cancer in the US and Canada. Two collaborating cancer centers in the US will deploy the terminology extensions into their EHR and research data dictionaries.

In cooperation with the CAP, terminology extensions will be bound to CAP Electronic Cancer Checklist(eCC) XML templates in Structured Data Capture(SDC) format that will organize and publish pathologist workflow standards. eCC-SDC forms will be employed to populate pathology departmental workflow software in all collaborating centers. Implementation of this software will support assisted automated encoding of synoptic cancer data at the time of diagnosis by the pathologist. Real-time synoptic pathology data will be loaded into the EHR and research databases at all three sites where it will dramatically improve information available to the clinician for making PCM decisions involving molecular therapy agents now emerging as innovations in PCM.

Point of care, interoperable decision support tools employing the extended terminology standards will be developed in collaboration with HL7, validated and tested at the cancer centers. A structured synoptic report employing HL7 CDA formalisms will be developed and balloted in year two employing expanded annotations from the molecular pathologist and links to reference knowledge sources for clinical genomics. Web-based decision support applications will employ FHIR APIs to access and employ the new and expanded pathology, genomic, clinical and laboratory data in the EHR. Interoperability of data and decision support technology will be demonstrated in year two with a project sharing PCM decision support between the collaborating sites.

Collaborating sites will deploy the extended synoptic datasets into their PCORnet research datamarts. In a project demonstrating re-use of information in the LHS, an observational research study will be conducted via PCORnet and deliver real-time knowledge back to the clinical point-of-care.

In years 2-5, performance sites will participate in a project under CAP advisement to explore the interoperation and utility of coded synoptic data in support of data quality and timeliness in reporting to cancer registries.

In years 3-5, additional collaborating sites in the US and Canada will implement, test and employ the terminologies, software and services developed by the US collaborators. Terminology extensions will be developed for additional cancer types to encompass 90% of cancer cases reported in the US. We will collaborate with CAP and the International Committee for Cancer Reporting efforts to assure international applicability of the terminology, software and services.