# **HBGD Ontology Development**



**HBGD Ontology provides** standards for vocabulary, term definitions, and semantics for global studies of child growth and neurocognitive development.

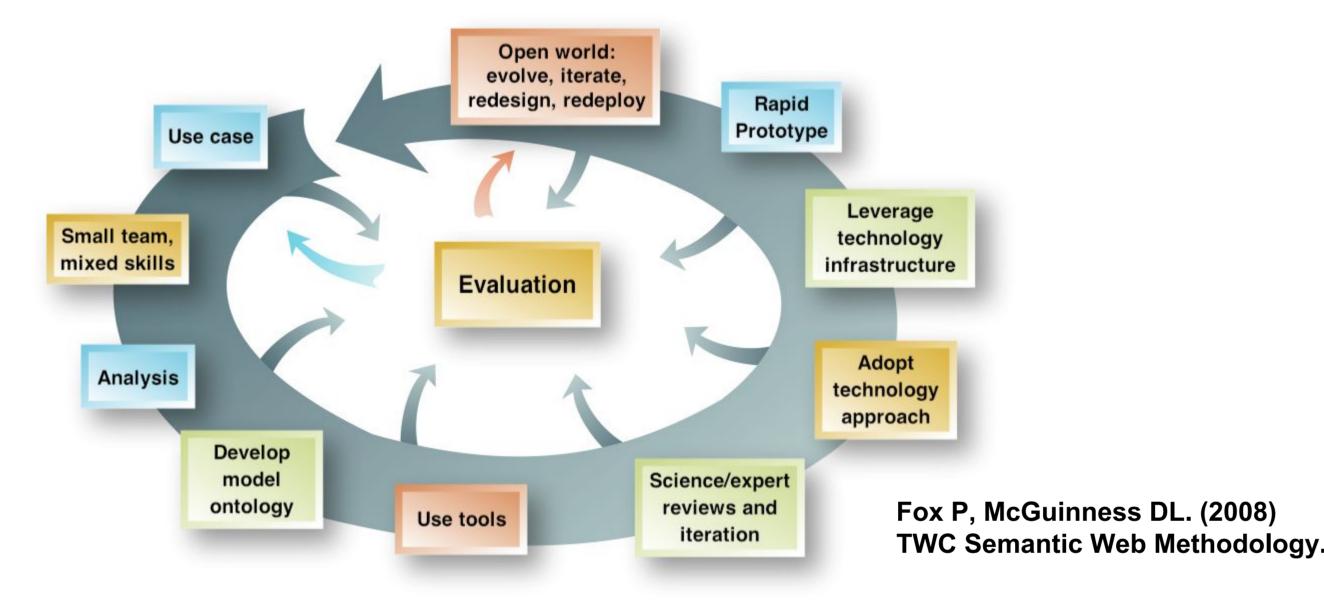
Healthy Birth, Growth, and Development Program **HBGD-Knowledge Integration: Knowledge Translation Surge Team** 

## PURPOSE

- The HBGDki mission is to eliminate growth faltering and impaired neurodevelopment globally by transforming data to insights to action.
- In deep data integration, an ontology (controlled vocabulary with specific term definitions) is important to enable integration of data sets that use different definitions for similar variables. • We developed an ontology for birth, growth, and neurocognitive development with controlled vocabulary, term definitions, and semantics.

## RESULTS

- 438 classes (288 classes [64%] with definitions)
- Subclass connections
  - 27 classes have 1 subclass
  - 39 classes have 2-5 subclasses
  - 7 classes have 6-10 subclasses 1 class has > 11 subclasses



ealthy Birth, Growth, and Developm	ant Ontology			Small for G	estational Age Class		
althy Birth, Growth, and Development Ontology				<b>Preferred Definition:</b> Small for gestational age (SGA) indicates birth weight <10th percentile for gestational age, in contrast to appropriate for gestational age (AGA) and large for gestational age (LGA).		Definitions	
is a more detailed description of the HBGDki Ontology.						Small for gestational age (SGA) indicates birth weight <10th percentile for gestational age, in contrast to appropriate for gestational age (AGA) and large for gestational age (LGA).	
HBGDki Prioritized Questions	HBGDki Concepts			Details	Small for Gestational Age	Status Preferred Definition	
These research questions have been prioritized to as a starting point for developing the HBGD Ontology.	Attribute C • Apgar Score • Average			Synonyms	A. Extent growth faitering is explained by pre- vs postnatal insults? B. What kind of recovery can we expect in infants born	Measure-based Definition Editorial Notes High accuracy High precision; exact measure Low: not practical in low resource settings.	
A. Extent growth faltering is explained by pre- vs postnatal insults? To what extent is growth faltering explained by pre- vs postnatal insults?	<ul> <li>Differential Average</li> <li>Baseline</li> <li>Biomarker</li> <li>Early Biomarker</li> <li>Covariance</li> </ul>			Sub-Questions	SGA?	narrow, fits use in literature There are many ways to measure gestational age. In hi resource settings this can be measured with precision, however low resource settings, other ney on recall of di of last menstrual period to determine gestational age. can introduce error into the measure. Due to difficulty i determining SGA in low resource settings, low birth	, iate This
B. What kind of recovery can we expect in infants born SGA? What kind of recovery can we expect in infants born small for gestational age (SGA)?	<ul> <li>Fecundability</li> <li>Growth And Development Rate Constitution</li> <li>Growth And Development Restriction <ul> <li>Intrauterine Growth And Development Restriction</li> </ul> </li> </ul>			References	84 Neurocognitive growth faitering recovery in infants born SGA? http://dx.doi.org/10.1136/jech.2004.023465 Auxology Studying Human Growth and Development. Ed.: Michael Hermanussen 2013. Pg 107	HBGDki Project HBGD Ontology	We
C. Links between preterm birth, physical growth & brain development?	HBGDki Project HBGD Ontology B. What kind of recovery can we expect in infants born SGA?			Related Classes Super Classes		Gestational Age Class	
Can we quantitatively characterize the relation and interaction between preterm birth, physical growth, and brain development?						Preferred Definition: Gestational age is the common term used during pregnancy to describe how far along the pregnancy is. It is measured in weeks, from the first day of the woman's last	
D. Pathways that contribute disproportionately to growth faltering?	HBGD Prioritized Investigative Question	bom our:	Sub Classes		often cited as ranging from 38 to 42 weeks. desc	Gestational age is the common term used during pregnancy describe how far along the pregnancy is. It is measured in weeks, from the first day of the woman's last menstrual cyc the current date. A normal pregnancy duration is often cited	
Are there disproportionately large contributions on growth faltering from certain pathways, and can we rank-order risk factors?	What kind of recovery can we expect in infants born small for gestational age (SGA)?					Term Gestational Age	ranging from 38 to 42 weeks. Status Preferred Definition
E. Growth faltering pathways that coincide with greater risk of	Classes	Details				Synonyms           Prioritized Questions         A. Extent growth failering is explained by pre- vs postnatal insuits?	Definition Consistent with Literature Measure-based Definition Editorial Notes High accuracy
NCDs? Are there specific pathways directly impacting linear growth faltering that coincide with	Birth The complete expulsion or extraction from the mother of a fetus, irrespective of the duration of pregnancy.		tp://debategraph.org/Details.as			B. What kind of recovery can we expect in infants born SGA?	High precision, exact measurement Low: not practical in low resource settings
Increased risk of noncommunicable diseases (NCDs) such as cardiovascular disease, obesity, and diabetes?	Gestational Age Gestational age is the common term used during pregnancy to describe how far along the pregnancy is. It is measured in weeks, from the first day of the woman's last menstrual cycle to the current date. A normal pregnancy duration is often cited as ranging from 38 to 42 weeks.	References http://onlinelibrary.wiley.com/dol				Sub-Questions References http://dx.doi.org/10.1138/jech.2004.023465 https://www.nlm.nih.gov/medilneplus/ency/article/002367.htm	narrow, fits use in literature There are many ways to measure gestational age. I resource settings with access to ultrasound or othe technologies, this can be measured with precision. However, in low resource settings it is often necess
	Infant A child during the period between live birth and 365 days of age.	Related Questions				Related Classes	rely on recail of date of last menstrual period to del gestational age. This can introduce uncertainty or into the measure. This measure is then used to def birth as preterm, term, or postterm.
	Recovery A healing process and/or an outcome implying relative health. The term is typically used in the context of direct and indirect effects of sickness or injury.	Sub Questions 16 Association between brain deve outcomes? 17 Which variables explain >80%			Super Classes Age the amount of time during which a thing has existed	Appears in	
	Small for Gestational Age Small for gestational age (SGA) indicates birth weight <10th percentile for gestational age, in contrast to appropriate for gestational age (AGA) and large for gestational age (LGA).	tra	) What is a "healthy" neurocogniti ajectory?			Sub Classes	See also Attributed To
	Age the amount of time during which a thing has existed 20 Which early lifecycle variables trajectories? 21 Which early lifecycle predictor						
		"risk"? 22 Are neurocognitive growth & de mutable?		velopment trajectories			The duration of pregnancy (and thus the age of fetus), measured from the "first day of the last normal menstrual period" or LMP. While it is the most practical basis for dating pregnancy, the LMP in fact occurs two or more weeks before conception. The LMP based gestational age is sometimes
		re	Biomarkers predictive of faltering covery? Association between fetal growt				adjusted later during pregnancy on the basis of ultrasound examination.
		bi	rth outcomes? Explaining >80% between-fetus				Status Alternate Definition

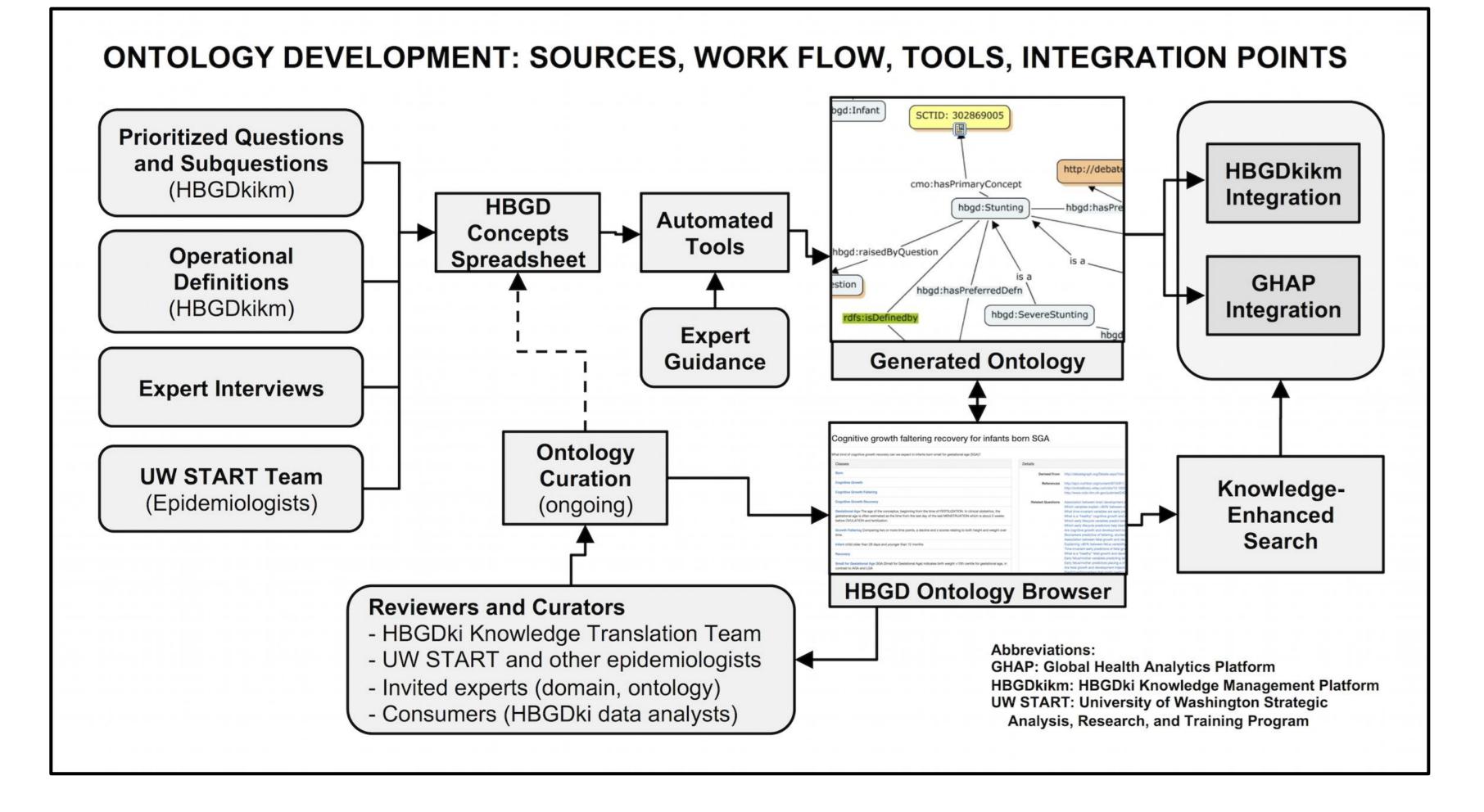
### **METHODS**

• Key terms taken from HBGDki questions, program members, and previous studies

## **NEXT STEPS**

Evolution

- Add updated HBGDki subquestions
- Tools developed to generate and curate ontology
- Ontology reviewed and iterated
- Tools developed to browse, search, review ontology



- Expert interviews
- Augment vocabulary

#### Curation

- Review by epidemiologists, domain experts, invited ontologists
- Define ontology review work flow
- Data analyst review for usability
- Onboard new ontology source material (questions, definitions)

#### **Tool Development**

- Improved faceted browser interface
- Ontology review work flow within browser
- Knowledge-enhanced search
- Automated tools

#### HBGDki Platform Integration

- HBGDki-Knowledge Management (kikm)
  - Automated embedded semantic markup to sync with ontology
- Global Health Analytics Platform
  - Add semantically enhanced, machine-readable data description files

