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# Die GND im Semantic Web

# Warum Normdaten?

- normierte Sucheinstiege zu bibliografischen Einheiten
  - erhöhte Benutzerfreundlichkeit bei der Recherche
- alles an einer Stelle
  - zentrale Datenverwaltung
  - einmalige Charakterisierung von Normdatenentitäten (Vorzugsbenennung, Verweisungsformen etc.)
- kooperative Erstellung und Nutzung
  - Daten sind allen Bibliotheken zugänglich

# Gemeinsame Normdatei (GND)

- Integration der Normdateien (PND, GKD, SWD, DMA-EST) in objektorientierter Struktur
  - Entitätenbasierte Repräsentation
  - Aufhebung von Redundanzen
  - einheitliches Datenformat und Regelwerk
  - Bereinigung ungeeigneter Datenstrukturen
  - Möglichkeit der Eingabe von Originalschrift
- Angleichung an internationale Standards
  - Austauschformat MARC 21 – Authority
  - GND-Erfassungsformat nahe an MARC 21
  - Berücksichtigung von RDA, FRBR und FRAD
- Zukunftsfähig
  - Semantic Web-fähig
  - für automatische Verfahren geeignet

# Ziele GND-Linked-Data-Service

- Vereinfachung des Datenzugriffes für bibliotheksfremde Anwender
  - Zugriff über HTTP
  - kein vorheriger Datenimport notwendig
- Schaffung einer international nachnutzbaren GND-Datenrepräsentation im Web
  - dokumentierte Ontologie nutzbar durch Mensch und Maschine
- Vollständige Abbildung der Normdatenentitäten im Semantic Web
- verbesserte Vernetzung und Ausweisung von Konkordanzen

# Der Weg zur GND im Semantic Web



- entitätenbasierte Repräsentation der GND-Daten
  - Personen, Familien, Körperschaften, Kongresse und Veranstaltungen, Geografika, Schlagwörter, Werke
- eine Ontologie zur Beschreibung der GND entwickeln
  - Voraussetzung:
    1. entitätenbasierter GND-Erfassungsleitfaden
    2. Beschreibung der verwendeten Felder und Codes
- Bereitstellung kontrollierter Vokabulare in RDF/SKOS
  - Sprachencodes, Ländercodes, GND-Sachgruppen, Geschlechtsangaben etc.

# Die GND-Ontologie

<https://wiki.d-nb.de/download/attachments/44532423/gnd.owl>

<https://wiki.d-nb.de/download/attachments/44532423/gnd-owl-doc.html>

- Verwendung von OWL
- Definition der Entitätentypen als Klassenhierarchie
- Differenzierung nach Datatype- und Object-Properties
- Zuweisung von Domain und Range
  - vorerst nur Zuweisung der obersten Entitätenebene
- Definition von Value Vocabularies
- Zuordnung von Classes, Properties und Values anderer Ontologien - Vocabulary-Alignment (VA)

# Vocabulary-Alignment

- Ziel:
  - ad-hoc Unterstützung mehrerer Datenformate/Ontologien und Anwendungen
  - Minimierung des Aufwandes für Mappings bei Datennachnutzung
  - „friedliche Koexistenz von Ontologien“
  - Steigerung der Akzeptanz und Verbreitung der GND-Ontologie

# Vocabulary-Alignment

- eingesetzt Mechanismen
  - für Klassen
    - Sub-Class of
    - Equivalent Class
  - für Properties
    - Sub-Property of
    - Equivalent-Property
    - Inverse-Property of
    - Super-Property of



# Beispiel Klasse

`<owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#CorporateBody">`  
`<rdfs:label xml:lang="de">Körperschaft</rdfs:label>`  
`<rdfs:label xml:lang="en">Corporate Body</rdfs:label>`  
`<marc21equivalent>079 $v=kiz</marc21equivalent>`  
`<rdfs:subClassOf rdf:resource="http://d-nb.info/standards/elementset/gnd#AuthorityResource"/>`  
`<rdfs:subClassOf rdf:resource="http://rdvocab.info/uri/schema/FRBRentitiesRDA/CorporateBody"/>`  
`<owl:equivalentClass rdf:resource="http://xmlns.com/foaf/0.1/Organization"/>`  
`</owl:Class>`

VA

## Classes Overview

Administrative unit *Authority Resource* Building or memorial Characters or morphemes Collection  
 Collective manuscript Collective pseudonym Conference or Event Corporate Body Country  
 Differentiated Person Ethnographic name Extraterrestrial territory Family Fictive corporate body  
 Fictive place Fictive term Gods Group of persons Historic single event or era Language Literary  
 or legendary character Manuscript Means of transport with individual name Member state Musical  
 work Name of small geographic unit lying within another geographic unit *Name of the person*  
 Natural geographic unit Nomenclature in biology or chemistry Organ of corporate body *Person*  
 Place or geographic name Product name or brand name Project or program Provenance  
 characteristic Pseudonym Religious territory Royal or member of a royal house Serie of  
 conference or event Software product Spirits Subject heading Subject heading *senso stricto*  
 Territorial corporate body or administrative unit Undifferentiated Person Version of a musical work  
 Way, border or line Work

# Beispiel Datatype-Property

```
<owl:DatatypeProperty
  rdf:about="http://d-nb.info/standards/elementset/gnd#biographicalOrHistoricalInformation">
  <rdfs:label xml:lang="de">Biografische oder historische Angaben</rdfs:label>
  <rdfs:label xml:lang="en">Biographical or historical information</rdfs:label>
  <rdfs:comment xml:lang="de">Zusammenfassung von wesentlichen biografischen, geschichtlichen oder
    anderen Informationen über die zu beschreibende Entität.</rdfs:comment>
  <rdfs:comment xml:lang="en">Summary of the essential biographical, historical, or other
    information about the described entity.</rdfs:comment>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#ConferenceOrEvent"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#CorporateBody"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#DifferentiatedPerson"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#Family"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#PlaceOrGeographicName"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#SubjectHeading"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#Work"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="http://www.w3.org/2000/01/rdf-schema#Literal"/>
  <marc21equivalent>678 $b</marc21equivalent>
  <superPropertyOf rdf:resource="http://rdvocab.info/ElementsGr2/biographicalInformation"/>
  <superPropertyOf rdf:resource="http://rdvocab.info/ElementsGr2/familyHistory"/>
  <superPropertyOf rdf:resource="http://rdvocab.info/ElementsGr2/corporateHistory"/>
</owl:DatatypeProperty>
```

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VA

# Super-property of Beispiel

Biographical information

-Domain RDA-Person

Family history

-Domain RDA-Familie

Corporate history

- Domain RDA-Körperschaft

## **Biographical or historical information**

- Domain: Conference or Event  
; Corporate Body; Differentiated  
Person; Family; Place or  
geographic name; Subject  
heading; Work

# Vocabulary-Alignment via Super-property of

URI	<code>http://d-nb.info/standards/elementset/gnd/superPropertyOf</code>
Label (english)	Super-property of
Label (german)	Super-Property von
Comment (english)	P1 gnd:superPropertyOf P2 states that P2 is a subproperty of P1. The gnd:superPropertyOf property is transitive.
Comment (german)	P1 gnd:superPropertyOf P2 sagt aus, dass P2 eine Subproperty von P1 ist. Die gnd:superPropertyOf-Property ist transitiv.
Inverse-Property of (Alignment)	<a href="http://www.w3.org/2000/01/rdf-schema#subPropertyOf">http://www.w3.org/2000/01/rdf-schema#subPropertyOf</a>

# Datatype-Properties Overview

Addition *Associated date* Biographical or historical information  
*Coordinates* Counting Date of birth Date of birth and death Date of  
 conference or event Date of death Date of discovery Date of  
 establishment Date of establishment and termination Date of production  
 Date of publication Date of termination Definition Easternmost longitude  
 Epithet, generic name, title or territory Forename GND-Identifier  
 Homepage Key of the version Key of the work Northernmost latitude Old  
 authority number Opus numeric designation of musical work Period of  
 activity Personal name *Preferred name* Preferred name entity for the  
 person Preferred name for the conference or event Preferred name for  
 the corporate body Preferred name for the family Preferred name for the  
 person Preferred name for the place or geographic name Preferred name  
 for the subject heading Preferred name for the work Prefix Publication  
 Serial numeric designation of musical work Southernmost latitude  
 Surname Thematic index numeric designation of musical work UDK-Code  
*Variant name* Variant name entity for the person Variant name for the  
 conference or event Variant name for the corporate body Variant name  
 for the family Variant name for the person Variant name for the place or  
 geographic name Variant name for the subject heading Variant name for  
 the work Westernmost longitude

# Beispiel Object-Property – 5XX

```

<owl:ObjectProperty rdf:about="http://d-nb.info/standards/elementset/gnd#accreditedAuthor">
  <rdfs:label xml:lang="de">Zugeschriebener Verfasser</rdfs:label>
  <rdfs:label xml:lang="en">Accredited author</rdfs:label>
  <rdfs:domain rdf:resource="http://d-nb.info/standards/elementset/gnd#Work"/>
  <rdfs:range>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#CorporateBody"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#DifferentiatedPerson"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#Family"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:range>
  <marc21equivalent>500 $0 $9=4:autg</marc21equivalent>
  <marc21equivalent>510 $0 $9=4:autg</marc21equivalent>
  <rdfs:subPropertyOf rdf:resource="http://d-nb.info/standards/elementset/gnd#author"/>
  <rdfs:subPropertyOf rdf:resource="http://rdvocab.info/roles/author"/>
</owl:ObjectProperty>

```

VA →

# Object-Properties Overview



Academic degree According work Accredited artist Accredited author Accredited composer  
Acquaintanceship or friendship Addressee Affiliation Annotator Architect Arranger Artist Associated place  
Author Benefactor Bookbinder Bookdesigner Broader term Broader term (generic) Broader term  
(instantial) Broader term (partitive) Broader term (with more than one element) Broader term (general)  
Building owner Cartographer Celebrated corporate body Celebrated family Celebrated person Celebrated  
topic Characteristic place Choreographer Cited artist Cited author Cited composer Collector Compiler  
Complex see reference - subject Composer Conferrer Contributing family Contributing corporate body  
Contributing person Contributing place or geographic name Copist Corporate body is member  
Correspondent Creator Curator Dedicatee Designer Director Director of photography Doubtful artist  
Doubtful author Doubtful composer Editor Engraver Etcher Exhibitor Familial relationship Fictitious  
author Field of activity Field of study First artist First author First composer Former owner Form of work  
and expression Founder Function or role Gender Geographic Area Code GND subject category Hierarchical  
superior Hierarchical superior of place or geographic name Hierarchical superior of the conference or event  
Hierarchical superior of the corporate body Illustrator or illuminator Initiator instrument Instrumentalist  
Inventor Language Language code Librettist Literary source Lithographer Manufacturer Member  
Member of the family Musician Narrator Occasion Occasion of the subject heading Occasion of the work  
Medium of performance Organizer or host Other place Owner Painter Photographer place Place of  
activity Place of Birth Place of business Place of conference or event Place of custody Place of death Place  
of discovery Place of Exile Place of manufacture Place or geographic name is member Played instrument  
Poet Preceding conference or event Preceding corporate body Preceding place or geographic name  
Preceding subject heading Preceding work Predecessor Printer Profession or occupation Professional  
relationship Pseudonym Related conference or event Related Corporate Body Related Dewey Decimal  
Classification with degree of determinacy 1 Related Dewey Decimal Classification with degree of  
determinacy 2 Related Dewey Decimal Classification with degree of determinacy 3 Related Dewey Decimal  
Classification with degree of determinacy 4 Related family Related person Related place or geographic  
name Related subject heading Related Term Related work Restorer Revisor Screenwriter Scriptorium  
Sculptor Singer Sponsor or patron Subeditor Succeeding conference or event Succeeding corporate body  
Succeeding place or geographic name Succeeding subject heading Succeeding work Spatial area of activity  
Starting or final point of a distance Super-property of Successor Temporary name Temporary name of the  
conference or event Temporary name of the corporate body Temporary name of the place or geographic  
name Title of nobility Topic Translator Type of coordinates Writer of added commentary

# DDC als Object-Properties

- Ausweisung von DDC-Relationen
  - Aufhebung der Coordinated Concepts
  - Einführung eigener Properties
    - Related Dewey Decimal Classification with degree of determinacy 1
    - Related Dewey Decimal Classification with degree of determinacy 2
    - Related Dewey Decimal Classification with degree of determinacy 3
    - Related Dewey Decimal Classification with degree of determinacy 4
- Perspektivische Planung:
  - parallele SKOS-Repräsentation der GND-Daten



# Beispiel Object-Property mit Value Vocabulary

```
<owl:ObjectProperty rdf:about="http://d-nb.info/standards/elementset/gnd#geographicAreaCode">
  <rdfs:label xml:lang="de">Ländercode</rdfs:label>
  <rdfs:label xml:lang="en">Geographic Area Code</rdfs:label>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#ConferenceOrEvent"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#CorporateBody"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#DifferentiatedPerson"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#Family"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#PlaceOrGeographicName"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#SubjectHeading"/>
        <owl:Class rdf:about="http://d-nb.info/standards/elementset/gnd#Work"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <range xmlns=""
    resource="http://d-nb.info/standards/vocab/gnd/geographic-area-code#GeographicAreaCodeValue"/>
  <marc21equivalent>043 $c</marc21equivalent>
</owl:ObjectProperty>
```

Hilfsklasse



# GND Ländercode

```
<owl:Class rdf:about="http://d-nb.info/standards/vocab/gnd/geographic-area-codes#GeographicAreaCodeValue">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
  <owl:equivalentClass>
    <owl:Restriction>
      <owl:onProperty rdf:resource="http://www.w3.org/2004/02/skos/core#inScheme"/>
      <owl:hasValue rdf:resource="http://d-nb.info/standards/vocab/gnd/geographic-area-codes"/>
    </owl:Restriction>
  </owl:equivalentClass>
</owl:Class>

<!-- Scheme: GND Geographic Area Codes -->
<skos:ConceptScheme rdf:about="http://d-nb.info/standards/vocab/gnd/geographic-area-codes">
  <dc:title xml:lang="de">GND-Ländercodes</dc:title>
  <dc:title xml:lang="en">GND Geographic Area Codes</dc:title>
</skos:ConceptScheme>

<skos:Concept rdf:about="http://d-nb.info/standards/vocab/gnd/geographic-area-codes#XA-DE">
  <skos:inScheme rdf:resource="http://d-nb.info/standards/vocab/gnd/geographic-area-codes"/>
  <rdfs:sameAs rdf:resource="http://id.loc.gov/vocabulary/geographicAreas/e-gx"/>
  <rdfs:sameAs rdf:resource="http://id.loc.gov/vocabulary/countries/gw"/>
  <rdfs:seeAlso rdf:resource="http://d-nb.info/gnd/4011882-4 "/>
  <skos:prefLabel xml:lang="de">Deutschland</skos:prefLabel>
  <skos:prefLabel xml:lang="en">Germany</skos:prefLabel>
</skos:Concept>
```

# SKOS Concept Scheme als Wertebereich einer Property

- nicht direkt aus OWL möglich
- Lösung:
  - Hilfsklasse mit Restriktion im Concept Scheme anlegen
  - die Range der Property muss auf die Hilfsklasse verweisen
- Aufnahme in alle GND SKOS Concept Schemes
- Best Practice definieren, SKOS Community darauf hinweisen

# Value Vocabularies

- DDC
- Ländercodes
- Sprachencode (nachnutzen von LoC)
- GND-Sachgruppen
- Gender
- Type of Coordinates
- Content Type (samt Property zurückgestellt)
- Carrier Type Type (samt Property zurückgestellt)
- Media Type Type (samt Property zurückgestellt)
- Form of work and expression sowie Medium of performance haben kein eigenes Scheme – verweisen auf Schlagwörter

# Einführen einer Metametadata-Entität?

- Quelle und Datum der Ersterfassung
- Quelle und Datum der letzten Änderung
- Quelle und Datum der letzten Statusvergabe
- Katalogisierungslevel
- Kennzeichen für Hinweissatz
- Änderungscodierung
- Teilbestandskennzeichen
- Nutzungskennzeichen
- Quellenangaben
- Negativ eingesehene Quellen
- Definition
- Benutzungshinweise
- Nummer und Ansetzungsform des Zielsatzes bei Umlenkung
- Katalogisierende Institution

# Instanzdaten-Alignment Cross-Konkordanzen

- Wikipedia
- Dbpedia
- VIAF
- LCSH
- RAMEAU
- STW
- GeoNames
- MusicBrainz
- ???

# Weiteres Vorgehen

- 2. April bis 27. April
  - Test der Konversion durch DNB
  - Fehlerkorrektur
- 27. April
  - Launch
- Folgezeit
  - Fehlenden Punkte in Transformation aufnehmen
  - Bei Bedarf der Community Ontologie erweitern

# **Vielen Dank!**

discussion is welcome...



# Beispiel Person

```
<gnd:DifferentiatedPerson rdf:about="http://d-nb.info/gnd/118598546">
  <gnd:preferredNameForThePerson>Benedikt &lt;XVI., Papst&gt;</gnd:preferredNameForThePerson>
  <gnd:preferredNameEntityForThePerson rdf:parseType="Resource">
    <gnd:epithetGenericNameTitleOrTerritory>Papst</gnd:epithetGenericNameTitleOrTerritory>
    <gnd:counting>XVI.</gnd:counting>
    <gnd:personalName>Benedikt</gnd:personalName>
  </gnd:preferredNameEntityForThePerson>
  <gnd:variantNameForThePerson>Ratzinger, Joseph</gnd:variantNameForThePerson>
  <gnd:variantNameEntityForThePerson rdf:parseType="Resource">
    <gnd:forename>Joseph</gnd:forename>
    <gnd:surname>Ratzinger</gnd:surname>
  </gnd:variantNameEntityForThePerson>
  <gnd:gender rdf:resource="http://d-nb.info/standards/vocab/gnd/Gender#male"/>
  <gnd:dateOfBirth>1927</gnd:dateOfBirth>
  <gnd:dateOfBirth>16.04.1927</gnd:dateOfBirth>
  <gnd:placeOfBirth rdf:resource="http://d-nb.info/gnd/4491052-6"/>
  <gnd:familialRelationship rdf:resource="http://d-nb.info/gnd/119141582"/>
  <gnd:biographicalOrHistoricalInformation>Sohn von Joseph und Maria Ratzinger, Papst seit
    19.04.2005</gnd:biographicalOrHistoricalInformation>
  <gnd:professionOrOccupation rdf:resource="http://d-nb.info/gnd/4059756-8"/>
  <gnd:professionOrOccupation rdf:resource="http://d-nb.info/gnd/4044561-6"/>
  <gnd:placeOfActivity rdf:resource="http://d-nb.info/gnd/4050471-2"/>
  <gnd:placeOfActivity rdf:resource="http://d-nb.info/gnd/4062404-3"/>
  <gnd:geographicAreaCode
    rdf:resource="http://d-nb.info/standards/vocab/gnd/geographic-area-code#XA-VA"/>
  <gnd:geographicAreaCode
    rdf:resource="http://d-nb.info/standards/vocab/gnd/geographic-area-code#XA-DE"/>
  <gnd:gndIdentifier>118598546</gnd:gndIdentifier>
  <gnd:oldAuthorityNumber>(DE-588c)310182379</gnd:oldAuthorityNumber>
</gnd:DifferentiatedPerson>
```

# Beispiel Körperschaft

```

<gnd:CorporateBody rdf:about="http://d-nb.info/gnd/5055902-3">
  <gnd:preferredNameForTheCorporateBody>Sportgemeinschaft Dynamo
    &lt;Dresden&gt;</gnd:preferredNameForTheCorporateBody>
  <gnd:variantNameForTheCorporateBody>SG Dynamo
    &lt;Dresden&gt;</gnd:variantNameForTheCorporateBody>
  <gnd:variantNameForTheCorporateBody>SGD</gnd:variantNameForTheCorporateBody>
  <gnd:variantNameForTheCorporateBody>Dynamo &lt;Dresden, Sportgemeinschaft
    Dynamo&gt;</gnd:variantNameForTheCorporateBody>
  <gnd:temporaryNameOfTheCorporateBody rdf:resource="http://d-nb.info/gnd/5052539-6"/>
  <gnd:gndIdentifier>5055902-3</gnd:gndIdentifier>
  <gnd:oldAuthorityNumber>(DE-588b)5055902-3</gnd:oldAuthorityNumber>
  <gnd:placeOfBusiness rdf:resource="http://d-nb.info/gnd/37172-5"/>
  <gnd:geographicAreaCode
    rdf:resource="http://d-nb.info/standards/vocab/gnd/geographic-area-code#XA-DE"/>
  <gnd:geographicAreaCode
    rdf:resource="http://d-nb.info/standards/vocab/gnd/geographic-area-code#XA-DDDE"/>
  <gnd:dateOfEstablishment>1953</gnd:dateOfEstablishment>
  <gnd:dateOfTermination>1990</gnd:dateOfTermination>
  <gnd:dateOfEstablishment>1.7.2007</gnd:dateOfEstablishment>
  <gnd:precedingCorporateBody rdf:resource="http://d-nb.info/gnd/5055903-5"/>
  <gnd:homepage rdf:resource="http://www.dynamo-dresden.de"/>
</gnd:CorporateBody>
  
```

# Beispiel Schlagwort



```
<gnd:SubjectHeading rdf:about="http://d-nb.info/gnd/4410512-5">
  <gnd:preferredNameForTheSubjectHeading>Metadaten</gnd:preferredNameForTheSubjectHeading>
  <gnd:gndSubjectCategory rdf:resource="http://d-nb.info/vocab/gnd-sc#30"/>
  <gnd:broderTermGeneral rdf:resource="http://d-nb.info/gnd/4135391-2"/>
  <gnd:relatedDdcWithDegreeOfDeterminacy2 rdf:resource="http://d-nb.info/ddc/class/025.3"/>
  <gnd:gndIdentifier>4410512-5</gnd:gndIdentifier>
</gnd:SubjectHeading>
<gnd:oldAuthorityNumber>(DE-588c)4410512-5</gnd:oldAuthorityNumber>
```