

# **Common Approach Indicator Vocabulary and Repository**

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Suggested Prefix: cav

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## 1 Introduction

Over the last decades, social purpose organizations (SPO) have adopted the use of indicators to measure their impact. Often, this adoption is motivated by funding agencies requiring a better understanding of the impact their funds are having. In the absence of standard indicators for the sectors, SPOs have created their own, leading to minimal commonality and the inability to compare SPOs. This is similar to the application of indicators to cities:

In 2007, it was recognized that “there are thousands of different sets of city (or urban) indicators and hundreds of agencies compiling and reviewing them. Most cities already have some degree of performance measurement in place. However, these indicators are usually not standardized, consistent or comparable (over time or across cities), nor do they have sufficient endorsement to be used as ongoing benchmarks.” (Hoornweg et al., 2007).

It is widely recognized that flexible standards are preferable over rigid ones (Egyedi & Blind, 2008; Timmermans & Epstein, 2010). The challenge is to create a flexible standard. As Timmermans and Epstein (2010) note in their review of standards across a range of disciplines, “a recurring surprising finding is that loose standards with great adaptability may work better than rigidly defined standards.... The trick in standardization appears to be to find a balance between flexibility and rigidity”(p 81).

Thus, simply predefining indicators for social purpose organizations is ill-advised. Efforts to align social purpose organizations around a single set of indicators, sometimes referred to as indicator banks (Wadia & Parkinson, 2011), have resulted in perverse consequences such as mission drift, reduced innovation, and a decoupling of indicators from purpose (Ruff, 2019). A standard for social purpose organizations needs enough uniformity to permit some measure of aggregation and comparability; and yet enough latitude that social purpose organizations can continue to select indicators well aligned with their purpose; including the creation of new indicators tailored to new innovations or unique contexts.

An important first step towards a flexible standard would be the introduction of a SPO indicator repository that: 1) provides visibility to the SPO community as to what indicators are being used and by whom, and 2) supports the analysis of these indicators to identify commonalities and possibly emergent standards.

The impetus for this work arose during the consultations of the Social Enterprise Impact Measurement Task Force (one of the key initiatives in *Ontario’s Social Enterprise Strategy 2016-2021*). Stakeholders identified capacity and financial barriers to undertaking impact measurement effectively. In particular, the absence of a common approach to social impact measurement was singled out as a key impediment in the effective and efficient evaluation of the success of the social enterprise community. Stakeholders highlighted a desire for greater consistency throughout the sector to reduce measurement costs and produce comparable data. As a result, a consortium of academic institutions, nongovernmental organizations and

other agents in the social services domain set out to work on formulating a Common Approach Framework as a key component in the development of Ontario's Social Enterprise Strategy. The work has subsequently been funded as part of Canada's national social finance and social innovation strategy, targeting a broader set of social-purpose organizations (not just social enterprises). The indicator repository presented here could be used by any organization, from any sectors, that is using indicators to track social performance.

This document defines a base data standard that minimizes the effort of Social Purposes Organizations to report their indicators. Extensions and elaborations of the concepts to represent and report the various Theories of Change are defined in the following documents:

- CAFO: The Common Approach Foundation Ontology
- CACO: The Common Approach Core Ontology for Modeling Theories of Change
- Representing Theories of Change Using the Common Approach Ontologies
- CACO-ACT: The Common Approach Core Ontology Activity Extension
- CACO-FIN: The Common Approach Core Ontology Finance Extension
- CACO-ORG: The Common Approach Core Ontology Organization Extension
- CACO-OUT: The Common Approach Core Ontology Outcome Extension
- CACO-PER: The Common Approach Core Ontology Person Extension

## 2 Indicator Repository Architecture

Access to the repository is provided in two ways: 1) either through third party platforms such as Sametrica ([sametrica.com](http://sametrica.com)) and Centre For Social Innovation's Impact Dashboard ([impactdashboard.org](http://impactdashboard.org)), or 2) directly through the repository interface. The repository interface is design for two stakeholders: 1) SPOs who wish to deposit their indicators directly and search the database of indicators and organizations, and 2) Indicator researchers.

The repository provides four functions:

1. **Registration:** SPOs will register their organization, and the outcomes and indicators they use. For organization registration basic information such as name, address, website URL, etc. is to be provided. For indicators, information such as the name and description/definition of the indicator is to be provided. A unique ID for the SPO and each of its indicators will be generated by the system.
2. **Deposition:** SPOs can deposit values for the indicators they have registered. They are represented as indicator reports. Information such as indicator id, value and the time period it applies is to be provided.
3. **Reporting:** SPOs, government, and other organizations will be able to generate a variety of reports based on the reported indicators. Reports will be anonymized.
4. **Analysis:** Researchers will be able to review indicator definitions, annotate and link them in order to specify whether they are equivalent, semantically overlap or distinct.

The following depicts the architecture:

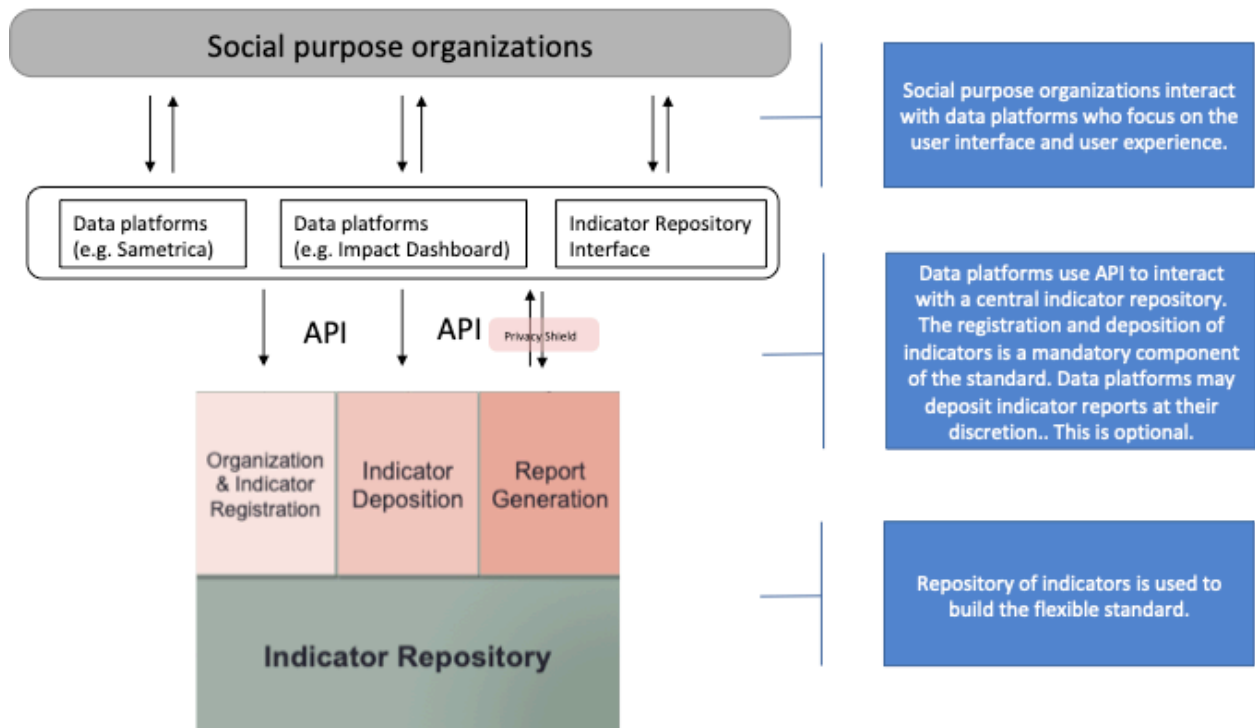


Figure 1: Indicator Repository Architecture

The repository APIs are defined in Appendix A.

### 3 Repository Data Model

The basic structure of the repository data is captured in the following diagram:

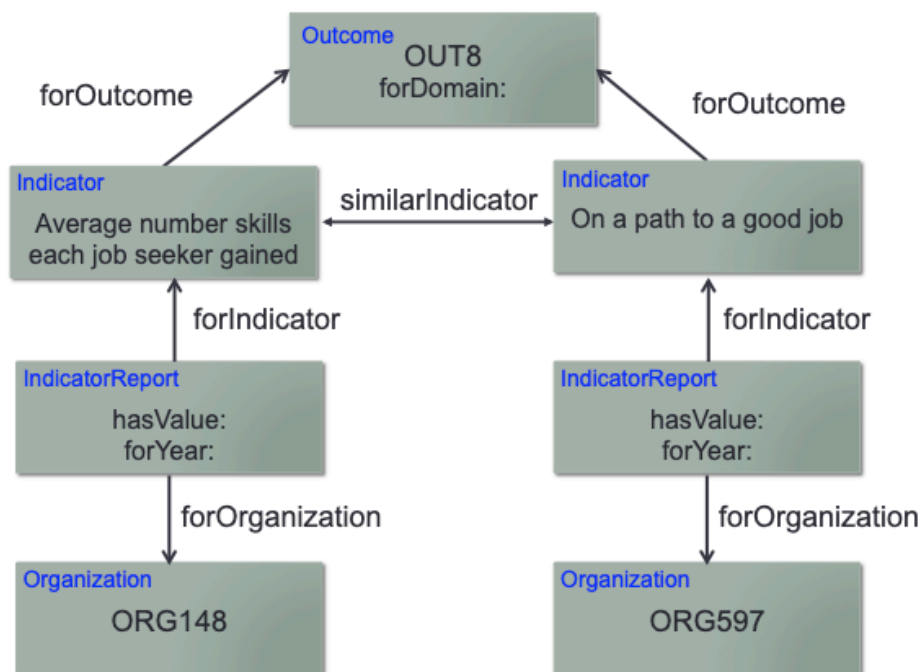


Figure 2: Indicator/Outcome Graph

There are four main classes in the repository: Outcome, Indicator, IndicatorReport and Organization. Any number of Outcomes can be defined. For each Outcome, any number of Indicators can be defined. Each Indicator can have any number of IndicatorReports that record the value of an indicator for a particular time and Organization.

To support the identification of commonalities and possibly emergent standards, additional relationships among Indicators is provided. Motivated by the ideas proposed by Ruff (2019), we include a property `hasSimilarIndicatorS` that denotes that two Indicators are similar. The basis of the similarity lies in the definitions of the two Indicators, in particular, in the concepts that are embedded in the definitions. For example, in Figure 2 the two indicators either explicitly or implicitly contain concepts such as skills, jobs, relevance of skills to jobs, and the acquisition of skills. The phrase “On a path” would be defined in terms of acquiring skills relevant to a job.

What follows in the remainder of this section is the definition of the data model, or what we refer to as a Vocabulary. The vocabulary specifies the “classes”, “properties” and possible “values” of a property within the context of a class. While it utilizes Description Logic syntax, formal definitions of classes are not provided. We use a simplified version of the Manchester syntax (Horridge et al., 2016) to specify the properties of a class:

- “min n” specifies the minimum number of values for the property is n
- “max n” specifies the maximum number of values for the property is n
- “exactly n” specifies the number of values for the property has to be n
- “only” means the values of the property have to be of the class/type specified, e.g., a string, integer, or another class such as Organization.

In the remainder of this section we define the four classes and their properties.

### 3.1 Unique Identifiers

Each registered class, i.e., Outcome, Indicator, IndicatorReport and Organization is assigned a unique identifier. Each identifier begins with a prefix defined as follows:

Class	Prefix
Indicator	IND
IndicatorReport	IR
Organization	ORG
Outcome	OUT
SimilarIndicator	SI

Some of the classes and properties are adopted from Schema.org and have a prefix of “sch:”. By using Schema.org classes and properties, where appropriate, we can use them to tag web documents that are generated from the repository and indexed by web search engines such as Google and Bing.

### 3.2 sch:Organization

The representation of a registered Organization in the repository has the following properties:

- sch:identifier: A unique ID (beginning with ORG)
- sch:legalName: Organization’s legal name
- sch:description: A description of the organization
- sch:address: Address as a single string
- sch:telephone: Phone number as a string of the form nnn-xxx-xxxx
- hasContact: name of contact
- sch:email: email address of the contact
- hasOutcomeS: list of Outcomes for the Organization
- hasIndicatorS: list of Indicators for the Organization
- hasIndicatorReportS: List of IndicatorReport IDs associated with the Organization
- sch:dateCreated: The Date/Time of the registration of the Organization
- sch:provider: Identifies the third party platform that provided the information, if any

Class	Property	Value Restriction
sch:Organization	sch:identifier	exactly 1 xsd:string (begins with ORG)
	sch:legalName	exactly 1 xsd:string
	sch:description	exactly 1 xsd:string
	sch:address	min 1 xsd:string
	sch:telephone	min 1 xsd:string “nnn-xxx-xxxx”
	hasContact	min 1 xsd:string
	sch:email	min 1 xsd:string
	hasOutcomeS	only xsd:string (each begins with OUT)
	hasIndicatorS	only xsd:string (each begins with IND)
	hasIndicatorReportS	only xsd:string (each begins with IR)
	sch:dateCreated	exactly 1 “yyyy-mm-dd”
	sch:provider	max 1 xsd:string

### 3.3 Outcome

The representation of a registered Outcome has the following properties:

- sch:identifier: A unique ID beginning with OUT
- sch:name: Name of the Outcome
- sch:description: A description of the Outcome – a definition
- forDomainS: List of domains that the Outcome is for. Domains are pre-defined.
- definedByS: The ID of the organization that created the Outcome (begins with ORG)
- hasIndicatorS: list of Indicators for the Organization
- sch:dateCreated: The Date/Time of the registration of the Outcome
- sch:provider: Identifies the third party platform that provided the information, if any

Class	Property	Value Restriction
Outcome	sch:identifier	exactly 1 xsd:string (begins with OUT)

	sch:name	exactly 1 xsd:string
	sch:description	exactly 1 xsd:string
	forDomainS	min 1 {sdg1, sdg2, sdg3}
	definedByS	exactly 1 xsd:string (begins with ORG)
	hasIndicatorS	only xsd:string (each begins with IND)
	sch:dateCreated	exactly 1 yyyy-mm-dd
	sch:provider	max 1 xsd:string

The Domain concept is defined by the list of UNSDGs, which in turn defines the possible values of the forDomain property.

### 3.4 Indicator

The representation of a registered Indicator has the following properties:

- sch:identifier: A unique ID beginning with IND
- sch:name: Name of the indicator
- sch:description: A description of the indicator – the definition
- definedByS: The organization that registered the indicator (begins with ORG)
- forOutcomeS: The list of Outcome IDs this is an indicator for (each begins with OUT)
- hasSimilarIndicatorS: List of SimilarIndicator IDs that define what Indicators it is similar to (each begins with SI)
- hasThresholdS: threshold value for the Indicator
- sch:dateCreated: The Date/Time of the registration of the Indicator
- sch:provider: Identifies the third party platform that provided the information, if any

Class	Property	Value Restriction
Indicator	sch:identifier	exactly 1 xsd:string (begins with IND)
	sch:name	exactly 1 xsd:string
	sch:description	exactly 1 xsd:string
	definedByS	exactly 1 xsd:string (begins with ORG)
	forOutcomeS	only xsd:string (begins with OUT)
	hasSimilarIndicatorS	only xsd:string (begins with SI)
	hasThresholdS	exactly 1 xsd:string
	sch:dateCreated	exactly 1 "yyyy-mm-dd"
	sch:provider	max 1 xsd:string

The hasSimilarIndicatorS property does not link two Indicators directly. Instead it links to an instance of the SimilarIndicator class where the reasons for proposed similarity of two Indicators can be described using the hasDescription property.

Future work will elaborate the properties of that similarity and will work to establishing similarity based on the underlying concepts embedded in the indicator definitions.



### 3.5 IndicatorReport

The actual value of an indicator for some organization for a specific time period is represented as an IndicatorReport. The representation of a registered IndicatorReport has the following properties:

- sch:identifier: A unique ID beginning with IR
- sch:name: Title of the IndicatorReport
- forIndicatorS: ID of the indicator being reported (begins with IND)
- forOrganizationS: ID of the Organization for which the Indicator is being reported (begins with ORG)
- forStartDateS: The start date for the period the Indicator is being reported
- forEndDateS: The end date for the period the Indicator is being reported
- hasSValue: The value of the indicator
- sch:dateCreated: The Date/Time of the registration of the IndicatorReport
- sch:provider: Identifies the third party platform that provided the information, if any

Class	Property	Value Restriction
IndicatorReport	sch:identifier	exactly 1 xsd:string (begins with IR)
	sch:name	exactly 1 xsd:string
	forIndicatorS	exactly 1 xsd:string (begins with IND)
	forOrganizationS	exactly 1 xsd:string (begins with ORG)
	forStartDateS	exactly 1 "yyyy-mm-dd"
	forEndDateS	exactly 1 "yyyy-mm-dd"
	hasValueS	exactly 1 xsd:string
	sch:dateCreated	exactly 1 "yyyy-mm-dd"
	sch:provider	max 1 xsd:string

### 3.6 SimilarIndicator

The representation of a registered SimilarIndicator has the following properties:

- sch:identifier: A unique ID beginning with SI
- sch:name: Name of the Similarindicator
- forIndicatorS: IDs of the two indicators that are similar (each begins with IND)
- sch:description: A description of why the two Indicators are similar
- definedByS: The ID of the organization that created the SimilarIndicator report (begins with ORG)
- sch:dateCreated: The Date/Time of the registration of the SimilarIndicator
- sch:provider: Identifies the third party platform that provided the information, if any

Class	Property	Value Restriction
SimilarIndicator	sch:identifier	exactly 1 xsd:string (begins with CE)
	sch:name	exactly 1 xsd:string
	forIndicatorS	exactly 2 xsd:string (begins with IND)

	sch:description	max 1 xsd:string
	definedByS	exactly 1 xsd:string (begins with ORG)
	sch:dateCreated	exactly 1 "yyyy-mm-dd"
	sch:provider	max 1 xsd:string

## 4 Privacy

TBD

## 5 Acknowledgements

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[static/pdf/ces\\_outcomes\\_and\\_outcome\\_indicator\\_banks.pdf](#)

## Appendix A: Repository API

The following defines the API's provided by the repository using the JSON format.

### A.2 Register Organization

Used to enter a new Organization into the repository.

```
{ "Organization" : {  
  "legalName" : "Acme Social Enterprise" ,  
  "description" : "Financial skills training" ,  
  "address" : "5 King's College Rd, Toronto ON M5S 3G8" ,  
  "telephone" : "416-978-6823" ,  
  "hasContact" : "Mark Fox" ,  
  "email" : "acmeSE@gmail.com" ,  
}}
```

returns a unique ID for the organization, e.g., ORG92.

### A.3 Register Indicator

Used to enter a new Indicator into the repository.

```
{ "Indicator" : {  
  "name" : "%Food Pred" ,  
  "description" : "Percentage complete food preparation training program" ,  
  "definedByS" : "ORG92" ,  
  "forOutcomeS" : "OUT38" ,  
}}
```

returns a unique ID for the Indicator, e.g., IND14.

### A.4 Register Outcome

Used to enter a new Outcome into the repository.

```
{ "Outcome" : {  
  "name" : "Prevalence of undernourishment" ,  
  "description" : "Prevalence of undernourishment" ,  
  "forDomainS" : "sdg1 sdg3" ,  
  "definedByS" : "ORG92" ,  
}}
```

returns a unique ID for the Outcome, e.g., OUT38.

### A.5 Submit IndicatorReport

Used to enter a new IndicatorReport into the repository.

```
{ "IndicatorReport" : {
  "name" : "IR for IND1" ,
  "forIndicatorS" : "IND1" ,
  "forOrganizationS" : "ORG92" ,
  "forYear" : "2019" ,
  "hasValueS": "75" ,
}}
```

returns a unique ID for the Indicator report, e.g., IR398.

## A.6 Add Similar Indicator

Used to suggest that two indicators are possibly equivalent.

```
{ "SimilarIndicator" : {
  "name" : "IND14 IND247 Similar" ,
  "forIndicatorS" : "IND14" "IND247" ,
  "description": "Although the stakeholders differ they measure the same thing" ,
  "definedByS" : "ORG92" ,
}}
```

returns a unique ID for the SimilarIndicator, e.g., SI1.

## A.7 Retrieve Organization

Returns the information on an organization.

```
{ "RetrieveOrganization" : {
  "identifier" : "ORG92" ,
}}
```

returns all defined properties of the organization:

```
{ "Organization" : {
  "identifier" : "ORG92" ,
  "legalName" : "Acme Social Enterprise" ,
  "description" : "Financial skills training" ,
  "address" : "5 King's College Rd, Toronto ON M5S 3G8" ,
  "telephone" : "416-978-6823" ,
  "hasBusinessNumber" : "041723" ,
  "hasContact" : "Mark Fox" ,
  "definedWhen" : "2019-08-07" ,
  "email" : "acmeSE@gmail.com" ,
  "hasIndicatorReportS" : "IR398" "IR471" ,
}}
```

```
    "dateCreated" : "2019-09-18" ,
  }}

```

## A.8 Retrieve Indicator

```
{ "RetrieveIndicator" : {
  "identifier" : "IND14" ,
}}

```

returns all defined properties of the Indicator:

```
{ "Indicator" : {
  "identifier" : "IND14" ,
  "name" : "%Food Pred" ,
  "description" : "Percentage complete food preparation training program" ,
  "definedByS" : "ORG92" ,
  "forOutcomeS" : "OUT38" ,
  "similarIndicator" : "IND28" ,
  "dateCreated" : "2019-09-18" ,
}}

```

## A.9 Retrieve Outcome

```
{ "RetrieveOutcome" : {
  "identifier" : "OUT38" ,
}}

```

returns all defined properties of the Outcome:

```
{ "Outcome" : {
  "identifier" : "OUT38" ,
  "name" : "Prevalence of undernourishment" ,
  "description" : "Prevalence of undernourishment" ,
  "forDomain" : "sdg1 sdg3" ,
  "dateCreated" : "2019-09-18" ,
  "definedByS" : "ORG92" ,
}}

```

## A.10 Retrieve IndicatorReport

```
{ "RetrieveIndicatorReport" : {

```

```
  "identifier" : "IR398" ,
}}
```

returns all defined properties of the Indicator Report:

```
{ "IndicatorReport" : {
  "identifier" : "IR398" ,
  "name" : "2019 IR for IND38" ,
  "forYear" : "2019" ,
  "forOrganizationS" : "ORG92" ,
  "hasValueS": "75" ,
  "dateCreated" : 2019-09-18
}}
```

### A.11 Retrieve Similar Indicator

Returns the properties of a specified SimilarIndicator

```
{ "RetrieveSimilarIndicator" : {
  "identifier" : "SI1" ,
}}
```

Returns:

```
{ "SimilarIndicator" : {
  "identifier " : "SI1" ,
  "forIndicatorS" : "IND14" "IND247" ,
  "description": "Although the stakeholders differ they measure the same thing" ,
  "definedByS" : "ORG92" ,
  "dateCreated" : 2019-09-18
}}
```

### A.12 Find Organization

Find Organization performs a text search of each of values of the properties specified. Note that any subset of properties can be specified.

```
{ "FindOrganization" : {
  "name " : "ACME" ,
  "address" : "Toronto" ,
}}
```

It returns the IDs for the organizations that whose name contains ACME AND address contains Toronto.

### A.13 Find Indicator

Find Indicator performs a text search of each of values of the properties specified. Note that any subset of properties can be specified.

```
{ "FindIndicator" : {  
  "name " : "ACME" ,  
  "address" : "Toronto" ,  
  "forOutcomeS" : "OUT13" ,  
}}
```

### A.14 Find IndicatorReport

Find IndicatorReport performs a text search of each of values of the properties specified. Note that any subset of properties can be specified.

```
{ "FindIndicatorReport" : {  
  "name " : "ACME" ,  
  "forIndicatorS" : "IND14" ,  
}}
```