Ensuring the sustainability of language resources

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Overview

- Setting the context
  - Understanding language resources in relation to language development

- Addressing the immediate problem
  - Ensuring the sustainability of language resources

- Considering the wider problem
  - Understanding language resources in relation to the sustainability of language development
The starting point

- Language development
  - Actions that are taken to increase a particular community’s capacity to use their languages in their efforts to achieve their changing social, cultural, political, economic and spiritual goals.

- A wide range of applications, *e.g.*, 
  - Acting to preserve identity and oral use
  - Acting to develop and spread literacy
  - Acting to enhance productivity through text technology
Definitions

Sustainability
- The ability to maintain something indefinitely at a desired level over time

Language resource
- Any digital resource that is a product of language development or that supports the activities of language development, e.g.,
  - Language documentation and description
  - Language teaching materials
  - Text technology tools and products
The sustainability problem

- Sustaining language resources =
  - Maintaining the use of language resources over time

- Given the relentless:
  - Entropy that degrades digitally stored information
  - Innovation that obsoletes hardware and software
  - Discovery that provides new ways of doing things

- How do we keep our language resources from
  - Falling into disuse, then
  - Slipping into oblivion
Goal: Sustain the use of language resources

Necessary conditions for use:
- Discoverable
- Accessible
- Authentic
- Intelligible
- Interoperable

Thus, to sustain use, we must establish and sustain these five characteristics of language resources
1. Discoverable

- A language resource cannot be used unless the prospective user is able to find it.

- The key is descriptive metadata:
  - The description of the resource must be published in such a way that the user to whom it is relevant is able to discover its existence when searching.
  - The description of the resource must be done in such a way that the user to whom it is relevant is able to judge it as being relevant without having to first obtain the resource.
2. Accessible

- A language resource cannot be used unless the prospective user can gain access to it.

- Access has two major facets:
  - User must have the right to access and use the resource; the rights must be sorted out when the resource is created and clarified when it is archived
  - User must know the procedure for gaining access

- Open Access fosters the most widespread use
  - Long term access requires persistent URIs
3. Authentic

- A language resource cannot be used if it is not a faithful copy of the originally created resource.

- Archiving institution must follow procedures to:
  - Ensure that the resources are preserved against all reasonable contingencies (e.g., offsite backup)
  - Ensure periodic migration to fresh and current media
  - Ensure that all copies are authenticated as matching the original
  - Keep preservation metadata (provenance, fixity)
4. Intelligible

- A language resource cannot be used if the user is not able to make sense of the content.

- OAIS standard (ISO 14721) states that:
  - Archives must ensure that resources are “independently understandable” by the designated user community (i.e., no need to consult producer)

- E.g., document the situational context, methodology, terminology, abbreviations, markup conventions, character encodings
5. Interoperable

A language resource cannot be used if it does not interoperate in user’s working environment.

A resource must work with:
- User’s hardware and operating system
- Software tools available to the user
- Best practices of the designated user community

Maximizing interoperability means:
- Formats that are open and transparent (not proprietary)
- Following best practice markup and terminology
The key players

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creator</td>
<td>A person who creates language resources</td>
</tr>
<tr>
<td>Archive</td>
<td>An institution that curates language resources for long-term preservation</td>
</tr>
<tr>
<td>Aggregator</td>
<td>An institution that makes language resources interoperate</td>
</tr>
<tr>
<td>User</td>
<td>A person who wants to use language resources</td>
</tr>
</tbody>
</table>
## The role of the creator

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discoverable</td>
<td>Supplies descriptive metadata</td>
</tr>
<tr>
<td>Accessible</td>
<td>Secures &amp; documents access rights</td>
</tr>
<tr>
<td>Authentic</td>
<td>Supplies a complete &amp; valid original</td>
</tr>
<tr>
<td>Intelligible</td>
<td>Supplies documentation of content</td>
</tr>
<tr>
<td>Interoperable</td>
<td>Supplies an interoperable original</td>
</tr>
</tbody>
</table>
## The role of the archive

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discoverable</td>
<td>Ensures adequacy of metadata. Publishes metadata in interoperable form.</td>
</tr>
<tr>
<td>Accessible</td>
<td>Ensures clarity of access rights. Provides a means of access.</td>
</tr>
<tr>
<td>Authentic</td>
<td>Follows preservation practices that ensure dissemination of authenticated copies.</td>
</tr>
<tr>
<td>Intelligible</td>
<td>Ensures that content is independently understandable to target users.</td>
</tr>
<tr>
<td>Interoperable</td>
<td>Ensures that format is adequately interoperable in current environments.</td>
</tr>
</tbody>
</table>
### The role of the aggregator

<table>
<thead>
<tr>
<th>Discoverable</th>
<th>Provides a search facility that interoperates across metadata or content from all archives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessible</td>
<td>Provides links to what the archives have made accessible</td>
</tr>
<tr>
<td>Authentic</td>
<td>Harvests only authenticated information</td>
</tr>
<tr>
<td>Intelligible</td>
<td>Makes the description of search and results understandable to target users</td>
</tr>
<tr>
<td>Interoperable</td>
<td>Provides interoperability with other aggregators to widen the circle of discovery</td>
</tr>
</tbody>
</table>
Two relevant aggregators

- DRIVER: Digital Repository Infrastructure Vision for European Research
  - Aggregates Open Access research results from hundreds of European institutions
  - http://www.driver-repository.eu/

- OLAC: Open Language Archives Community
  - Aggregates language resources from 34 institutions worldwide
  - http://www.language-archives.org/
The five factors are necessary for sustained use, but are not sufficient to guarantee it.

A sixth factor is involved: Relevance

This is where the role of the user enters in

A language resource will not be used unless it is relevant to the needs of the prospective user.

Widening the view

- Given my definition of language resource as:
  - Any digital resource that is a product of language development or that supports the activities of language development

- We should also consider the sustainability of language resources as it relates to the sustainability of language development.

- Language development can be viewed as action to achieve an ever increasing series of goals.
## Hierarchy of goals for sustainable language development

<table>
<thead>
<tr>
<th>Sustainable Identity</th>
<th>Development that will sustain identity of a people even with language loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Orality</td>
<td>Development that will sustain the oral use of a language</td>
</tr>
<tr>
<td>Sustainable Literacy</td>
<td>Development that will sustain reading, writing, and literature in a language</td>
</tr>
<tr>
<td>Sustainable Automation</td>
<td>Development that will sustain the benefits of language automation</td>
</tr>
</tbody>
</table>
The cycle of sustainability

- Existing resources feed development
  - which in turn produces new resources
  - which in turn feeds more development, which …

- Since language resources are the fuel of language development,
  - Sustainable language development depends on sustaining resources
    - Lest each generation must start over again
    - Or worse, lest in the absence of adequate development the language itself is not sustained
Biocultural diversity at risk

- Emphasis on sustainability arises from the global concern over the deteriorating natural and social environment in many parts of the world.
- *The extinction crisis:* If non-sustainability continues at current rates, by end of century we will lose:
  - 50% of plant and animal species
  - 50% to 90% of languages
- Serious problem because diversity of life forms is what allows ecosystems to adapt and diversity of knowledge is what allows humankind to adapt.
### OLAC coverage in relation to language size

Where language identification is based on ISO 639-3 codes in descriptive metadata.

<table>
<thead>
<tr>
<th>Population range</th>
<th>Langs.</th>
<th>In OLAC</th>
<th>Items</th>
<th>Per lg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000,000 or more</td>
<td>83</td>
<td>81</td>
<td>2,533</td>
<td>30.6</td>
</tr>
<tr>
<td>1,000,000 to 9,999,999</td>
<td>264</td>
<td>209</td>
<td>1,281</td>
<td>4.9</td>
</tr>
<tr>
<td>100,000 to 999,999</td>
<td>892</td>
<td>507</td>
<td>2,097</td>
<td>2.4</td>
</tr>
<tr>
<td>1,000 to 99,999</td>
<td>3,746</td>
<td>1,593</td>
<td>8,131</td>
<td>2.2</td>
</tr>
<tr>
<td>100 to 999</td>
<td>1,071</td>
<td>356</td>
<td>1,866</td>
<td>1.7</td>
</tr>
<tr>
<td>1 to 99</td>
<td>548</td>
<td>237</td>
<td>704</td>
<td>1.3</td>
</tr>
<tr>
<td>Unknown</td>
<td>308</td>
<td>56</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>All living languages</td>
<td>6,912</td>
<td>3,039</td>
<td>16,779</td>
<td></td>
</tr>
<tr>
<td>Extinct languages</td>
<td>95</td>
<td></td>
<td>231</td>
<td></td>
</tr>
</tbody>
</table>
Sustainable development

- Most cited definition comes from the final report of the World Commission on Environment and Development convened by the UN in 1983.
  - "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

- Language development does not occur in isolation
  - *E.g.*, economic development of the present may compromise a people’s language, identity, and future well-being as they lose language and identity.
Common failings

- Achieving sustainable development requires coordinated efforts of many actors, which fail when:
  - The actors fail to take the long view
    - The short-term fix creates a bigger long-term problem
  - The actors fail to represent dispersed interests
    - Powerful minorities benefit at expense of everyone else
  - The actors fail to commit to allowing assets to thrive
    - Over consumption or hoarding leads to ultimate loss

Conclusion: Toward sustainability

- Let us not fail to take the long view
  - Embracing the five factors for sustainability of language resources will ensure their long-term use

- Let us not fail to represent dispersed interests
  - Attending to sustainability of language development for all languages will encourage their survival

- Let us not fail to commit to allow assets to thrive
  - By committing to both of the above we will help the resources and the languages themselves to thrive