

How to Build-Your-Own Practical A.I. Tools for Language Maintenance

Workshop 7 @ ICLDC7

Presenters: Noelani Arista, Joel Davison, Caleb Moses,
Caroline Running Wolf, Michael Running Wolf

Overview

- **Background**
- Introduction to A.I.
- Hands-On
- Dictionary
- User Interface
- Q&A



Artwork by Sergio Garzon (March 2019)

Workshop 1

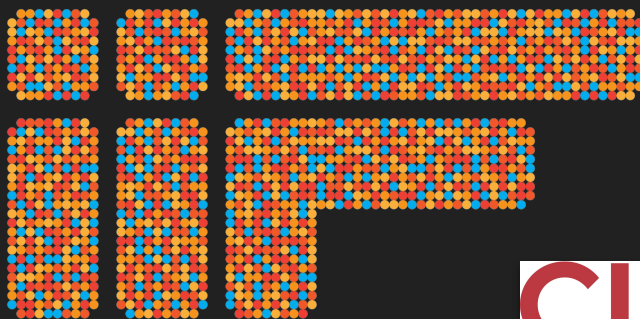
30 participants from

Aotearoa, Australia,
North America, Pacific

at University of Hawai'i Mānoa

reconceptualize A.I. systems,
build from a foundation of
Indigenous cultural values, like
relationality

explore how Indigenous
protocols for maintaining
relations with non-humans can
help us imagine our
relationship with A.I. systems



Initiative for Indigenous Futures



March 1–2, 2019

Indigenous Protocol and Artificial Intelligence

Workshop 1

Honolulu, Oahu, Hawai'i
www.indigenous-ai.net

Workshop 2

15 participants from
Aotearoa, Australia, North America, Pacific
returned to Honolulu for a writing workshop



Indigenous Protocol
and Artificial Intelligence Workshops
March 1 - 2, 2019
May 26 - June 1, 2019



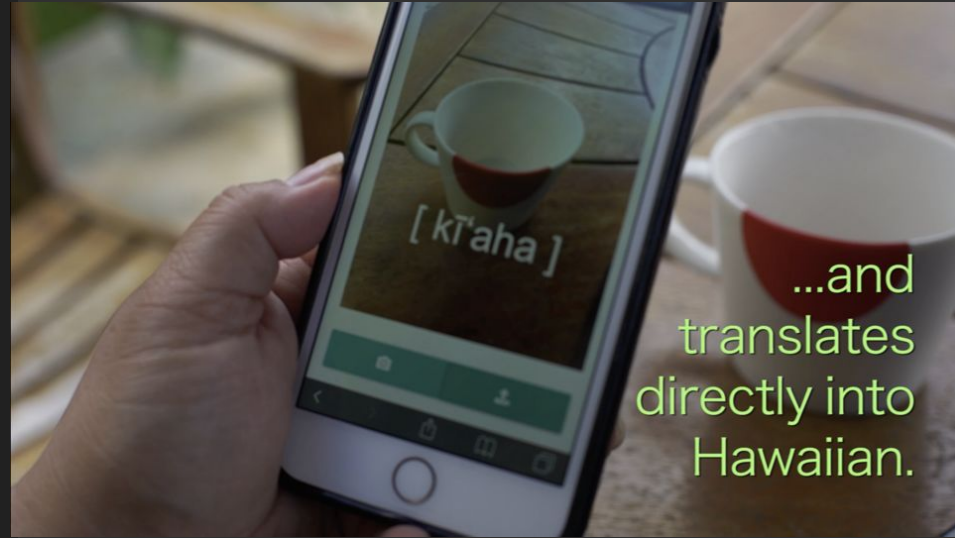
Indigenous Protocol and Artificial Intelligence
Position Paper:

<http://www.indigenous-ai.net/position-paper>

guidelines, essays, artworks, poetry, ... and
technology prototypes!

Hua Ki'i

Mobile image recognition app
Translates images to Hawaiian



...and
translates
directly into
Hawaiian.

<https://vimeo.com/348661163>

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Sketch of user interface by Isaac 'Ika'aka Nāhuewai

The state of Indigenous language technology

- Language technology is undergoing a transformation
- The benefits of these new technologies are inequitably distributed in our society
- Indigenous language communities are highly motivated to engage, but many are under-resourced
- There is a need for widely available Indigenous language technology

How does AI work?

Artificial Intelligence works by generalising patterns which are discovered from large datasets which demonstrate the problem at hand.

For language applications, this data takes the form of text corpora, speech recordings and so forth.

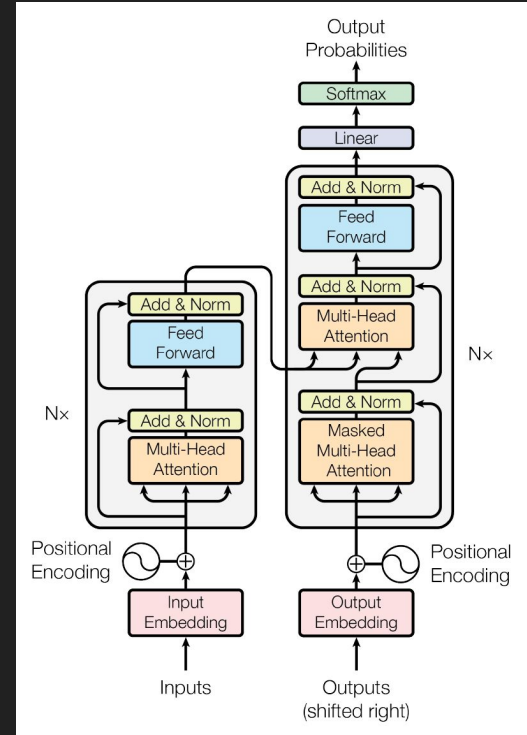
The job is left to a computer to discover transformations that compress information, direct attention to relevant details and otherwise utilise the given data to perform a given task.

Artificial Intelligence for language

In many language tasks such as:

- Translation
- Speech recognition
- Speech synthesis
- Text generation

State of the art performance is achieved using deep learning



Challenges for applying AI to under-resourced languages

There are gaps between the current state of the art on well resourced languages (such as English) and under-resourced languages (e.g. indigenous languages)

They range from:

- Cultural knowledge and expertise
- Connection to language communities
- Computational resource gaps
- Availability of training data
- Raising capital

Proliferation of Indigenous Language technology

We want to:

- Enable indigenous language communities to develop their own language technology capability
- Ensure that the sovereignty and benefits derived from these technologies goes to their communities.

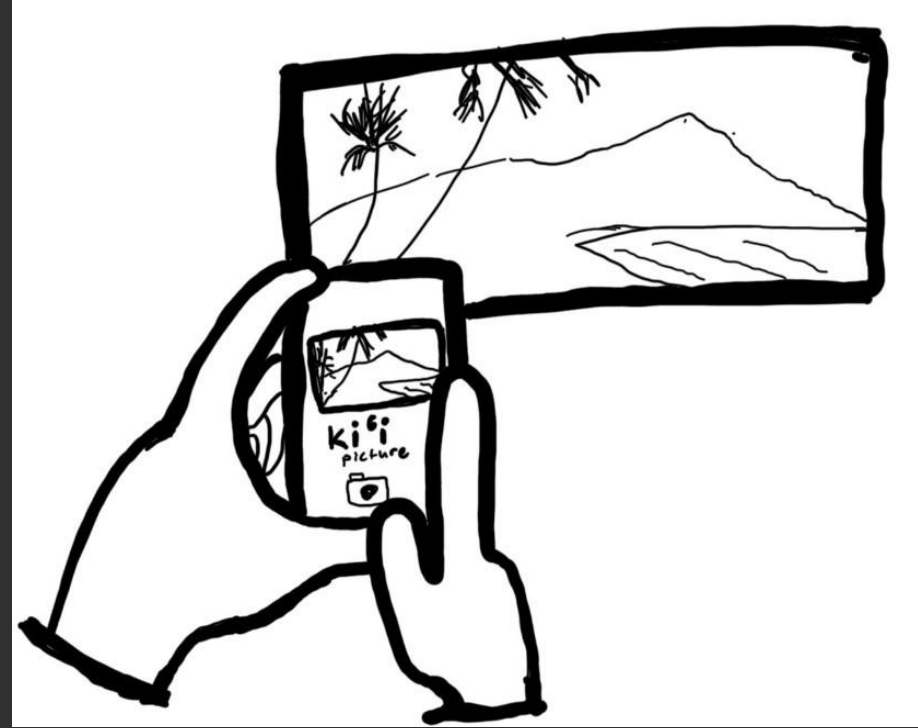
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Sketch of user interface by Isaac 'Ika'aka Nāhuewai

https://github.com/rngwlf/hua_kii

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Sketch of user interface by Isaac 'Ika'aka Nāhuewai

The background features several stylized leaf outlines in green, orange, and light blue, arranged in a decorative pattern around the central text.

Huaki'i Object Detector

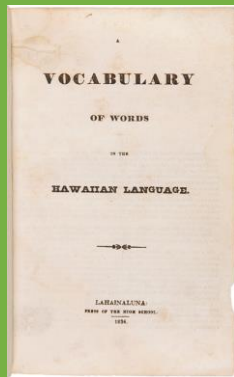
A Hawaiian wor(l)d viewer

Dr. Noelani Arista
Associate Professor
Chair of Indigenous Studies
Department of History & Classics
McGill University

Nā Puke Wehewehe 'Ōlelo Hawai'i

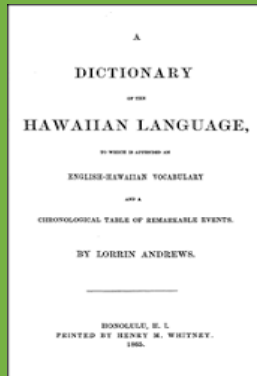
Vocabulary of
Words in the
Hawaiian Language
Lorrin Andrews

1836



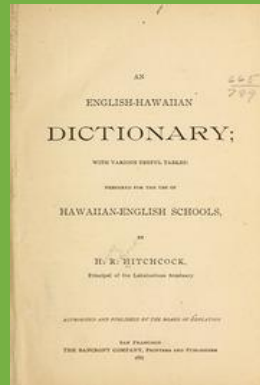
A Dictionary of the
Hawaiian Language
Lorrin Andrews

1865



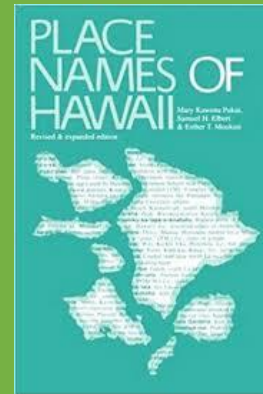
An English
Hawaiian Dictionary
H. R. Hitchcock

1887



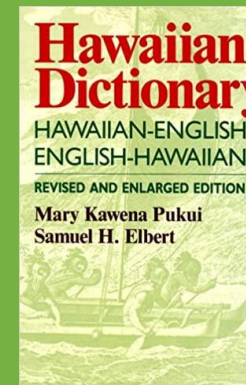
Place Names of
Hawaii
Mary Kawena Pukui
Samuel H. Elbert
Esther Mookini

1976



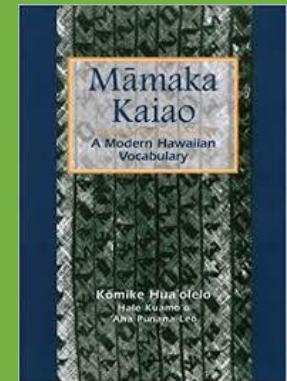
Revised and
Enlarged Hawaiian
Dictionary
Mary Kawena Pukui
Samuel Elbert

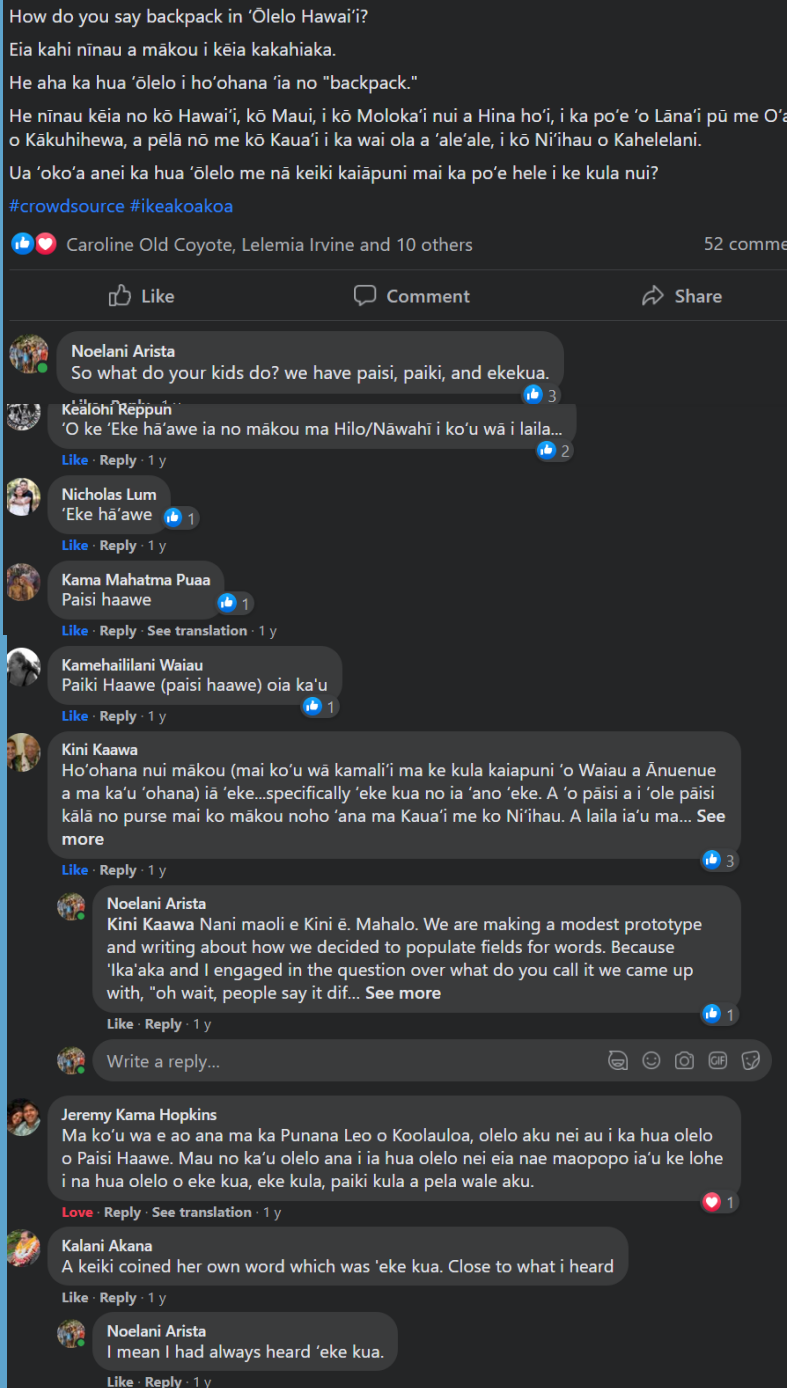
1986



Māmaka
Kaiao
A Modern Hawaiian
Vocabulary

2003





Crowdsourcing Knowledge

Community connection through social media

How do you say backpack in the Hawaiian language?

20 respondents

10 different “places” including elementary and intermediate schools across the archipelago

‘Eke / ‘Eks = 5

‘Eke Kua (bag / back) = 4

(teacher said a student coined this term)

Pāisi / Pāiki = 4

Pāiki Hā’awe / Pāiki Hā’awe = 6

‘Eke Hā’awe = 4

The results

[Hawaiian Dictionary(Hwn to Eng)]

hā.‘awe

1. nvt. To carry a burden on the back, pack; a bundle or burden so carried, backpack. See ‘awe 1. Nā hā’awe kaumaha (Isa. 58.6), heavy burdens. ho’o.hā.‘awe To have something carried on the back; to load on the back.

Real time and relational engagements to build dictionaries

Wehewehe.org

Online Hawaiian language dictionaries

ulukau HAWAIIAN ELECTRONIC LIBRARY Kōkua | English

Nā Puke Wehewehe 'Ōlelo Hawai'i E HULI I KA HUA'ŌLELO A I 'OLE KA MANA'O KA HO'OHANA 'ANA KĒIA WAHI HULI

NĀ PIHI KAHAKŌ
A ME 'OKINA

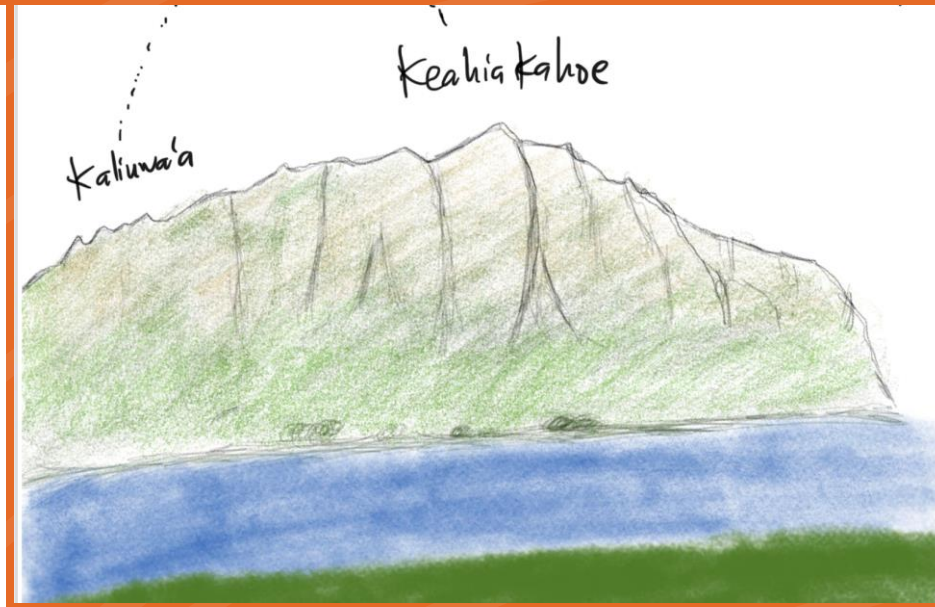
E KIKOKIKO I KA HUA'ŌLELO

ā ē ī ō ū ' .

NO KA HO'OLOLI IKI KA HULI

- Hawaiian Dictionary
- Parker Dictionary
- Combined Hawaiian Dictionary
- Māmaka Kaiao
- Place Names of Hawai'i
- Hawaiian Legal Land-Terms
- Andrews Dictionary
- Hawai'i Place Names

Kuano'o : Thoughtful, meditative, comprehending [Indigenous AI]





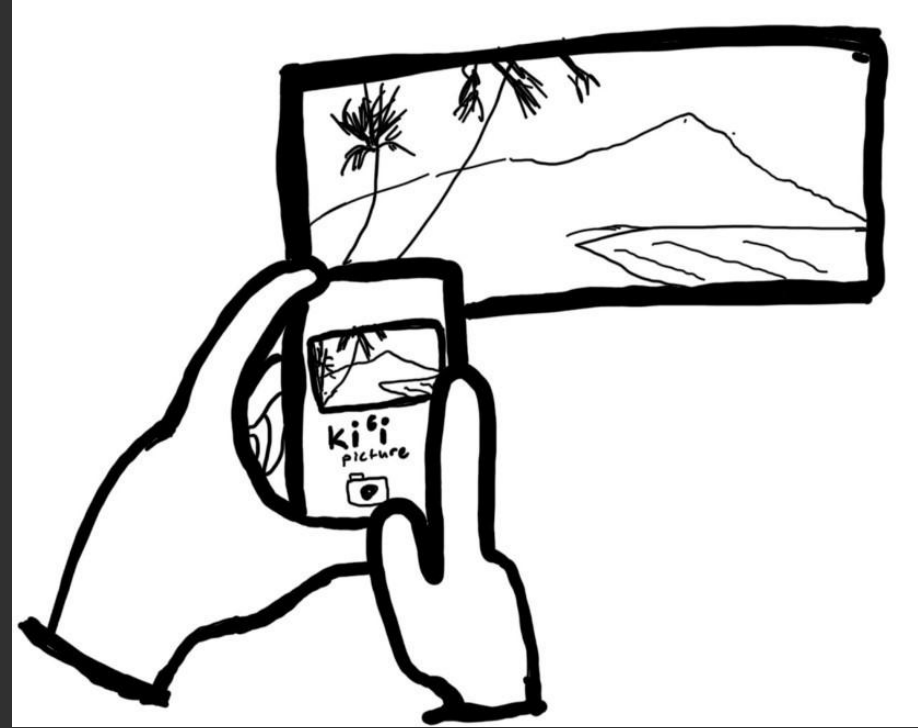
Mahalo!

Dr. Noelani Arista
noelaniarista@gmail.com

Indigenous AI – Position Paper
<https://www.indigenous-ai.net/position-paper/>

https://github.com/rngwlf/hua_kii
Huakii.indigenouai.dev

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User Interface Design

Wishlist and input ('Ika'aka, Noe)

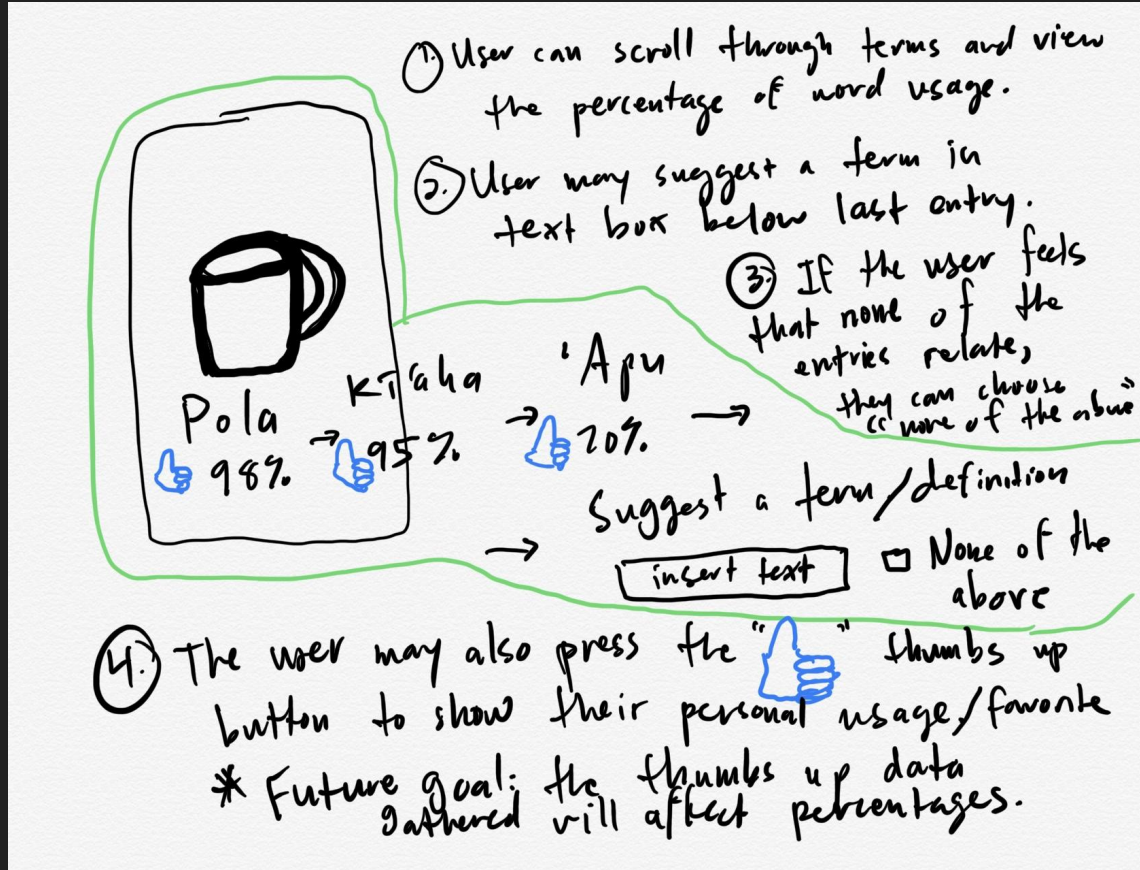
- Snap a ki'i - Fetch a hua 'olelo
- Select language based on location
- Confidence
- Swipe option for alternative results
- Feedback options

Prototype does not fulfill all items from wishlist; 90% confidence threshold implemented but not shown in UI

Immersion:

- Iconography
- Image recognition

Easily extensible: more Indigenous languages!



mahalo

Dr. Noelani Arista (Kanaka Maoli)
Joel Davison (Gadigal/Dunghutti)
Caleb Moses (Maori)
Caroline Running Wolf (Crow)
Michael Running Wolf (N. Cheyenne)



Artwork by Sergio Garzon (March 2019)