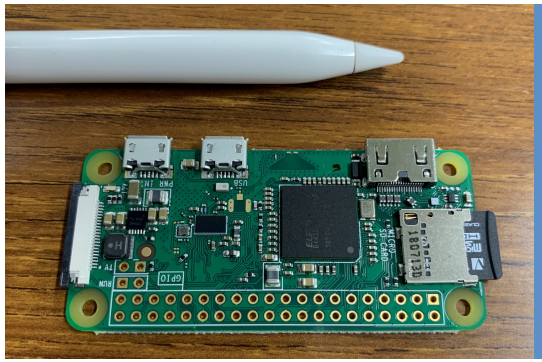
Principle 4 of the GSGF through the United Nations Vector Tile Toolkit (**UNVT**)

Hidenori
Vice-chair, WG-3, UN-GGIM-AP
Lead, TG-B, WG-Disasters, UN-GGIM
Lead, United Nations Vector Tile Toolkit
Executive Officer for GI Policy, GSI



Nice to meet you!

Hidenori

- Background: ICT
- Work experience:
  1. Development and **Operation** of **Web Maps**
  2. International projects, including the Global Mapping Project (1996 - 2017)
  3. Standardization: HoD of Japan to ISO/TC 211
  4. Senior Geospatial Expert, United Nations Geospatial Information Section (2017 – 2019)
- Back in GSI, new to UN-GGIM-AP, excited to contribute by **Open Source Running Code**

My favorite part of GSGF

Principle 4: Statistical and geospatial interoperability

Data, Standards, Processes, and Organisations

Principle 4: *Statistical and geospatial interoperability (data, standards, processes and organisations)* enables greater standardisation and use of data which will lead to improved efficiency and simplification in the creation, discovery, integration, and use of geospatially enabled statistics. It also increases the potential application of a larger range of data and technologies, and thereby enables a wider range of information to be available and accessible for use in decision-making, and addresses aspects of better cooperation between all stakeholders producing and using statistical and geospatial information.

Why do we need this Principle?

Greater interoperability between statistical and geospatial data and metadata standards is required to overcome structural, semantic, and syntactic barriers between data and metadata from different communities and providers. This also improves the discovery, access, and use of geospatially enabled statistical data. Enhancing interoperability improves the fitness-for-use of geospatial and statistical data for their use in a range of applications and data management systems, including data modelling and production planning. Clear agreement on standards and commitment to their implementation are therefore critical to realise the benefits of interoperability.

What does this Principle cover?

Principle 4 covers the interoperability of all data, metadata, standards, and good practices that facilitate the integration and output of geospatially enabled statistical data. This includes tools and methods which are used in all stages of the statistical production process. It also addresses supporting processes, including reproducibility, quality management and the mechanisms by which stakeholders and users interact. Principle 4 recognises that both the statistical and geospatial communities operate their own general data models, metadata capabilities, architectures and data infrastructure. For example, the statistical community use the GSIM, SDMX, and DDI mechanisms. In parallel, the geospatial community commonly use the GFM and developed the ISO:19115 metadata standard, plus several application specific standards[35] and good practices to support interoperability of data.

Within the statistical community there is a need to consistently build geospatial processes, standards, and good practices into statistical business processes and data management systems as a fundamental element, not just to disseminate statistical data. To ensure this occurs, countries are urged to consider how to incorporate existing geospatial frameworks, standards, good practices, and processes more explicitly into the CSPA and its components. This would in turn provide greater efficiency and

[35] For a discussion on these statistical and geospatial models and metadata standards, see: http://ggim.un.org/meetings/2015-2nd_Mtg_EG-ISGI-Portugal/documents/Connecting%20Geographic%20and%20Statistical%20Information%20Standards%20EG-ISGI%202015.pdf and http://ggim.un.org/meetings/2015-2nd_Mtg_EG-ISGI-Portugal/documents/Metadata%20interoperability%20cover%20paper%20EG-ISGI%202015.pdf

<Principle 4>

Clear agreement on standards and **commitment to** their **implementation are** therefore **critical to realise the benefit of interoperability**.

The GSGF value I can contribute the most.

Commitment to the implementation of the standards are critical to realise the benefit of interoperability.

"This is the value where I can contribute to GSGF the most by making use of my experience in Running Code."

I identified three focus elements.

My focus element 1 in implementing Principle 4

Implementing service based or machine readable access mechanisms (e.g. through APIs) that provide greater **efficiency** of access and use and allow adaptation and evolution of uses **through time** (p. 29)

3. **Semantic interoperability** ensures that the precise format and meaning of exchanged data and information is preserved and understood: "What is sent is understood". This includes syntactic aspects, such as the terminology used to describe concepts, as well describing the exact format of the information.
4. **Technical interoperability** covers the linking systems and services of applications and infrastructures. Aspects include interface and services specifications, and data and metadata standards and formats.

Each of these items are crucial towards the integration and output of geospatially enabled statistical data and share a close interlinkage with each other.

Objectives of this Principle

In implementing Principle 4, the following key elements should be targeted:

Standards and good practices

- Enabling experts from the statistical and geospatial community to fully understand the nature, potential and limitations of other data domains;
- Facilitating smooth communication between experts by using consistent and understandable terminology;
- Provision should be made such that data, tools, processes and methodologies are documented in the official languages of the country;
- Guaranteeing preservation and persistence of data and tools;
- Ensuring that only open and international standards and good practices are implemented, ideally by using or further developing existing standards or connecting between existing standards; and only creating new standards and practices when necessary and doing so collectively;
- Ensuring transparency and visibility of data and metadata; and,
- Safeguarding common quality Principles.

National Laws and Policies

- Supporting cooperation of stakeholders through arrangements and legislation.

Infrastructure

- Ensuring that geospatially enabled/integrated data can flow freely between statistical and geospatial data producers, and from data producers to data users without having to worry about technical, national laws and policies, organisational, economic, language and conceptual barriers or national borders;
- Implementing service based or machine-readable access mechanisms (e.g. through APIs) that provide greater efficiency of access and use and allow adaptation and evolution of uses through time;
- Developing common solutions, so data and tools can be re-used, avoiding duplication of effort, through a single national fundamental geospatial infrastructure;

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Developing **common solutions**, so data and tools can **be re-used**, avoiding duplication of effort, through a single national fundamental geospatial infrastructure. (p. 29)

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My focus element 3 in implementing Principle 4

Ensuring that data and **tools** are **open and free**, wherever possible, so that users have access to the full range of information with **no information loss** due to technical or other **interoperability** issues. (p. 30)

- Ensuring that users, no matter if they come from both a geospatial or statistical background, can discover and access the required information via defined technical and user interfaces that do not require cross domain knowledge; and,
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Relationship to other Principles

Interoperability concerns how data travels from the source to the end-user; for example, across the full statistical production process, including dissemination to intermediate and end-users. As a result, interoperability issues in most cases cut across the other Principles of the GSGF rather than belonging to one Principle only. Interoperability is critical to the successful implementation of the GSGF.

The full implementation of interoperability described in this Principle is particularly important for Principle 5, as failure to achieve interoperability in any of the other Principles will often result in incomplete or less useful information for the end-user.

Key Stakeholders

Often, NSOs and NGIAs are augmented by administrative data custodians, which also act as providers of statistical data, but which are often not interoperable with statistics and geospatial information (for example administrative boundaries – see Principle 3). Other stakeholders are the main global standard setting bodies such as ISO, OGC and IHO and the organisations driving the Modernisation of Official Statistics, such as UNECE[37].

The **European Commission** is the custodian of INSPIRE as the most important standard setting framework for geospatial information in Europe with **Eurostat** maintaining the European Statistical System and contributing with respect to standard setting activities, such as SDMX and ModernStats. The regional overview is further supported by the UN Regional Commission for Europe, **UNECE**, in supporting the "Modernstats" initiative for the modernisation of official statistics.

The European Forum for Geography and Statistics focuses on the development of best practices in the production of geospatially enabled statistics in Europe and acts as the professional network and organises the European annual conference on the integration of statistics and geospatial information, further enhancing knowledge exchange and communication.

Regionally, Europe have led with various initiatives and bodies supporting interoperability and the UNSC acts as the global custodian for statistics and geospatial information and their integration, while supporting capacity building.

European Efforts towards Interoperability

[37] This is not limited to those countries within the geographic bounds of Europe and includes several non-European Member States: https://www.unece.org/oes/nutshell/member_states_representatives.html

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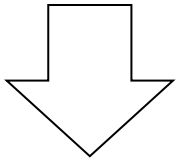
My contribution to GSGF Principle 4

Value	Commitment to implementation are critical.
Element 1	Implement access mechanisms that provide greater efficiency. Allow adaptation and evolution through time.
Element 2	Develop common solutions. Promote reuse and avoid duplication of efforts.
Element 3	Ensure tools are free and open. No information loss or interoperability issues.



My commitment

Contribution from the United Nations Vector Tile Toolkit for the GSGF Principle 4

Principle 4 of the GSGF through the UNVT

1. What is the United Nations Vector Tile Toolkit (UNVT) ?
2. A short demo of the UNVT for statistical-geospatial integration.
3. Possible future work items by the UNVT, for the GSGF Principle 4.
4. Invitation to the UNVT, for the GSGF and many other UN-GGIM Frameworks.

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What is Vector Tiles, first of all?

Tiles

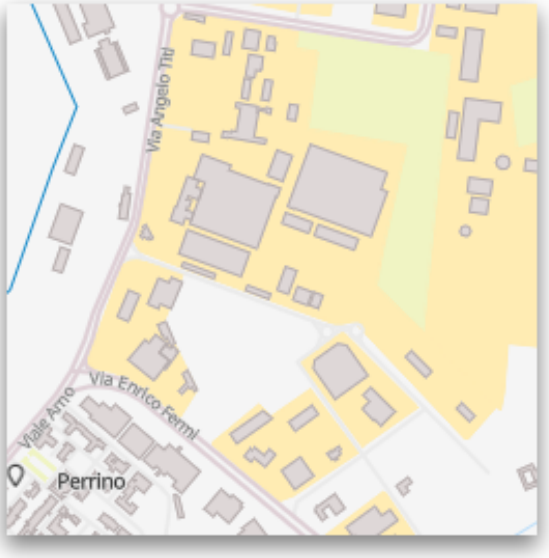
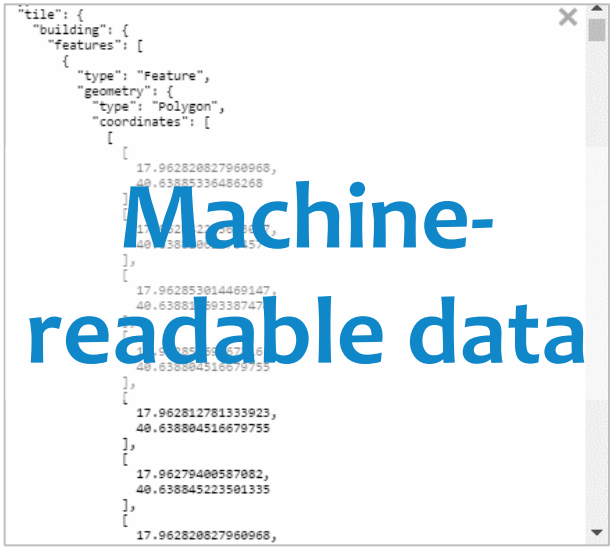


Image Tiles

Vector Tiles

Image Tiles

Vector Tiles



Vector Tiles are Machine-Readable (Element 1)

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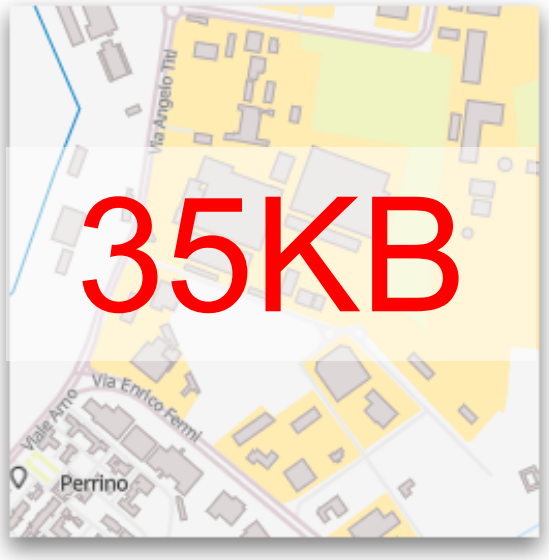
Image Tiles



Vector Tiles

Vector Tiles are Efficient (Element 1)

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So, What is the United Nations Vector Tile Toolkit (UNVT) ?

The United Nations Vector Tile Toolkit

2015	**UN Open GIS Initiative** was established. Aim: to identify and develop open source geospatial solutions for UN operations. WG1: Geoportal WG2: Capacity Building WG3: Geoanalysis WG4: Geodata collection
2018	To support automatic and continuous update of basemap vector tiles hosted by the UN Global Service Center, WG4 created the **United Nations Vector Tile Toolkit (UNVT)**. Lead: Hidenori, Senior Geospatial Expert at the UN Geospatial Information Section.

UN Open GIS
INITIATIVE

The United Nations Vector Tile Toolkit

Participatory

Capacity Building Oriented

Open Source

Experience of GSI on UNVT principles

1996
Global Mapping Project

2003
Digital Japan Web System

2005 Google Maps

Participatory

Capacity building

2012
Adoption of Open Source in the Digital Japan Web System

Open Source

2014
GSI vector tile engineering experiment

2014 vector-tile-spec

2016 UN Open GIS Initiative

2017
Completion of Global Mapping Project

2018 UNVT

Structure of the UNVT

Produce	Host
Style	Optimize

① Priority goal: automatic continuous update of the basemap vector tiles for UN operations.

② Wider goal: leave no one behind vector tile technology.

Versatility for Sustainability

Content of the UNVT

- Collection of existing open source tools.
  such as Tippecanoe, Mapbox GL JS, and vt-optimizer.
- Custom Node.js scripts.

Technical Details: Fujimura, H., Sanchez, O. M., Ferreiro, D. G., Kayama, Y., Hayashi, H., Iwasaki, N., Mugambi, F., Obukhov, T., Motojima, Y., Sato, T. (2019): Design and Development of the UN Vector Tile Toolkit, International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII-4/W14, 57 – 62.

DESIGN AND DEVELOPMENT OF THE UN VECTOR TILE TOOLKIT

H. Fujimura [1, *], O. Martin Sanchez [2], D. Gonzalez Ferreiro [2], Y. Kayama [3, 4], H. Hayashi [3, 5], N. Iwasaki [3,6], F. Mugambi [7], T. Obukhov [1], Y. Motojima [8], T. Sato [8]

[1] Geospatial Information Section, United Nations, New York, USA – fujimura.hidenori@gmail.com, obukhov@un.org
[2] Global Service Centre, United Nations, Brindisi Italy - (martinsanchez, gonzalezferreiro)@un.org
[3] OSGeo Foundation Japan Chapter, Kawagoe, Japan – yoichi.kayama@gmail.com, hayashi@apptec.co.jp, wata909@gmail.com
[4] Aero Asahi Corporation, Kawagoe, Japan – youichi-kayama@aeroasahi.co.jp
[5] Applied Technology Co., Ltd., Osaka, Japan – hayashi@apptec.co.jp
[6] Institute for Agro-Environmental Sciences, NARO, Tsukuba, Japan – niwasaki@affrc.go.jp
[7] United Nations Truce Supervision – UNTSO, Jerusalem, Israel – mugambi@un.org
[8] Geospatial Information Authority of Japan, Tsukuba, Japan – (motojima-y96st, satoh-t96b2)@mlit.go.jp

Commission IV, WG IV/4

KEY WORDS: Community, GeoJSON Text Sequences, Module, Software Development, Stream, Vector Tiles

ABSTRACT:

The UN Vector Tile Toolkit (https://github.com/un-vector-tile-toolkit/) is a package of open source tools designed under the UN Open GIS Initiative to enable public basemap providers, such as the UN geospatial information services or mapping organizations of governments, among others, to deliver their basemap vector tiles leveraging the latest web map technologies. The toolkit provides a set of Node.js open source scripts designed for developers to use with existing and proven open-source software such as Tippecanoe, Maputnik and Vector Tile optimizer. The toolkit will help organizations to produce, host, style, and optimize fast and interoperable

Outputs from the UNVT

① “Around the World in 80 hours”

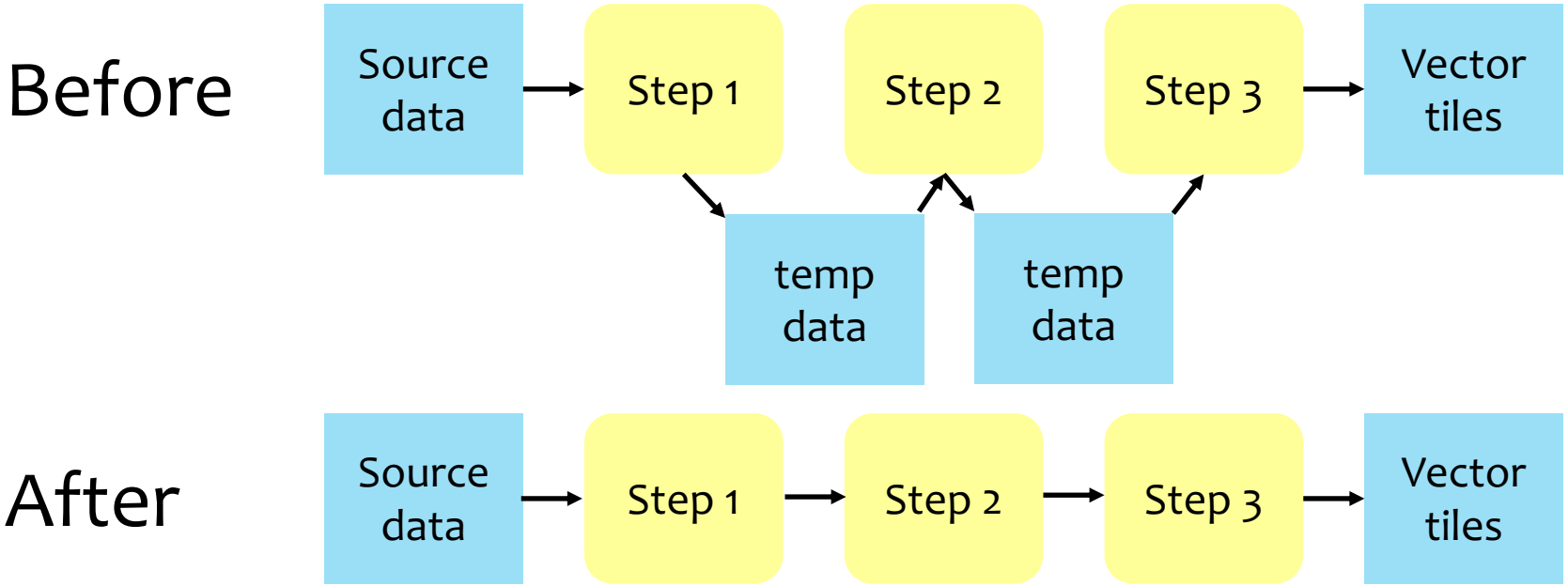
② Server-side image tile rendering for interoperability

③ Tiny PC implementation for demos and capacity building

①Around the World in 80 hours

Successfully implemented a production tools as fast as 80 hours per a global dataset which contains the whole OpenStreetMap data and other 10GBs of data.

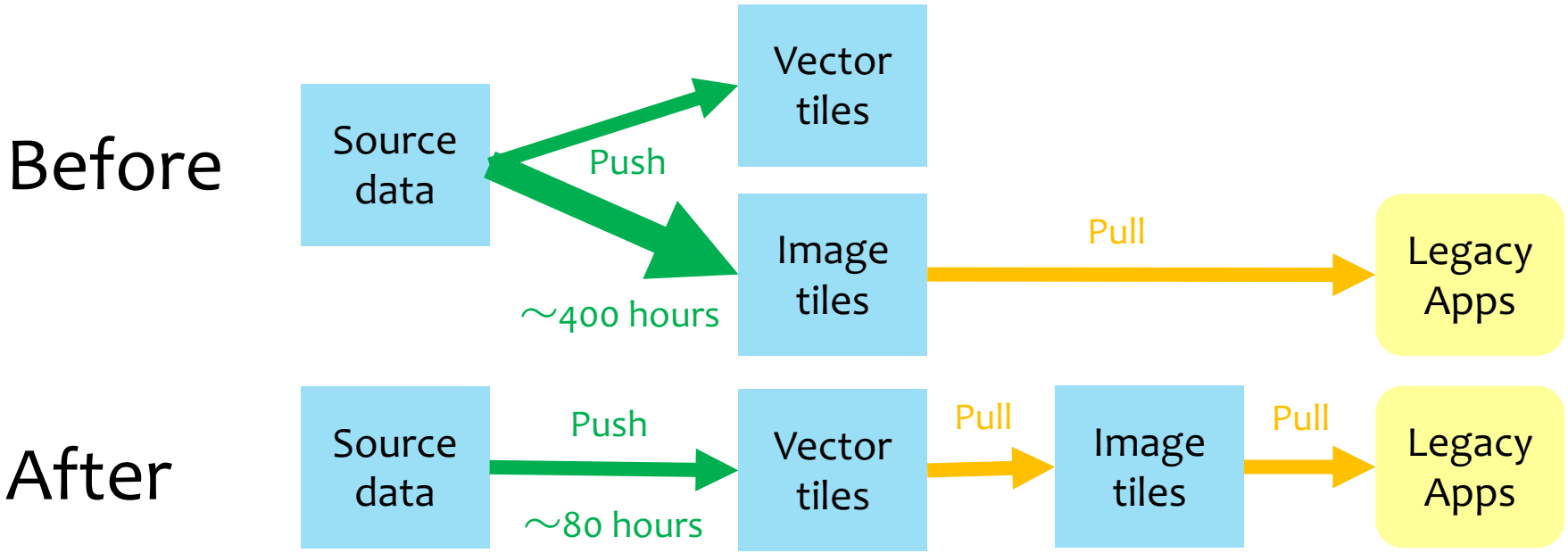
✓ By carefully designing a data flow without temporary data storage.



②Server-side image tile rendering

Only vector tiles are inside the continuous production loop. Image tiles are rendered on request at the server side.

- ✓ Take heavy process off the production loop.
- ✓ A proven method from private sector.
- ✓ Reduced 80% of data production.



Interoperability guaranteed

Server-side image-tile rendering function of the UNVT guaranteed the **interoperability with proprietary solutions and legacy solutions**, without compromising on the production speed.

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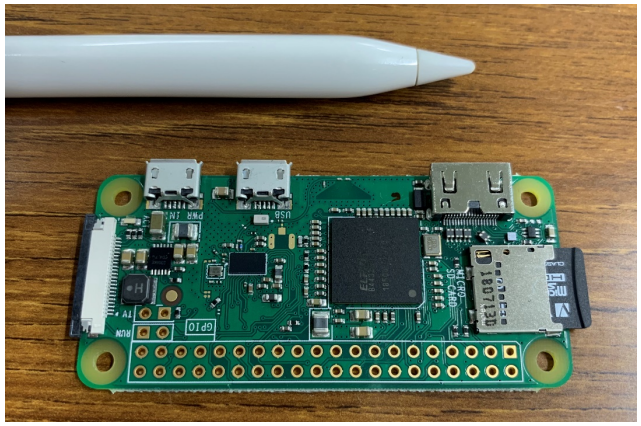
A prototype for UNGSC using UNVT

Tiny PC implementation

1. The UN solution is built in the UN enterprise environment which is not for external access.
   - ✓ For information management and security reasons
2. Involvement of external participants is critical to sustainment of the open source project.
3. Enable demos and capacity building by a tiny PC implementation.

US$ 10 – 50 per a PC
Frequently used for STEM education or IoT



Tiny PC implementation

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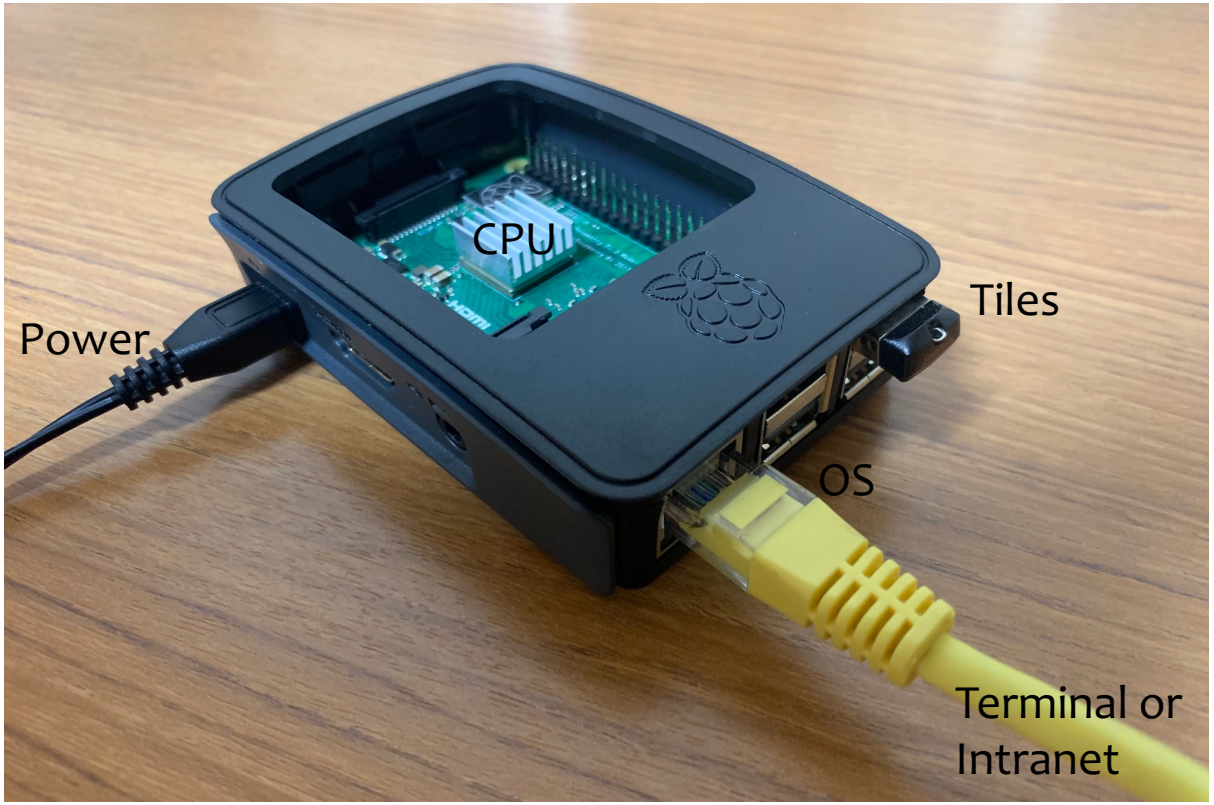
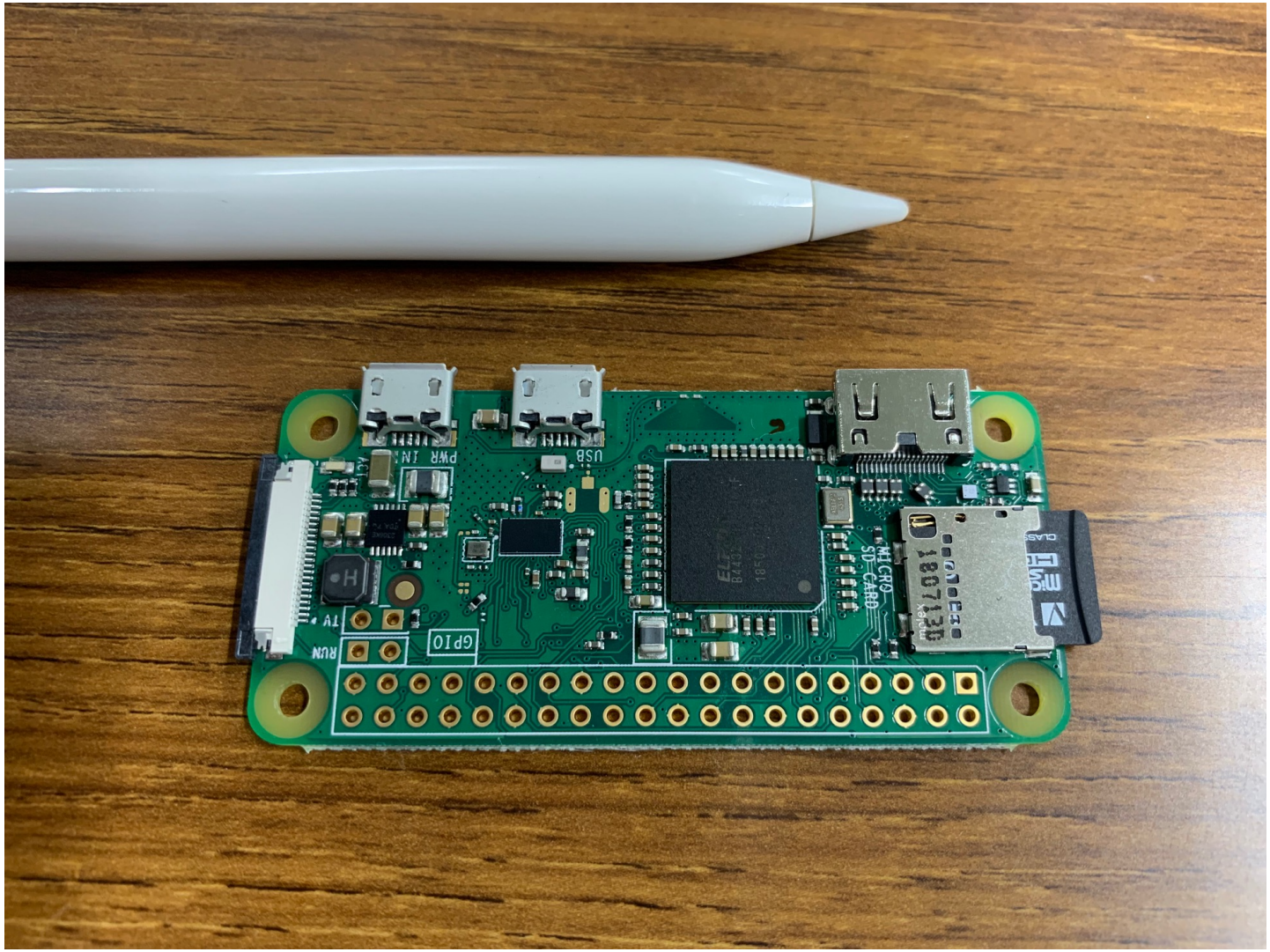
Start Web map within a cost of a text book (US$ 10 – 50) even without an Internet connection.



Possibly even smaller



The UNVT Team

UN Open GIS Initiative

GeoThings

Geospatial Information Authority of Japan

National Astronomical Observatory of Japan

National Institute for Agro-Environmental Sciences

Mapbox

Mapple On

OSGeo Japan Chapter

UN Geospatial Information Section

UN Global Service Centre

The UNVT Values

UN Open GIS INITIATIVE

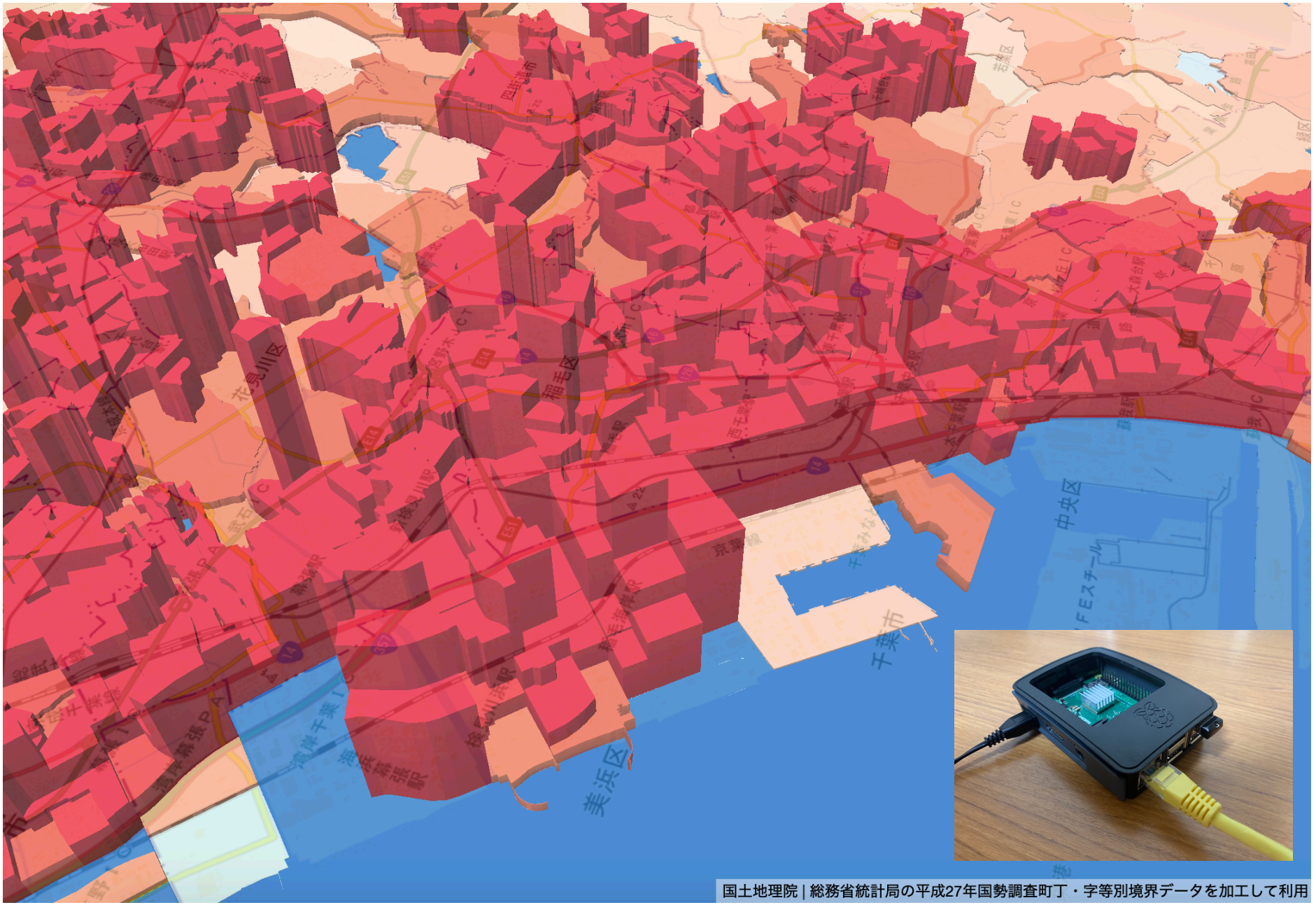
1. **Leave no one behind**
   - ✓ We apply for the OSGeo incubation process
2. **Contribute by the Running Code**
   - ✓ We contribute to UN-GGIM agendas
3. **Lead as the advance team**
   - ✓ We deploy before you deploy

The United Nations Vector Tile Toolkit

UNGIS UNGSC NAOJ NIAES OSGeo·JP mapbox マップル・オン

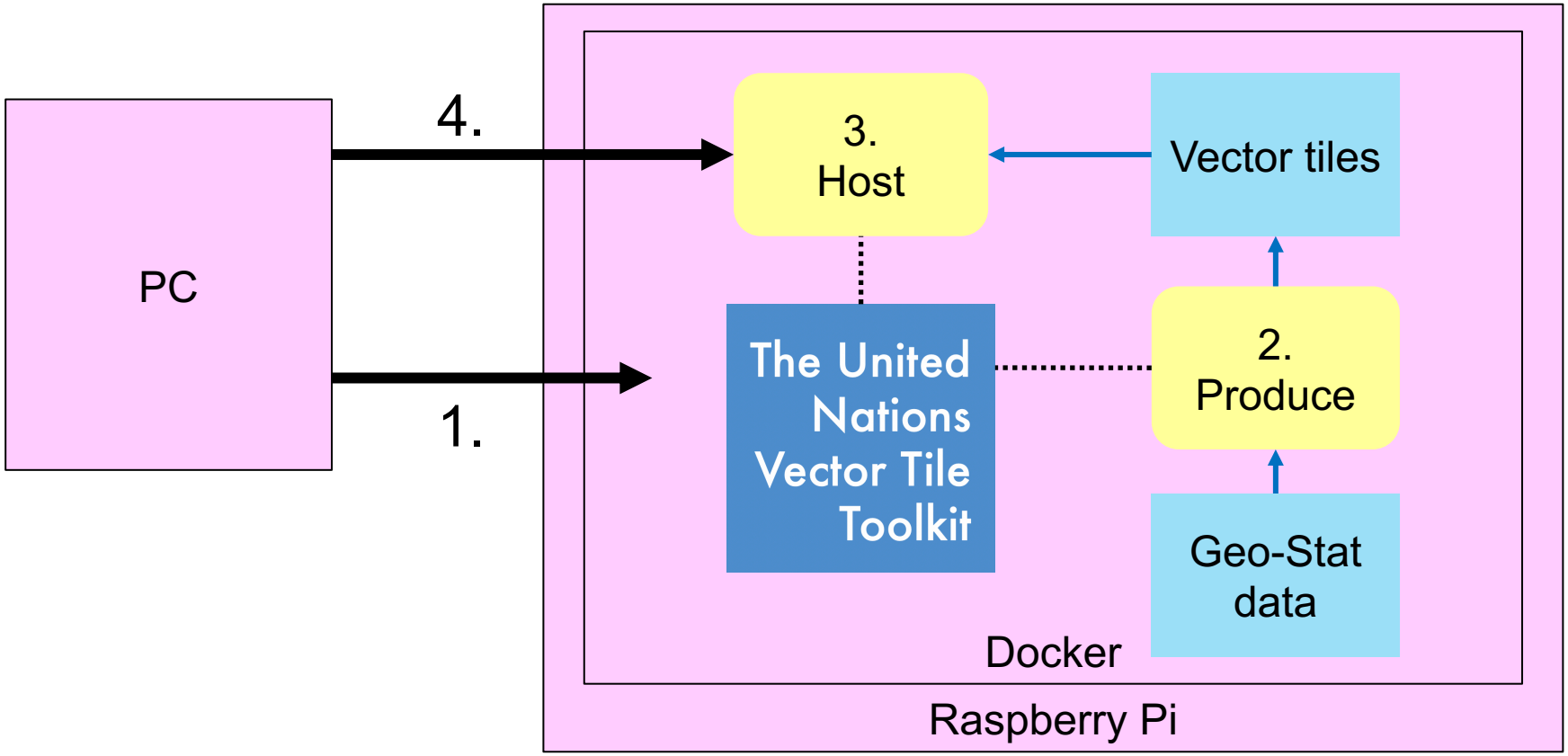
Principle 4 of the GSGF through the UNVT

1. What is the United Nations Vector Tile Toolkit (UNVT) ?
2. A short demo of the UNVT for statistical-geospatial integration.
3. Possible future work items by the UNVT, for the GSGF Principle 4.
4. Invitation to the UNVT, for the GSGF and many other UN-GGIM Frameworks.



国土地理院 | 総務省統計局の平成27年国勢調査町丁・字等別境界データを加工して利用

A short demo



1. Log in to the Tiny PC from the presentation PC.
2. Produce vector tiles from the data from the Statistics Bureau.
3. Host the produced vector tiles.
4. Browse the web map from the presentation PC.

A short demo

国土地理院

```
ssh pi@unvt0.local
docker run -ti --rm –p 3000:3000 unvt/koji
tmux

cd koji-produce                    c.f. Sugi Koji
rake                          3m59s, 45,000 polygons

cd ../koji-host
vi hocon/style.config
rake build
rake rake start
```

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Possible future work items by the UNVT

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1. UNVT will be able to develop and operate a demo with **more dynamic table joining** with various statistical data.
   - ✓ Taking advantage of hyperlinking from features inside vector tiles.

2. UNVT will be able to offer an **on-line capacity building** program of UNVT.

Principle 4 of the GSGF through the UNVT

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We contribute by Running Code

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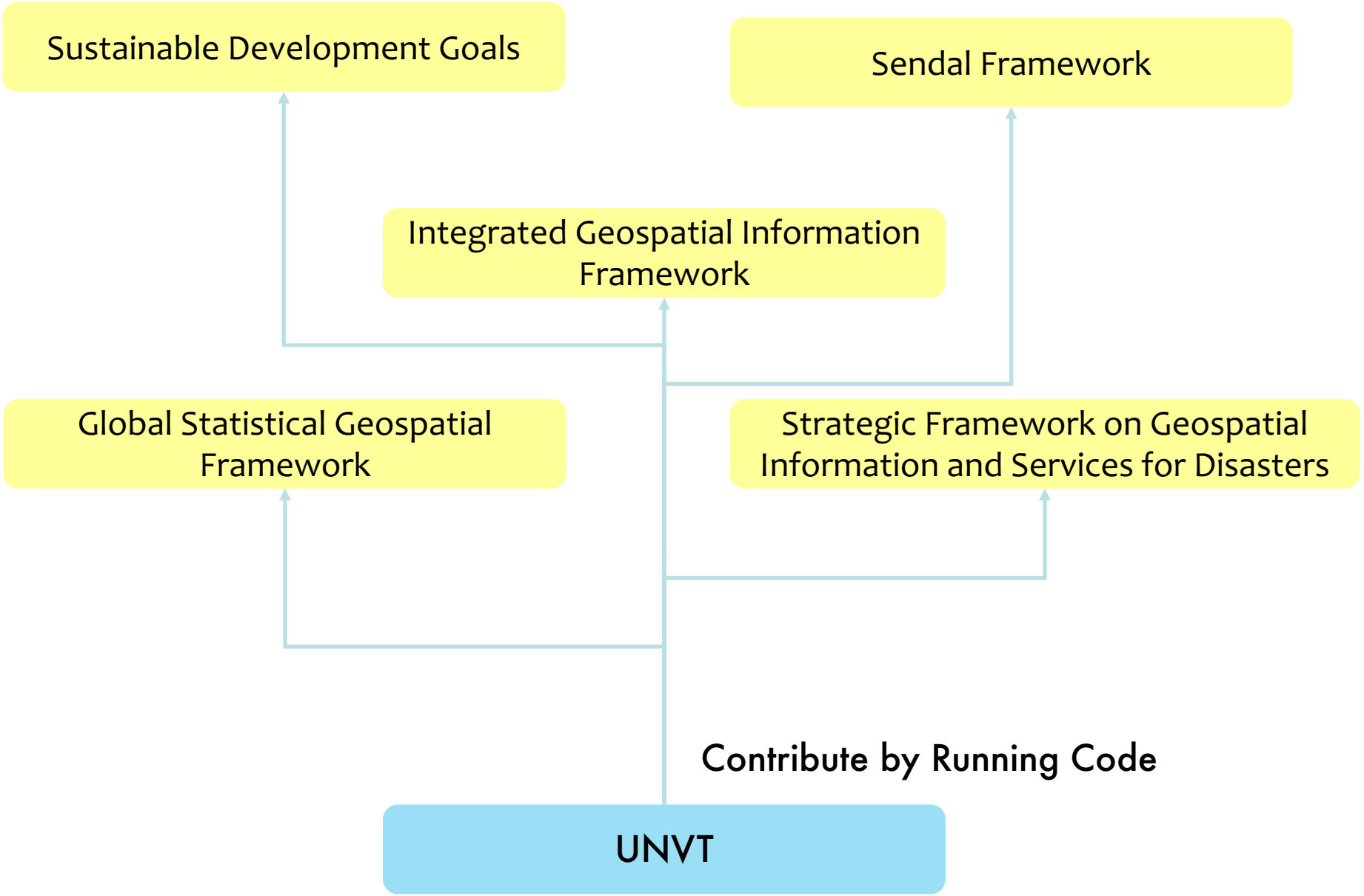


Strategic Pathway 5: Innovation

- Creating enhanced opportunities for innovation and creativity that **enable governments to quickly bridge the digital divide**.
- To stimulate the use of the **latest cost-effective technologies**

Strategic Pathway 7: Partnership

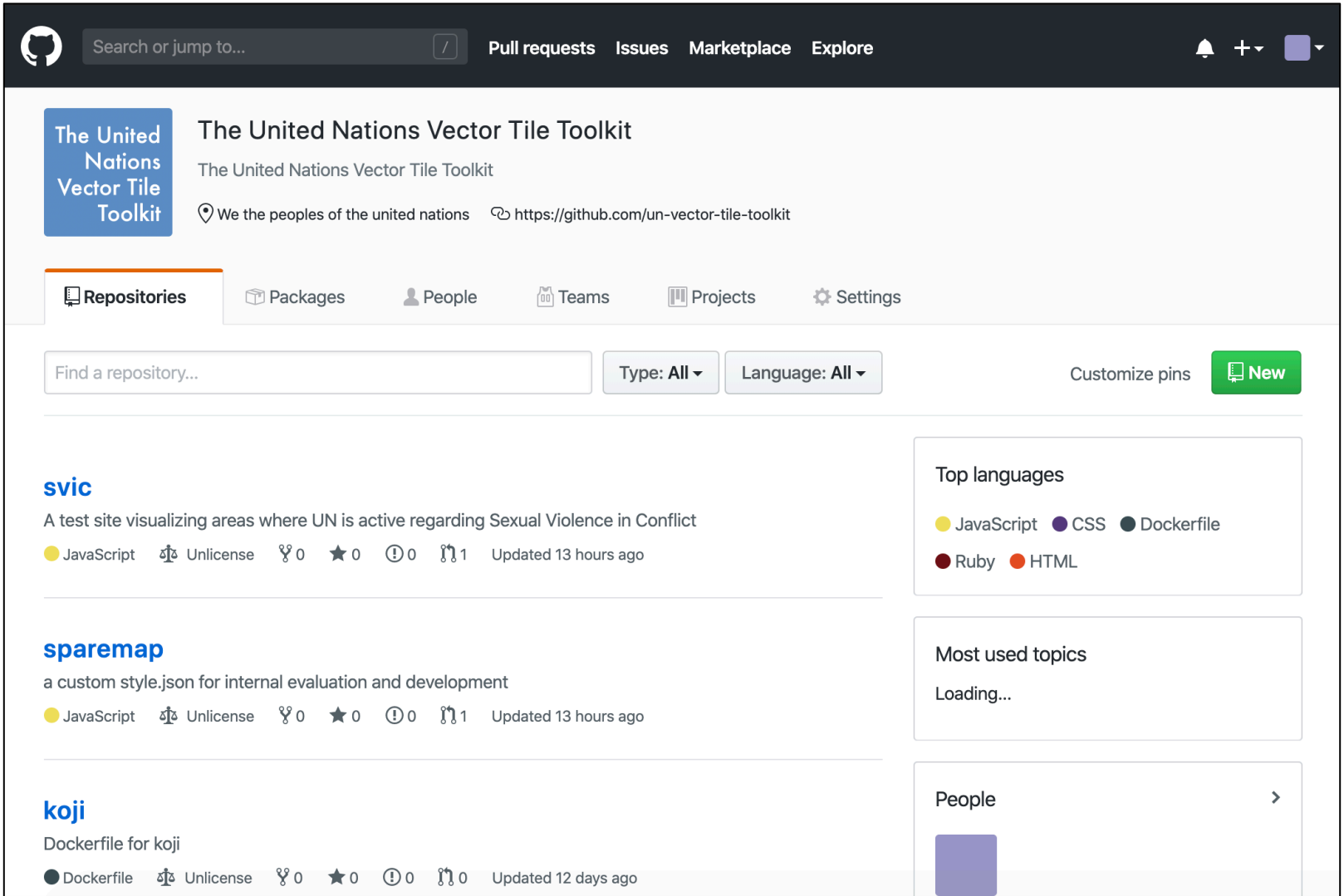
- Effective cross-sector and interdisciplinary **cooperation**, industry and private sector **partnerships**, and **international cooperation**

UNVT is available to anyone as FOSS4G

国土地理院

FOSS4G: Free and Open Source Software for Geospatial

https://github.com/un-vector-tile-toolkit



United Nations...
Hidenori Fujimura

会話を移動

スレッド

チャンネル
general
incubation-process
literate
monthly-progress
random
rasv

+ チャンネルを追加する

ダイレクトメッセージ
Slackbot
Hidenori Fujimura（自分）
Allan Walker
Anthony Calamito
Diego Gonzalez
Gakumin Kato
Nobusuke Iwasaki
Oliva Martin Sanchez
Taro Matsuzawa (smellm...
Ubukawa Taro
Yoichi Kayama

#general
20 | 0 | 全社的なアナウンスと業務関連の事項

検索

10月21日 (月)

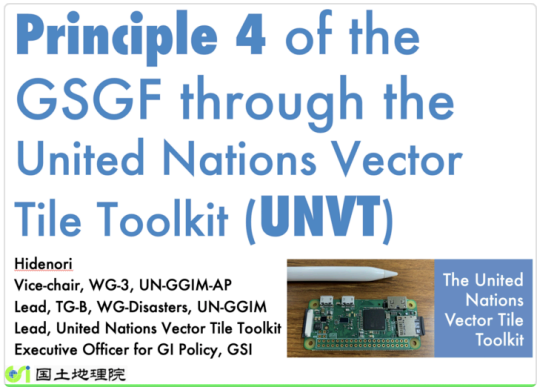
前回の更新：14分前... 新しいメッセージを読み込む

3 件の返信 最終返信: 10日前

11月1日 (金)

Hidenori Fujimura 20:37
I am going to make two presentations at the UN-GGIM-AP conference. The first one is in the Workshop of the WG-2 of the UN-GGIM-AP on Sunday. I have one hour, so I am including a short demo using a Raspberry Pi using unvt/koji. I wish I could have time to consult with you and other UN colleagues, however, I need to make the presentation probably on the airplane... I think this is a good chance to create the first example of contribution by Running Code inside the UN-GGIM series of conferences. （編集済み）

スクリーンショット 2019-11-01 20.30.56.png



I am going to share the slides with you probably via Speakerdeck.

#general へのメッセージ

送信

UN Open GIS INITIATIVE

The United Nations Vector Tile Toolkit

Slack, in addition to GitHub, for project-internal communications

UNGIS UNGSC NAOJ NIAES OSGeo·JP mapbox マップル・オン

UN Open GIS
INITIATIVE

Please contact me if you are interested in joining the project.

I will update you anyway with the latest development.

The United Nations Vector Tile Toolkit

Principle 4 of the GSGF through the United Nations Vector Tile Toolkit (**UNVT**)

Hidenori
Vice-chair, WG-3, UN-GGIM-AP
Lead, TG-B, WG-Disasters, UN-GGIM
Lead, United Nations Vector Tile Toolkit
Executive Officer for GI Policy, GSI