DIGITAL MAPPING TECHNIQUES 2021
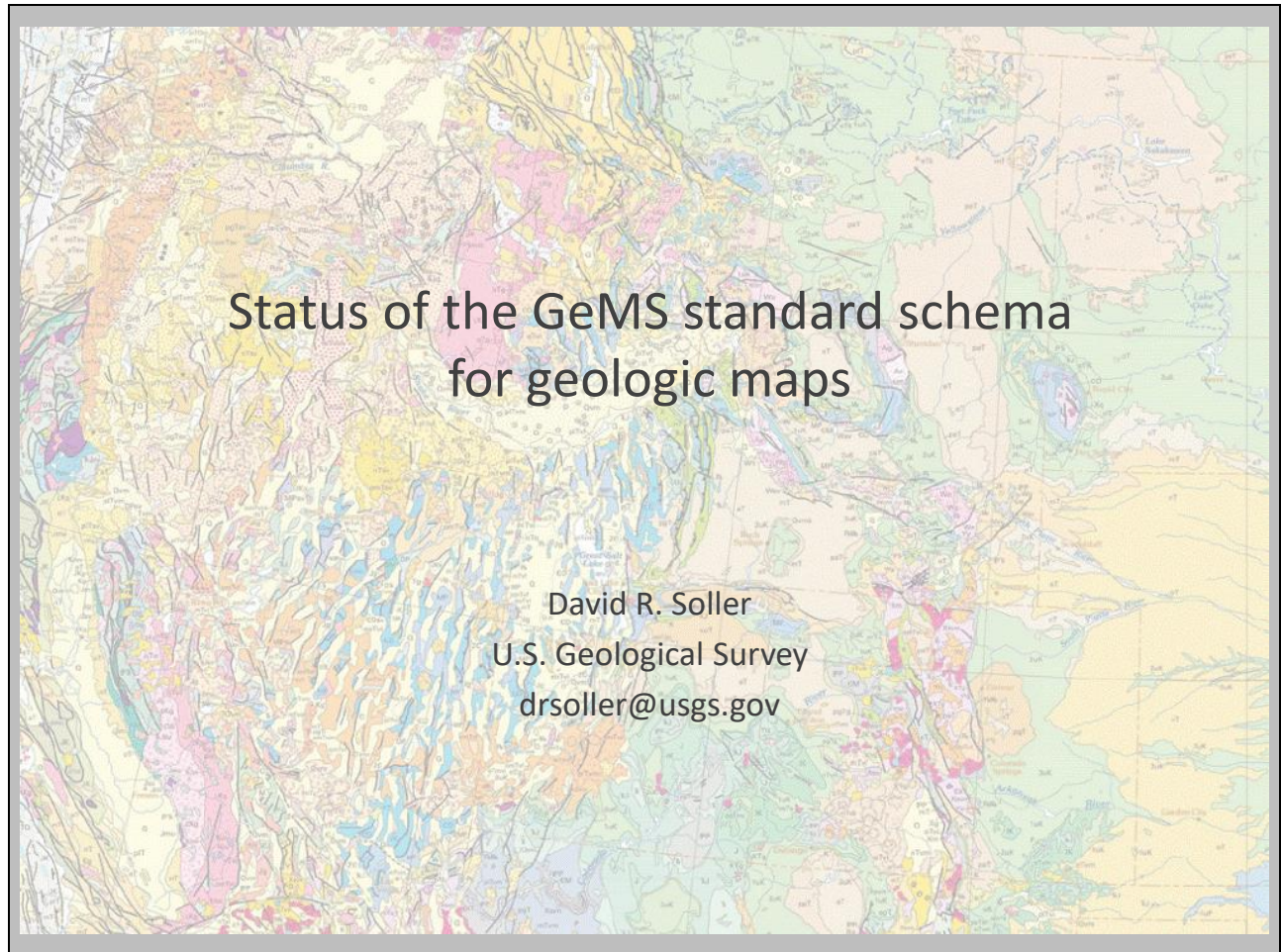
The following was presented at DMT'21
(June 7 - 10, 2021 - A Virtual Event)

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2021)

http://ngmdb.usgs.gov/info/dmt/

SLIDE 1

Status of the GeMS standard schema
for geologic maps

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PRESENTER NOTES:
It's my pleasure to introduce the day's discussions about the standard geologic map schema (GeMS). This is a team effort, and we're very fortunate that Evan Thoms (USGS) and Ralph Haugerud (USGS) are willing to work with us on this. They write the main scripts, and Evan manages the GeMS Website (https://ngmdb.usgs.gov/info/standards/GeMS/) and the Github sites (https://github.com/usgs/gems-tools-pro; https://github.com/usgs/gems-tools-arcmap). I'll give a brief perspective on how standards development can work, using GeMS as the example.

[Slide background: Geologic map of the western United States and surrounding areas, extracted from the "Geologic map of North America" (Reed and others, 2005; database from Garrity and Soller, 2009). Image downloaded from the National Geologic Map Database (https://ngmdb.usgs.gov/Prodesc/proddesc_86688.htm).]

SLIDE 2

Summary of AASG-USGS collaboration on geologic map database standards

1996 Geologic Data Model Working Group

- formed August, 1996, at the meeting in St. Louis, Missouri.
- Released a database design ("v.4.3") in 1999.

AASG/USGS Geologic Data Model Working Group

On August 14-15, 1996, in St. Louis, Missouri, the AASG and USGS convened a meeting to discuss development of standards to support the geoscience community and the National Geologic Map Database. At the meeting, this Working Group was formed to develop a standard database design for geologic maps.

The Working Group's charge:
1) Identify the "core" elements common to all geologic maps and legends.
2) Bells and Whistles -- How to add features and capabilities to the core elements?
3) Investigate data structures to facilitate generalization and creation of derivative maps from the data (i.e., the "evolutionary" map).

Chronology

- In October, 1997, the Geologic Data Model Working Group released a draft data model for public comment. Software tools were written that enabled the model to be evaluated, and implementation to be tested.
- In June, 1998, a workshop to evaluate the data model was held. Twenty-eight members of the USGS, state geological surveys, and the Canadian federal and provincial surveys attended. A revised data model (v.4.2) and software tools were shown. The attendees supported further development of the model. A meeting summary is available.
- Following the data model workshop, revisions were made to the data model, and these were made available to the public as version 4.3.
- With completion of the workshop and version 4.3, the objectives of this Working Group were considered to be met, and **the group was dissolved**.
- In late 1998, the Federal, State, and Provincial geological surveys of the United States and Canada formed the **North American Data Model Steering Committee** (NADMSC), to continue development of the data model. General information on the Committee process, and progress on the data model and standard science language can be found at the NADM site.
- **The National Geologic Map Database** continues to develop its data model and science language, in support of requirements of the National Geologic Mapping Act. Please see the NGMDB Standards site for information.

Membership in this working group was informal, and all were invited to participate and to evaluate the model as it develops. The original members were:
Gary Raines, USGS (Chair)
Boyan Brodaric, Geological Survey of Canada
Jim Cobb, Kentucky Geological Survey
Todd Fitzgibbon, USGS
Ralph Haugerud, USGS
Greg Hermann, New Jersey Geological Survey
Bruce Johnson, USGS
Jon Matti, USGS
Jim McDonald, Ohio Geological Survey
Don Mckay, Illinois Geological Survey
Steve Schilling, USGS
Randy Schumann, USGS
Bill Shilts, Illinois Geological Survey
Ron Wahl, USGS

Comments or questions about the content of this archived page?
Please submit them via the NGMDB's Comments form.

DIGITAL GEOLOGIC MAP DATA MODEL

Version 4.3

September 27, 1999

By

**Bruce R. Johnson, Boyan Brodaric, Gary L. Raines, Jordan T. Hastings, and Ron Wahl**

PRESENTER NOTES:
The long road to GeMS began in 1996, with a meeting in St. Louis, Missouri, where a half-dozen National Geologic Map Database (NGMDB) Working Groups were formed. This one, the Data Model Working Group (https://ngmdb.usgs.gov/archive/datamodelWG.html), had two members with us today -- Ralph Haugerud (USGS) and Randy Schumann (USGS). They released a conceptual data model design in 1999 (Johnson, B.R., and others, Digital geologic map data model, version 4.3, unpublished AASG-USGS working document dated September 27, 1999, 69 p.; https://ngmdb.usgs.gov/www-nadm/prd/Model43a.pdf).
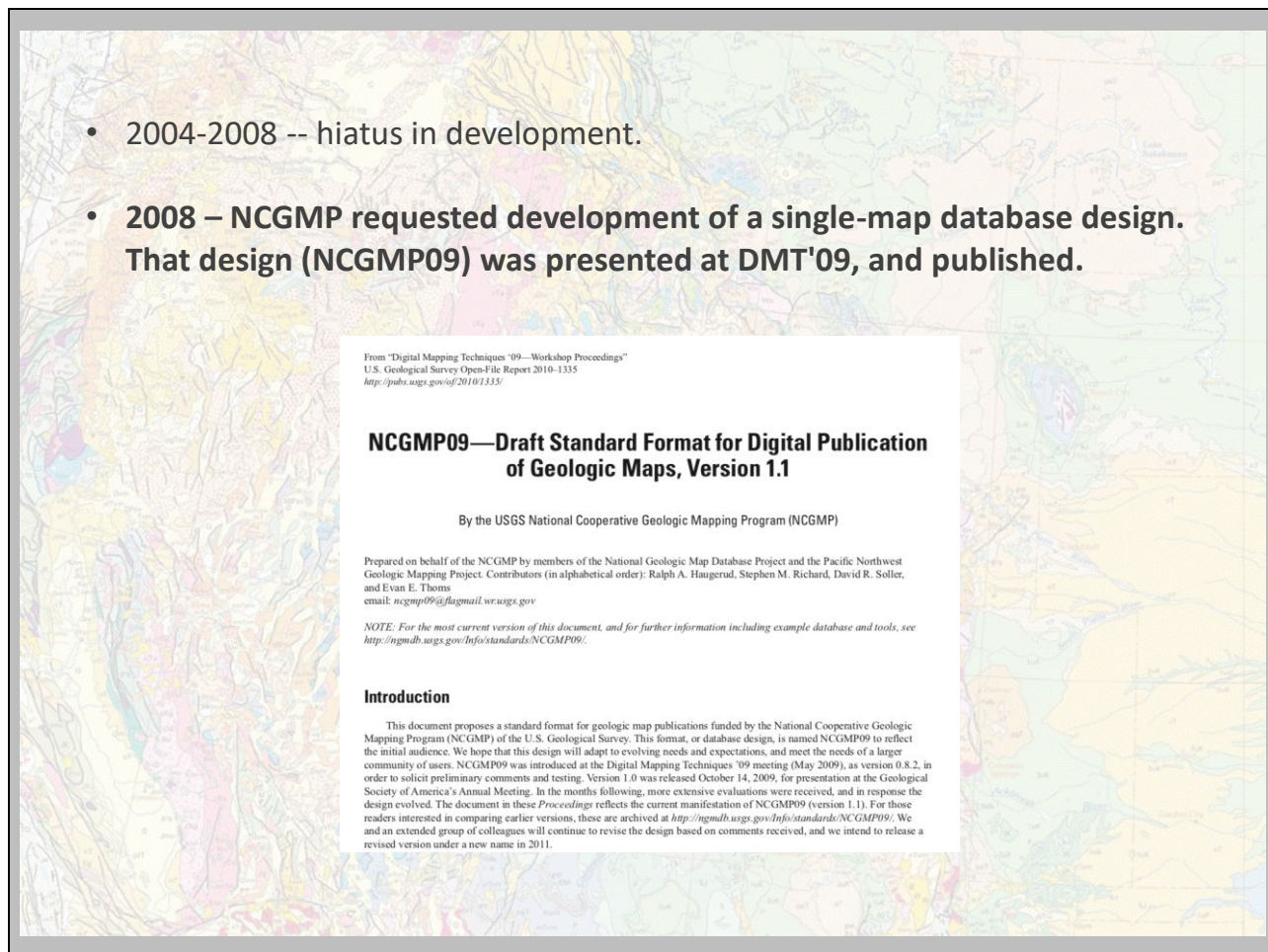
SLIDE 3
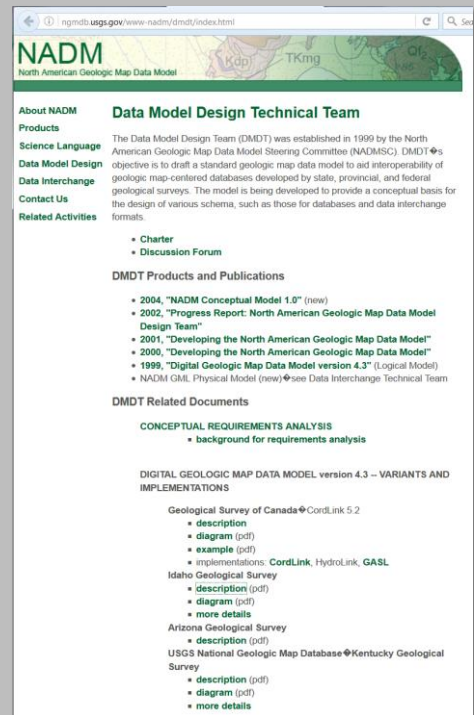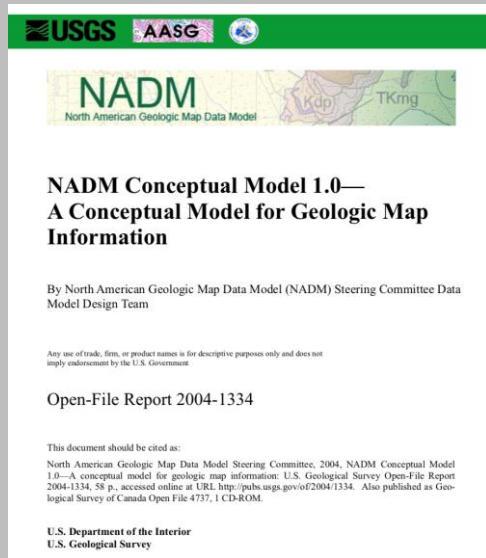
PRESENTER NOTES:
By that time (1999), in part through the Association of American State Geologists (AASG) / USGS Digital Mapping Techniques Workshops (DMT; https://ngmdb.usgs.gov/Info/dmt/), we had begun working with Canadian geologists, and formed the North American Data Model Steering Committee (NADM; https://ngmdb.usgs.gov/www-nadm/). The NADM design, published in 2004, was an evolution of the data model ver. 4.3, in the last slide. It was envisioned as a very complete, robust design that would serve many analytical needs, at the enterprise level (North American Geologic Map Data Model Steering Committee, 2004, NADM Conceptual Model 1.0—A conceptual model for geologic map information: U.S. Geological Survey Open-File Report 2004-1334, 58 p.; https://pubs.usgs.gov/of/2004/1334. Also published as Geological Survey of Canada Open File 4737, 1 CD-ROM).

SLIDE 4

- 2004-2008 -- hiatus in development.

- **2008 – NCGMP requested development of a single-map database design. That design (NCGMP09) was presented at DMT'09, and published.**

From "Digital Mapping Techniques '09—Workshop Proceedings"
U.S. Geological Survey Open-File Report 2010–1335
http://pubs.usgs.gov/of/2010/1335/

NCGMP09—Draft Standard Format for Digital Publication of Geologic Maps, Version 1.1

By the USGS National Cooperative Geologic Mapping Program (NCGMP)

Prepared on behalf of the NCGMP by members of the National Geologic Map Database Project and the Pacific Northwest Geologic Mapping Project. Contributors (in alphabetical order): Ralph A. Haugerud, Stephen M. Richard, David R. Soller, and Evan E. Thoms
email: ncgmp09@flagmail.wr.usgs.gov

NOTE: For the most current version of this document, and for further information including example database and tools, see http://ngmdb.usgs.gov/Info/standards/NCGMP09/.

Introduction

This document proposes a standard format for geologic map publications funded by the National Cooperative Geologic Mapping Program (NCGMP) of the U.S. Geological Survey. This format, or database design, is named NCGMP09 to reflect the initial audience. We hope that this design will adapt to evolving needs and expectations, and meet the needs of a larger community of users. NCGMP09 was introduced at the Digital Mapping Techniques '09 meeting (May 2009), as version 0.8.2, in order to solicit preliminary comments and testing. Version 1.0 was released October 14, 2009, for presentation at the Geological Society of America's Annual Meeting. In the months following, more extensive evaluations were received, and in response the design evolved. The document in these *Proceedings* reflects the current manifestation of NCGMP09 (version 1.1). For those readers interested in comparing earlier versions, these are archived at *http://ngmdb.usgs.gov/Info/standards/NCGMP09/.* We and an extended group of colleagues will continue to revise the design based on comments received, and we intend to release a revised version under a new name in 2011.

PRESENTER NOTES:
However, the NADM Conceptual Model 1.0 was judged to be too complex for implementation by the Nation's geological surveys at that time, and so I phased us out of this work, although continuing to fund some involvement in the GeoSciML activity (https://geosciml.org/), which was informed by the NADM design.
In 2008, Peter Lyttle (USGS), the National Cooperative Geologic Mapping Program (NCGMP) Coordinator, asked us to design a data schema that would at least address the needs of authors of individual geologic maps. Ralph Haugerud (USGS), Evan Thoms (USGS), Steve Richard (Arizona Geological Survey), and I developed this, presented it at DMT'09, and published it (USGS National Cooperative Geologic Mapping Program [NCGMP], 2010, NCGMP09—Draft standard format for digital publication of geologic maps, version 1.1, *in* Soller, D.R., ed., Digital Mapping Techniques '09—Workshop Proceedings: U.S. Geological Survey Open-File Report 2010–1335, p. 93–146, 4 appendixes;
https://pubs.usgs.gov/of/2010/1335/pdf/usgs_of2010-1335_NCGMP09.pdf).

SLIDE 5

- 2013 – based on discussions at DMT'13, a Progress Report on NCGMP09 implementation was released.

Progress Report on the evaluation and implementation of NCGMP09

Submitted to the U.S. Geological Survey (USGS) and Association of American State Geologists (AASG), by David R. Soller (Chief, National Geologic Map Database) on behalf of colleagues noted in the "Summary of Progress", below.

September 25, 2013

      The purpose of this report is to provide USGS and AASG management with a summary of progress toward adoption of NCGMP09 as a standard format for the publication of geologic maps. Background information on NCGMP09, and justification for its use and adoption is, therefore, purposely brief. It is recommended that any questions be addressed to the technical experts whose input provided the basis for this Progress Report.

PRESENTER NOTES:
There then ensued a period of evaluation by the DMT community. Four years later, at DMT in 2013, we had a long discussion about it, and compiled this Progress Report (Progress report on the evaluation and implementation of NCGMP09, submitted to the USGS and AASG September 25, 2013, 14 p.;
https://ngmdb.usgs.gov/Info/standards/GeMS/docs/NCGMP09_ProgressReport_Sept2013.pdf).
I recommend reading it, as it remains quite relevant.

SLIDE 6

- 2014-2016 – revisions to NCGMP09 were systematically debated among a large group of AASG and USGS staff.

- 2017 – Version 2 (renamed "GeMS") provisionally released.

- March 2018 – Update to GeMS version 2 posted to Web site

NOTE: As of March, 2018, this draft manuscript[1] is still provisional; however, it has passed Peer Review, and it is now being prepared for technical edit and, ultimately, for formal publication.

NOTE: For the most current version of this draft manuscript, and for further information including example database and tools, see http://ngmdb.usgs.gov/Info/standards/GeMS/

Please contact Ralph Haugerud and Dave Soller (USGS, gems@usgs.gov) with questions or comments, or to request access to the software tools.

GeMS (*Geologic Map Schema*)—a standard format for digital publication of geologic maps[1]

By the USGS National Cooperative Geologic Mapping Program (NCGMP)[2]

Contents

PRESENTER NOTES:
Following that, we went through a 4-year period of review, re-evaluation, and updates to NCGMP09, renaming it GeMS and posting it to the website for use while awaiting publication (Soller, D.R., and Haugerud, R.A., Recommendations for State and federal compliance with NCGMP's standard "Geologic Map Schema" [GeMS] for geologic map databases, with contributions from, and approval by, the NGMDB Technical Advisory Working Group, unpublished draft document dated April 5, 2019, 6 p.; https://ngmdb.usgs.gov/Info/standards/GeMS/docs/GeMSv2_draft7g_ProvisionalRelease.pdf).

SLIDE 7

- 2018-2019 – USGS Peer and editorial reviews

- 2020 – Published as a USGS Techniques and Methods Chapter

- This schema will be formally proposed as the FGDC Standard for geologic map databases.
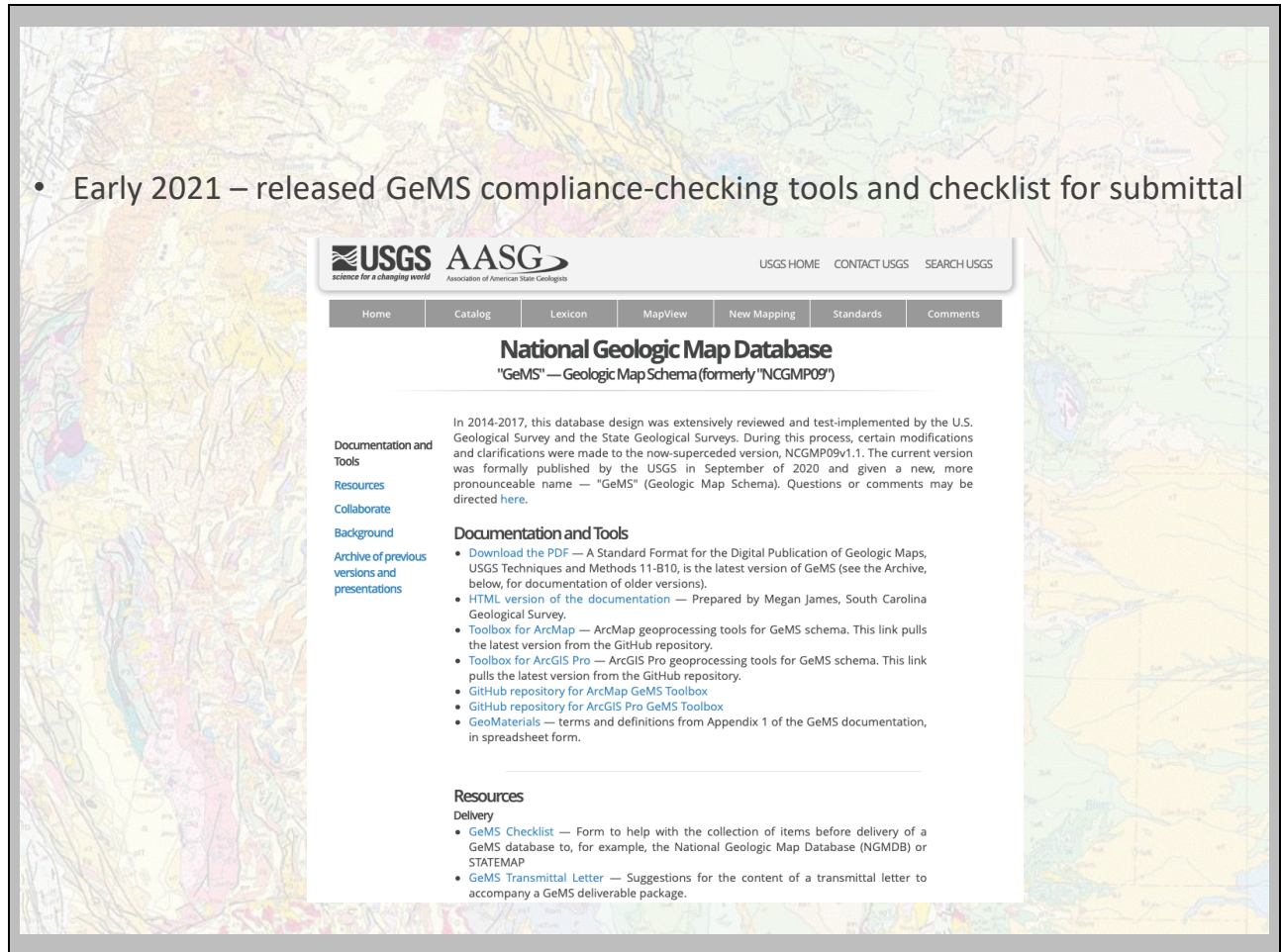
PRESENTER NOTES:
That process was completed just last Fall.
U.S. Geological Survey National Cooperative Geologic Mapping Program, 2020, GeMS (Geologic Map Schema)—A standard format for the digital publication of geologic maps: U.S. Geological Survey Techniques and Methods, Book 11, Chap. B10, 74 p.; https://doi.org/10.3133/tm11B10, https://pubs.usgs.gov/tm/11b10/tm11b10.pdf.

SLIDE 8

PRESENTER NOTES:
To support this standard, we've been working on compliance-checking tools (which you've seen at previous DMTs), and various things that are needed so we can keep track of the information as it is reposited, and then searched for and downloaded for use (https://ngmdb.usgs.gov/Info/standards/GeMS/).

SLIDE 9

PRESENTER NOTES:
For example, this compliance checklist and transmittal letter which, along with the tools, were released in January of this year.

SLIDE 10

2021 – Compliance workflow under development

This workflow will involve your agency, NCGMP, and the NGMDB.

"Administrative" and science content will be collected and used for file management in the NGMDB's Trusted Digital Repository (TDR), and for search and spatial analysis (e.g., show all maps that include "____" in the DMU).

PRESENTER NOTES:
We're now reasoning out what the workflow needs to be, for repositing, search, and use.

SLIDE 11

Next, how best to explain GeMS to our end users?

E.g., tutorials, Continuing Education Credit courses prepared in cooperation with AGI, presentations to AIPG, ASCE, etc.

Suggestions welcome!

PRESENTER NOTES:
Regarding how best to explain GeMS to our end users, your suggestions are welcome (gems@usgs.gov).

END OF PRESENTATION