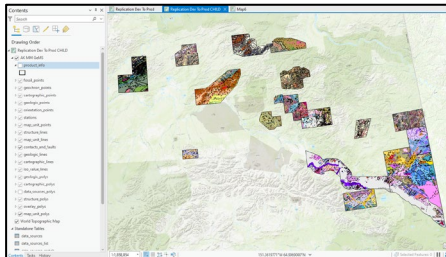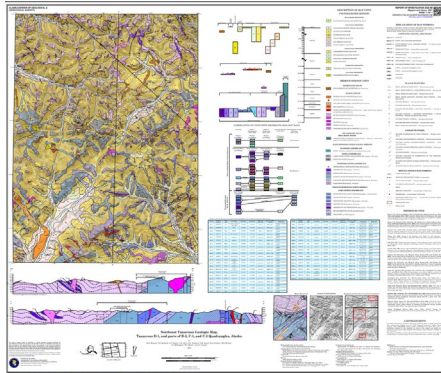# AK GeMS
Geologic Mapping System

The Alaska Division of Geological and Geophysical Surveys (DGGS) produces and publishes numerous geologic maps each year.
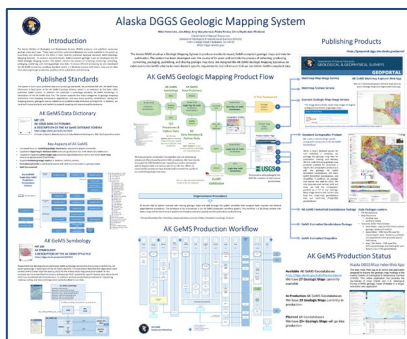
To produce standards-based geologic maps we developed the

AK DGGS Geologic Mapping System

This system controls the process of:
collecting, producing, converting, packaging, publishing, and sharing geologic map data.

Poster View of System

https://doi.org/10.14509/30864

Mike Hendricks, Jen Athey, Amy Macpherson, Pedro Rivera, Chris Wyatt, Alec Wildland, and others

Alaska Division of Geological & Geophysical Surveys
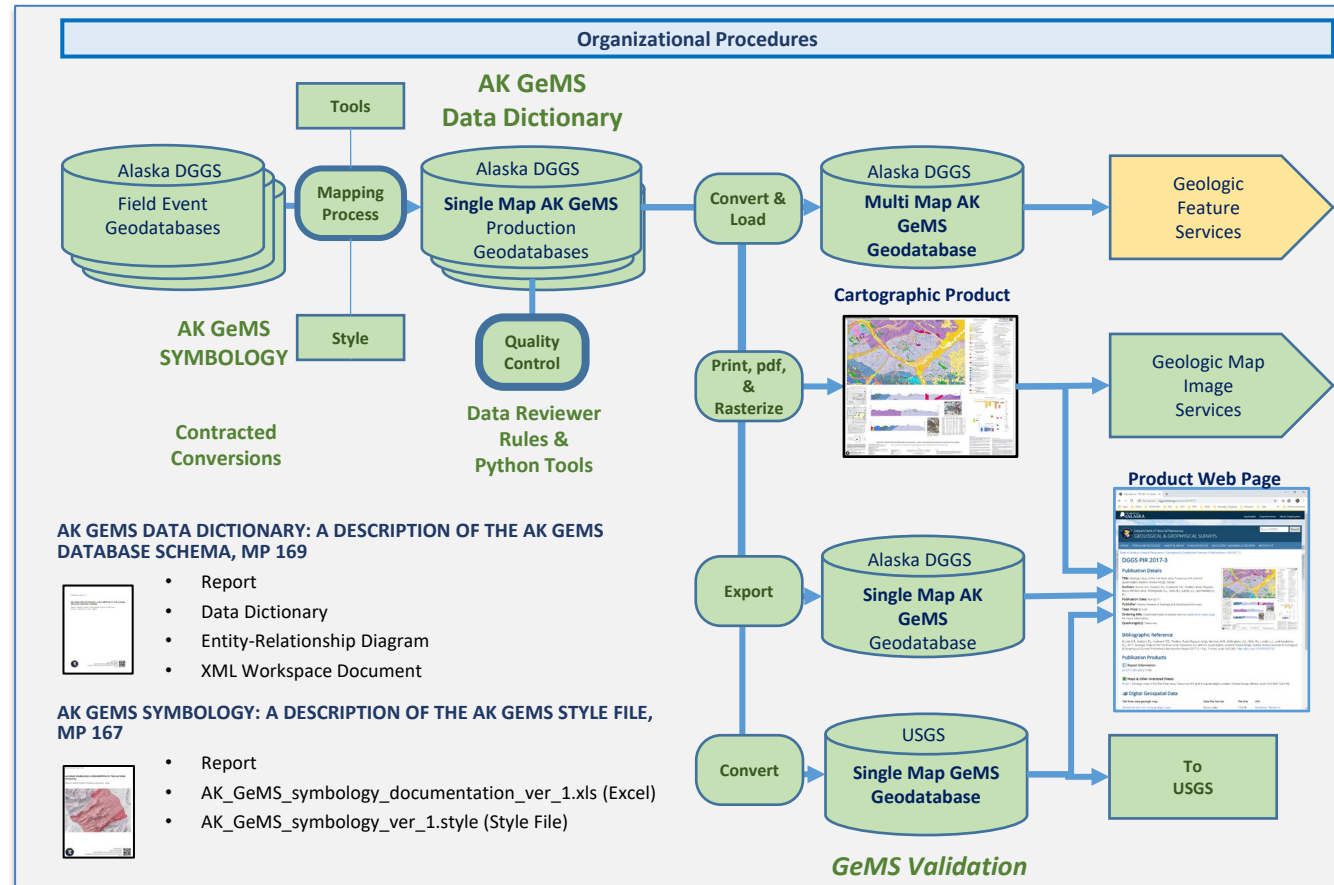**3354 College Rd, Fairbanks AK 99709**

Alaska Geospatial Council

GIS Day Celebration
Nov 14th & 15th 2022

AK GeMS
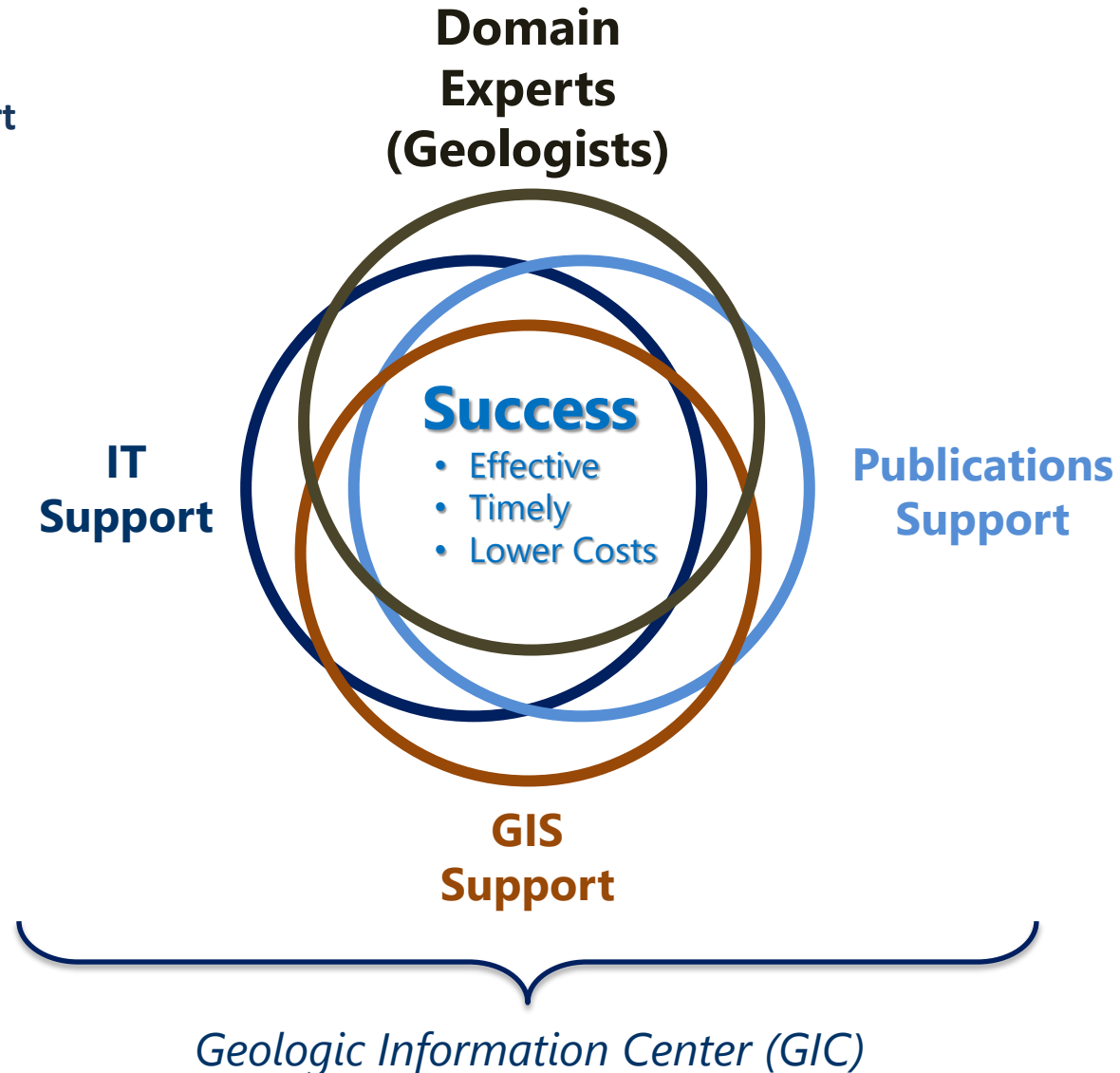# Geologic Mapping System

AK GeMS Recent Efforts

- Developed a **comprehensive AK GeMS Production Workflow** & Task List

- Developed a semi-automated **quality control process**

- Published **40+ AK GeMS Databases**

- Populating our **multi-map geodatabase** and began development of multi-map services and web apps

- Working on **Version 2.0** of Published Standards

Organizational Procedures

Tools

AK GeMS Data Dictionary

Alaska DGGS — Field Event Geodatabases

Mapping Process

Alaska DGGS — **Single Map AK GeMS Production Geodatabases**

Convert & Load

Alaska DGGS — **Multi Map AK GeMS Geodatabase**

Geologic Feature Services

AK GeMS SYMBOLOGY

Style

Quality Control

Contracted Conversions

Data Reviewer Rules & Python Tools

Cartographic Product

Print, pdf, & Rasterize

Geologic Map Image Services

Product Web Page

AK GEMS DATA DICTIONARY: A DESCRIPTION OF THE AK GEMS DATABASE SCHEMA, MP 169

- Report
- Data Dictionary
- Entity-Relationship Diagram
- XML Workspace Document

Export

Alaska DGGS — **Single Map AK GeMS** Geodatabase

AK GEMS SYMBOLOGY: A DESCRIPTION OF THE AK GEMS STYLE FILE, MP 167

- Report
- AK_GeMS_symbology_documentation_ver_1.xls (Excel)
- AK_GeMS_symbology_ver_1.style (Style File)

Convert

USGS — **Single Map GeMS Geodatabase**

To USGS

GeMS Validation

Integrated Team Is Essential!

AK GeMS Geologic Mapping System

- **Dedicated and Embedded IT support** at the Division Level is Absolutely Critical

- **Regularly scheduled coordination meetings:**
  - Weekly GEDI meetings (Geologic Data Inquiry)
  - Bi-weekly Division Publications Meetings
  - Weekly GeMS Multimap Meetings
  - Individual Product Production Status Meetings
  - Other Spin Off Meetings

- **Emphasis on Training:**
  - Weekly GIS Tips & Tricks
  - Illustrator sessions
  - ESRI Training emphasis
  - One-on-one training and support from IT, GIS, & Publications.

Domain Experts (Geologists)

IT Support

Publications Support

Success
- Effective
- Timely
- Lower Costs

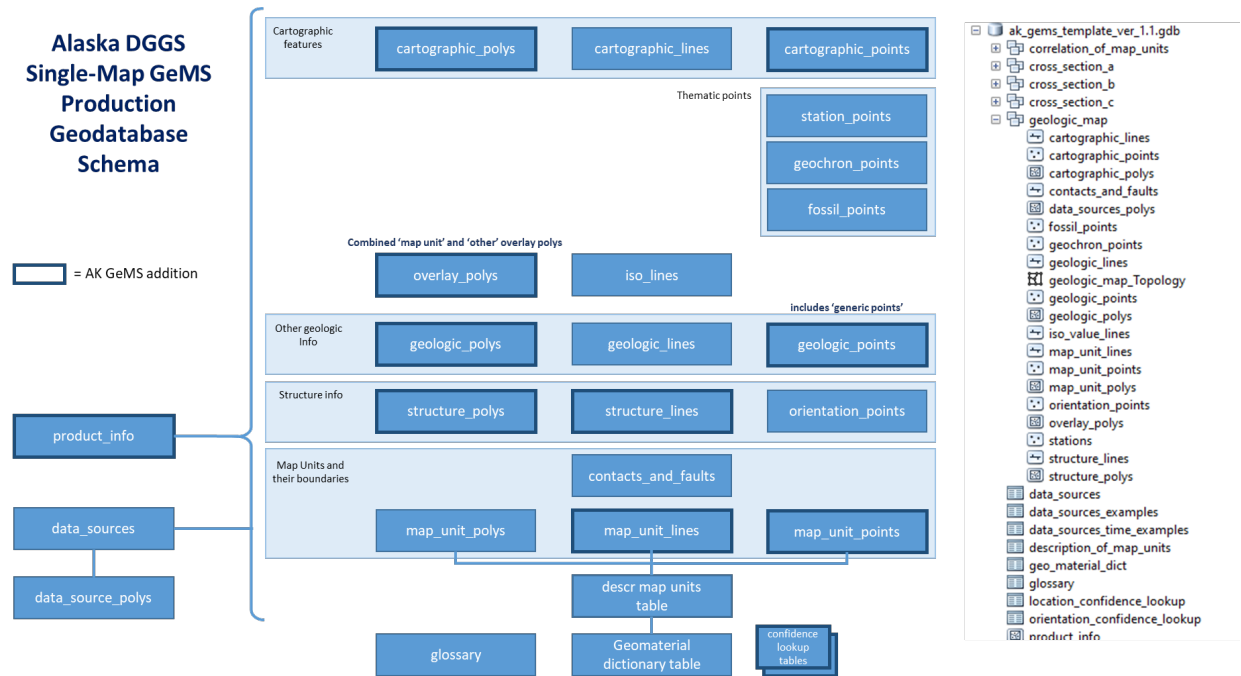**GIS Support**

Geologic Information Center (GIC)

AK GeMS Data Dictionary

Key Aspects

- Increased focus on **modeling geologic features**
- Capable of **exporting to National GeMS**.
- Capable of supporting **both single-map** geodatabases as well as the DGGS **multi-map** enterprise geodatabase (PostGreSQL).
- Support **multiple geologic layers** (i.e. bedrock, surficial, others).
- **Formalized pick lists** as attribute domains.
  - Over 75 domains
  - Over 400 controlled & defined values
- **Well Documented**.

Version 2.0 scheduled for 1 Apr 2023

AK GeMS Schema

Alaska DGGS Single-Map GeMS Production Geodatabase Schema

AK GeMS Data Dictionary: A description of the AK GeMS database schema, MP 170.
https://dggs.alaska.gov/pubs/id/30669

Example: map_unit_polys Documentation from Data Dictionary

Field	When	Who	How	Why	default value	Domain	data type
OBJECTID	on the fly	esri	calculated	software			OBJECTID
Shape	on the fly	esri	calculated	software			Geomtery
map_unit_polys_id	pub prep	pub data lead	calculated				string: 50
layer	Interpretation	geologist	calculated		0		Long Integer
category	pub prep	pub data lead	calculated			map_unit_polys_category_dom	string: 50
type	Interpretation	geologist				map_unit_polys_type_dom	string: 254
symbol	pub prep	variable	calculated				string: 254
label	pub prep	pub data lead	calculated				string: 50
map_unit	interpretation	geologist	manual				string: 10
identity_confidence	interpretation	geologist	manual			identity_confidence_dom	string: 50
is_concealed	interpretation	geologist	manual			is_concealed_dom	string: 10
modifier	interpretation	geologist	manual	allows special characteristic of a unit, withou making a new unit in the DMU		no domain, but suggested values of: hornfels, migmatite, mylonite, outcrop, shear, non, other, unspecified, unknown	
notes	interpretation	geologist	manual				string: 4096
data_sources_method	interpretation	geologist	manual			data_sources_method_dom	Long Integer
data_sources_id	interpretation	geologist	manual				string: 50
product_id	pub prep	pub data lead	calculated				string: 50
draw_policy	Interpretation	Geologist	manual	Controls if the feature is drawn on the map product	yes	draw_policy_dom	string: 10
distribution_policy	pub prep	pub data lead	manual		1	distribution_policy_dom	Long Integer

Code / Description domain tables:

Code	Description
100	map unit
997	unprovided
998	unknown
999	other

Code	Description
100	map unit, generic
101	map unit, dike
102	map unit, key bed
997	unprovided
998	unknown
999	other

Code	Description
1	certain
2	probable
3	questionable
997	unprovided
998	unknown

Code	Description
0	no
1	yes
2	thinly
998	unprovided
999	unknown

Code	Description
1	Feature unmodified from source material
2	Feature modified from source(s), primarily field mapping
3	Feature modified from source(s), primarily basemap data
4	Feature modified from source(s), primarily geophysical data
5	Feature modified from source(s)
6	New feature based primarily on field mapping
7	New feature based primarily on basemap data
8	New feature based primarily on geophysical data
9	New feature based on sources(s)
997	unprovided
998	unknown
999	other

Version 2.0 scheduled for 1 Apr 2023

AK GeMS Data Dictionary: A description of the AK GeMS database schema, MP 170.
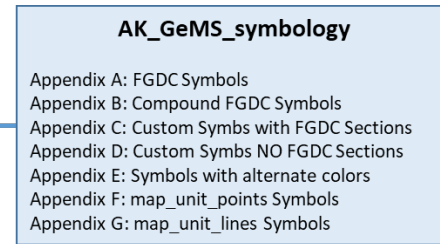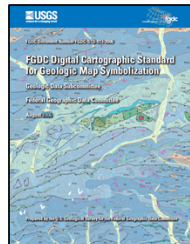**https://dggs.alaska.gov/pubs/id/30669**

5

AK GeMS Symbology

- Alaska DGGS has developed and **published a GeMS symbology standard** and accompanying **style file**

- **Describes the organization and content of the style file** used by DGGS for the Alaska GeMS map production system.

- **Established procedures** for requesting, creating, coding, and documenting **custom symbols** added to our style.

Version 2.0 scheduled for 1 Apr 2023

AK GeMS Symbology Architecture

AK GEMS SYMBOLOGY: A DESCRIPTION OF THE AK GEMS STYLE FILE, MP

- Report
- AK_GeMS_symbology_documentation_ver_1.xls (Excel)
- AK_GeMS_symbology_ver_1.style (Style File)

AK_GeMS_symbology

Appendix A: FGDC Symbols
Appendix B: Compound FGDC Symbols
Appendix C: Custom Symbs with FGDC Sections
Appendix D: Custom Symbs NO FGDC Sections
Appendix E: Symbols with alternate colors
Appendix F: map_unit_points Symbols
Appendix G: map_unit_lines Symbols

AK_GeMS_symbols_ver_1.style

.style
.stylx

1400 + FGDC
60 + custom
730 map_unit_points

AK GEMS DATA DICTIONARY: A DESCRIPTION OF THE AK GEMS DATABASE SCHEMA, MP 169

AK_GeMS_DB

Classes

Symbol field — *join* — **symbol_info Table** — Symbol Description

Type & Category fields — *join* — **glossary Table**

370+ records

AK GeMS symbology: A description of the AK GeMS style file, MP 169.
https://dggs.alaska.gov/pubs/id/30584

6

Well-defined organizational procedures are critical.

Key Aspects

- The backbone of our procedures is our **AK GeMS production workflow graphic**.

- This workflow is a **16-phase process** that takes a map and its data from pre-publication though production, quality control, publication, and archiving.

- The workflow Identifies:
  - **Order**
  - **Responsibilities**
  - **Location of data**
  - **Production meetings**
  - **Products**

AK GeMS
Production Workflow
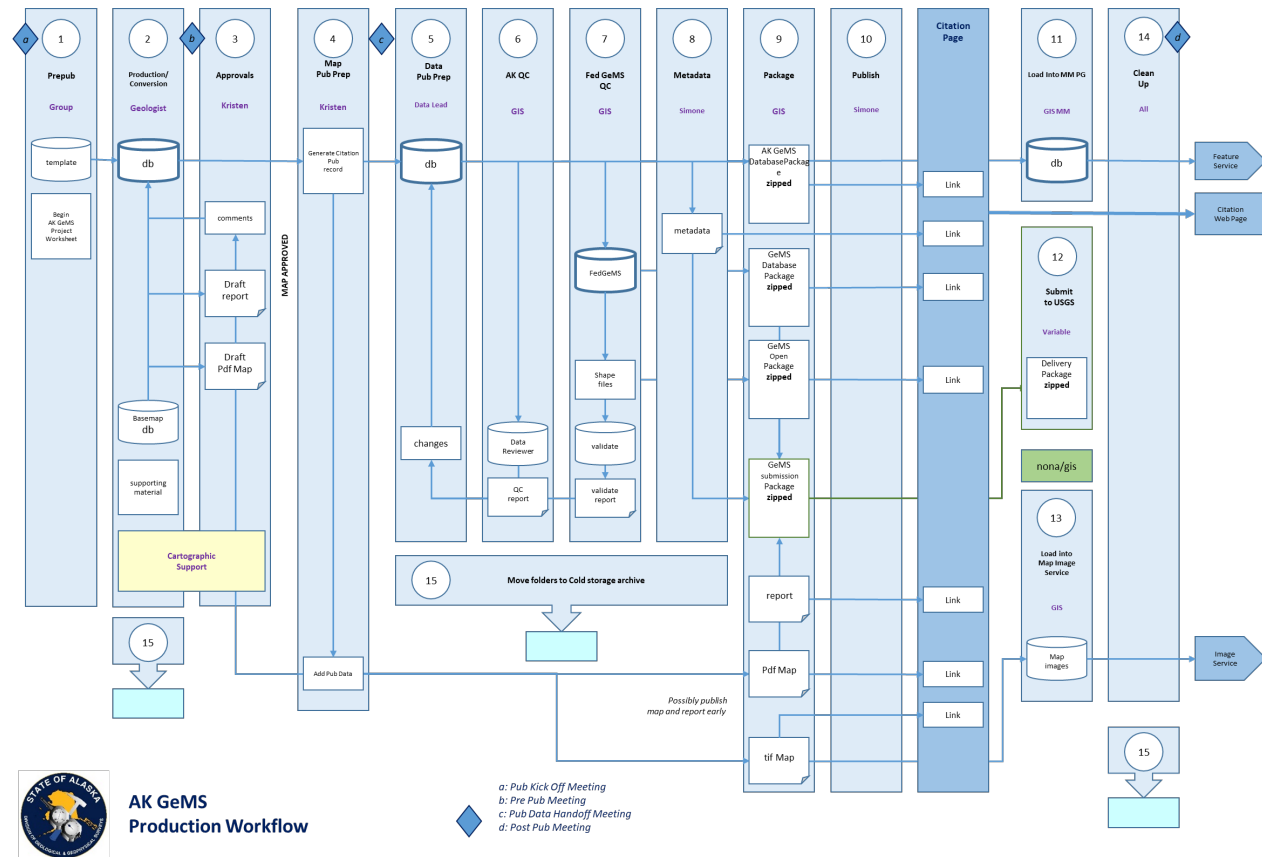
AK GeMS QA/QC focused workflow phases

QA (*don't make mistakes*)

- Phase 2: Production
- Phases 5: Data Prep

QC (*find mistakes*)

- Phase 3: Approvals
- Phases 6-7: GeMS QC

QA/QC Accomplished with:

- Data Reviewer
- Python Scripts
- Implementing Attribute Rules

AK GeMS Production Workflow

AK GeMS Production Workflow

a: Pub Kick Off Meeting
b: Pre Pub Meeting
c: Pub Data Handoff Meeting
d: Post Pub Meeting
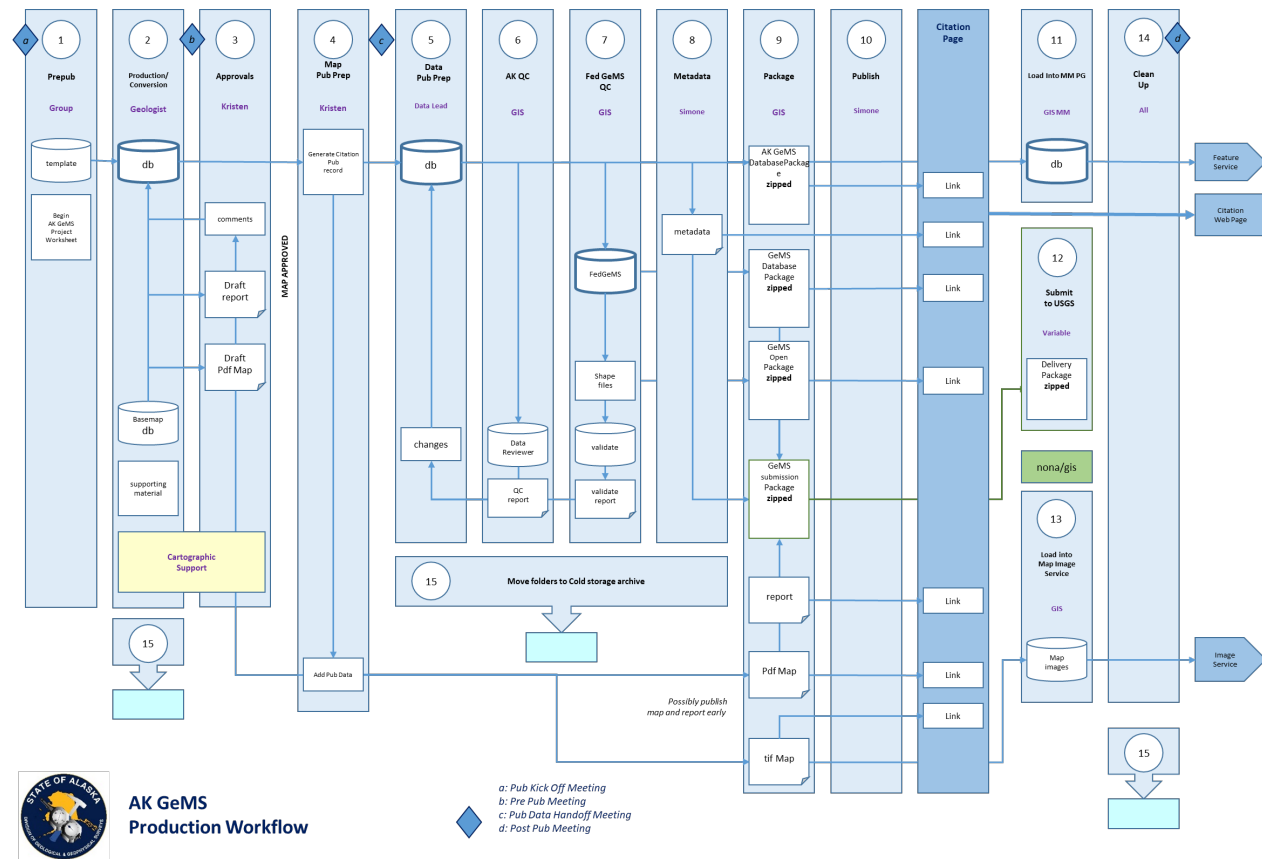
Currently leveraging ESRI advantage Program credits to leverage Tasks and upgrade data reviewer processes to ArcPro 3.0

Using
MS Teams
Planner App
to track
map production
through the
AK GeMS
Production
Workflow

Reviewed during

Weekly GEDI meetings
(***Ge****ologic **D***ata **I**nquiry*)

&

Bi-weekly Division
Publications Meetings

AK GeMS Availability

- **Available**: 43 AK GeMS Map Database currently available for download

- **In Production**: 20 Geologic Maps currently in production

- **Planned**: We have 40+ Geologic Maps will go into production this next year

- Populating our **multi-map postGreSQL geodatabase** and begun development of multi-map services and web apps.

Geologic Map Index Web App
https://maps.dggs.alaska.gov/mapindex

For additional Information & related Presentations and Publications
https://dggs.alaska.gov/pubs/project/1607