Modernizing Healthcare at the Federal Level with Open Source at the Centers for Medicare & Medicaid Services (CMS.gov)

Digital Service at CMS // September, 2022

Problem Statement

The Digital Service at CMS (DSAC)

1. **Digital Service at CMS**
2. What is Open Source
3. Open Source at CMS today
4. The future of Open Source at CMS
5. How to get involved

DIGITAL SERVICE AT CMS

Who we are

We work with dedicated civil servants at the Centers for Medicare and Medicaid Services:

Andrea Fletcher
Director,
Digital Service at CMS

Remy DeCausemaker
Open Source Lead,
Digital Service at CMS

Alberto Colón Viera,
Staff Engineer,
Office of Enterprise Data and Analytics, CMS

What we do

We work to transform the U.S. healthcare system by:

Improving the design of healthcare experiences

Delivering value to the government, healthcare providers, and patients

Modernizing systems

Participating in policy development

How we work

We achieve goals through hiring great talent. We deploy **small, responsive** groups of designers, engineers, and product managers to CMS for a "tour of duty" to work alongside **dedicated civil servants** to solve some of the largest, most complex problems facing our healthcare system. These **multidisciplinary teams** bring best practices and new approaches to support government **modernization** efforts.

Who we serve

62M

Medicare Beneficiaries

(As of 11/2021)

88M

Medicaid Beneficiaries

(As of 4/2022)

31M

Healthcare.gov Beneficiaries

(As of 6/2021)

https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMS-Fast-Facts
https://www.hhs.gov/about/news/2021/06/05/new-hhs-data-show-more-americans-than-ever-have-health-coverage-through-affordable-care-act.html
https://www.medicaid.gov/medicaid/program-information/medicaid-and-chip-enrollment-data/report-highlights/index.html

Problem Statement

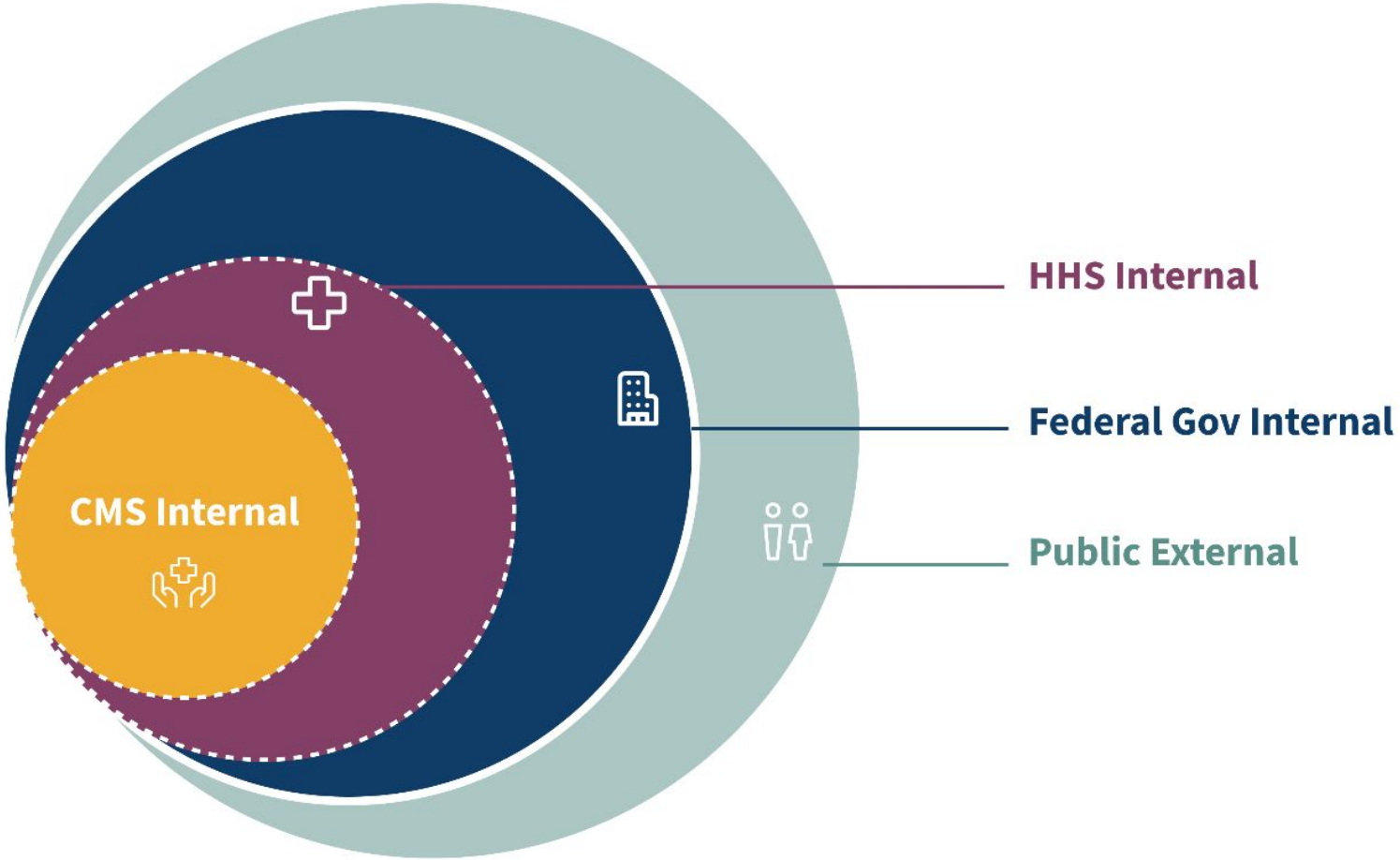
What is Open Source?

1. Digital Service at CMS
2. **What is Open Source**
3. Open Source at CMS today
4. The future of Open Source at CMS
5. How to get involved

What is Open Source Software?

Open source means source code that anyone can **inspect**, **modify**, **enhance**, and **share.**

Open Source is a Community of Communities



CMS INTERNAL: https://github.cms.gov (CMS Employee Access Only)

HHS INTERNAL: Agency Employee Access Only

Federal Gov INTERNAL: Federal Employee Access Only

Public EXTERNAL: code.gov, github.com (Public Access)

DIGITAL SERVICE AT CMS

Benefits of Open Source Software (OSS) within the CMS Environment [1]

> *“OSS provides many advantages, as demonstrated in the commercial industry and the government sector. If used thoughtfully,* ***OSS offers the potential for cost reduction, timelier delivery, and improvement of the overall capabilities of a system.*** *”*

[1]: https://www.cms.gov/tra/Content/AD_0210%20Open%20Source%20Software%20Overview.htm

Specifically, Open Source Software (OSS) can:

Offer **considerable savings** in software purchasing cost and **greater efficiency** in repurposing and enhancing existing software

Minimize vendor lock-in through open standards and **flexibility in the choice** of solutions

Enable transparency of software implementation to **support extension** of software (through supported plug-in mechanisms) while also ensuring robustness of design and implementation

Increase the productivity of application development through open standards to help achieve **interoperability across systems**

Support **open collaboration and innovation** with the open source **development community** through **free exchange of ideas and results** with the wider community

Help **keep the enterprise abreast of technology developments** and **facilitate the early adoption of emerging technology**

Myths of Open Source

Open source is ~~less~~ more secure.

"**Many eyes make any bug shallow**." The more people looking at a project, the faster we'll be able to identify problems and create solutions.

Open source is ~~bad~~ good for for-profit businesses.

By **lowering barriers to entry and costs of acquisition**, developers are given access to world-class industry leading tools and infrastructure used at the largest enterprises today.

~~Open Source means all data must be public.~~ Open Source means SOME data CAN be public.

Open source is not a binary, it is a spectrum, and there are layers to the stack. Being intentional about what we cannot share for privacy and security purposes, helps us determine what we can share more effectively.

Open by Default is something we ~~do not~~ already do in Federal Government.

According to **Title 17 U.S. Code § 101 and § 105**, "Copyright protection under this title is not available for any work of the United States Government" meaning, "work prepared by an officer or employee of the United States Government as part of that persons official duties."[1][2]

https://www.law.cornell.edu/uscode/text/17/101
https://www.law.cornell.edu/uscode/text/17/105

OSS Timeline 20+ Years of Federal Open Source Policy

DIGITAL SERVICE AT CMS

Ecosystem of APIs at CMS

CMS Blue Button 2.0

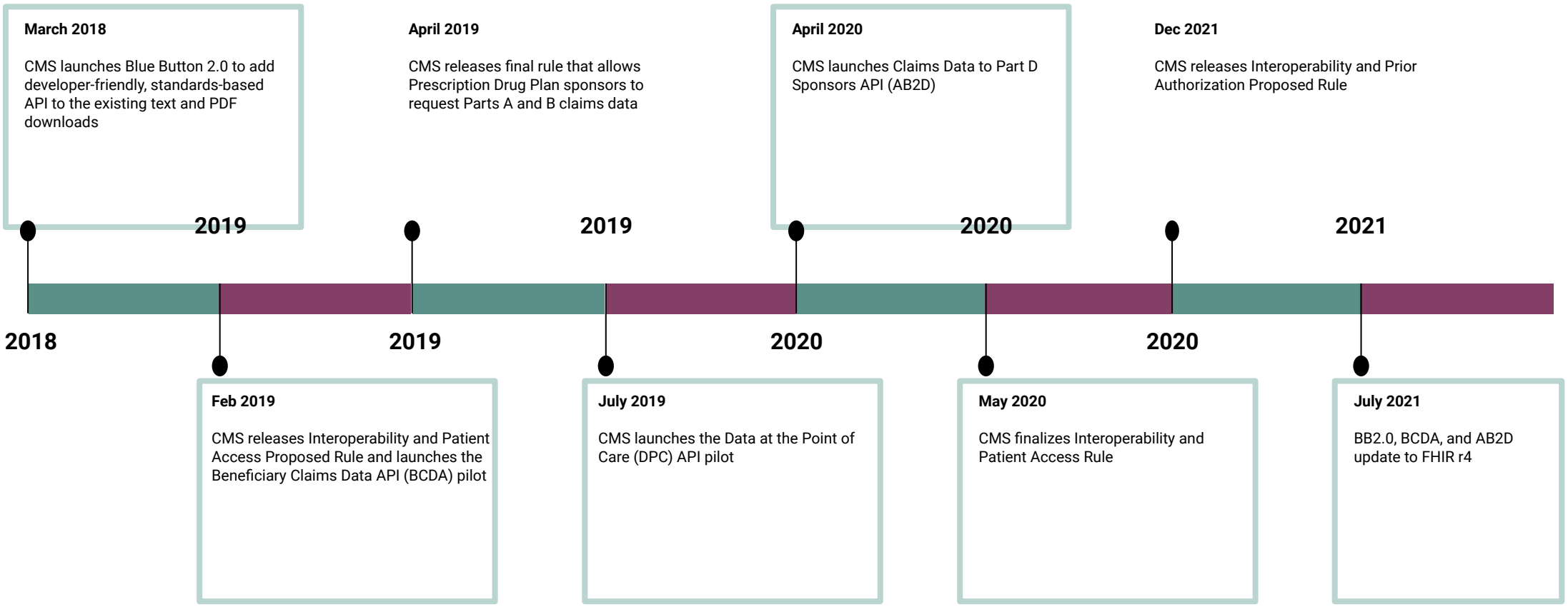
Beneficiary Claims Data API

Data at the Point of Care

AB2D

Claims Data to Part D Sponsors API

OSS-powered APIs at CMS



DIGITAL SERVICE AT CMS

Transforming Healthcare

Medicare recipients

Providers

Accountable care organizations

Insurance plans

The Big Picture

What are the *actual* Risks in Open Source

Overdifferentiation

- Unnecessarily duplicating work
- Unnecessarily dividing your resources

Examples

"Not Invented Here" Syndrome

Proliferation

- Unnecessarily duplicating communities and projects
- Unnecessarily dividing your addressable market

License Proliferation, Conference Proliferation, Event Proliferation

Fragmentation

- Unnecessarily dividing your community of contributors

Hostile Forks, Internal Forks

Problem Statement

Open source at CMS today

1. Digital Service at CMS
2. What is Open Source
3. **Open Source at CMS today**
4. The future of Open Source at CMS
5. How to get involved

DIGITAL SERVICE AT CMS

How do we ‘do’ Open Source at CMS?

Policies

How we inbound and outbound open source code and content

Projects

Open Source Projects we have released publicly

Programs

How we onboard new contributors into projects, internships, and jobs

Who We Serve

100's

source code repositories

(As of 08/2022)

1000's

open source contributors

(As of 08/2022)

1,000,000's

lines of code

(As of 08/2022)

https://github.com/orgs/CMSgov/insights?period=year

Open Source Success Metrics

Repositories

- 128 public repositories
- 18,245,248 lines of code added
- 10,575,036 lines of code removed

Pull Requests

- 8,000 pull requests created
- 7,666 pull requests merged

Issues

- 6,567 issues closed
- 88 unique submitters
- 29 assignees
- .611 days median time open

CMS Open Source Recommended Inbound Policies

Common Criteria for OSS Evaluation

Existing Products

- **Approved COTS:** Are there CMS-approved COTS products that can serve the same purpose as the OSS?

Maturity

- **Market Share:** What is the OSS's market/industry rate of adoption?
- **Credibility:** What is the position of OSS's structured bodies and organizations?
- **Documentation/Books:** Are instruction manuals comprehensive and readily available?
- **Community:** Is there an active online community behind OSS? Are there any comercial conflicts? What is the composition of the community?
- **Source Code Quality:** Does the open source project routinely use source code inspection tools to assess quality and security of the source code? Is the code well documented? Does an independent body review the code?
- **Rate of Change:** What is the rate of change of the OSS? This includes the rate of code change and the rate of new releases.
- **Bug and Vulnerability Tracking:** Is there a bug/vulnerability reporting and resolution system? How quickly are patches issued to resolve them?

Costs and Risks

- **Integration:** How well will the OSS integrate within CMS's environment? Is customization of the OSS required?
- **Talent Pool:** Does CMS have the right resources to support Development, Operations, and Maintenance for the OSS?
- **Prohibitions:** Are there CMS or federal security policies that prohibit the use of the OSS? Does the OSS product allow implementation of CMS or federal security requirements?
- **Professional Services Availability:** Is there third-party vendor support to install, configure, customize, integrate, operate, and maintain the OSS?
- **Cost Comparison:** What is the cost of using and maintaining the OSS compared to a COTS solution?

Licensing

- **Licensing Model:** Does the copyright license associated with the OSS have restrictions limiting the redistribution of software code or restrictions on merging with proprietary code that are unreasonable for CMS?

CMS Open Source Recommended Outbound Policies

RP-OSS-1

Provide Ample Documentation with CMS-Release OSS Code

For a CMS-managed repository, the project team should include ample documentation with the software code for increased adoption and modification by the community. The documentation should provide the information on the project's mission, philosophy, goal, design, decision-making process and product roadmap. It should also provide instructions on how to submit issues, feature requests and how to contribute towards fixes or enhancements.

RP-OSS-2

Implement the Tools to Support the Community Around a CMS-Released OSS Project

Implement some or all of the following tools to support the community around an open source project:

- Mailing lists
- Message forums
- Version control
- Wiki
- Tracking mechanisms, such as Kanban boards

GitHub now includes a Kanban board for planning each project, thereby allowing development teams to create a development roadmap. Project teams should use Github Kanban or another Kanban tool, such as Trello to publicly display development

CMS Open Source Recommended Policies

Industry Best Practices

Follow or adopt a **decentralized goverance** model.

Define the team constituents, their decision-making authority **and their roles** to support the project in the open source community.

Define and **staff the roles** for active user engagement, product roadmap development, and for accepting new contributions via pull-requests.

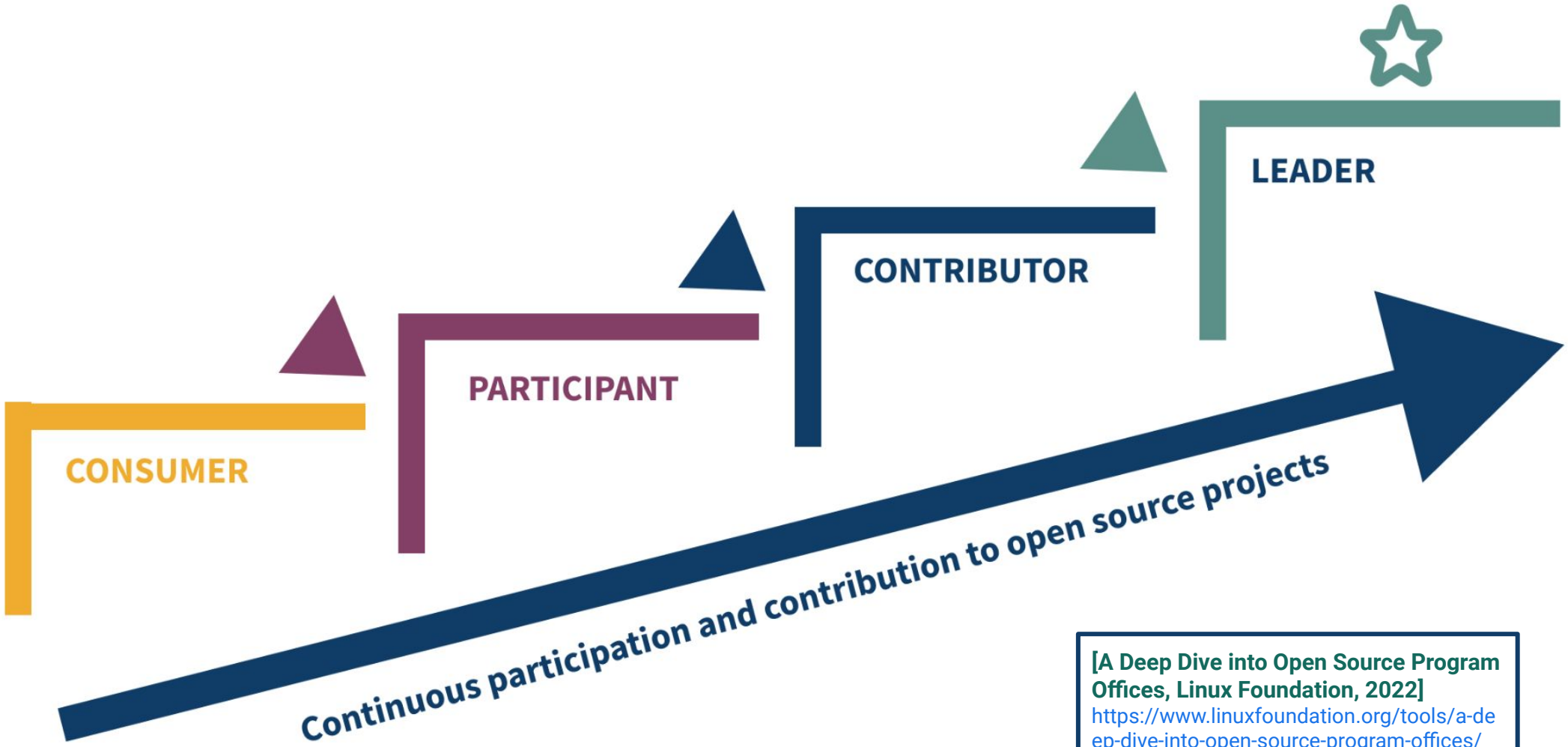
Identify and **promote active contributors to committer status** based on the quality and quantity of code contributions and involvement in day-to-day discussions.

Problem Statement

The Future of Open Source at CMS

1. Digital Service at CMS
2. What is Open Source
3. Open Source at CMS today
4. **The future of Open Source at CMS**
5. How to get involved

The Four Core Stages of Open Source Strategy



[A Deep Dive into Open Source Program Offices, Linux Foundation, 2022]
https://www.linuxfoundation.org/tools/a-deep-dive-into-open-source-program-offices/

DIGITAL SERVICE AT CMS

Challenges Open Source Program Offices Face

Open source programs face many challenges including **culture**, **process**, **tools**, **continuity**, and **education**.

How will CMS Open Source Programs address Challenges?

Education	Tools	Policy & Process	Communication	Continuity
Guidance on Agency policy	Source code scanning	Usage & compliance policy (distribution, auditing, notices, usage)	**Internal portal (educational)**	**Succession planning**
Guidelines & best practices	**CommArch analysis**		**External portal (project visibility, recruiting, developer comms)**	**Governance models**
Guidance on open source licenses	**Repository analysis & metrics**	**Upstream contribution policy**		Incident reponse & protocol
New employee orientation	Security vulnerability analysis	**Bug bounty & disclosure Policy**	Data sharing & visualization	Internal communities
Checklist for outbound repos	Software bill of materials (SBOM)	**Code of conduct & incident policy**	**Conferences & public speaking**	External communities
Checklist for inbound deps	**Repository linters & templates**		Mailing lists (internal/External)	**Onboarding documentation**
Checklist for OSS procurement	IP evauation tooling			**Automation of manual workflows**
Coaching and mentorship guide	**SW inventory management**			Hackathons & contributor events
Professional developer training	Project management			

Aspirational Roadmap/Timeline

DIGITAL SERVICE AT CMS

Problem Statement

How to get involved

1. **Digital Service**

2. **Digital Corps**

3. **CodingItForward**

4. **Hacktoberfest**

Join us at the Digital Service!

Digital Service at CMS.gov DIGITAL SERVICE AT CMS	4 year tour of duty for established professionals in Engineering, Product management, Design, and Data science. GS-13+	https://cms.gov/digital-service-cms
Digital Corps at GSA.gov UNITED STATES DIGITAL CORPS	2 year tour of duty fellowship for **early-career** technologists. Successful fellows at the completion of the program are eligible to convert to full-time, career positions in the competitive service at their agency. GS-9 to 12, + 50% recruitment Incentive	https://digitalcorps.gsa.gov
Civic Digital Fellowship and Civic Innovation Corps at CodingItForward.com CIVIC DIGITAL FELLOWSHIP	Paid 10 week **summer internship** program for currently enrolled undergrad, grad, and bootcamp students or recent graduates.	https://www.codingitforward.com

DIGITAL SERVICE AT CMS

Questions or comments?

Andrea Fletcher, Director

andrea.fletcher2@cms.hhs.gov

Remy DeCausemaker, Open Source Lead

jeremy.decausemaker@cms.hhs.gov

Digital Service, General Questions

DigitalService@cms.hhs.gov

Answer the Call!

Digital Service at CMS.gov
https://cms.gov/digital-service-cms

DigitalCorps Fellowships
https://digitalcorps.gsa.gov

CodingItForward Summer Internships
https://codingitforward.com