Open Civic

Architectural Framework

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Introductions

I am Heather Crondahl, Co-CEO and Chief Architect of the **Open Civic Foundation**, and Co-Chair of the **Open Civic Standards Domain Special Interest Group** under OMG.

The Open Civic Foundation (OCF) is a non-profit for the development, management and redistribution of assets from the Open Civic Architectural Framework (OCAF) and digital ecosystem to communities and civic projects to better civic services and constituent quality of life.

What is OCF's mission?

To realign technology with civic outcomes.

Definitions

Architecture: The fundamental organization of a system embodied in its components, their relationship to each other, and to the environment, and the principles guiding its design and evolution [IEEE 1471, 2000].

Architecture Framework: An architecture framework provides guidance and rules for structuring, classifying, and organizing architectures [DoDAF, 2007].

Architecture as Code: Architecture as code is about patterns. ... A centralized function, like enterprise architecture, can create a pattern library that contains authoritative, hardened, tuned application topologies [(application requirements and infrastructure capabilities)] that are secure by design [CIO.com, 2016].

What is a reference architecture?

Reference Architectures capture knowledge from existing architectures. Based on an elaboration of mission, vision, strategy, and on customer needs, the Reference Architecture is transformed into an architecture that provides guidance to multiple organizations that evolve or create new architectures [Cloutier et al., 2016].

Conceptualizing OCAF

Within the time period outlined below, I learned that most government information systems (including infrastructure) are procured and designed around domain specific implementations (health, education, labor, etc.). This is fine from an application perspective, but not from an infrastructure perspective.

You could liken this approach to running a separate bus system for every demographic of people in a city. It's economically infeasible and causing unmanageable technology bloat for government entities. Infrastructure code must be separated from application code for the implementation of sustainable civic services.

- **2018 to 2020:** Technology architect for the State of Alaska, Office of Management and Budget – Reviewed Information Technology capital budget requests to find architectural inefficiencies:
  - Health Information Exchanges;
  - Statewide Longitudinal Data Systems; and
  - All data interoperability projects.
- **2014 to 2018:** State of Alaska, Office of Management and Budget - Proposed and led efforts to develop a data and digital asset management program for the State; advanced data integration and digital transformation readiness; developed the Alaska Budget Visualizer.

Barriers in Civic Service Delivery

- Proprietary system lock-in

- Procurement and contract management failure

- Duplicative infrastructure and systems integration failure

- Noncomprehensive cybersecurity

- Unstandardized and siloed data

- Loss of data rights and loss of privacy

- Unclear strategy resulting in unfocused, ineffective governance

- Technology bloat and increased IT management costs

- Minimal opportunity for civic engagement

- Antiquated civic service delivery methods

- Maintenance vs modernization disruptions

Civic Service Delivery, Digital Systems Transformation and Supply Chain Management

Our current problems with data interoperability, access, security/privacy and equity are supply chain management issues.

Decomposing an Information System into Commodity Components

Breaking information systems into functional components allows standardization. Standardization (lack of differentiation in an asset) creates commodity components that can be reused to create an unlimited number of applications and civic services. Digital commodities are the assets that fuel the OCAF ecosystem.

Monolithic
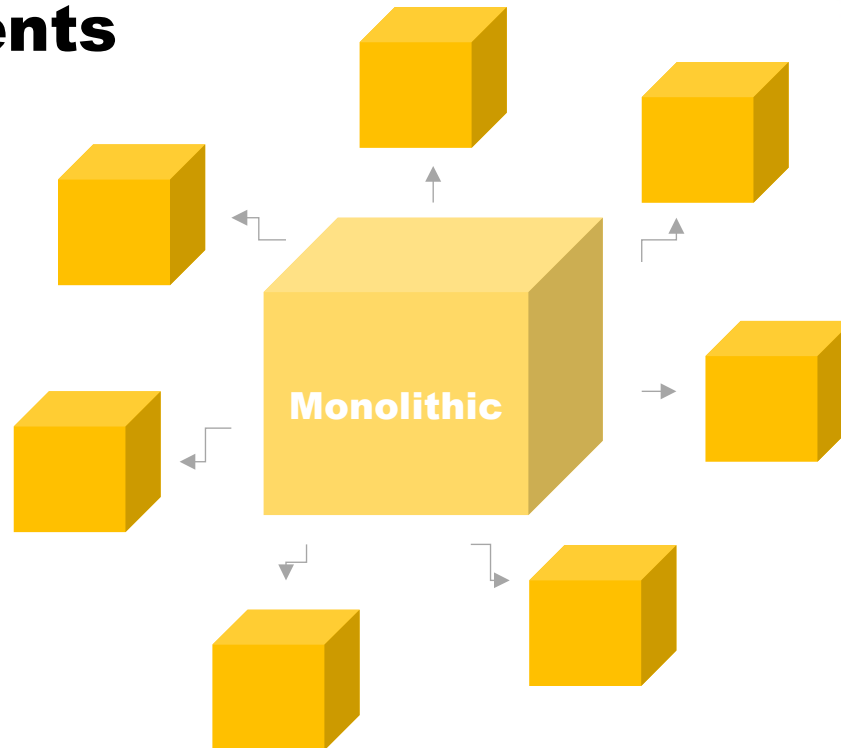
Commodity Components

Commodity components include but are not limited to:

- Standardized and master data
- Ontologies, taxonomies, common vocabularies
- Business rules, processes, decision and case management
- Application programming interfaces
- Microservices
- Configuration management services
- Business modeling services
- Data classification services

Modular Open System Approach

Principles of MOSA

· **Establish an enabling environment -** The OCAF ecosystem will provide a sustainable business model, open government enterprise architecture, implementation guidance (business, technical, governance and procurement), standardized Application Programming Interface (API) and software development kit.

· **Employ modular design** – OCAF defines 5 architectural domains. Each domain represents a focus area of functional decomposition within an information system. An example of this is business rules, processes, decision and case management within the Business domain.

· **Designate key interfaces** – OCAF defines a standardized API layer over the top of each domain. The APIs are based on standards such as DMN, CMMN, BPMN. APIs are mapped to distributed microservices to provide functionality.

· **Use open standards** – OCAF proposes the use of the following standards: Data Distribution Service, Distributed Immutable Data Objects, Business Process Model and Notation, etc. (BPMN, CMMN and DMN), Value Delivery Modeling Language, Modular Open Systems Approach (MOSA).

· **Certify conformance** – The OCAF ecosystem includes organizations that will certify an API or microservice against vertical and horizontal standards, as well as providing certification of people through the

§2446a. Requirement for modular open system approach in major defense acquisition programs

A major defense acquisition program that receives Milestone A or Milestone B approval after January 1, 2019, shall be designed and developed, to the maximum extent practicable, with a modular open system approach to enable incremental development and enhance competition, innovation, and interoperability. Other defense acquisition programs shall also be designed and developed, to the maximum extent practicable, with a modular open system approach to **enable incremental development** and **enhance competition, innovation**, and **interoperability** [US Code, 2021].

Business Rules, Process, Decision and Case Management (BRPDCM)

Given the ever-changing nature of BRPDCM, it makes sense to decouple these concerns from the application layer:

· Business rules and processes are ever changing and represent a significant cost center within information system design and maintenance.
· Government business rules and processes are subject to changes brought about by statute, federal regulation, administrative code, policy and procedure, and lawsuits.

BRPDCM should provide the ability for business analysts to:
· Record business rules and process groups;
· Define the processes and decision points necessary to automate workflows; and
· Provide case management.
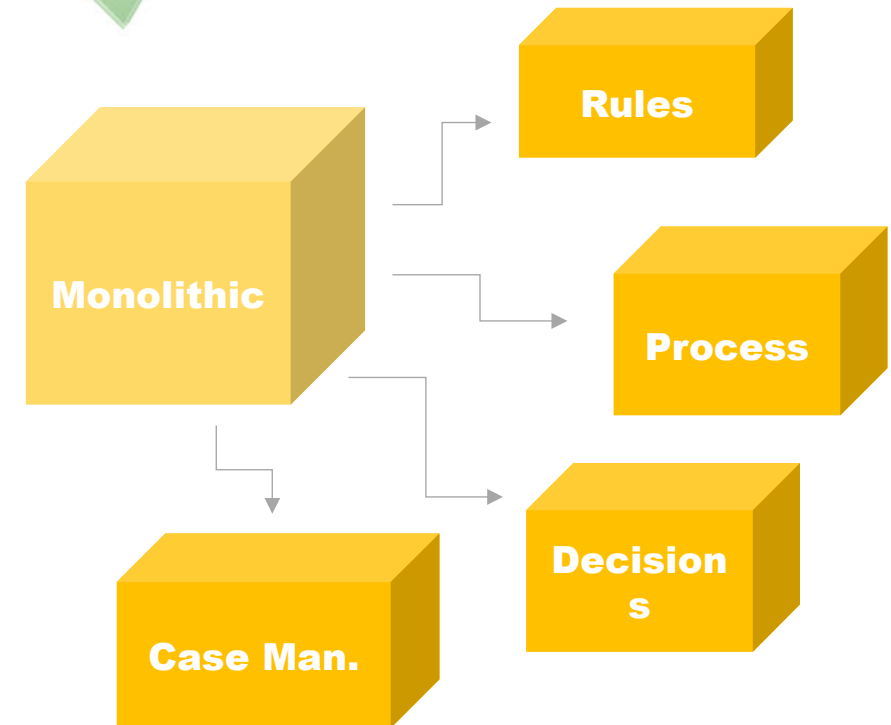
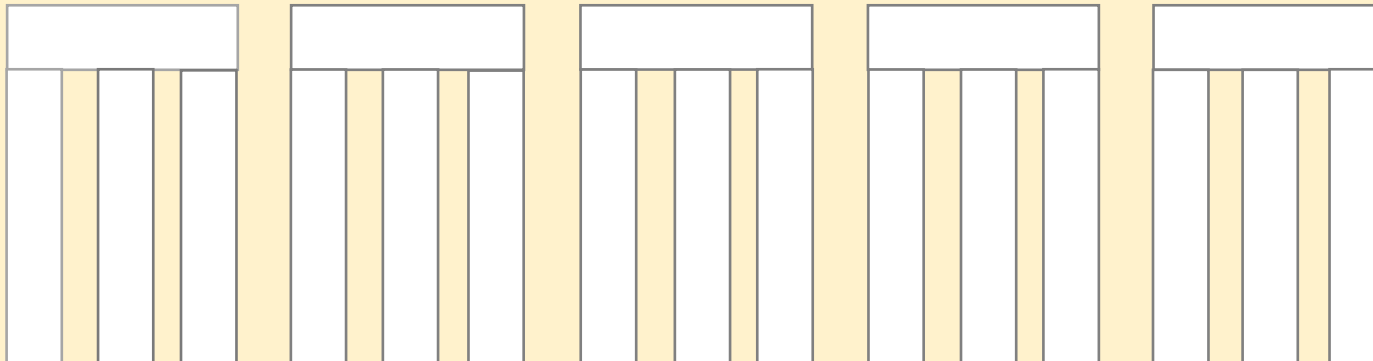# OCAF Reference Architecture

Mission, Vision, Values
Problem Statement
Views and Viewpoints
Solution Overview

Architectural Pattern and Domains

System Architecture Pattern

Horizontal and Vertical Standards

Horizontal standards are the OCAF standards that apply to most open government civic services. An example of a horizontal standard in the OCAF reference architecture is the Modular Open Systems Approach (MOSA).

Vertical standards apply to specific abstract system operations such as business rules, processes, decision and case management.

A sample of vertical standards include:

- Data Distribution Service
- Distributed Immutable Data Objects
- Business Process Model and Notation, etc. (BPMN, CMMN and DMN)
- Value Delivery Modeling Language