Modern Application Playbook (Beta)

Citizen Services' OCIO-ES IMB

July 15,2020

Contents

Modern Application Playbook (BETA)

This playbook is designed to help you on your IT project journey, and to navigate the development and support of government applications within the Agile framework. It provides you with a collection of references, tools, and best practices.

What Does It Do?

It contributes to a shared understanding of the solution ecosystem, from ideation to operation and maintenance. “Plays” describe valuable patterns that project teams should consider as part of their modern digital product management lifecycle.

What Are the Benefits?

This playbook provides the IMB and our partners, vendors, and clients with key resources that will help them identify, use, and leverage trustworthy sources of knowledge that are regularly improved with the aim of enhancing and simplifying the IT solution delivery experience.

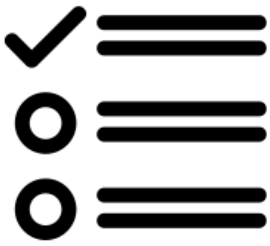
The Plays…

1: Ideate Solutions That Meet the Needs of Business

The business knows its users; it owns the problem space. Apply design thinking to new product development to create high value solutions that users want to adopt.

2: Successfully Navigate the Project Intake Process

Having a clear understanding of the IM/IT project governance process will ensure that your proposal obtains the necessary approvals in order to proceed.



3: Building Your Team

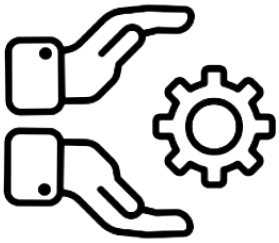
Develop your team's capacity to deliver modern digital solutions by enhancing your existing skillset through exposure to experienced people.

4: Ready, Refine, Sprint

This play contains methodologies and frameworks that you can follow to develop working Minimum Viable Product (MVP) solutions.

5: Transition to Operations

Following product development and deployment, a decision is made concerning the product's lifecycle. A knowledge transfer from the development team to the operations team is realized.



6: Continuous Product Improvement

In this play, a team is responsible for a continuous cycle of product enhancement and ongoing support, based on incorporating user feedback and operational metrics provided by monitoring.

7: Sustainment Lifecycle

Your product has been delivered with a roadmap that guides its lifecycle.

Review annual funding plans to account for any and all changes, including product retirement and product replacement.

Definition of a Modern Application

A modern application is one that exhibits five important characteristics:

1. It supports multiple users through the interface of their choice
    - Web, Mobile, API (application programming interface)
2. It provides an API for accessing data over HTTP(S) for all features that would normally be available over a graphical user interface (GUI) or the command line interface (CLI)
3. Its data is available via generic formats (such as JSON or XML)
4. It is built on a modern stack that supports the creation of an application with an HTTP interface and an API which can consume and emit JSON data
5. It conforms to the relevant elements of a 12-factor application

Play 1

Ideate Solutions That Meet the Needs of Business

We must begin digital projects by developing solutions for the people who will use them. Users are often, but not always, employees of the Ministry. Staff who interact with users on a regular basis are an untapped source of information. Creating an environment that promotes participation will strengthen the business unit mandate and contribute to its future success. The ideation process is less about what the product will look like, and more about who it is for, how it works, and why.

Step 1: Promote Innovation From Within

- Understand Your Business Mandate
    - Focus on business challenges
    - Invite your staff to contribute ideas
    - Formulate problem statements to guide conversations
    - Be specific, in order to create a sense of urgency
- Understand Your User's Needs
    - Regularly review your product portfolio with users
    - Update your feature roadmaps to reflect their needs
    - Invite suggestions on what would enhance the way they work
    - Can end users interact with the existing system using multiple channels? What is their experience?
- Park Bias
    - Negativity eats ideation for breakfast. Be open minded. Don't prejudge what others say
- Encourage Creativity
    - A diverse workplace brings with it a wide range of experience. Engage an external facilitator to surface discussions
    - Amplify soft voices. They will bring unique insights that often get overlooked. Failing to do so may lead to a disengaged workforce
- Collaborate
    - Time box activities. Circulate proposals. Encourage additions
    - Require a short submission that describes objectives and benefits. Estimate effort to develop and implement. Include a risk assessment
- Visualize
    - A diagram helps to communicate
    - Develop from the end user's perspective
- The More the Better
    - Develop as many ideas as possible around a theme

    - Elements of any one idea may be incorporated into another idea thereby promoting more discussion
- Submit for Peer Review
    - Your colleagues bring a diverse lens based on their unique insight

Step 2: Engage Your Stakeholders

- Develop & test prototypes
    - Describe the user's journey and interaction with the solution
    - Develop wireframes
    - Solicit feedback. Document attributes (goals, needs, behaviours, preferences).
- Evolve scenarios and user stories that speak to a set of defined personas
    - Invite stakeholders to review and prioritize
    - Avoid over-solutioning how to accomplish the idea
    - Do your research. Are your assumptions complete?

Step 3: Present Your Proposal

- Do your homework. What would be required to go from ideation to project inception?
- Develop the product roadmap
- Seek approval to proceed
- Become a business priority

Resources

Thoughtworks.com provides valuable insight into organizational future proofing in an era of constant change by promoting the concept of validated learning.

Interaction-design.org identifies strategies towards reducing potential barriers of innovation.

The BC Government Service Design Playbook provides resources, methods, and templates to guide new service development. Ideo.org and Sourcemaking.com both provide additional toolkits and sources of useful information.

The Canadian and US federal governments detail a series of digital plays in their playbooks. Both the Government of Canada Digital Playbook "design with users" section, and plays 1, 2, and 3 from the US Digital Service provide useful questions to ask during ideation.

Guidance to Consider

- Research
    - Develop a fulsome understanding of the problem and the intended audience. Understand the solution context and dependencies
    - Follow the BC User Research Guide

- Engagement
    - Solicit responses via surveys and workshops in order to provide data to guide the ideation process

Play 2

Successfully Navigate the Project Intake Process

To improve the delivery of successful IM/IT services that meet Ministry goals and objectives, business units work with experienced senior business consultants. Following the Ministry IM/IT Governance process ensures that project proposals, which have been championed by a Ministry business unit, will obtain funding and approvals for strategically important initiatives.

Step 1: Obtain Business Unit Endorsement

- Follow your business unit's project authorization process
    - Create a Concept Case / Business Case
    - Receive approval to proceed
    - The business unit's analyst works closely with the Project Secretariat Senior Business Consultant (SBC) and holds biweekly meetings to surface initiatives and concerns
    - Register proposal in the Ministry project tracking system
- Develop your operating model
    - What does it mean to be "done"?
    - Who will maintain and operate the solution?
    - What is the sustainment lifecycle for the product?

Step 2: Follow the Ministry IM/IT Project Intake Process

- Submit a project intake form
    - The IM/IT Project Coordinator works with the SBC to ensure the submission receives visibility
    - Provide project summary information
    - Complete a client project survey in order to rank the submission
- Provide resources to participate at the Architecture Review Board(ARB)
    - The ARB assesses the submission to determine technical fit with Government CIO / Ministry CIO direction
    - The Project Review Board (PRAB) conducts a project review
        - Upon approval to proceed, a project charter will be required
        - Project submission will be made to the OCIO-Digital Investment Office and authorized by the Deputy Minister Committee

Step 3: Determine Project Resourcing

- For an internally managed initiative:

    - The business unit has the skillset and resources to successfully manage and deliver the project
    - The business unit enters a procurement activity to obtain an IM/IT solution via a Request For Proposal (RFP) process.
- For a partnership agreement
    - The business unit enters into an Alliance agreement with the BCDevExchange and OCIO-Digital Products Division (DPDD) to design and develop a solution *-or-*
    - The business unit enters into a "Memorandum of Understanding" (MOU) with the IMB to co-develop and deliver an IM/IT solution
        - Incorporate a transition plan section into your MOU
        - Formulate a common understanding of the "definition of done"
    - **NOTE:** It takes time to resource additional skills (often as long as 6 months), so plan accordingly in your transition plan *-or-*
    - Draw down on Ministry contract for an external vendor via the IMB's Request for Service (RFS) process

Step 4: Provide Regular Updates

- This is based upon the reporting requirement
    - IM/IT capital = quarterly
    - Project reporting = monthly
- Working with the Secretariat Portfolio Manager / Project Analyst, provide regular status updates to Ministry executives

Resources

The CITZ IMB maintains a collection of templates and information in their Project Management Resource Centre. Gaurav Mehra provides insight into common challenges encountered in Agile intake processes in this article.

Guidance to Consider

- Understand the Work Intake Process
- The Architecture Review Board should be aware of your project and may ask you to provide a presentation
- Understand why Governance is important
- Adhere to Government IM/IT Principles and Standards

Play 3

Building Your Team

Project success is never guaranteed. Determine your approach to product development in order to correctly fit your resource needs. Develop your team's capacity to deliver modern digital solutions by enhancing your existing skillset through exposure to experienced people either using temporary assignments, contractors, or co-ops. Once you have your team come to a common understanding of the culture you wish to promote, then entrust design and development to the team which you have empowered.

Have a design system that establishes your product framework, is based on your priorities, and complies with government standards.

Step 1: Go Agile; Don't Repeat the Old Ways

- Select Agile when:
  - The intended solution is large
  - The solution can be a collection of many different projects
  - Working within a Time & Materials contract
  - Requirements are expected to change over time
  - Product Owners are embedded in a team and prepare requirements daily
  - Projects do not have a Project Manager as all team members co-manage the project
  - Developers have cross-functional skills
- Reject the "old ways" (aka: Waterfall) because:
  - The intended solution will be large and has a higher risk for failure
  - Requirements are expected to change over time
  - Many Waterfall projects are abandoned and do not meet user expectations when finally completed

Step 2: Augment Your Team With Experience

- Identify the roles your project needs
  - Build up your team's capacity by bringing in resources that are seasoned professionals
  - Work with the procurement team to understand how to evaluate proposals
  - Provide existing staff with opportunities to pair up with contractors to build more internal capability
  - Identify the product/project owner
  - Include a Security and Privacy Officer in your team

- Consider the Sprint with Us and Code With Us mechanisms that allow the Government of B.C. to procure Agile software development teams

Step 3: Introduction to the Product Vision

- Review the project team membership and identify responsibilities
    - Product Owner, Scrum Master, Developers, Testers, and Delivery Manager
- Specify the approval process for signing off deliverables
- Review and understand the Product Owner's solution vision
- Discuss the client's attitude and approach to managing risk and change
- Agree on a reporting strategy to track and communicate progress to stakeholders
- Agree on which tools will foster the most productive collaboration
- Decide what assets are required in order to start delivering products
- Formulate the Project Inception Agenda

Step 4: Project Inception

- Have a team agreement session
    - Introduce the team members and the project stakeholders
    - Define and agree on the team's values; display them prominently
- Establish your team agreement
- Establish "way of working" (sprint cycles, way of communication, meeting regularity)
    - Advertise when you will hold Sprint Planning, Stand-ups, Sprint Reviews, and Product/feature Demos
- Agree on a common "definition of done"
- Create a virtual/physical workspace for the team
- Set up your development environment
- Define an initial backlog of requirements/stories/features
- Identify the high value user stories based on their needs/challenges formulated as user stories
- Specify acceptance criteria for each story
- Review your Definition of Ready
- Work in the open. Deliver often. Increment continuously

Resources

- Adopt a set of Digital Principles and Standards
- The Government of Canada Digital Playbook has a useful tool to help determine if Agile is right for your project
- For more information on the BCDevExchange approach to Agile, consult the DevHub
- The US Digital Playbook and the GSA Guides describe the benefits of adopting an incremental Agile approach to digital project development

Tooling to Consider

- Kanban board
- Task assignment system (Jira)
- Documentation hub (Confluence)
- Code repository (GitHub)
- Training schedule
- Scrum templates
- Scrum ceremonies

Play 4

Ready, Refine, Sprint…

Activities undertaken by the entire team to define a fulsome “Sprint 0” prepare the team for product development sprints.

Adopt code frameworks and libraries that accelerate your development to create working Minimal Viable Product (MVP) solutions that adhere to security and privacy requirements.

Define your architecturally significant requirements (ASR) based on product abilities. Implement architecture as late as possible so you can pivot when required.

Step 1: Develop a Release Plan

- Refine the (initial) backlog
- Define the product release schedule
- Develop/review feature stories
- Identify dependencies

Step 2: Develop Your Conceptual Architecture

- Document the overarching view of the system and placement of technical functions (e.g. use ArchiMate to visualize relationships)
- Whiteboard relationships between components and the data model

Step 3: Adhere to Modern Application Principles

- Adopt the 12 factor approach
- Understand cloud-native architecture

Step 4: Set up Your Technical Infrastructure

- Establish communication channels for support
    - MS-Teams, RocketChat, Slack
- Create a documentation repository
- Provision your environments
- Verify access

Step 5: Identify Your Development Workflow Processes

Step 6: Set Up, Document, and Implement Your Tooling (Code Repository, Pipelines, Automation)

Verify your processes for successful:

- Integration
- Build and Deployment
- Application Security

Step 7: Educate Your Business Stakeholders

Your project has a finite set of resources and funding; defining and managing the scope is critical to your team's success. The product owner educates both the team and the stakeholders in order to manage the team's velocity and output.

- Keep an eye on the budget
- Ensure change management processes are being followed
- Regularly groom the backlog(s)

Step 8: Now Sprint…

- Following a successful "Sprint 0" phase, your team is prepared to start coding, testing, and committing features into the source code management system

Step 9: Conduct Code Reviews (As Required)

- Automate where possible

Step 10: Complete User Acceptance Testing and Remediate Defects

- Dealing with this in advance will save effort and time in the future

Step 11: Deploy and Promote Through Your Environments

- The Product Owner (PO) confirms the Definition of Done (DoD) prior to deployment

Step 12: Demonstrate Your Products Frequently and Obtain User Feedback

- Sprint demo (feature delivery)
- Stakeholder demo (batch delivery)

Step 13: Monitor and Measure the Development Process

- This supports the Product Owner and the Team; it also shields members from scope/feature creep
- Monitor your system for reliability

Definition of an MVP

A Minimal Viable Product (MVP) is one that delivers core functionality as expected by a business unit's target audience. The core functionality is a set of features that is delivered at the initial product launch. Once launched, the product follows a documented lifecycle for user feedback and product support.

An MVP is no longer considered to be an experiment, but a product that has value to its users.

https://en.wikipedia.org/wiki/Minimum_viable_product

Guidance to Consider

- Understand how product management is different in Agile projects
- Understand Agile software product integrity
- Define and develop your pipeline (ex: Jenkins)
- Create and maintain a testing framework

Play 5

Transition to Operations

Following successful initial product development and deployment, a new modern application (digital product) is launched. At this stage a decision is made concerning the products lifecycle. Ensure that the Operations team has been involved in the previous plays on a regular basis from team formation to product delivery so that they are aware of, and have been able to provide input into, your delivery pipeline processes. Following formal knowledge transfer from the development team, the product can be transitioned to the operations team. If the initial product (often called a Minimal Viable Product or MVP) requires enhancements, then it typically enters the **Continuous Product Improvement** cycle as described in Play 6. If, however, the product meets the business needs, it will proceed through an operations cycle consisting of product governance and change management.

Step 1: Review Your Memorandum of Understanding (See Play 2)

- It takes time to resource additional skills (often as long as 6 months), so your transition plan should reflect this

Step 2: Complete Knowledge Transfer

- Adopt the "Site Reliability Engineer" support model pioneered by Google
- Throughout the development cycle, the product team member who represents the Ministry Operations team should regularly participate in development team meetings and should be cross-functionally trained to understand how product features have been developed, tested, and pushed through the deployment pipeline

Step 3: Validate Operations Processes Including:

- Change Management procedures
- Monitoring & Logging
    - Application Performance Monitoring (APM) metrics have been defined
    - Application logs are generated and maintained in accordance with policy
- Tooling Updates
- Product Triage
    - Define your product triage procedures
- Escalation procedures

Guidance to Consider

- The project operations (Ops) team member communicates with colleagues of the Ministry DevOps and technical support team to educate other coworkers about the product's shared documentation, tooling and outcomes from design review meetings
- The project's source code repository (ex: GitHub) has a README file with relevant procedures and links required to recreate the solution installation
- Make documentation easily locatable (Confluence, SharePoint, GitHub)
- Create a product "runbook"
- Integrate your solution into the Ministry logging and monitoring environment
- Google's monitoring & logging patterns
- Triage best practices
- Knowledge transfer best practices
- Review your operating commitments:
    - 9's uptime
    - Performance targets
- Read through and understand the IMB Application Transition Checklist

Play 6

Continuous Product Improvement

In this play, a team is responsible for the continuous cycle of product enhancement and ongoing support, based on incorporating user feedback and operational metrics provided by monitoring. Continuous product improvement is a critical aspect of product management; it is aimed at improving work practices that focus on customer value adding tasks and minimizing non-value (defect remediation, partially done work, unnecessary features) activities.

The work that took you to this play offers insights and metrics that should be reviewed and actioned as part of the overall improvement and change management processes.

Ensure that team ownership (originally defined in Play 2) has been reviewed and reaffirmed.

- Is it within the product business unit?
- Has it been delegated to the IMB (through an agreement)?
- Has it been outsourced to an independent services organization?
- Has an Application/Product Manager role been defined?
- Who is providing the Business Analyst (BA) services? Are the IMB BA's involved?

Step 1: Incorporate Feedback

- Conduct a product reusability analysis at least twice a year
    - Defer to a product usability expert to run workshops
    - Aim for incremental deliverables; identify the features users want (unnecessary features result in partially done work)
    - Review and obtain metrics that can provide product adoption and usage insights
- Prioritize feedback

Step 2: Maintain Product Vision

- Reaffirm direction with stakeholders
- Review the product roadmap with the team and your stakeholders
- Regularly groom the Kanban board
- Review the user story catalogue and deprecate stories that are no longer valued
- Strive for better team and stakeholder collaboration

Step 3: Conduct Process Improvement Reviews

- Prioritize the type of improvement:

    - **Deliberate Improvement:** Make features better that add user value. Focus on small incremental improvements that can be quickly deployed
    - **Frequency Improvement:** Identify features that would benefit from increased usage. Communicate with the team. Incorporate into the product release plan
    - **Adoption Improvement:** Identify opportunities to recast features that are core to the product but aren't being used. This may introduce risk; plan potential solutions
- Identify non-valued work (defects, partially done work, unnecessary features, sources of delays) and devise strategies to address it
- Seek to improve the sizing of tasks
- Maintain an "improvement" backlog

Step 4: Prioritize Bugs and New Feature Requests

- Defects lead to customer dissatisfaction and reduce team efficiency
    - Aim for a zero defect policy
    - Bugs have higher priority over new feature development
- Maintain a "root cause registry" of logged defects/bugs
    - Maintain a defect backlog

Step 5: Ongoing Code/Build/Deploy/Release Management

- Commit to feature driven development where the team pulls tasks from the Kanban board
- Review your tooling
    - Are there updates or dependencies that impact the supportability of your product?
- When was the documentation last reviewed?
- Utilize application performance monitoring tools to conduct application flow analysis. This will help to show which features are actually being used
- Conduct code reviews to identify partially done work or features that have not been deployed
- Review image build times
    - Can they be reduced?
- Validate release rollback process

Step 6: Skills Retention Requires a Plan

- Reducing "handoffs" is difficult; studies show that after the 4th handoff only 6% of the original knowledge is retained
- Change is inevitable; ensure you have a succession plan in place for each "role" on your team
- Share knowledge
- Ask for feedback from other groups

- Seek opportunities to invite other interested workers into the team (via “Expression of Interest” Temporary Assignments)
- Engage University/College Co-op students
- Give staff the time to take webinars and other online training

Step 7: Communicate Your Success

- Measure, celebrate, and communicate the team’s workflow throughout the organization with announcements such as newsletters, “lessons learned” webinars, presentations, and author blogs

Guidance to Consider

- Does your team composition (IS21, IS24, IS27s) still reflect the product’s needs?
- Does your team have access to Service Design and User Experience (UX) skills as needed?
- Kanban board guides activities
- Incident/Bug Tickets can be assigned
- Regularly review your task assignment system (Jira)

Play 7

Sustainment Lifecycle

Your product has been delivered; the product roadmap guides the product sustainment plan. Guidance described in previous plays will have produced valuable "lessons learned" that should be incorporated into your product's sustainment lifecycle.

Maintain care and feeding of your processes with your stakeholders through good governance.

Ensure that annual funding plans are in place to account for any and all changes, including product retirement and product replacement.

Step 1: Maintain a Happy User

- Review your product's goals and assumptions
    - Are they still relevant?
    - Are they being met?
- Evaluate and Analyze product analytics data (if not available then look to create it)
- Interpret user feedback. Can unused features be deprecated? Will a new user interface result in increased adoption and user satisfaction?
- Conduct product research. Do other products offer a better value proposition for users?
- Review the product roadmap and release schedule
- Identify new feature opportunities
    - Can the product spawn other products?

Step 2: Maintain Product Funding

- Review your product's value proposition
- Get ahead of the budget cycle; regularly review your operating and capital expenses (OpEx/CapEx) and update your budget plan
- Understand opportunities to adopt non-proprietary services and products that add value
- Seek reviews from the finance team

Step 3: Maintain Vendor/Partner Relationships

- Review licensing dependencies
- Review support arrangements
- Understand possible vendor roadmap impacts

Step 4: Continuously Improve Your Overall Lifecycle

- The goal is continuous productivity improvement
- Conduct process reviews
    - Ask your team on a regular basis (quarterly) what could be done better
- Seek, conduct, and assess experiments

Step 5: Maintain Product Integrity & Quality

- This is the product Owner and/or the Application Manager's responsibility
- Do your release and change management processes align with the platform update cadence?
- Review the defect log
    - Have the processes that you put in place reduced the time it takes to remediate these defects?
    - The aim is to identify in this the early development stage of play 4
    - Late stage remediation takes away from new feature development and delivery

Guidance to Consider

- Business Unit budgeting exercise
- User engagement
- UX review (outlined in play 6)
- Industry Analysis of similar products
- Review the corporate product inventory (look for new opportunities)
- US Department of Defense LCSP (as an example)

Modern Application Development IMB's Principles

Adopting these principles can help to guide your product decisions. Designing and building solutions that are loosely coupled and utilize interfaces for process communication will result in maintainable applications.

The following **proposed** principles offer guiding statements that should be considered in the development of your applications:

- Guiding Principles
- Application Principles
- Architecture Principles
- Project Governance Principles
- Technical Principles
- Infrastructure Principles

Guiding Principles *adopted*

Principle 1: Develop Open and Innovative Partnerships

We recognize that by developing trusted partnerships and collaborating across teams and the ministry, we create opportunities to find new ways of delivering efficient and effective services to program areas.

Principle 2: Service Focus

Solutions and services are designed from a client-centered and end-to-end digital service delivery perspective to increase the value they bring to the client.

Principle 3: Teamwork and Collaboration

We will create and empower cross-functional, dynamic teams to increase engagement, communication, talent, and opportunities to deliver value and services to clients.

Principle 4: Invest Wisely

Through effective governance and financial oversight, we will maximize IM/IT spending and optimize our existing investments to support the ministry.

Principle 5: Enable a Modern and Innovative Workplace

We will support collaboration, create efficiencies, and encourage people to work smarter, greener, healthier, and more innovatively so all feel valued and recognized.

Principle 6: Continuous Improvement

We believe in testing early and often. We will do end-to-end testing of processes, services, and technology, continuously improving in response to user feedback.

Principle 7: Proactive Approach to Security and Privacy

We are committed to supporting our clients to adopt a proactive approach to ensuring strong information security and privacy protection practices. By applying a privacy and security by design philosophy, we help our clients ensure that privacy and security measures are considered at project initiation and built in to the solution, rather than having to be retrofitted afterwards.

Application Principles *proposed*

Principle 1: Do No Harm

Only build what you can't buy and buy what you can't build.

Principle 2: Build/Buy Responsibly

Don't contribute to technical debt.

Principle 3: Be Citizen-Centric

Everything you build is for the greater good. Citizens are the real product owners.

Principle 4: Today's Build Could Be Tomorrow's Burden

Like building responsibly, think about the effort required to maintain and evolve the application.

Principle 5: Nature vs. Nurture

An application will only be as good as the effort put into its evolution.

Principle 6: Sharing Is Caring

Information is a commodity to be shared; build with this in mind.

Principle 7: Keep It Small

Small code packages and small feature sets make for shorter delivery cycles, fewer changes, and overall better software quality.

Principle 8: Focus on the Developer

Select the best environment with the right tooling. Endorse a good set of Architecture Principles.

Principle 9: Develop for Networks

Application communication happens over the network, not in memory. It supports distributed development teams, increases application resiliency, and simplifies product deployment.

Architecture Principles *proposed*

Principle 1: Primacy of Principles

… TOGAF Principles, OCIO Digital principles, HADF principles

Principle 2: Adhere to Standards

… OCIO Digital Framework, GCIO, and Ministry Standards

Principle 3: Adopt a Set of Software Design Principles

Patterns and practices are the tools used to achieve the desired outcome of the principles. Follow fundamental principles for writing quality software such as:

- KISS - Keep it simple, stupid
- DRY - Don't repeat yourself
  - Do not duplicate work; this is a frequent source of errors
- YAGNI - You aren't gonna need it
  - Are you going to need that feature? If not, leave it out
- SoC - Separation of concerns
  - Minimize tight coupling of code by separating core business logic from infrastructure and user interface logic; this will ensure that the module is easy to test and evolve

Principle 4: Adopt a Service Oriented Architecture

- Single responsibility
  - Objects should have only one reason to change; this helps to produce more loosely coupled and modular systems
- Bounded context
  - Limit complexity by reducing a solution into separate conceptual modules where, each module represents a context that is separated from other contexts (ie: bounded), and can be evolved independently of one another

Principle 5: API First

Develop your solution to be used by multiple client applications through a well described API.

Principle 6: Be Data Driven

Principle 7: Design to Be Secure

Design, develop, and deliver solutions that mitigate risks. Ensure security is addressed end-to-end and considered upfront.

Principle 8: Adopt Cloud

Whether public, private, or hybrid cloud, adopt a set of guiding principles for Cloud Computing and Use; include enablement, cost/benefit, enterprise risk, capability, accountability, and trust.

Principle 9: DevOps for Agility

DevOps is founded on product delivery. Agile is founded on the project's success. Embrace the combination of the following:

- Continuous integration (including Build management, test management, and automation)
- Continuous delivery (including environment management and deployment management)
- Infrastructure as code
- Iterative development approach to support successful projects

Project Governance Principles *proposed*

These principles apply to the **ministry governance process for the planning, intake, and approval of IM/IT projects**.

Goals of Principles

- These principles will help the project governance team ensure that we understand the scope of the work, and stay focused on outcomes
- The principles should be simple, straightforward, and high-level

Principle 1: Enable the Right People to Make the Right Decisions at the Right Times

Principle 2: Be Easy to Understand and Follow

Principle 3: Be Simple and Efficient, With Each Step Adding Value

Principle 4: Be Timely

Principle 5: Add Value for All Stakeholders, While Maximizing the Benefits to the Ministry

Principle 6: Be Transparent and Enable Decisions That Are Objective and Fair

Principle 7: Apply a Common Set of Selection Criteria to All Proposed IM/IT Projects

Technical Principles *proposed*

Principle 1: Prioritize Principles

Any decision to ignore or reject core principles, so as to satisfy project goals, must be recorded.

Principle 2: Adopt Technology Standards That Aid the Business

- Make friends in the business
    - If the business understands why a standard needs to be adopted, they will be more likely to weigh the implications on impacts to their expected outcomes
- Stakeholders drive the adoption of technical standards
    - If a standard is seen as an impediment, then the natural pattern is to seek an exemption. Ensuring stakeholders are aware early on in the project lifecycle helps to develop adoption strategies
- Involve the architects from the start of your project
    - Architects are central to product viability discussions. Engaging them early will mitigate waste in the product development flow

Infrastructure Principles *proposed*

Principle 1: Plan for Needed Capacity

Solutions that evolve requirements need to be scalable in order to guarantee performance over the entire product lifecycle. Don't overcommit up front; validate the ability to meet unexpected system demands.

Principle 2: Design for Scalability

Adoption and feature growth will result in unforeseen system demands. Ensure that the solution architecture is able to scale.

Principle 3: Achieve User Happiness Through System Performance

User expectations will change over time. Ensure that the architecture is adaptable and can satisfy performance demands. Assess how the solution is hosted and its portability.

Principle 4: Monitoring Enables Your Team

Understand what to monitor. Ensure that the available monitoring system can provide actionable metrics in order to provide the necessary information needed to resolve any issues that can arise. Knowing what can cause performance issues and monitoring for those scenarios will feed the product continuous lifecycle with data.

Modern Application Development IMB Patterns and Practices

Patterns describe typical issues that are experienced by Ministry business clients when they start to develop a new IM/IT based solution. A pattern provides techniques that describe best practices toward achieving a desired outcome.

When a Ministry business unit starts its product development journey, it is often aware of the need to get a STRA and, if required, a PIA. Ministry clients require additional information when starting their new product journeys. The IMB is compiling a list of repeatable adoption and usage "patterns" to common questions asked of our Ministry business consultants. The following list of patterns will evolve as the IMB works with our clients to develop additional modern solutions based on our supported platforms and service offerings.

How are patterns described?

A pattern describes a process and a "thing". It describes a proven solution that can be applied by our clients. Patterns are usually generic and intended to initiate a dialog.

IMB Patterns we will evolve will include…

Platform Adoption Patterns

- BC DevExchange Adoption Pattern
- Microsoft PowerBI Adoption Pattern
- Microsoft Dynamics Adoption Pattern
- Microsoft SharePoint Adoption Pattern
- BC Dev Exchange DevOps Container Platform (OpenShift) Adoption Pattern
- Progressive Web Application Capstone Pattern *currently in development*

IMB Patterns

- Ministry IMB IM/IT Strategic Planning Pattern
- Ministry IMB Service Desk Pattern
- Ministry STRA & PIA Pattern
- Ministry IMB Technical Services Support Pattern

BC DevExchange Adoption Pattern

The Need:

Modernization has been identified as a Ministry goal. To achieve this, business units are embarking on difficult change initiatives that are tied to culture shifts within their organizations. It won't happen overnight. Readiness to adopt new systems and approaches requires a plan. A key element of the plan is based on having the capabilities and capacity to deliver solutions that end-users value. The BC DevExchange is an incubator for the promotion of innovation.

User Story:

As a member of the business unit executive, I need to have a knowledgeable team that is capable of delivering a digitally enabled product that meets the needs of our discerning users.

Context:

Taking a solution that is nearing its end of life, identifying business scenarios (through client engagement) pinpoints the need for teams that can propose, design, and deliver solutions that will modernize the business unit's product portfolio for the digital government era.

Scenario:

Develop organization capabilities that allow teams to solve difficult business problems. Co-locate in the lab environment where teams can reside (physically or virtually). Get exposure to resident experts who have experience and knowledge in delivering solutions, based on Agile methodologies, utilizing open source software on modern, cloud-ready platforms.

Solution:

- Obtain executive sponsorship and commitment to form a dedicated team to learn, experiment, and create a viable solution in the BC Dev Exchange lab environment capable of being transitioned to, and supported by, the IMB
- Start the conversation with the IMB Strategic planning team

Microsoft PowerBI Adoption Pattern

under development

The Need:

Executives and team-leads need to be able to ask questions about business data. Stakeholders want to be informed in real-time by looking at informative web sites without having to wade through complicated multi-tab spreadsheets stored on shared drives or file sites.

User Story:

As a member of the business unit steering committee, I need access to business intelligence that shows historical, current, and predictive views of our business operations, in order to provide the executive with the information they require to make informed, data-driven decisions.

Context:

Business intelligence tools are a central organizational capability used to analyze, visualize, and share insights into business information. Structured and unstructured files and repositories contain a wide array of data sources that can be modeled and shaped to provide dashboards and reports.

Scenarios:

- Provide regular financial reports, drawing on multiple data sources
- Report real-time internet-of-things enabled instrumented data sources
- Provide predictive views of consumption reports, based on field data

Solution:

under development

The IMB can work with project teams to review requirements, participate on technical teams, and assist in shepherding teams through the approval and project inception process.

- PowerBI initiatives should be requested through the IMB Project Submission form

Microsoft Dynamics Adoption Pattern

under development

The Need:

Digital government requires on-demand, reliable delivery of citizen-centric services that often touch multiple business units in multiple Ministries. Being able to provide a unified view of the citizen, while using various backing services each with separate data sources, requires a platform approach to service delivery.

User Story:

As a BC Government digital product owner, I need a platform that allows me to deliver a secure e-Permitting (as one example) solution that involves stakeholders from a diverse group of Ministries.

Context:

Modern Customer Relationship Management (CRM) platforms, such as Dynamics, offer a diverse suite of products that allow government service providers to obtain consistent integrated views of their business functions by using a common database. Custom applications can be built on the platform, integrating workflows to solve complex citizen-focused solutions.

Scenarios:

The Dynamics platform can been applied in a diverse set of citizen and service focused management systems including:

- Grant Management
- Registration systems / Registries
- Appeals Management
- Citizen Engagement
- Referral Management
- Product orders and delivery tracking
- Call Centres
- Marketing List Management

Solution:

under development

IMB can work with project teams to review requirements, participate on technical teams, and assist teams through the approval and project inception process.

- MS Dynamics initiatives can be started by completing the IMB Project Submission form

Additional Guidance:

- Customer Relationship Management

Microsoft SharePoint Adoption Pattern

The Need:

Collaboration is key to team success. Working in the open is a digital principle that requires on-demand access to information. Projects are mandated to follow core policy and OCIO records management. Files stored on network drives or in email folders are difficult to locate. A purpose built, secure (IDIR/BCEID supported) document repository enforces structure and file findability.

User Story:

As a member of the business unit working on a new initiative, I need to have a secure document storage site that my team and our partners can access over the web so that we can collaborate on documents for our project.

Context:

Teams delivering a time boxed initiative create office documents including spreadsheets, presentations, MS Word files, and PDF documents. Being able to organize the document structure allows for efficient team collaboration.

Scenario:

Your initiative requires a central repository of project related documents, lists, and team contacts. Files should only be viewable to those who have been granted access to specific folders. In order to ensure that changes can be rolled back, a versioning feature is required. The platform should include an all-of-site search capability. The site will have a diverse set of

government users but may also allow access to external authenticated users.

Solution:

Before deciding on a completely self-serve approach to team based document management, engage the IMB SharePoint consulting services team who will examine your requirements and guide site design, configuration, and development. SharePoint is a flexible environment that includes a team site collaboration template which supports IDIR and BCEID user accounts.

- SharePoint projects should be requested through the IMB Project Submission form
- Operational services are requested through CITZ SharePoint Support
- For additional information on the SharePoint service offering, visit the IMB Hub

Additional information:

- IMB Hub SharePoint resource

BC Dev Exchange DevOps Container Platform (OpenShift) Adoption Pattern

The Need:

Successful application development teams require on-demand, consistent environments and do not want to deal with underlying infrastructure. Business units are looking for hosting flexibility.

User Story:

As a product owner, I need to be assured that my full stack development team has access to a supported platform that offers an automated code delivery environment without having to worry about the infrastructure, so that my team can sustain a high frequency of feature delivery.

Context:

As teams design and architect new IT-based systems that deliver business value, they are looking to adopt flexible technologies without the inherent lock-in that has come with selecting platforms in the past. Application containers are lightweight, secure, and scalable. Container Based Applications (CBA) are portable across a number of on-premise (OCIO-ES) and vendor clouds.

Scenarios:

- New or existing web based solutions that can be designed or refactored to run on the OpenShift platform
- New product offerings that may have peak volume demands are ideal candidates to take advantage of the scalable nature of the BCDevExchange DevOps OpenShift container platform
- ETL scheduled jobs
- Application Programming Interfaces (API)
- Solutions that don't expect to have a high degree of ongoing development

Solution:

- Obtain executive approval as described in the DevExchange Adoption Pattern
- Identify a Product Owner and a Technical Steward for your project
- Communicate with the DevExchange DevOps team through Rocketchat
- Enroll and complete Agile and OpenShift training offered through the DevExchange
- Request a GitHub repository
- Request an OpenShift environment

Progressive Web Application Capstone Pattern

The Need:

Citizens and employees prefer to use their mobile devices to access information and services. Mobile devices are able to access on-device sensors and smart-phone/tablet features to provide a richer more engaging user experience.

User Story:

As a citizen, I rely on my mobile device as my preferred way of consuming government services.

Context:

Installable progressive web applications (PWA) offer an authentic mobile experience for users. A PWA allows a website to run on the mobile device when connectivity can't be guaranteed. Web-based solutions can be enriched to access on-device sensors (example: location services). PWAs allow users to self-install the solution without having to be published in an App Store. Solution owners can send update notices directly to the installed solution, thereby simplifying application management.

Scenarios:

- Offline information services
- Store/forward data entry

Solution:

- Use modern web technologies (such as React and Node.js)
- Investigate the playbook exemplar as a "starter kit"

Additional Information:

- PWA on Wikipedia

IMB Patterns

Ministry IMB IM/IT Strategic Planning Pattern

This pattern describes how the IMB will work with your division/business unit for IM/IT initiatives and enquiries.

- The IMB has dedicated Senior Business Consultants for every Division, and we want to help you through the challenges and successes in order to meet your goals and objectives
    - Please contact your Division's Senior Business Consultant
- The IMB works together with our internal team, and other key stakeholders as needed, to review the enquiry and help you through every step of your journey
- The team will do a comprehensive review of your needs and requirements and try to align you with the best tools and Ministry objectives
- An agreed upon response to the enquiry is reached and your Senior Business Consultant will follow up with you to guide you through the next steps of the journey
- Our goal is to establish a clear set of objectives and actions that will determine the best outcome of the review

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Ministry IMB Service Desk Pattern

This pattern describes how to contact the IMB Service Desk and the areas of assistance available to the Ministry.

Ministry staff and clients can contact the service desk via phone, email, or the OCIO My Service Centre to request a service or a product.

Users can access the IMB Hub site for IMB Service Catalogue information.

The Service Desk will assist clients by:

- Reviewing and authenticating requests or consulting with requesters where necessary, and entering requests into the ticketing system for tracking
- Providing technical support for meeting rooms at 4000 Seymour, including visual and audio equipment

- Creating and maintaining a knowledge base of IT order and problem management processes and workarounds
- Identifying, defining, and analysing recurring issues, potential problems, and opportunities for business or system improvements
- Advising clients on best practices for the use of IT services and technology and ensuring that clients can utilize IT resources effectively
- Managing the loaning of IT equipment such as laptops or projectors for use in boardrooms
- Directing clients to available information on the internet, LAN drives, 77000, or the Self-Serve portal, based on what they are looking for
- Responding to clients requests via emails, phone calls, and replies from the ticketing systems
- Following up and updating clients on the progress of their requests via email, phone, and ticket updates

The CITZ IMB Service Desk Manager can be reached by email.

Ministry STRA & PIA Pattern

This pattern describes a set of steps to allow your team to start your STRA and PIA journey.

- The project team contacts the Information Privacy and Security Team (IPS) to seek advice and initiate the assessment process
- The IPS collects information from the project team to provide an initial recommendation regarding assessment approach and scope
- The IPS works together with the project team, and other key stakeholders as needed, to conduct the assessment
- The project team supports the process by providing all relevant information and documentation to IPS in order to conduct the assessment
- The IPS liaises with core government information privacy and security branches (the Privacy, Compliance and Training Branch (PCT) and the Information Security Branch (ISB)) throughout the process, and during the assessment “sign-off” phase

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Ministry IMB Technical Services Support Pattern

This pattern describes a set of steps to allow your team to engage the IMB Infrastructure support team and their service offerings.

The IMB Technical Services works with the different business units to manage their technical infrastructure.

The project team contacts the IMB Technical Services team to seek advice on:

- Management and provisioning of Infrastructure
- SSL certificate management
- Assistance with Reverse Proxy and Site Minder setup for applications and websites
- Monitoring Server and application infrastructure
- Assistance with setup, install, and upgrades for applications and Web infrastructure to support applications
- Firewall rule management
- Infrastructure patch and change management

The IMB Technical Services Team is available by email to provide consulting services on these services.

Glossary

Government technology is in the process of a significant shift from the solutions of the 1980's, which were based on traditional, on-premise hosted platforms, and proprietary vendor licensed software, towards a cloud-based, open-source model.

As your project and digital products advance on this journey, you will encounter a new vocabulary of terms, acronyms and definitions. While we have included a list of links to many of these terms, we can not guarantee that all these links will be available. We recommend the glossary posted at the United States Federal Government Services Agency (GSA) technical guides web site.

https://bcgov.github.io/CITZ-IMB-playbook/glossary