Appendix C – Brief Overview of Continuous Improvement Theory and Systems

History and Terminology

The origins of continuous improvement can be found in Fredrick Winslow Taylor's principles of scientific management (1911), and in early Ford production systems. The term "continuous improvement", however, rose to prominence in the late 1980s and early 1990s through manufacturing advancements in Japan and the United States. The most well-known of these advancements included: Just-In-Time production, Kanban systems, and Kaizen philosophy (elements of the Toyota Production System, later known as Lean); Total Quality Management (TQM); Six Sigma; Theory of Constraints (TOC); Business Process Re-engineering; and Learning Organizations.

Since then, the most widely adopted toolkits have become Lean, Six Sigma, Theory of Constraints, or combinations of these (i.e. "Lean Six Sigma" and TLS [Theory of Constraints-Lean-Six Sigma]). Modern iterations of these toolkits have also cross-pollinated and adopted elements of other systems that diminished in popularity over time. Today, the main toolkits have very similar tools, but different focal perspectives.

Different terms are used for the same basic concept of "continuous improvement" across management literature, including:

- Continual Improvement
- Continual Improvement Process
- Continuous Process Improvement
- Process of Ongoing Improvement
- Quality Improvement
- Operational Excellence, and
- Kaizen (roughly translated, "good change")

The core element of all these terms is the ongoing examination of how an organization operates, and changing operations to deliver greater customer value.

Overview of Tools, Toolkits and Management Frameworks

Improvement tools identified in Council discussions generally fall into three categories:

1. Toolkits – broad methodologies that have guiding principles and sets of tools for generating continuous improvement
2. Tools – individual techniques that help generate or contribute to improvements
3. Management Frameworks – overarching sets of management practices associated with high-performing organizations

The most well-known improvement systems, tools identified in Council discussions, and tools identified in previous administrative reports, are presented below along with their characteristics and beneficial uses.

Widely Adopted Approaches

Tool	Lean	Category	Toolkit
What is it?	Evolved from the Toyota Production System, Lean is a principle-based system of tools that builds a culture and practice of identifying and reducing waste from organizational processes.		
Approach	Direct process improvement	Main focus	Reduction of waste in processes
Beneficial for	Process performance improvement		

Tool	Six Sigma (6σ)	Category	Toolkit
What is it?	Originating at Motorola in the 1980s, Six Sigma is a science-based system of tools for developing statistical quality control of processes and products. Six Sigma has largely replaced the adoption of Total Quality Management.		
Approach	Direct process improvement	Main focus	Reduction of variance in processes
Beneficial for	Eliminating intolerable variation in process activities and outputs		

Tool	Theory of Constraints (TOC)	Category	Toolkit
What is it?	Originating from the business novel *The Goal: A Process of Ongoing Improvement*, TOC is a system of tools for finding and leveraging organizational constraints (originally called “bottlenecks”).		
Approach	Direct process improvement	Main focus	Identifying and managing system constraints/bottlenecks
Beneficial for	Increasing organizational throughput and determining where improvement efforts should be focused		

Tool	Kaizen (aka “Gemba Kaizen”)	Category	Toolkit
What is it?	Based on the work of Masaaki Imai, Kaizen programs use a mixture of Lean and Total Quality Management tools to improve products and processes, and build a culture of *kaizen* (“good change”).		
Approach	Direct process improvement	Main focus	Reduction of waste in processes
Beneficial for	Process performance improvement		

Tool	Operational Review	Category	Undefined
What is it?	Acquisition of consulting advice on agreed-upon aspects of an organization’s functioning		
Approach	Dependent on the consultant’s methodology	Main focus	Defined by the client
Beneficial for	Comparison of organizational performance to industry standards and benchmarks		

Management Frameworks

Tool	ISO 9000 Standards Series on Quality	Category	Tool (Set of standards for Quality Management)
What is it?	ISO 9000 is a widely adopted management framework for developing and maintaining quality management systems.		
Approach	Indirect process improvement through the implementation of a quality management system	Main focus	Demonstrable proof of quality standards and practices
Beneficial for	Implementation of a Quality Management System		

Tool	Capability Maturity Model Integration (CMMI)	Category	Tool (Maturity model for process management practices)
What is it?	Originating from contract requirements for technology suppliers to the US Department of Defense, the Capability Maturity Model Integration provides a set of essential practices for achieving increasing levels of management maturity in the acquisition or development of assets, and the provision of services.		
Approach	Indirect process improvement through an adopted set of practices	Main focus	Demonstrable proof of practices at different levels of management maturity
Beneficial for	Developing a roadmap for change in continuous improvement practices		

Tool	Business Process Maturity Model (BPMM)	Category	Tool (Maturity model for process management practices)
What is it?	Originating from CMMI methodology, the Business Process Maturity Model provides a set of essential practices for achieving increasing levels of maturity in process management. According to the BPMM, the highest level of maturity is labelled as achieving “continuous improvement”.		
Approach	Indirect process improvement through an adopted set of practices	Main focus	Demonstrable proof of practices at different levels of management maturity
Beneficial for	Developing a roadmap for change in continuous improvement practices		

Other Well-Known Methodologies and Tools

Tool	Zero-Based Budgeting (ZBB)	Category	Tool (budget preparation approach)
What is it?	ZBB is a budgeting approach that requires service managers to theoretically build service budgets "starting from zero". Services are divided into "decision units" (compartmentalized business units or functional activities) that are arranged into "decision packages" for varying levels of service. With the zero-line item approach to ZBB, elected officials are asked to use detailed operational information in order to make budget decisions, rather than using more holistic, strategic information.		
Approach	Indirect improvement through the budget process	Main focus	Budget decision making
Beneficial for	A different perspective on the budget that aims at balancing City services with public demand based on what is available		

Tool	Zero-Based Review (ZBR)	Category	Toolkit
What is it?	Taking the ZBB principle of viewing a service from a "zero base", a zero-based review (as utilized by the City of Calgary) examines whether all current services should continue to the same level and in the same way. The questions examined in each review can vary greatly about service delivery channels and processes. The rigour of Zero-Based Reviews causes each review to take about one year to complete. Not all services or business units are able to be reviewed at the same time. ZBR programs, like the City of Calgary's (now part of the Solutions for Achieving Value and Excellence (SAVE) Program), are multi-year improvement initiatives. They have not been designed for short-term results.		
Approach	Dependent on the practitioner's methodology	Main focus	Defined by key stakeholders
Beneficial for	Examining and aligning services and costs with what citizens want and are prepared to pay for		

Tool	Control Self-Assessment	Category	Tool (survey/questionnaire)
What is it?	An assessment of controls made by the staff of the unit or units involved. It provides assurance to stakeholders that the internal control system of the organization is reliable.		
Approach	Indirect (opinion survey on risk and control processes)	Main focus	Risk and control processes
Beneficial for	Gathering stakeholder opinions on risk and control process effectiveness		

Tool	Innovation Engineering	Category	Toolkit
What is it?	A systems-design-based, data-driven, complete operating system and academic field of study that provides a disciplined approach for delivering innovation at every level of the organization – from everyday process improvements to disruptive breakthroughs.		
Approach	Indirect (a variety of tools that may or may not examine processes)	Main focus	Innovation, project delivery speed, and risk reduction
Beneficial for	Creating innovative solutions in organizations		

Tool	Business Architecture	Category	Toolkit
What is it?	The collection of "holistic, multidimensional business views [visualizations] of: capabilities, end-to-end value delivery, information, and organizational structure; and the relationships among these business views and strategies, products, policies, initiatives, and stakeholders."[1]		
Approach	Direct (creates end-to-end process visualizations and documentation)	Main focus	Articulation of key business elements and their relationships to each other
Beneficial for	Creating a common language and cross-departmental views of business elements to accelerate stakeholder alignment, agreement, and cooperation		

Tool	Business Process Re-engineering	Category	Toolkit
What is it?	An approach of abandoning the collection of current (possibly fragmented) processes to create new "end-to-end" processes for the organization. This framework also requires revamping the organizational structure to create "process owners" who have the authority to manage end-to-end processes across organizational boundaries.		
Approach	Direct process improvement	Main focus	Managing end-to-end processes
Beneficial for	Holistic re-design of processes and organizational structure		
Current status	Usage peaked and declined in the 1990s. Due to high implementation failure rates, this approach has largely been replaced by Business Process Management (BPM) and Enterprise Architecture methodologies.		

[1] Business Architecture Guild. (2022). *A Guide to the Business Architecture Body of Knowledge® (BIZBOK® Guide) (Ver 11.0)*.

Tool	Total Quality Management (aka “Deming Approach”)	Category	Toolkit
What is it?	A framework that leverages strategy, data, and communications to build a focus on quality in the organizational culture.		
Approach	Direct process improvement	Main focus	Achieving statistical control of processes and outputs
Beneficial for	Statistical variance control		
Current status	Starting in the early 1990s, Total Quality Management has largely been abandoned for Six Sigma and Lean Six Sigma methodologies		