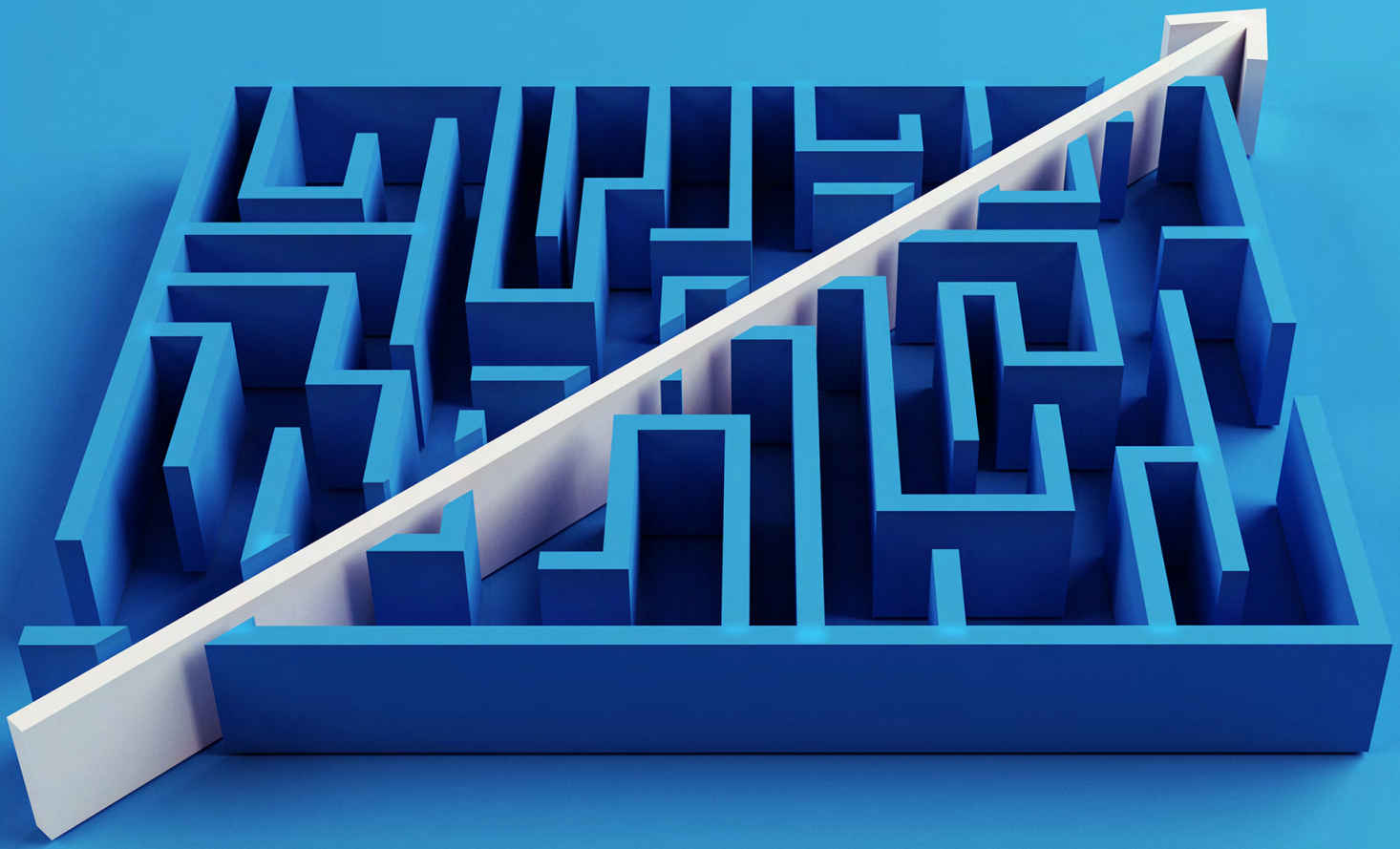
RETHINKING BUDGETING

SIMPLIFYING COMPLEXITY

Using Mental Models to Enhance Understanding and Decision-Making in Public Finance



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ABOUT GFOA

The Government Finance Officers Association (GFOA) represents over 21,000 public finance officers throughout the United States and Canada. GFOA's mission is to advance excellence in government finance. GFOA views its role as a resource, educator, facilitator, and advocate for both its members and the governments they serve and provides best practice guidance, leadership, professional development, resources and tools, networking opportunities, award programs, and advisory services.

ABOUT THE RETHINKING BUDGETING PROJECT

Local governments have long relied on incremental, line item budgeting where last year's budget becomes next year's budget with changes around the margin. Though this form of budgeting has its advantages and can be useful under circumstances of stability, it also has important disadvantages. The primary disadvantage is that it causes local governments to be slow to adapt to changing conditions. The premise of the "Rethinking Budgeting" initiative is that the public finance profession has an opportunity to update local government budgeting practices to take advantage of new ways of thinking, new technologies, and to better meet the changing needs of communities. The Rethinking Budgeting initiative will raise new and interesting ideas like those featured in this paper and will produce guidance for state and local policy makers on how to local government budget systems can be adapted to today's needs. We hope the ideas presented in this paper will spur conversation about the possibilities for rethinking budgeting. The Rethinking Budgeting initiative is a collaborative effort between the Government Finance Officers Association (GFOA) and International City/County Management Association (ICMA).

To learn more, visit **gfoa.org/rethinking-budgeting**.

USE OF GENERATIVE ARTIFICIAL INTELLIGENCE IN THIS REPORT

Generative Artificial Intelligence (AI) tools, primarily ChatGPT4, were used to help develop the report. Primary uses of the AI tools include:

- Development of ideas for the outline of the report
- Generation of text for a few specific purposes. Text generated directly from generative AI is clearly labeled as such in the report where the contribution from AI is material. Examples of immaterial contributions would be suggestions from AI on wording choices, grammar, etc.
- Review of final report and to give suggestions to make language more accessible for the intended audience.

GFOA acknowledges the limitations of AI-generated information, including potential biases and other limitations of generative artificial intelligence. All data, ideas, etc. from ChatGPT4 that were used in the report were independently verified/validated by the author(s) and not taken at face value.

SUMMARY OF KEY IDEAS | SHAREABLE INFOGRAPHIC

SIMPLIFYING COMPLEXITY WITH

MENTAL MODELS

Reality is complicated. Mental models simplify. Mental models help people make decisions and solve problems by making it easier to navigate complexity and information. Public finance officers with good mental models can help their audience to become better informed and make better decisions.

MENTAL MODEL AS PROCESS MAP: THE CITY OF SACO

Process maps are mental models that can help identify and explain influencing factors. The City of Saco created a map to explain the factors influencing its financial health. This helped the City make decisions to keep taxes stable.

MENTAL MODEL AS METAPHOR: THE TOWN OF QUEEN CREEK

The importance of staying current on pension funding can be difficult to appreciate for non-experts. Most people don't have a good mental model for this because they do not deal with "unfunded liabilities" in their day-to-day lives. The Town of Queen Creek described the unfunded liability as **"bad debt"** akin to credit card debt. Money spent on the **"interest payments"** on the "bad debt" is money not spent on value-adding city services.

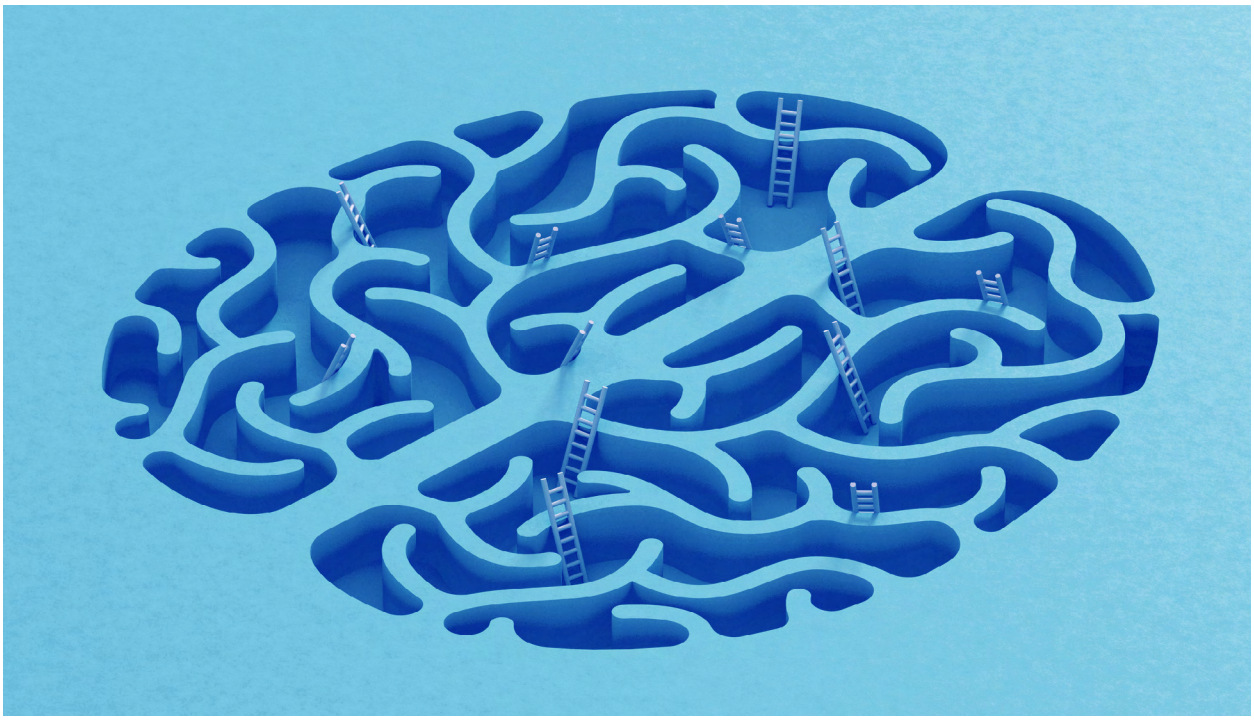
SOME TIPS FOR GOOD MENTAL MODELS

1. Tell a story, like in the process flow example from the City of Saco.
2. Make things as simple as possible, but not simpler. There are limits to the simplification of a complicated public finance concept.
3. Lean on analogies and metaphors, like "pension as bad debt".
4. All models are wrong, some are useful. Seek a sweet spot of simplification and descriptive power.

See our full report for more tips and examples.

WE NEED MORE MENTAL MODELS. YOU CAN HELP.

These are examples of mental models. However, there are many more concepts in public finance where public officials could benefit from better mental models. As you create new models, share them with GFOA so we can begin to build a repository of better mental models for public finance. Enter your submissions at: https://www.gfoa.org/mental-model-challenge



Reality is complex; mental models simplify it. A mental model is a tool that helps us make sense of the world and manage complexity and large amounts of information. For example, in public finance, thinking of reserves or rainy-day funds as a government's savings account is a mental model. This approach simplifies the complex idea of fund balances by comparing it to something familiar from everyday life.

Everyone uses mental models, although we might not always realize we're using them. Just like some maps are better for navigating roadways than others, some mental models are better for navigating reality than others.

Public finance officers often wish their audiences were better informed about public finance. Providing them with mental models can serve as a shortcut to help the audience become more informed, make better decisions, and gain a shared understanding of public finance.

Mental models can serve as a shortcut to help the audience become more informed, make better decisions, and gain a shared understanding of public finance.

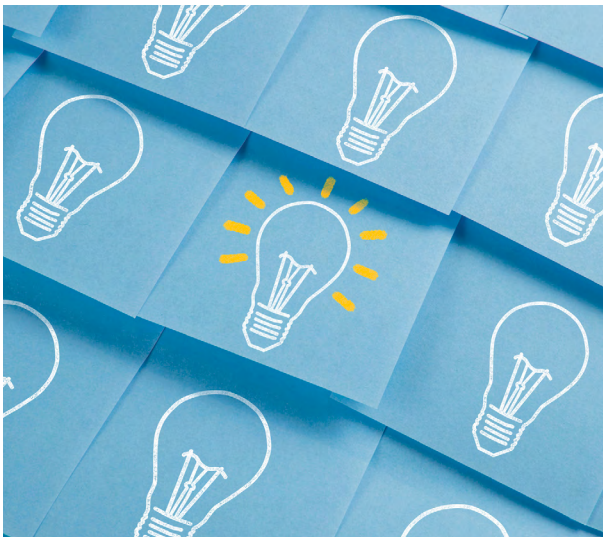
Mental models often compare favorably to traditional methods of informing non-experts, such as providing them with facts and figures. Facts and figures are like a pile of bricks. It is up to the recipient to fashion those bricks into a viable structure. This doesn't always happen. Mental models act like a structural frame. Other materials, such as walls and ceilings, hang on this frame. This structure helps organize and support the information. A good mental model provides a strong base and can accommodate a diverse set of facts and figures, helping the user make sense of the information and incorporate it into their decision-making.

In this paper, we will illustrate mental models that are well-established decision-making tools in both personal and professional financial settings. This will help familiarize you with the basic concepts of mental models. Then we'll go into examples of public finance mental models. Ultimately, you'll want to develop your own models. To build useful ones, we need to know what strong models have in common. We'll describe design principles for creating mental models and show how generative artificial intelligence (AI) tools, like ChatGPT, can help you create them. Finally, because mental models simplify reality, they also have limitations. We'll discuss the blind spots of mental models.

Mental Models, Personal and Professional

Mental models come in many forms and can be specific to public finance. But let's start with a few models that work well in both personal and professional settings as effective decision-making tools.[1] These models often take the form of proverbs, but mental models can take other forms, as we will see later.

Sunk cost fallacy. This mental model advises us to only consider the potential *future* benefits of *additional* investments of time or money into a project, asset, etc., and to *forget* past investments. This is because past investments are gone, while future investments are yet to be made. The emphasis should be put on decisions that will create the most benefit in the future, regardless of where past investments have been made. The sunk cost fallacy is summed up by the proverb: "Don't throw good money after bad."



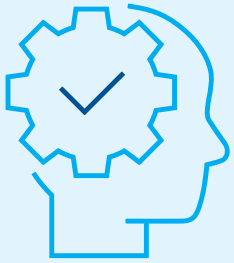
Compound interest. This is a powerful mental model for understanding the value of making small but consistent steps toward many of life's endeavors, not just for financial investments. The impacts compound over time to make a big difference. This model is expressed by the proverb: "The best time to plant a tree was 20 years ago."

Opportunity cost. This is a mental model that recognizes the cost of opportunities not taken and encourages mindfulness of the benefits available from other courses of action. "Time is money" captures the idea of opportunity costs by encouraging us to be mindful of how we spend time. Every minute is an opportunity to achieve something. We don't want to waste those opportunities.

These mental models can supplant other mental models that may be less helpful...

- **Sunk cost fallacy** supplants the model expressed by "in for a penny, in for a pound," which encourages staying the course no matter what.
- **Compound interest** can supplant a model that problems must be solved immediately, often expressed by "go big or go home."
- **Opportunity cost** supplants models that narrow our focus. "Live for today" ignores the long-term. "Follow your heart" ignores rationality and favors emotional decisions.

Here we've seen three mental models that have implications for public finance. We also saw that proverbs are one form of mental model and that these mental models can replace less helpful ones. Next, we'll look at mental models for public finance that take other forms.



We need more mental models! And you can help...

There are many concepts in public finance where public officials could benefit from better mental models. For this reason, GFOA is holding the **Mental Model Makeover Challenge**. One lucky winner will receive an all-expense paid trip to the 2025 GFOA conference in Washington, DC.

JOIN THE CHALLENGE

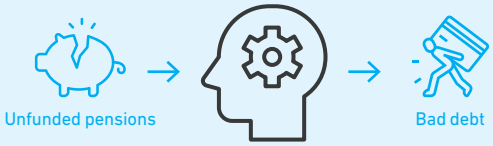
Public Finance Mental Models

Let's examine four mental models that could enhance decision-making in public finance. We'll see concepts that are unique to public finance, but we'll also bring in some concepts from the last section.

Our first two mental models will rely heavily on metaphor. Reserves or "rainy-day funds" often come up in discussions with elected officials. A common mental model used to explain reserves is the metaphor of reserves as a government "savings account." This is easy to grasp and has a *seemingly* obvious parallel to the audience's personal lives. However, this mental model has important limitations. First, people with no finance background often view savings as deferred spending, such as saving for a vacation, a house down payment, or a new car. They may not see it as a hedge against risk to the same degree as finance officers do.[2] Second, it implies that more is better, when, in reality, holding excessive reserves can involve significant opportunity costs. In **"Should We Rethink Reserves?,"** GFOA suggests supplementing the savings account metaphor with the idea of reserves as an insurance policy. This directly links reserve's role in responding to unplanned, unavoidable costs or revenue losses, it has an obvious parallel to our personal lives, and it suggests there is an optimal amount to hold—not too much, not too little.

Another common discussion with elected officials and the public is unfunded pension liabilities. Non-experts may find it challenging to understand the importance of keeping up with pension funding. The CFO of the Town of Queen Creek, Arizona, Scott McCarty, had to explain this complex concept to the Town Council and the public to ensure the growing community's financial stability for the future. Otherwise, the Town's pension liability could grow along with the Town. Most people do not deal with "unfunded liabilities" in their daily lives. They don't have a clear mental model for understanding this concept. This makes it harder to grasp and harder to resolve. McCarty simplified it by describing the unfunded liability as "bad debt" and the employer contributions toward that as "interest." Almost everyone has personal experience with the potentially crippling consequences of bad debt, whether through high credit card interest, overwhelming mortgage and interest payments, or student loans that you are not getting value from later in life. Thus, just as people are better off without bad debt, it was clear to see that Queen Creek would be better off without the bad debt of unfunded pension liabilities. McCarty also used mental models to help explain opportunity costs and compound interest. The money the Town was spending on the "interest payments" on the "bad debt" was money not spent on more firefighters or police for the growing community (opportunity costs). Even small contributions toward paying down the principle on the "bad debt" would have a big impact over time (compound interest).

QUEEN CREEK'S MENTAL MODEL IN ACTION



= a problem to avoid

Our next mental model uses story elements. GFOA's **Rethinking Budgeting** uses the parable of the "Tragedy of the Commons" to describe the competition for resources that takes place in budgeting. The story goes like this...*

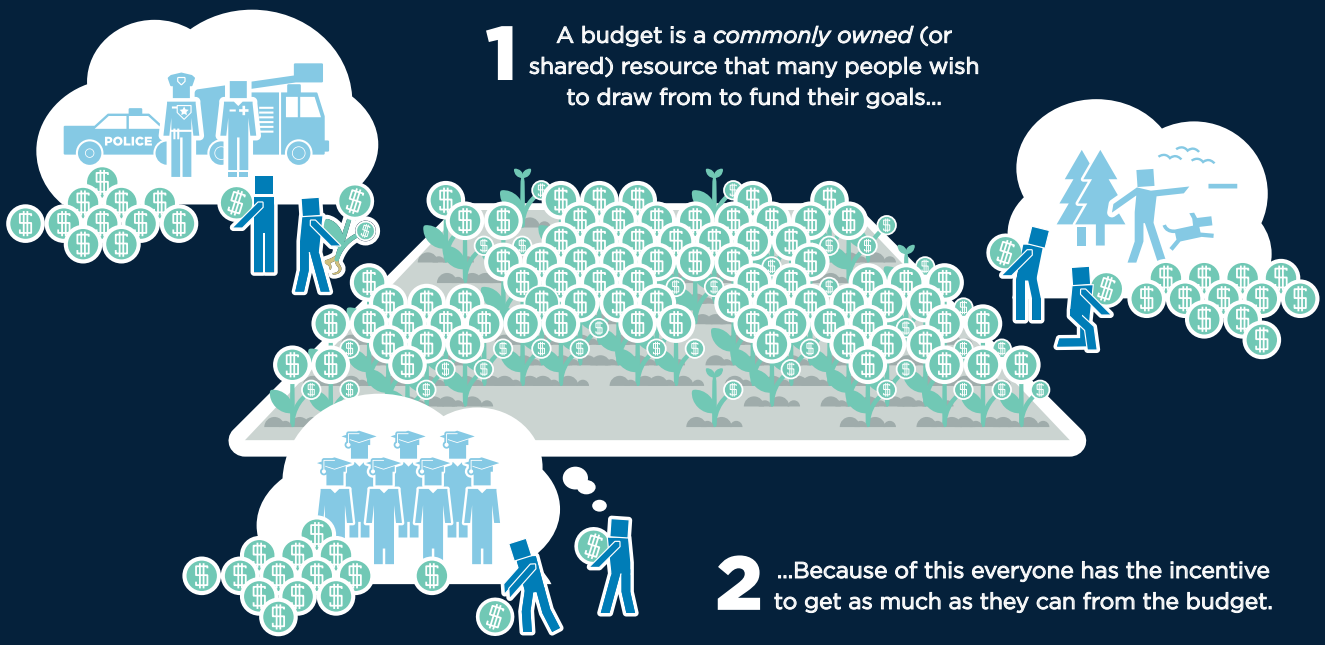
In a verdant village, there existed a lush common pasture where every villager was free to graze their livestock. Initially, the villagers took only what they needed, maintaining the land's abundance. But as the village grew, so did the desire to use the pasture. Each villager, thinking a little more wouldn't hurt, began to graze more animals.

Slowly, the pasture thinned under the weight of excess, transforming from a green haven into a barren wasteland. The villagers, too late to realize their folly, faced a dire shortage. The commons they had taken for granted, burdened by excess, could no longer sustain them.

This tragedy, arising not from malice but from a lack of collective foresight, mirrors the challenges local governments face in budgeting. Just as the villagers mismanaged the commons to the point of ruin, local governments can also strain shared resources through short-term gains and insufficient planning. The tale of the village and its common pasture serves as a strong metaphor for the importance of prudent, collaborative budgeting. It highlights the need for local governments to manage public funds with an eye toward sustainability and the common good, ensuring that shared resources benefit all members of the community now and in the future.

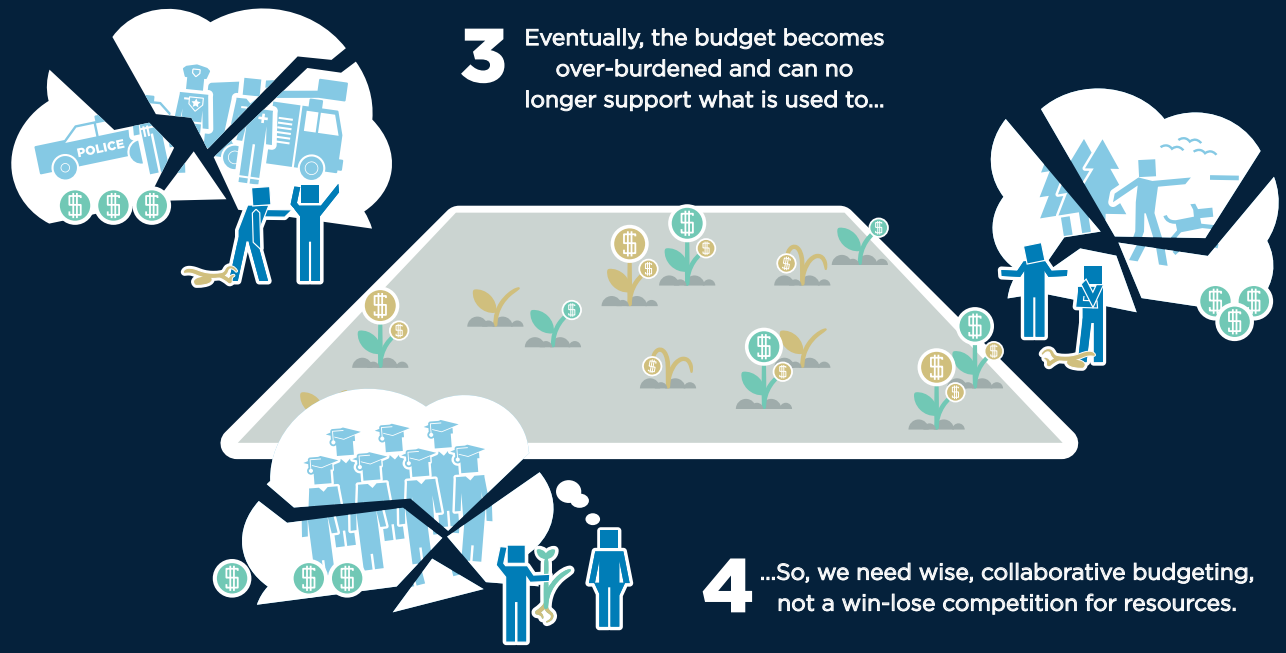
*Story generated by ChatGPT4.

THE TRAGEDY OF THE COMMONS* IN LOCAL GOVERNMENT BUDGETING



1 A budget is a *commonly owned* (or shared) resource that many people wish to draw from to fund their goals...

2 ...Because of this everyone has the incentive to get as much as they can from the budget.



3 Eventually, the budget becomes over-burdened and can no longer support what is used to...

4 ...So, we need wise, collaborative budgeting, not a win-lose competition for resources.

*The Tragedy of the Commons is a name for a resource problem that occurs in many different domains. GFOA's Financial Foundations for Thriving Communities describes how to solve this problem in public finance.

The Tragedy of the Commons mental model seeks to replace the more common "win-lose game" model that characterizes local government budgeting, where participants compete against each other for resources.

Finally, we have mental models as a process. Elected officials in the City of Saco, Maine, were concerned about the stability of the property tax burden on their community. They were right to be as big year-to-year changes in property tax liability is the main cause of tax revolts.[3] Glenys Salas, Director of Budget and Financial Analysis, developed a mental model to illustrate a sustainable cycle of municipal government. Shown in Exhibit 1, this model helped elected officials understand where external forces and government action might intervene in the cycle and impact tax rates.

According to Salas, the "model sets best-in-class City services as the foundation of a healthy and growing community. Those best-in-class services drive population growth, as more people and businesses want to be a part of our community. Population growth drives growth in real estate values, whether that be new development or rising demand for existing inventory. That growth in real estate values ensures rising tax revenue, which pays for the inflation-based cost increases of best-in-class City services with minimal impact on the property tax rate. This cycle is the foundation of annual budget development and helps identify and explain influencing factors. The model takes the complicated relationship between property value, tax rates, and budget numbers and turns it into an easy-to-understand flow chart."

In 2024, the City faced increases in the utility costs that exceeded inflation. Salas illustrated that increasing utility costs hindered the City's ability to provide best-in-class services, threatening to turn the green arrow next to that icon to red. Thus, the budget would need to find ways to pay for higher utility costs without sacrificing the quality of City services and without causing a spike in property taxes for the community.

EXHIBIT 1 | SACO'S SUSTAINABLE CYCLE OF CITY GOVERNMENT

What Makes a Good Mental Model

So far, we've explored a series of mental models, but to develop new and more useful ones for public finance, we need to understand the characteristics of effective models. We will now present design principles for creating mental models. A mental model does not have to comply with every design principle. Rather, think of this as a paint palette of options as you make your own models. Just as every color on a palette might not be a fit for every painting, not every principle needs to be used for every model.

Make things as simple as possible, but not simpler.* There are limits to how far a complex public finance concept can be simplified. Oversimplifying can make a model too different from reality to be useful. For example, Cori Wallace, Director of Communications & Community Relations for the City of Lawrence, Kansas, was frustrated by the common mental model for budgeting as "balancing the family checkbook." This model oversimplifies the task of budgeting, thereby missing important nuances. For example, family members typically love each other, making it easier to decide how to distribute scarce resources. In contrast, participants in the most well-functioning local government budget process don't share this kind of familial love! This makes allocating resources quite different from managing the family checkbook.

All models are wrong, but some are useful.** While models can't perfectly depict reality, they can still be helpful. This principle pairs with our previous one: though we should not oversimplify a model, we must also accept that every model is imperfect. Thus, we should seek a balance between simplicity and descriptive power.

Lean on analogies and metaphors. Analogies and metaphors can pack a lot of information into a small and beautiful package. Analogies draw upon information already familiar to us about the generic properties of a concept or category. Earlier, we used an insurance policy as a metaphor for a reserve. Generally, people know that insurance policies pay out when a bad thing happens, requiring ongoing resources to maintain insurance coverage. An analogy can be particularly effective when it relates a public finance concept to something people are familiar with in their personal lives. They do not have to spend mental effort understanding that part of the analogy.

A mental model should not just help people understand a public finance concept but also help them make better decisions. Analogies or metaphors that do this are known as "generative analogies."[4] The "reserves as insurance" metaphor, for example, might cause decision-makers to: consider the risks they are "insuring" against; reserve the right amount given those risks; consider other risk mitigation besides reserves; and use the reserves when the time comes.[5]

To develop generative analogies, consider using tools like ChatGPT. In our experiments with ChatGPT-4, it produced several options for generative analogies for a local government's reserves. While some options were not useful, it did generate the insurance policy analogy that GFOA has found to be effective. This suggests that generative AI can create generative analogies for other public finance mental models. However, finance officers will need to separate the wheat from the chaff in the AI's output.

Prompt Engineering for Generative Analogies

Below is the prompt we used with ChatGPT-4 that produced a list of generative analogies for reserves. But before doing so, we first asked ChatGPT to give a definition of a local government's reserve to see if had an adequate understanding of the concept.

Imagine you are the CFO for a local government. You need to explain to the elected governing board how to make better decisions about the government's reserve. What are some generative analogies you could use?

*This is a quote attributed to the physicist Albert Einstein.

**This is a quote attributed to the statistician George Box.

The power of proverbs. Proverbs are valuable for communicating mental models because they are simple and profound.[6] Proverbs can wrap an abstract concept into concrete language. Earlier we introduced "compound interest" as a mental model. This idea can be abstract, making it difficult for people to imagine the cumulative effects of annually increasing an investment by a certain percentage over many years. However, the proverb "The best time to plant a tree was 20 years ago" makes the underlying model clear—a small investment (planting a seed) pays off big (a tree) over time. Similarly, you might be able to find an existing proverb that can effectively convey your mental model.

Generative AI tools can help. For example, we gave ChatGPT-4 a description of compound interest and then asked it for a list of well-known proverbs that describe the mental model of compound interest. The list included the tree proverb we used here as well as other examples, such as "slow and steady wins the race" and "a journey of a thousand miles begins with a single step."

We also asked ChatGPT to create an entirely new proverb to express the idea of reserves as an insurance policy. For public finance officers focused more on clarifying finance concepts for their audience than winning a literature prize, the results could be more than adequate.

A Proverb for Reserves *by ChatGPT-4*

"For fiscal health and peace of mind, a reserve fund is the best insurance one can find."

Tell stories. In *Made to Stick*, authors Chip Heath and Dan Heath point out that stories are effective for communicating mental models because they provide:[7]

- **Simulation**—Knowledge about how to act.
- **Inspiration**—Motivation to act.

Earlier, we showed the Tragedy of the Commons as a story that illustrates the challenges of managing a collective resource, such as a budget. It simulates what happens when a group fails to adequately manage a collective resource. The ruin that befell the village serves as a strong motivation to act responsibly.

The Tragedy of the Commons provides a valuable lesson by likening budgeting to a village's grazing area. However, stories can directly involve characters from local government and the actions they take. Saco's sustainable cycle of city government is a kind of story. Each of the circled elements in Exhibit 1 represents a character, and the arrows are the actions they take in the story of the City's financial health.

Decompose processes. Often, understanding a concept within public finance as a sequence of steps—where one step leads to the next—makes the concept more concrete. Expressing these steps graphically, like in Saco's example, adds to the memorability of the model.

Highlight impact. A mental model can link financial decisions to their effects on community services and quality of life. All the public finance mental models we've discussed accomplish this. The metaphors of "reserves as insurance" and "unfunded pensions as bad debt" imply the consequences of not heeding the model—going un- or under-insured and accumulating crippling bad debt. The Tragedy of the Commons highlights the impact of mismanaging a commonly held resource. The Saco model highlights how a sustainable budgeting and planning cycle can lead to best-in-class city services.

Simulate. If experience is the best teacher, then simulations could be a close second. They provide the mental material needed to build the structural frame of mental models. For example, GFOA develops computer simulations to assess a local government's financial risks by showing how changes in key variables can affect outcomes. This helps people understand the role and magnitude of these variables in the local government's reserve strategy. Similarly, Saco's sustainable cycle of city government is also a form of simulation. It suggests a clear cause and effect relationship that invites the audience to run *thought experiments** about how various external forces or the City's decisions might impact financial condition.

ChatGPT and Storytelling

The story of the Tragedy of the Commons, along with its closing paragraph on implications for local government, was created by asking ChatGPT-4 to tell a story about the Tragedy of the Commons in 200 words or less, and to develop a closing paragraph that links the Tragedy of the Commons to local government budgeting.

*According to ChatGPT, a thought experiment is a hypothetical scenario designed to explore ideas, principles, or theories in a way that doesn't rely on physical experimentation. It's an exercise in imagination used to investigate the nature of things or examine the consequences of a concept or principle in a controlled, mental environment.

The Map is Not the Territory: All Mental Models Have Blind Spots

A map is a model of a physical territory. It Is not a perfect representation of every aspect of it. Like a map, mental models are not perfect descriptions of reality. Models will miss important details. Therefore, we should think about the blind spots our models might leave and then address them. Let's look at some examples.

A blind spot in the "reserves as insurance" metaphor is that reserves are sometimes used as deferred spending. Funds are accumulated over time to pay for costly projects unaffordable within a single year's revenue. That's why GFOA recommends using the "reserves as savings" and "reserves as insurance" metaphors together.

Another blind spot of the "reserves as insurance" metaphor is that insurance policies are purchased to cover known risks. Reserves are expected to also cover unknown risks—the unexpected sources of loss that can arise each year. This problem is addressed in the GFOA report "" by differentiating the "known unknowns" from the "unknown unknowns." The former is exemplified by an earthquake-prone area. It is known that quakes are a risk, but the timing and magnitude of a quake are unknown. The latter consists of risks that no one has thought about. For example, 15 years ago, cyberattacks were not known as a potentially catastrophic risk for local government. Now, they are. And with the rising cost of policies and stricter underwriting standards for cyber-insurance policies, some governments are thinking about how reserves might help self-insure against this risk.* The GFOA report suggests how unknown unknowns can be accommodated in a "reserves as insurance" strategy.

Glenys Salas, Saco's Director of Budget and Financial Analysis, considered the blind spots in Saco's model. One blind spot became apparent when property values increased at a rate greater than the cost of City services due to the high demand for property in Saco. The City needed to lower tax rates to keep the total tax burden stable. This was not a situation the model was designed to address. The model also does not address the role of fund balances in the City's budget. These balances must be addressed separately during budget deliberations.

Finally, though Saco has undeveloped land and room to grow, there are limits. This is especially important for communities nearing or at full development. They must consider the long-term costs of maintaining the infrastructure built during periods of growth, using a tax base that is not growing at the rate it once did.

Conclusion

Using mental models is a powerful way to convey deep knowledge and understanding in a small package. They enhance decision-making by bridging the gap between expert knowledge and practical application in a political environment. They do this by providing a structural frame for the user to absorb new information and to incorporate it into their decision-making.

Public finance officers can develop and share better mental models to help their audience make better decisions. In this paper, we not only examined a series of models, but we also provided design principles for creating new ones. As you create new models, please **share them with GFOA** so we can build a repository of better mental models for public finance. Together, the profession can build a better toolset for informed decisions that support thriving communities.

ENDNOTES

[1] For example, see the Great Mental Models Project by Farnam Street, including a series of books "The Great Mental Models" by Shane Parrish, et al.

[2] Please see the following research for further related discussion: Fenimore, A. & McCue, C. (2021). Are public managers wired for risk aversion? *Public Finance & Management, 20*(1). Hildreth, B. W., Yeager, S. J., Miller, G. J., & Rabin, J. (2017). Finance managers' propensity to save. J*ournal of Public Budgeting, Accounting & Financial Management, 24*(2), 1–35.

[3] Fisher, R. C., Bristle, A., & Prasad, A. (2010). An overview of the implications of eliminating the property tax: What do recent state debates and prior state experience tell us? The Property Tax and Local Autonomy (ed. Michael E. Bell, David Brunori, and Joan Youngman). Cambridge, MA: Lincoln Institute of Land Policy.

[4] Heath, C. & Heath, D. (2007). *Made to stick: Why some ideas survive and others die.* (1st Ed.). Random House.

[5] Research suggests that local governments often do not use their rainy-day funds when the proverbial rainy day arrives in the form a recession. See, for example, the following journal articles empirically examining local government expenditure stabilization: Marlowe, J. (2005). Fiscal slack and counter-cyclical expenditure stabilization: A first look at the local level. *Public Budgeting & Finance, 25*(3), 48–72. Wang, W. & Hou, Y. (2012). Do local governments save and spend across budget cycles? Evidence from North Carolina. *American Review of Public Administration*, 42(2), 152–169.

[6] Heath, C. & Heath, D. (2007). *Made to stick: Why some ideas survive and others die.* (1st Ed.). Random House.

[7] Heath, C. & Heath, D. (2007). *Made to stick: Why some ideas survive and others die.* (1st Ed.). Random House.

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