



FMI Conference

Financial Forecasting Stream

November 20, 2019



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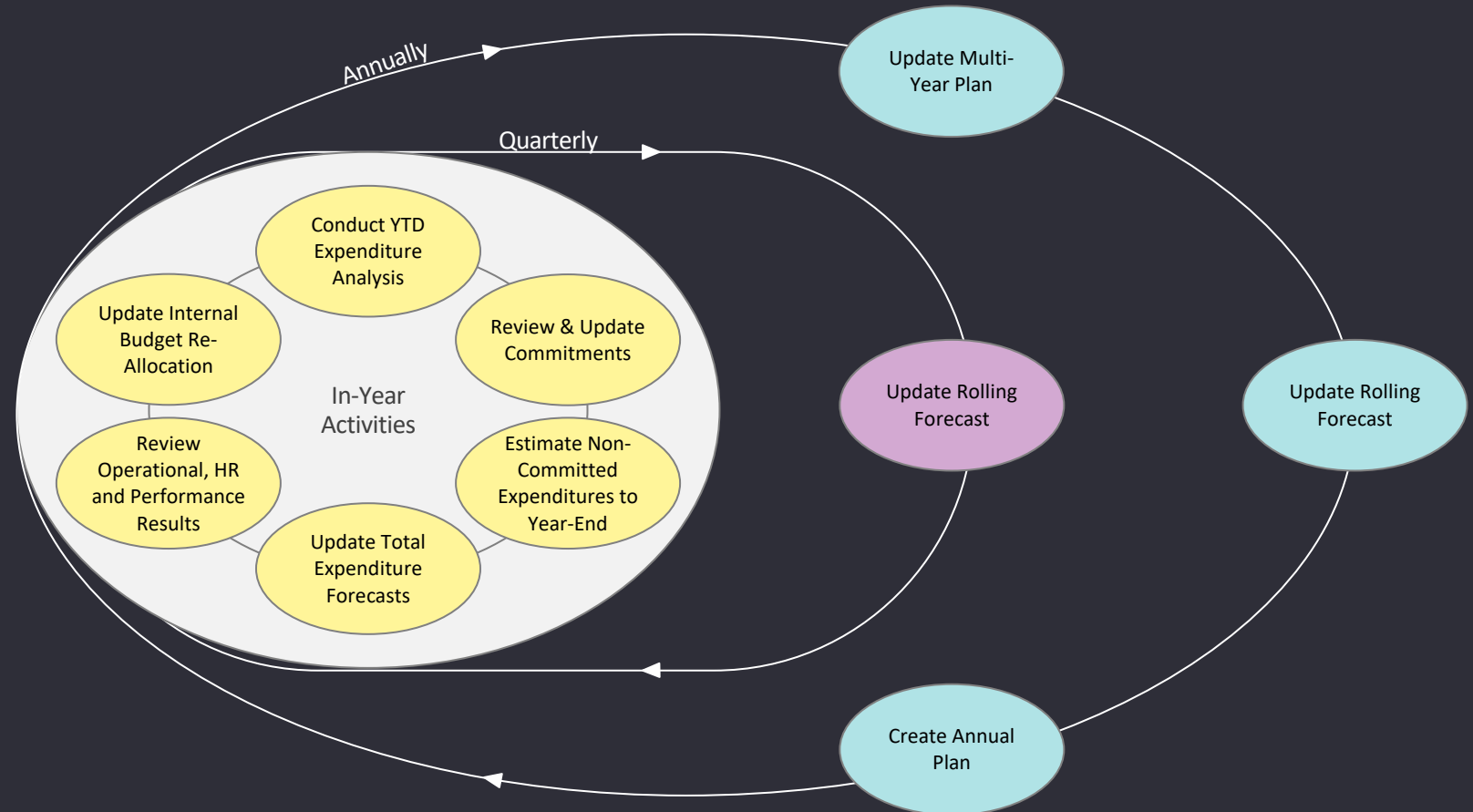
Strategy & Public Finance Management

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Section 1 – Forecasting Principles

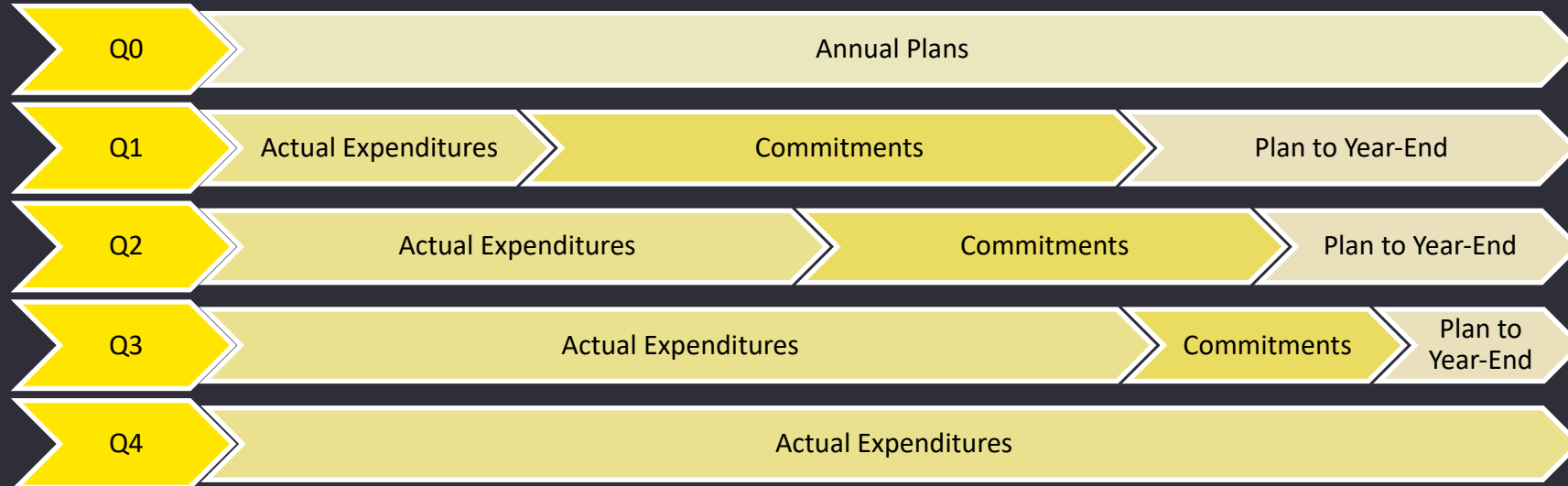
Key Steps In Forecasting

- ▶ Forecasting is a multi-step process which requires integrating multiple inputs, both financial and non-financial
- ▶ Effective forecasting requires the integration of both financial and operational forecasts



Current Process for In-Year Forecasting

- ▶ Each update ends with the fiscal year, tied to spending authority from Parliament
- ▶ Business planning continues, both for day to day operations & projects, albeit without commitments
- ▶ Operational expenditures continue, even if procurements cannot proceed



The Value of Rolling Forecasts

Rolling forecasting incorporates a consistent, foreseeable planning horizon that extends 12 to 18 months beyond the fiscal year, providing better insights into future projected expenditures and revenues.

Leading organizations in both the public and private sectors often adopt rolling forecasts because:

- ▶ They provide a more holistic picture than static forecasts
- ▶ They allow for more informed decision making
- ▶ They reduce the time required for annual planning
- ▶ They reduce “horse-trading” on annual budget goals by developing a rigorous, ongoing view of the future drivers and outcomes

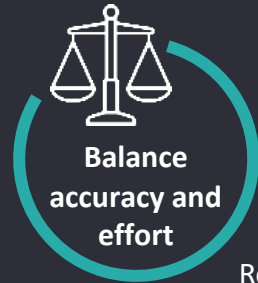


Key Elements of a Rolling Forecast



Focus on the right drivers

Rolling forecasts benefit services with variable costs, unpredictable demand, that are seasonal, or volatile



Balance accuracy and effort

Rolling forecasts should be detailed enough to enable decision making while being timely to produce and analyze



Enhance decision support

Evidence-based adjustments can be made, and the impacts of in-year decisions tracked more effectively



Forecasts inform planning

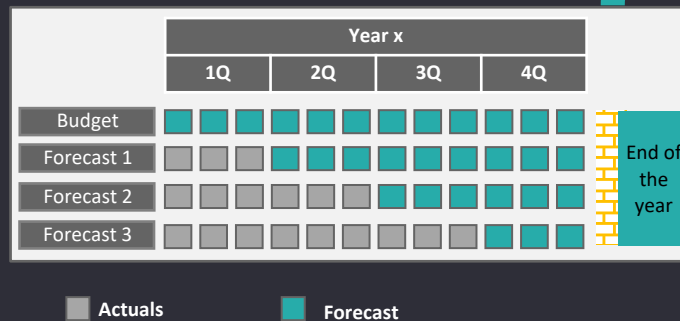
Rolling forecasts shorten the planning cycle while improving its accuracy through regular management decisions

UPFRONT EFFORT

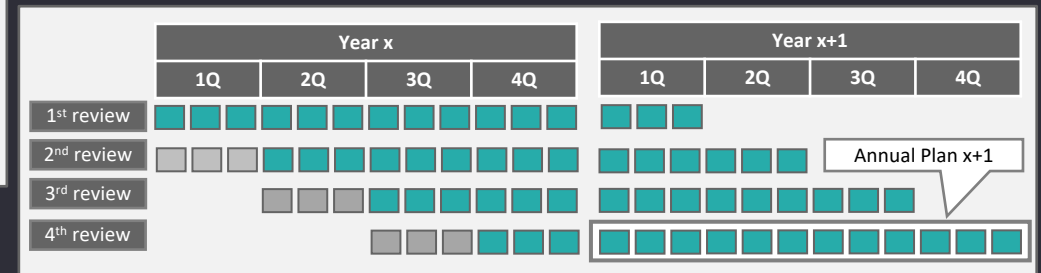
- Rolling forecasts are an output of all key forecast and planning decisions from various functional areas (volume, cost rates, overheads, demand, supply etc.)
- Data is extrapolated and disaggregated to planning level to build a forecast extending beyond the current fiscal year

The budget and forecast process

From Forecasting to the "wall"....



...to "Rolling forecasts" where a consistent planning horizon extends beyond the current budget year.



Case Study – Rolling Forecasting in a Private Sector Context

Objective

A multi-billion dollar consumer products company needed to transform its financial planning and reporting process to increase accuracy and efficiency.

Their new CFO mandated the adoption of a rolling forecast and tighter integration with the Operations Plan.

Drivers

CFO mandated adoption of a rolling forecast and tighter integration to the Operations Plan to:

- ▶ Improve the projection (plan and forecast) accuracy and drive ownership through clear linkage and definition of drivers and metrics
- ▶ Standardize assumptions across the organization for planning and forecasting
- ▶ Reduce the effort and duration of the planning and forecast process
- ▶ Reduce reporting cycle times and shift focus to decision support

Benefits achieved

- ✓ Created a rolling forecast with monthly integration to the Sales and Operational Plan
- ✓ Reduced the annual planning and forecasting cycle time by over 50%
- ✓ Allowed staff to focus more on analyzing business performance by reducing the time spent on manual data collection and consolidation
- ✓ Created scenario analysis capabilities that provided a better understanding of the impacts and trade-offs of different business decisions

To be Successful a Rolling Forecast Must be....

- ▶ **C**ost-effective
- ▶ **A**ctionable
- ▶ **R**eliable
- ▶ **T**imely

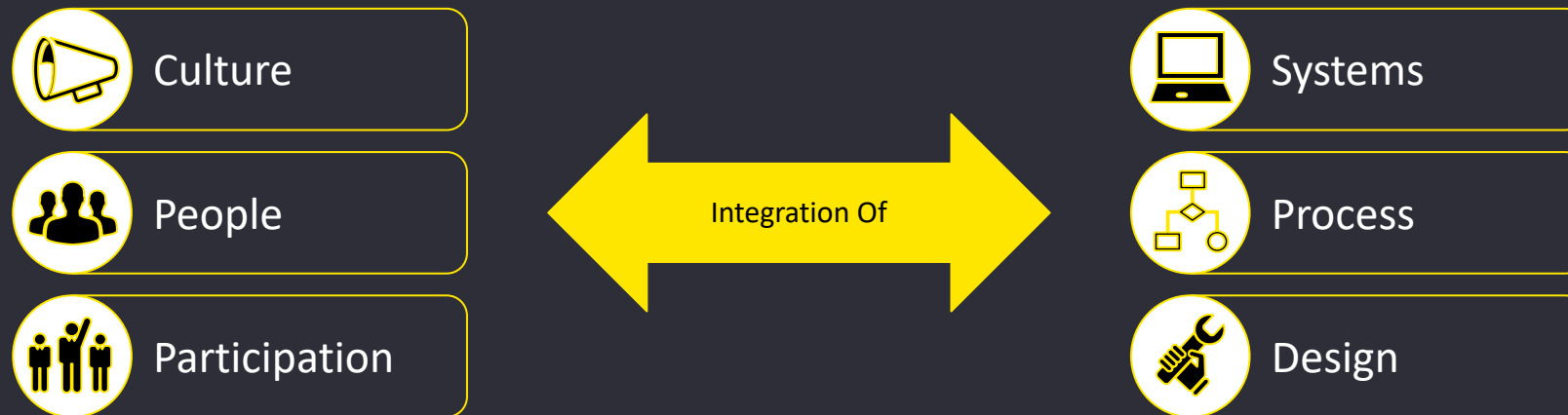


Reconciling Rolling Forecasting with Public Sector Fiscal Year Budgets

- ▶ Governments, at almost any level, prepare multi-year budgets and plans typically using a three to four year horizon
- ▶ During the fiscal year, in-year spending decisions regularly have budgetary impacts on out-years which are inconsistently tracked, managed and forecasted
- ▶ Typically, reconciling the impacts of in-year decisions on future years is done during the subsequent budget cycles
- ▶ Rolling forecasting presents an opportunity to not only increase the focus and accuracy of spending impacts 'beyond the wall' of the fiscal year, it also creates an opportunity to effectively incorporate the impacts of in-year decisions on future fiscal years so that they are appropriately understood, tracked, and evaluated

Successfully Implementing Rolling Forecasts

- ▶ Rolling Forecasting is a process that can be implemented, but it requires a fundamental change in how organizations think and therefore touches all elements of a how they work



- ▶ Implementing rolling forecasting has operational impacts as well, and requires operating departments to develop corresponding processes

Overcoming Barriers to Rolling Forecasting

- ▶ Many organizations face barriers with implementing rolling forecasting – but there are effective solutions to overcome them!

Challenge

“

It's not needed. The fiscal year is what we live by – parliamentary authority, reporting, budgets, etc.

“

We would need new people, skills and technology. The cost is too high

“

Forecasts will probably be inaccurate. The further out we look, the more inaccurate we'll be.

Solution / Idea

“

The fiscal year is arbitrary and has no connection to the underlying cycle, so why stop with a fixed date?

“

Value – much cheaper to have greater visibility than to react to unforeseen situations

“

Still better – forecasting the possible ≠ predicting the future

Scenarios Planning vs Options Analysis

- ▶ There are key differences in scenario planning vs options analysis

Scenarios

- ▶ Outcomes or events that might occur at some point in the near or distant future
- ▶ Often fall outside of the current business environment and challenge the norm
- ▶ May require different analytical tools and capabilities
- ▶ Key challenge is to envision them and discuss them openly, far enough in advance to be able to act

Example

Impact of self-driving cars on traffic laws and parking enforcement

Options

- ▶ A (more) concrete idea actively being considered and requiring analysis
- ▶ Usually seen as adjustments to the existing business, and shorter term
- ▶ Fit within current modelling and business structures / capabilities
- ▶ Key challenge is the analysis itself, since details and timing are often critical

Example

Planning for an X% reduction in police dedicated to traffic laws and parking



Better Planning and Budgeting

Rolling forecasts can play a significant roll in improving planning and budgeting processes in the public sector through...

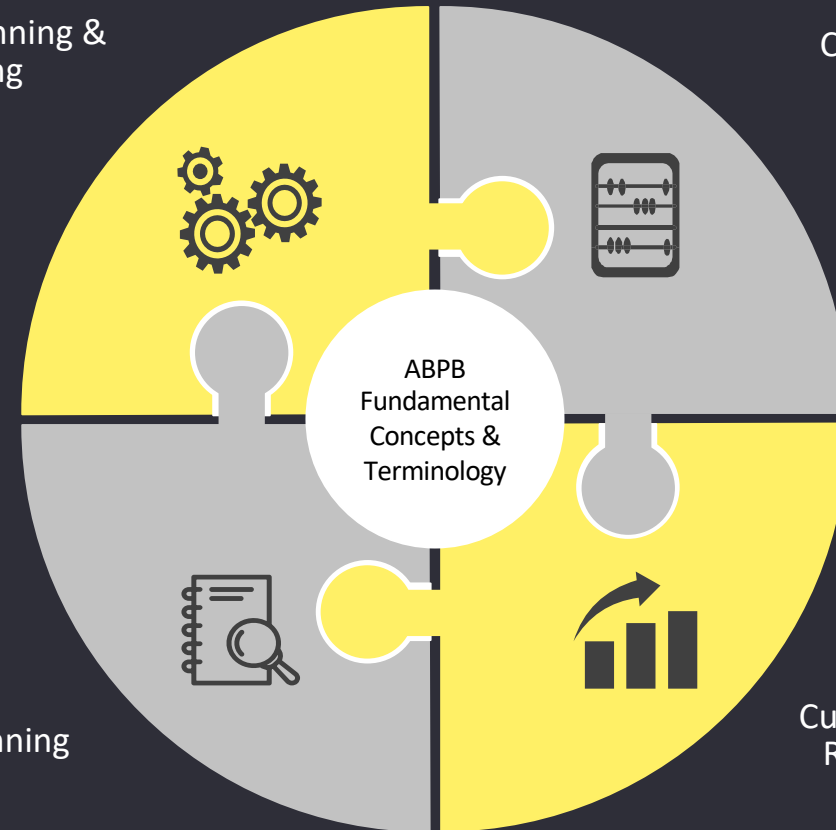
... And provides an effective lens to continually reassess the assumptions that drive variances in forecasting!

Operations Planning & Forecasting

Current Budgeting Process

Capacity Planning Process

Current Performance Reporting Process



Variances and Impacts

- ▶ Variances are the inevitable result of assumptions and circumstances to matching forecasts
- ▶ But its NOT the variances themselves that need to be explained
- ▶ Rather, look behind the variances at the assumptions & drivers that drove the budget/forecast amounts and comment on why they differed



Key Drivers of Bad Plans

- ▶ Lack of planning
- ▶ Excessive focus on financial data
- ▶ Lack of linkage to business operations



Key Drivers of Good Plans

- ▶ Draws on operational planning, capacity planning
- ▶ Incorporates performance management
- ▶ Leads to a process valuable to both the languages of operations and finance

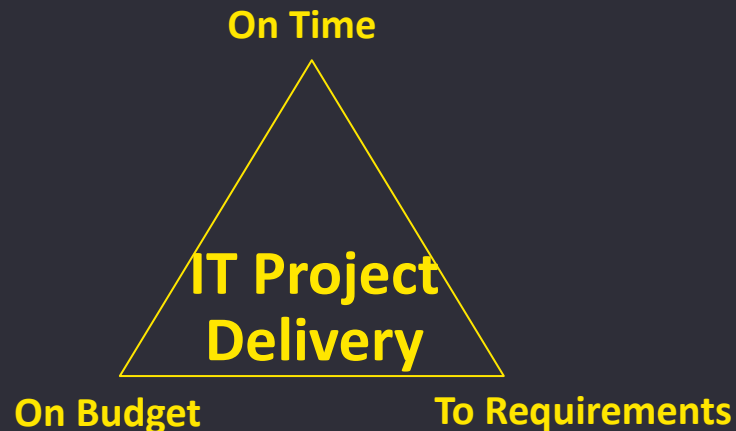
Finally, think about... how you would want to use improved forecasting?

- ▶ What decisions might the organization make based on the forecast?
- ▶ What actions might be taken?
- ▶ Who will be most impacted by the forecast?
- ▶ What if the forecast is wrong?
- ▶ Where might it be wrong?
- ▶ What can I do to improve forecast accuracy?

Section 2 – Forecasting & IT Project Risk

What makes planning and forecasting IT Projects so difficult?

- ▶ Very few, if any, IT projects are completed on time, on budget, and to the original features / requirements
- ▶ At some point, a trade-off will likely be made to implement something by a fixed date or fixed cost (i.e. What can I get for \$X or what functionality can go live on Jan. 1?) which often leads to the term Minimum Viable Product (MVP).
- ▶ That term expresses the minimum capability the organization can live with at a point in time, with the rest to come later

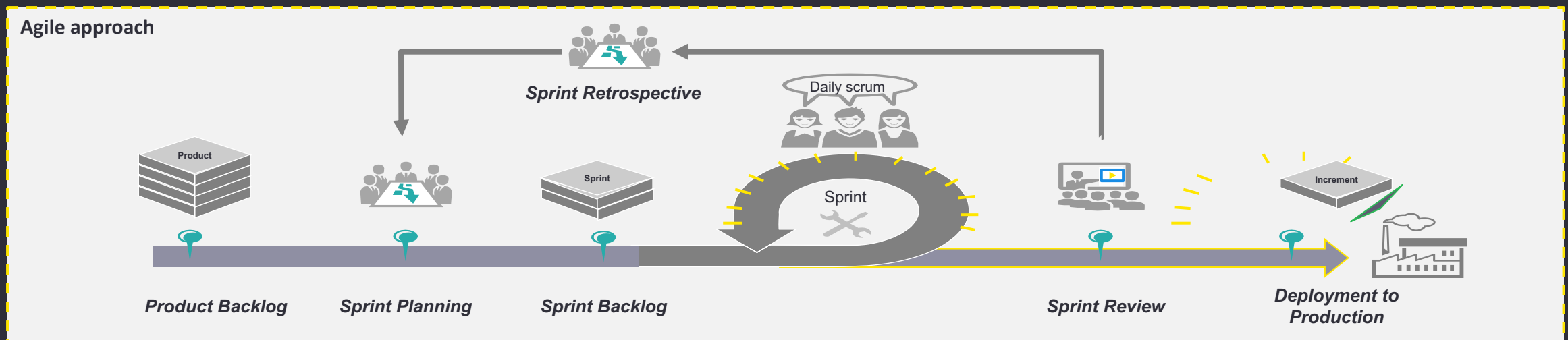


IT Project Contingency Planning

- ▶ IT project budgets need a larger contingency than most others (as do capital infrastructure projects). There are several reasons behind this:
 - User needs change as they learn about the system, discovering new functionality or drilling deeper into requirements
 - Many technical details, such as interfaces with other systems, are only going to be discovered during the implementation phase
 - Certain business units will do things differently and in a manner not quite in alignment with the solution's technical approach resulting in requirements changes and / or process changes
 - Some development will be more complex than expected, and take longer, just as a home renovation stumbles into unexpected circumstances
 - Similarly, some need will emerge that was never thought of or understood, so more resources are needed

How are IT Implementations Changing?

- ▶ IT Project implementations are changing – for the most part, gone are the days of ‘big bang’ implementations in favour of more agile project delivery
- ▶ Agile project delivery focuses on driving to an MVP while continually re-engaging users along the way to capture their feedback during development
- ▶ An agile approach can be very effective when it comes to delivering proofs-of-concept (PoCs) or Pilots as part of testing the impact of new technologies



How can IT projects impact Planning and Budgeting?

- ▶ IT project delays – whether enterprise level or driven by a single business unit – can have an outsized impact on Planning and Budgeting through:
 - Delaying benefits realization associated with project implementation
 - Impacts on other systems planned for integration
 - The need to acquire and onboard new resources for technology support and
 - Impacts to user expectations, either internal resources or members of the public

Section 3 – Emerging Technologies & Forecasting

Enabling Technologies in Finance and Forecasting

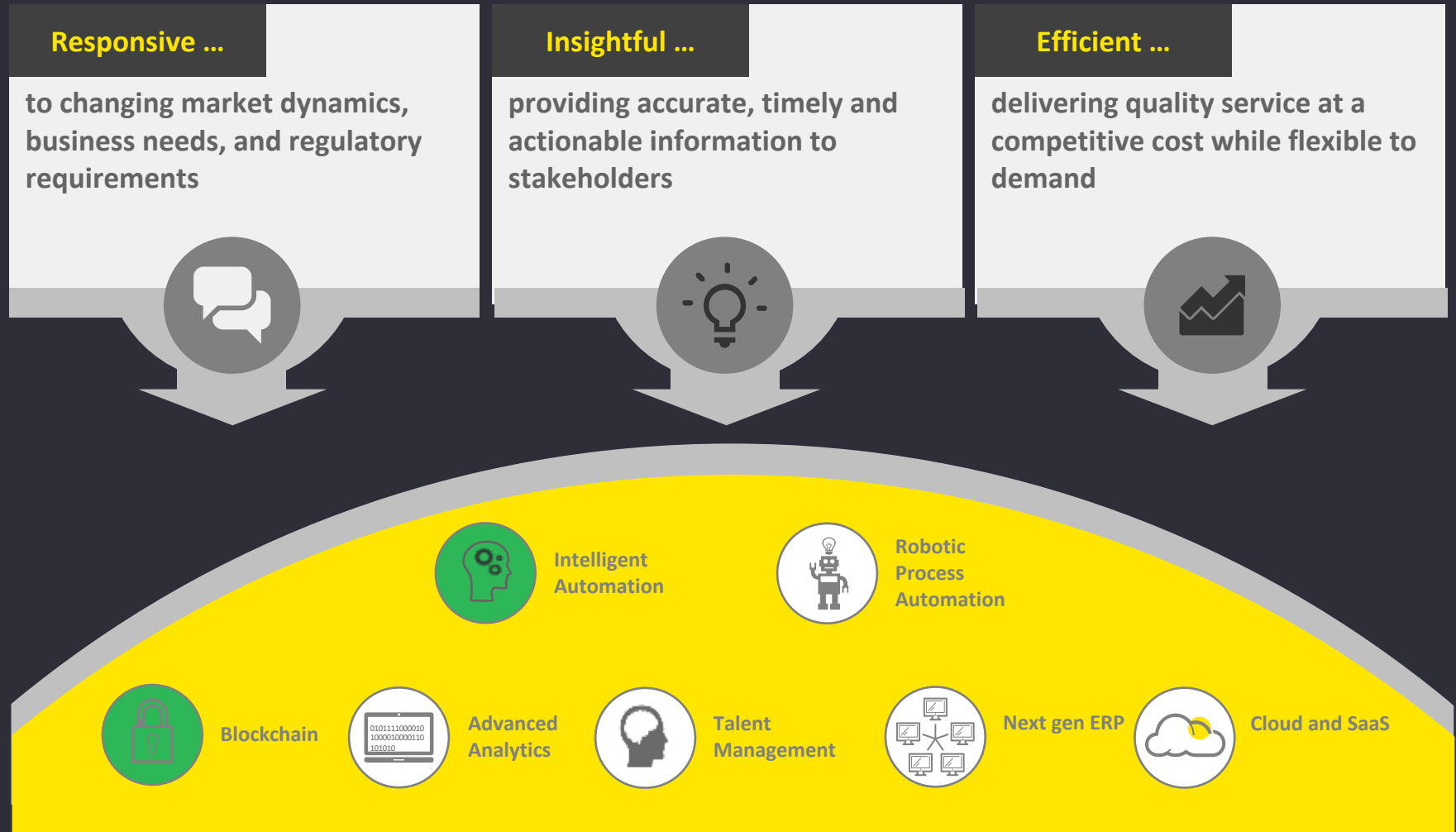
- ▶ Today we will focus on two emerging technologies:



Intelligent Automation



Blockchain



What is Intelligent Automation / Machine Learning?



What Can Machine Learning Do?

Machine Learning can run any number of prediction models including:

- ▶ Grouping items
- ▶ Predicting numbers
- ▶ Translating Languages
- ▶ Much More...



How do Machines Learn?

Learning models include:

- ▶ Supervised Learning (taught by a human)
- ▶ Unsupervised Learning (data mining)
- ▶ Reinforcement Learning (exploration and validation)



What do Machines Learn From?

Machines can learn from a wide variety of data and environments:

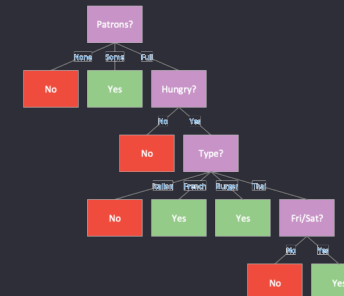
- ▶ Structured data (e.g. databases, excel)
- ▶ Unstructured data (e.g. PDFs)
- ▶ Positive and Negative Feedback

Class	Example
Address Change	I've moved
Address Change	I'd like to change my address
Address Change	Can I change my home address?
Phone Number Change	I want to change my phone number
Phone Number Change	I need a new phone number
Phone Number Change	Can I have a new number?

How do Machines Make Predictions?

Machine Learning models include:

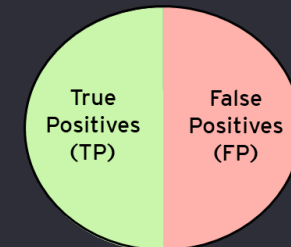
- ▶ Decision Trees
- ▶ Deep Neural Networks which assess weights and biases between options
- ▶ Prediction models can be transparent or opaque



How to Measure Success?

Machine Learning performance can be measured through:

- ▶ Precision, Accuracy and Recall
- ▶ Reduction in bias and variance

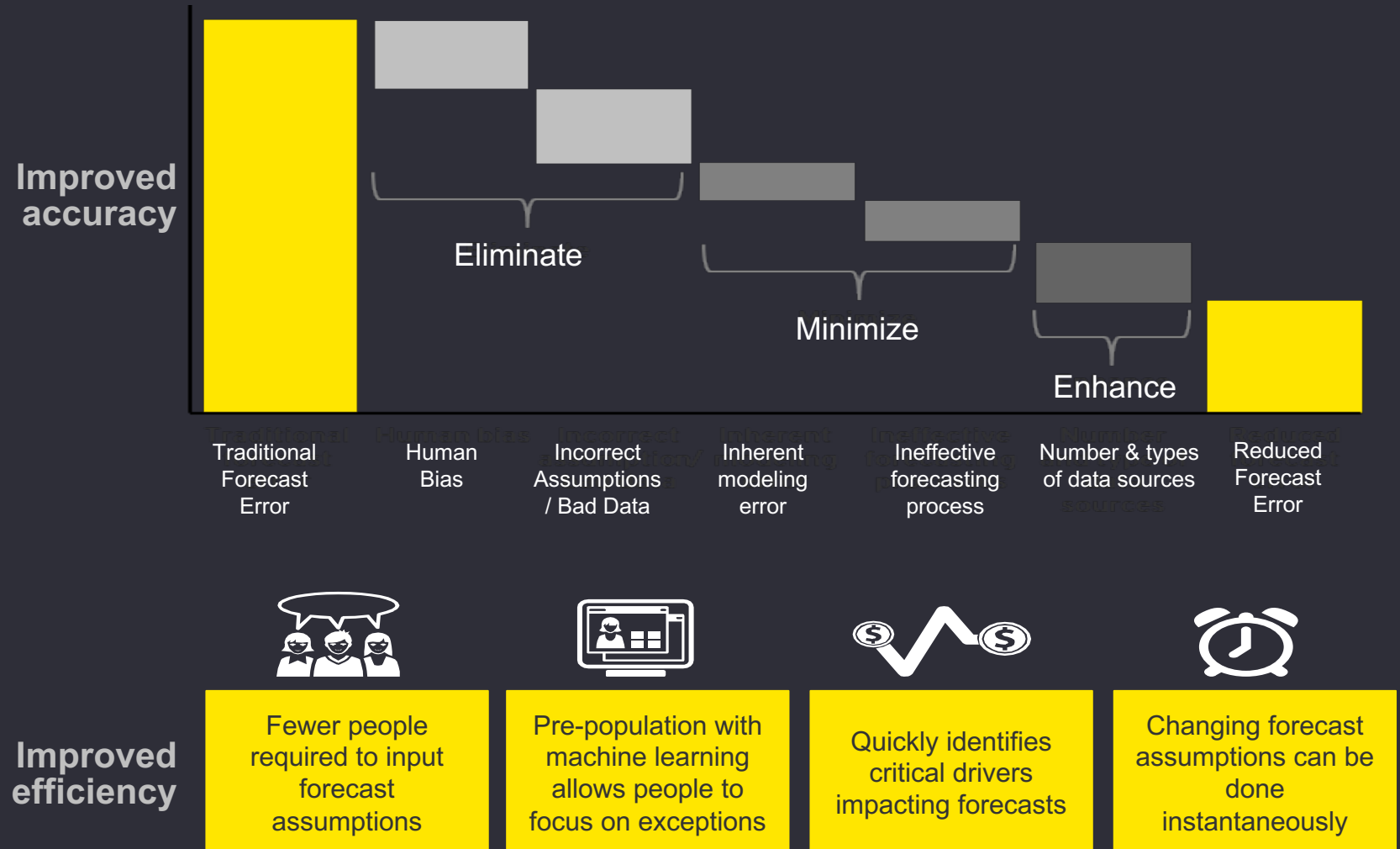


Machine learning addresses the common causes of inaccuracy and inefficiency in forecasting



An analytics-driven approach to forecasting eliminates the biases inherent in manual forecasts, while minimizing forecast errors and process inefficiencies.

In addition, the richness of the forecast model can be enhanced by incorporating diverse data sources, including unstructured and external data.





In 2014, Microsoft's CFO and the VP Machine Learning agreed to conduct a proof of concept with two goals:



Accuracy: Provide a strong unbiased baseline forecast for financial planning and analysis professionals who can apply their domain experience and adjust it to create a final revenue forecast



Frequency: More frequent forecasts to enable finance department to respond to the business

What did Microsoft achieve?

Accuracy



54%

improvement vs. manual-based forecast for Enterprise business

86%

improvement for the Cloud business

96%

improvement for the Consumer Hardware business

Speed



- ▶ Ability to rapidly respond within one day to requests for updated forecast within the quarter.
- ▶ Previously took several days.

What is Blockchain?



Think of a blockchain as a digital ledger of transactions, with a copy stored on every user's computer. Every time a new transaction takes place, a new record is added to the ledger, and an update is sent out to the rest of the network in a peer-to-peer fashion.

The key components of a blockchain are:



Trust and Transparency



Tokenization



Smart Contracts

TRUST AND TRANSPARENCY

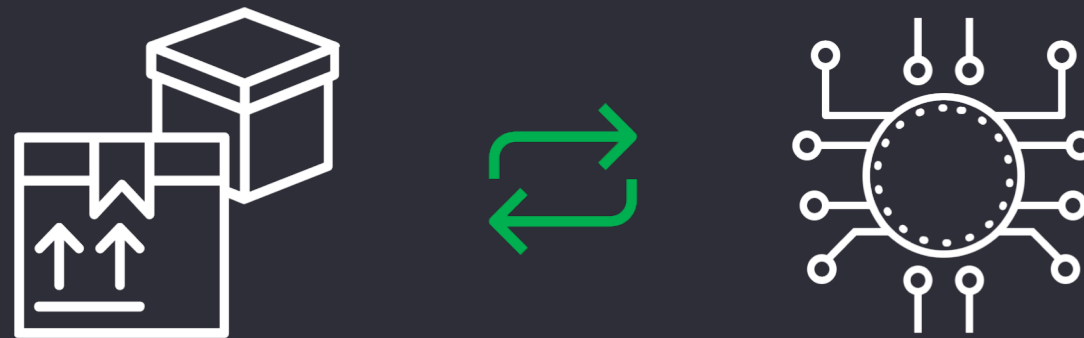


Every transaction is recorded to a ledger that is distributed to all participants in the network



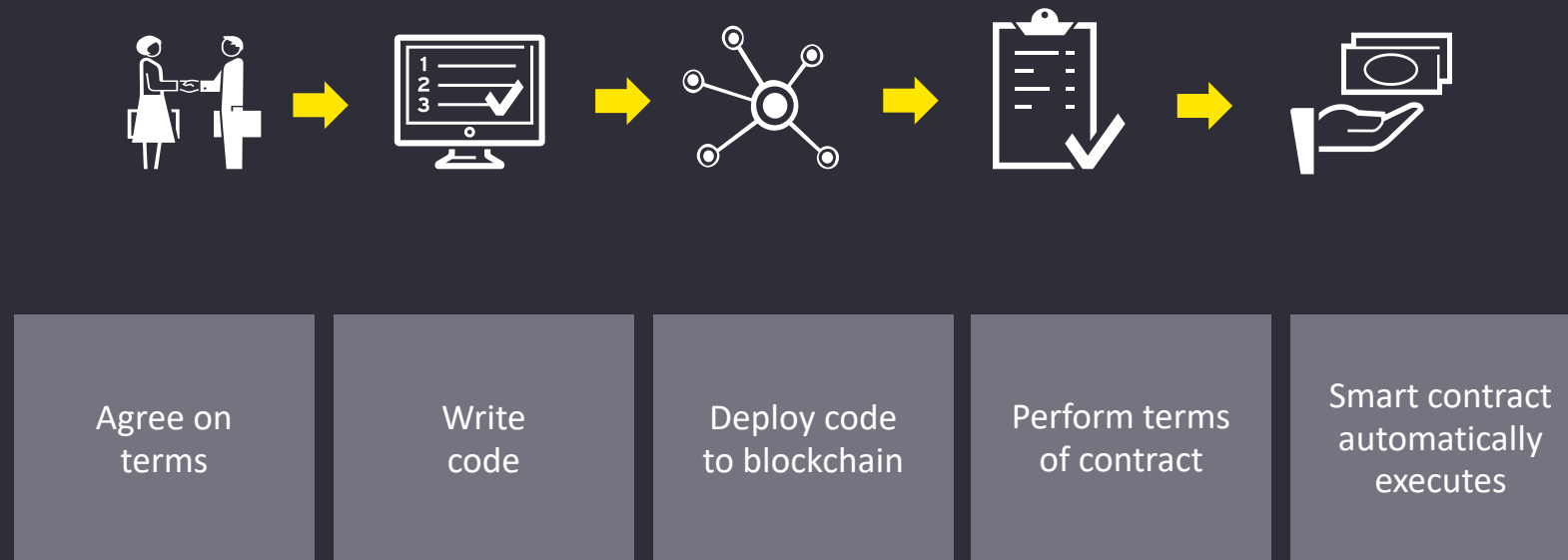


TOKENIZATION



Tokenization creates a unique digital twin to a physical asset

SMART CONTRACTS



Smart contracts allow for autonomously executing transactions based on agreed conditions



Modern public administration systems are characterized by ***complex interactions and networks of funders***, policy and program managers, and delivery agents that ***each play a role in delivering public outcomes***.

For all of the innovations in public administration, the ability to understand **WHAT** we spend our money on, **HOW** we spend it, and **RESULTS** delivered in an integrated real-time flow of information has yet to be achieved



1

Transparent, accurate, continual information for financial reporting and accountability along the entire PFM chain: central budget authority, program authority, delivery agent

2

Administrative efficiency and capacity in core financial management business processes such as budgeting, expenditure management and performance management, without significant financial management information system investment and risk

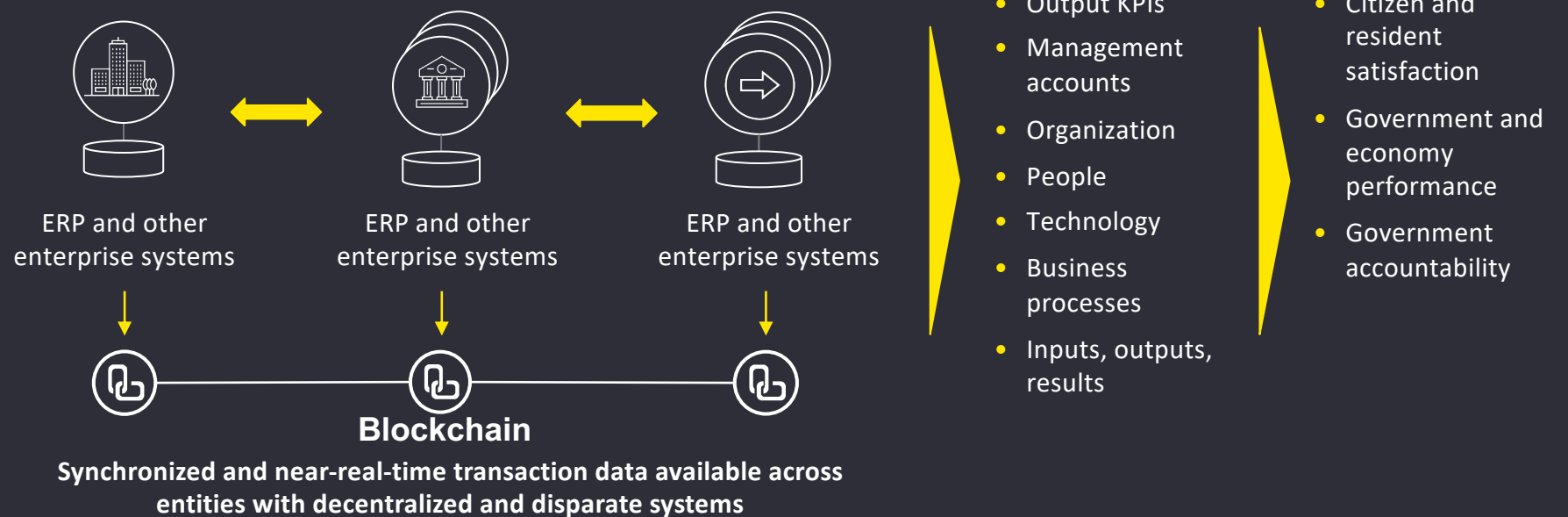
3

A single source of integrated financial and nonfinancial performance information provided continually to support managerial and strategic decision-making and help promote allocative efficiency and effectiveness for public outcomes



How can government entities better manage public financing?

Blockchain could be used in public finance to give governments of any level the ability to take the evidence-based decisions that lead to more efficient and effective allocation of taxpayer resources without the need for overhauling existing ERP systems.





Questions?

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