



Best In Class Costing Systems

What do the best costing systems have in
common?

GALORATH



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- Extensive experience with cost model development and implementation
- Extensive costing support to those preparing cost proposals



What Does A Costing System Do?



Provide Cost Insight to Support Decisions



Costing is ubiquitous and a costing system can be found in many domains and parts of the enterprise. The key aspect is it will offer insight into what something will cost. This could be a machined part, complex assembly, information system or a spacecraft.

Cost can be measured as a monetary value (eg \$ €) or in terms of effort or schedule.

Costing Systems Support Decisions

Understanding Cost Leverages Decision Making

Design to Cost

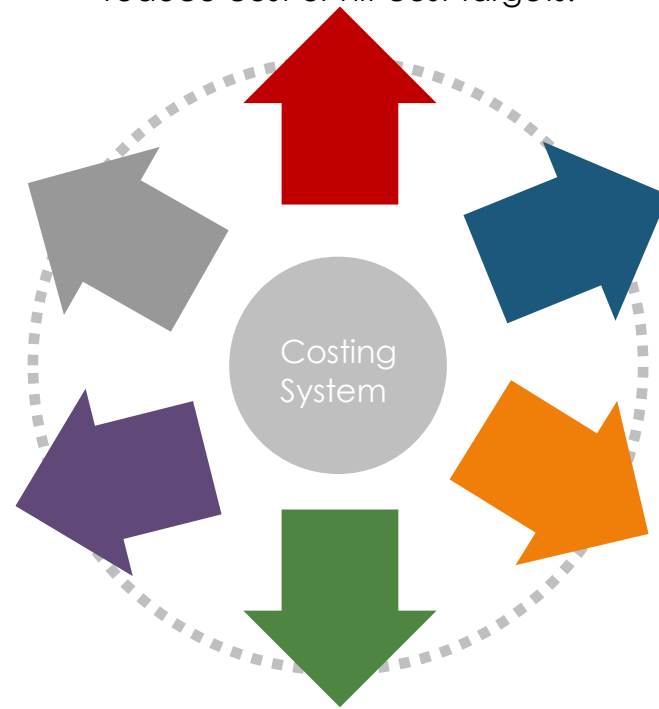
Early Understanding of Cost before the design is committed offers the greatest opportunity to reduce cost or hit cost targets.

Proposal

Basis of Estimate that can be substantiated and defended is driven by the ability to determine a credible cost. It can also support a bid/no bid decision.

Competitive Analysis

Price to Win and other competitive analysis is supported by a costing system providing a realistic cost for a given solution.



Investment Analysis/MBSE

Model Based Systems Engineering benefits from understanding cost as part of an overall optimization of cost & performance.

Pricing

Pricing activity works best when cost is well understood.

Budgeting & Planning

Portfolio Planning and budgeting require an understanding of cost for all potential projects and initiatives. Setting priorities is easier when costs, schedules and risks are understood.

Elements of a Costing System

All are needed and vital to a top notch system

People

Stakeholders are those who have an interest in using the system, consuming information produced by the system, along with those who need to maintain the system.

Tooling

Systems that automate computation, handling of data, and navigation of the workflow. This also includes ancillary interfaces and reporting.



Process

Process and workflow is provide the controls for which the system is used and applied. It provides the roadmap as to how the people, tooling and data all work together.

Data

Data is vital to creating costings and can serve as a basis for learning/improving over time. Data can be structured or unstructured.

Experts Chime In

In doing an overview, it is helpful to see what experts, in various capacities, have to say.



GAO COST GUIDE

GAO offers the Cost Estimating and Assessment Guide. In this excellent handbook is a 12 step estimation process.

[GAO 12 Step Estimating Process](#)



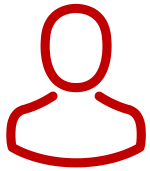
COST ESTIMATING AND ASSESSMENT GUIDE

**Best Practices for Developing and Managing
Program Costs**



GAO 12 Step Process

Steps 1-4



Define Purpose

Purpose covers scope, and intended use and will help determine the level of detail needed.



Develop an Estimating Plan

Plan identifies resources needed relative to the scope of the estimate. Identifies approaches to be used, needed access to SMEs and a schedule required.



Technical Baseline

Technical Baseline establishes a concept of the solution to be evaluated, programmatic information, performance objectives, etc.

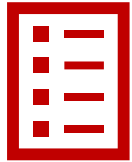


Estimating Structure

Estimating Structure or WBS establishes key solution components in a standard product structure. Each element should be well defined and traceable.

GAO12 Step Process

Steps 5-8



Ground Rules & Assumptions

Ground Rules & Assumptions are used to fill in data where information is limited. Captures rationale and data to be used. Identifies potential risks.



Gather Data

Obtain Data which is cost, programmatic or technical. Use primary sources when possible. Normalize data.



Develop the Point Estimate

Point Estimate creates the cost model to be used for each WBS. Includes review for errors, crosscheck and update.



Sensitivity Analysis

Sensitivity Analysis creates a range about the point estimate looking at uncertainty in parameters and assumptions.

GAO 12 Step Process

Steps 9 - 12



Risk and Uncertainty Analysis

Risk Analysis quantifies cost ranges and confidence. Uses statistical methods to capture aggregate risk and correlation among elements.



Document the Estimate

Documenting will capture data, assumptions and methods used so the estimate can be defended and serve as a basis for change or for future estimates.



Present to Management

Present to Management or other stakeholders to communicate the cost and confidence around the cost. Adapt to the audience.

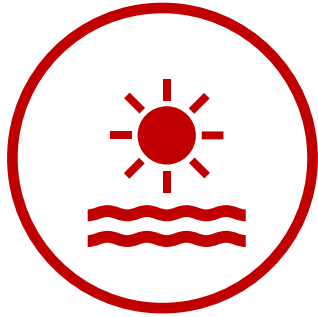


Update the Estimate

Update as new data or information is known.

What Defines Best In Class Product Cost Management

Aberdeen Strategy & Research



Incorporate Cost Early

Cost should be monitored and early, during design. This offers the opportunity to evaluate design alternatives.

Best in class companies have visibility into product cost early and are more likely to consider alternatives.



Trust by Verify

Cost models need to be validated and updated as a matter of course.

Best in class companies refine models based on real-world feedback and verify with actual cost data.



Use the Right Tools

Too many manual processes pose a challenge, causing missed cost targets.

Best in class organizations will integrate PCM with ERP and PLM.

PCM Expert Eric Hiller - Spend Matters

Criteria To Evaluate a Costing Tools

01

Overall spend

The cost required to get get the solution installed AND ready for use.

02

Usable by non-experts

Can non-costing specialists use the system (with reliability or confidence)

03

Efficiency

Is there a demonstrable efficiency in using the system. KPIs such as hours per estimates should be measured.

04

Transparency

Can calculations be followed and understood? Can it be used to understand cost drivers?

05

Ability to customize

Can the product be customized or tailored to meet unique and specific requirements

06

Professional services

Does the vendor offer professional services to support adapting the tooling to organizational processes and methods.

Best Practices In Estimating

SEER offers an objective and repeatable approach that avoids error and bias

Industry Based

Comprehensive & Complete
with knowledge bases and
estimating relationships.



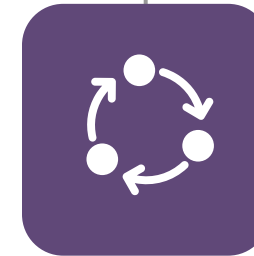
Efficient

Rapid estimate creation leaves
more time to study alternatives,
approaches and strategies.



Learning

Feedback so estimates can be
tuned and informed as your
experience and database grows.



Consistency

Standardized templates, metrics
and a common framework
creates a process that can be
replicated across an organization



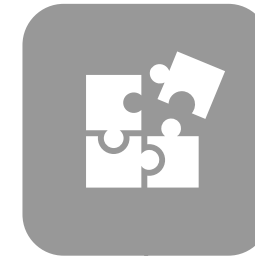
Transparent

Every estimate creates its
own data package
documenting inputs, drivers
and results.

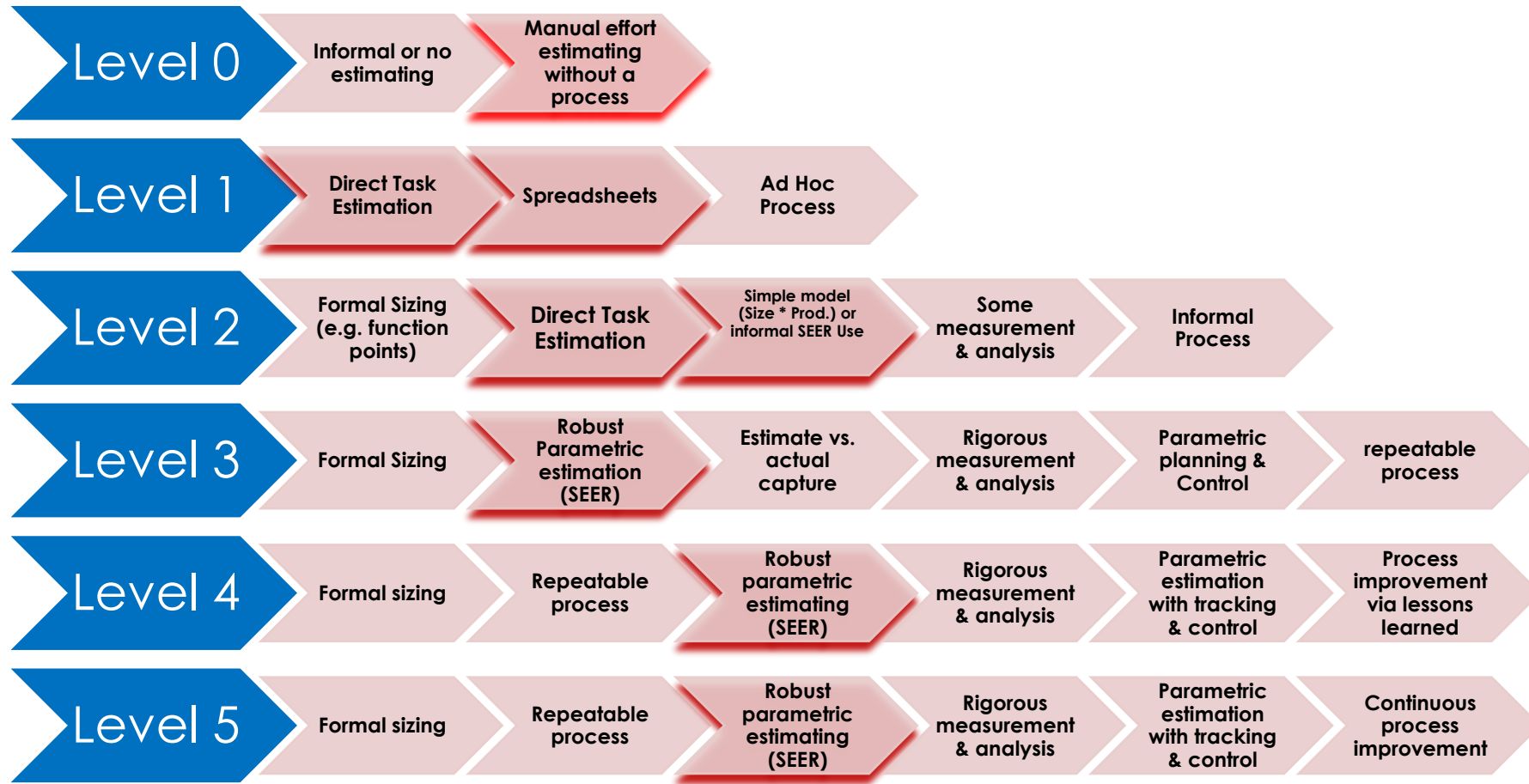


Adaptable

SEER can be adapted to
your process and reflect how
your organization works



Estimation Organization Maturity Process Assessment





CONFIDENCE

A Healthy Costing System is one that maintains the confidence of the stakeholders. People who create the costings, those that provide input or those that use the information generated need to feel that the system is legitimate and offers value.

Capture Expertise

Rely on Tribal Knowledge At Your Peril

Inside Information

Depth of Experience can offer insight and background that may not be obvious.

Solution Understanding

Past Experience offers understanding into the key elements of a solution and potential cost..



Risk

Individual Bias can be introduced to drive overly optimistic or pessimistic cost references.

Degradation Over Time

Retirements and Turnover will inevitably lead to this source of information deteriorating.

Data and Repositories

Cost and Technical Data

The costing system should be design to feed the need for data



Historical Cost Data

Cost data, including effort hours and schedule months should be collected at a level that maintains accuracy. Also include qualifiers such as quantities, base year or currency.



Technical Data

This covers detailed technical data such as software size, mass properties, and complexities. It should also consider higher level data that describes technical baseline.

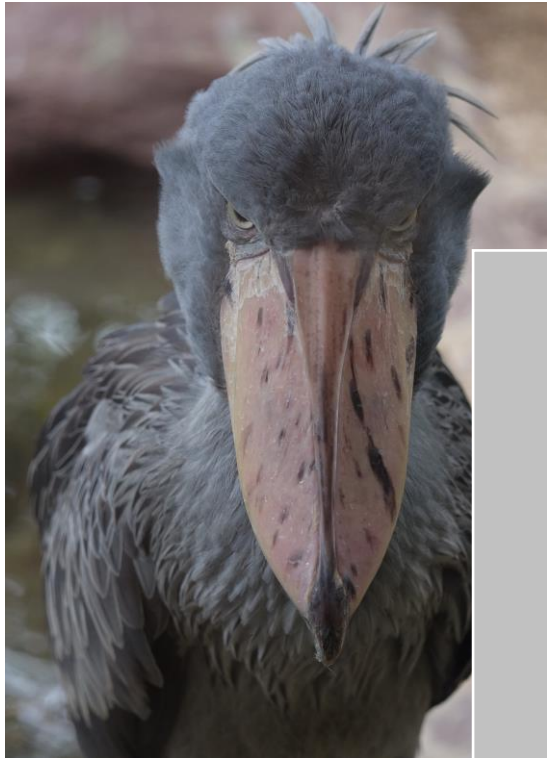


Costing/Estimate Repository

Being able to refer to past costings provides value to new estimators and can be a window to data used and how it can be adapted to a new estimate.

Pace of Costing

The frequency and scope of costing needs will drive how a costing system will be setup and the roles supporting it



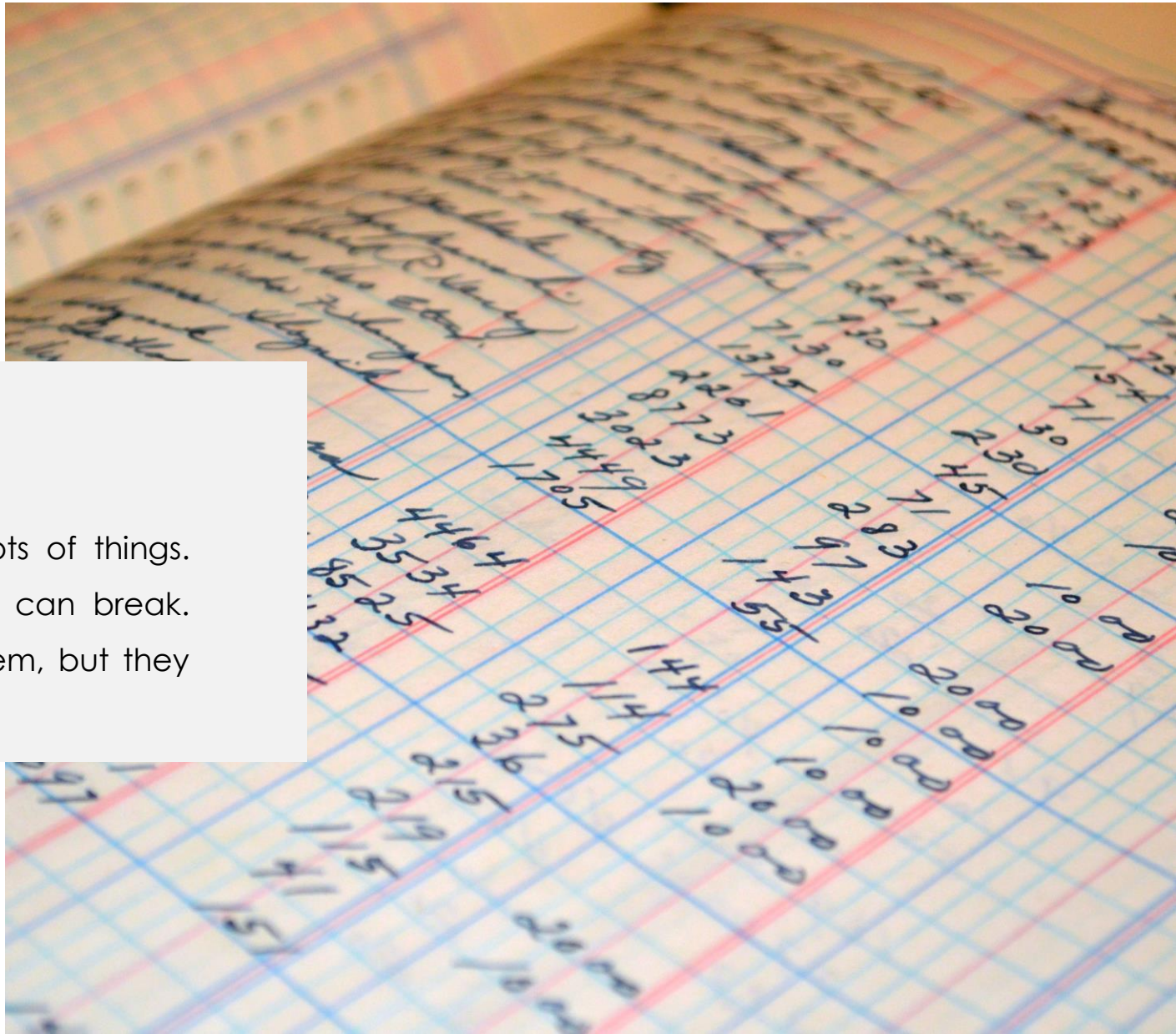
Fewer / Bigger

Uses costing professionals.
Requires expertise to define the solution. There may be multiple people contributing.
Supports acquisition and proposal efforts, investment/initiative analysis or competitive analysis.



Many / Smaller

Costings can be more template driven and set up for non-experts to provide input and even generate the estimates. Supports portfolio planning, project budgeting, prioritization or other requirements.



SPREADSHEETS!

Spreadsheets are great, versatile, and can do lots of things. Spreadsheets are easy to tweak, and ergo they can break. Spreadsheet will likely be part of any costing system, but they should not be the heart and soul.



Errors

A good costing system will be designed to minimize errors. Here are some common themes and how to avoid.



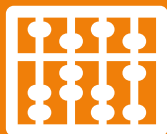
Poor Data Management

Data that is not up to date, erroneously changed, or misaligned.



Poor Assumptions

Lack of domain understanding, lack of insight into past costings of similar characteristics.



Logic/Calculation Errors

Misapplied statistical analysis or model theory, misapplied units, double counting, etc.



Data Entry Errors

Typos, transposed numbers, miscoded data, formatting issues.

01

Manage and Control Data Used

Implement access controls for database. Make sure other data has a process for update and the system uses current data.

02

Use Standard Templates

Capture assumptions used for past costings and use them as patterns. Cost from source data when possible.

03

Validate & Control Logic and Business Rules

Validate bespoke calculations. Use trusted vendors and independently validate. Control who/how logic can be changed. (spreadsheets!)

04

Minimize Manual Data Entry & Reviews

Manual data entry cannot be eliminated, but it can be minimized. Highlight changes. Implement review process to catch issues.



Technical Baselines

Plus Ground Rules and Assumptions



Golden Rule

Know What “It” Is Some notional concept of what needs to be costed must be defined. This forms the technical baseline. Trade studies and sensitivity analysis can be based on changes to the baseline.



Ground Rules & Assumptions

Unknowns and uncertainty are part of the process. Ground rules and assumptions fill those gaps. As more is known, assumptions can be replaced with data.



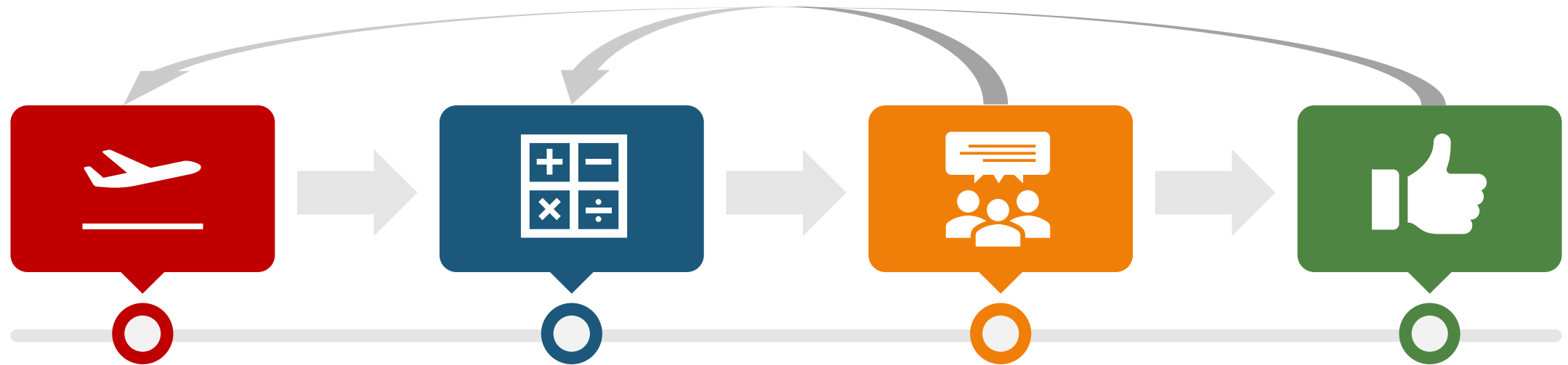
Supporting Documents

Capture and Reference supporting documents and other information. The costing system should be able to accommodate adding documents/references or links to such references for traceability.



Repeat As Required

A costing system should support gateways and keep a history



Initiation

How does costing request get started? Somewhere a request can be submitted. Perhaps a job code is added. It may include information about the project, or what type of costing is needed.

Estimate

Assignment of the cost estimate is made to one/more individuals. They work using information provided and gathered to generate a cost estimate.

Review

Upon submission a review should be triggered. The review can result in the costing going back for changes/fixes or it can move on.

Approval

Once reviewed and accepted the costing should be archived. This can be used for future change cycles or reference for other "similar-to" costing efforts.

Data Collection

Even if you don't have data to start, a good costing system will foster collection for future use

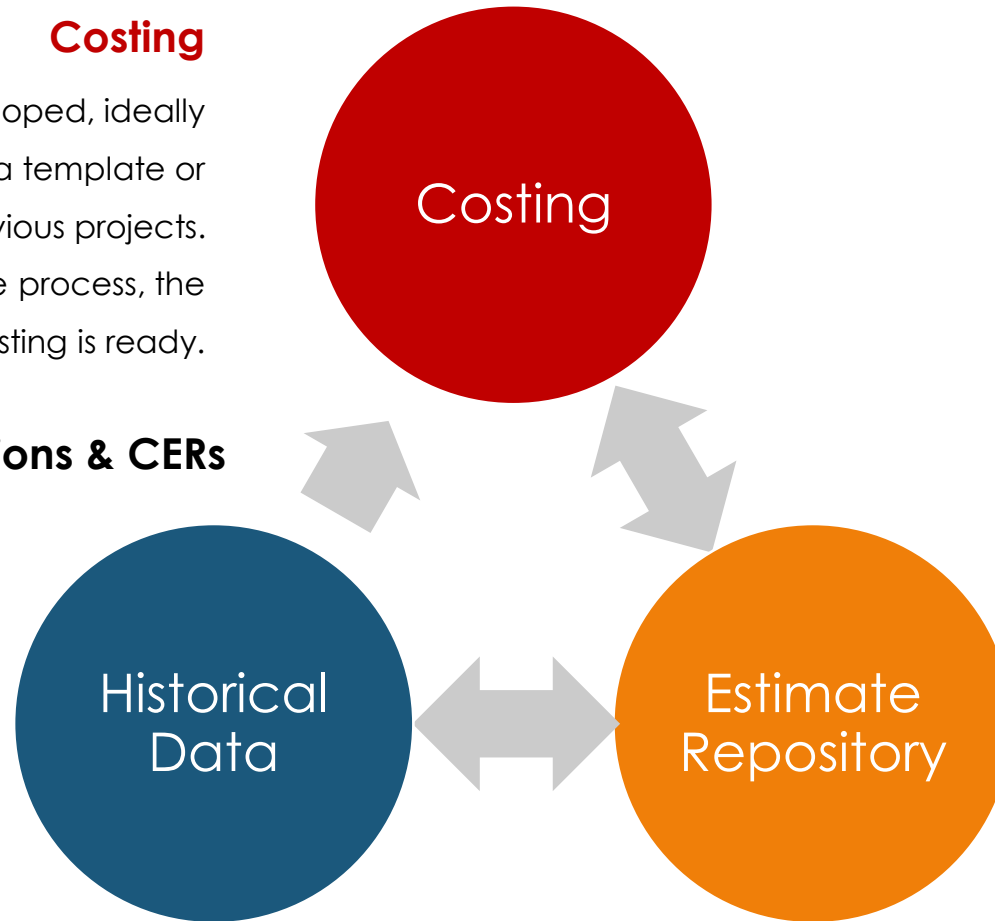
Costing

A costing is developed, ideally starting with a template or exemplar from previous projects. After an iterative process, the costing is ready.

Calibrations & CERs

Historical Data

For projects that are greenlit, capture actual effort, cost and technical data. Update estimates to reflect an as-built configuration and cost. This can feed model tuning/development.



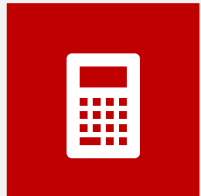
Exemplars & Templates

Repository

At each project gate, the costing should be submitted to a repository. The repository can be used to create templates for future estimates. It can also be used to gather actual costs to be used for analogies and CER analysis.

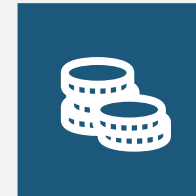
ESTIMATION METHODS

A good toolbox will not rely on one method, the ability to blend methods is important



PARAMETRICS

➤ Built-in estimating relationships, ready to use. Which can be tuned and calibrated to improve accuracy.



ANALOGY

➤ Estimate based on past history. Analogies can offer be cost/effort, or provide inputs (e.g. weight, size) for other methods.



RATES and FACTORS

➤ This is a model rate & quantity, sometimes with adjustments or using catalog rates.



TOP DOWN

➤ Estimate total cost and allocate



EXPERT JUDGEMENT

➤ Utilize SME inputs for a task



BOTTOM UP

➤ Estimate each detailed task or process step

Controls

Controls are vital to maintaining system integrity

Data Controls



Core data used for costings should be managed so that the latest version is available and used. Processes for making updates to catalogs, rates and factors should be in place.

Access Controls



Define who can create and update costings, as well as those who can review. Accommodate access to those who have the advanced knowledge and understanding to create and update estimating data and templates.

Enforceable but Usable



Well defined and enforceable controls are important but should not be too onerous as to incentivize people skirting around the system.



Adaptable & Flexible

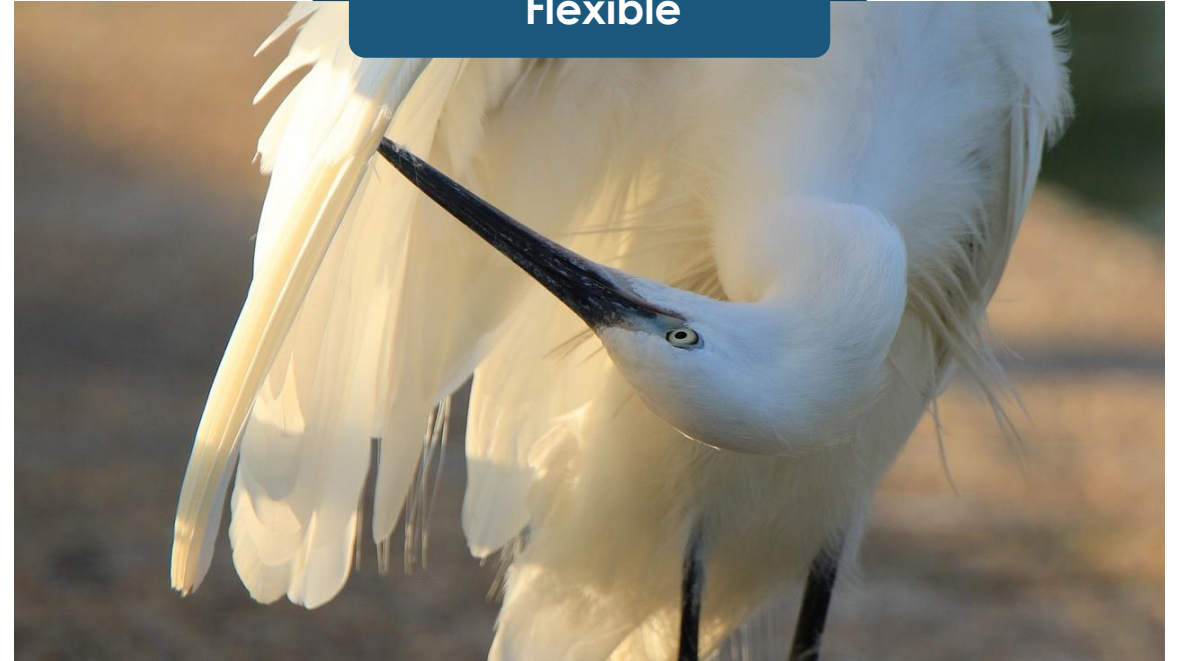
Costing systems need to be designed so they improve and meet changing needs

Adaptable



Adaptability the costing system must be set up so that it can adapt to changing data, changing rules, and changing systems. This should not upend the system or cause disruptive changes.

Flexible



Flexibility is needed to accommodate the unique needs that arise, especially when costing a new or novel system. It also is a way to make a general system specific to an organization or department. Can you create custom parameters? Custom lists? Custom business rules?

Trends in Costing 1

What are people seeking

Cloud



Cloud/SaaS

Turnkey system that doesn't require IT to help setup. Costing is sensitive, so this is not a universal desire.

Model Driving Costing



3D Models, MBSE Models

Integration with design tools to promote design trade-offs for optimal design/cost scenario.

Financial Details



Labor Rates, G&A, Fees

Catalogs for using customer rates by role, purchased items, materials. Looking at indicative pricing.

Workflow Support



Tooling & Process

Support for different roles/responsibilities, access controls. Also for tracking project status and auditing.

Knowledge Capture



Knowledge Base + Customizing

A set of standard rules and data are desired, but customers want to add their own rules/CERs and parameters.

Trends in Costing 2

What are people seeking

Sharing Cost Knowledge



Collaboration

Capturing, managing and sharing cost knowledge throughout cost systems and stakeholders.

Automation and Guidance



Modeling Help

Assistance in selecting meaningful methods of manufacturing along with automated analysis of viable options. AI assistance in developing assumptions.

Auditing Changes



Audit Trail

Summary of changes made between revisions, at the element and input levels to help explain the new cost picture. Also error checking.

Reporting



Reporting at High and Low Levels

Storage and organization of cost estimates so results can be sliced and diced to produce deeper meta level cost analysis and trends.

BOE Guidance



Adaptive Reporting

BOE Guidance and cost reporting to support proposal or internal accounting format.

CONFIDENCE. REIMAGINED

Galorath provides costing solutions that help organizational leaders make complex business decisions with confidence. Our predictive analytics products and services give complete insight into the implications of significant technical or financial decisions, allowing organizations to execute a plan with assurance and reach their goals with absolute certainty.

On the web @ Galorath.com

