NATIONAL NUCLEAR SECURITY ADMINISTRATION
OFFICE OF DEFENSE PROGRAMS

Uncertainties in Infrastructure Data

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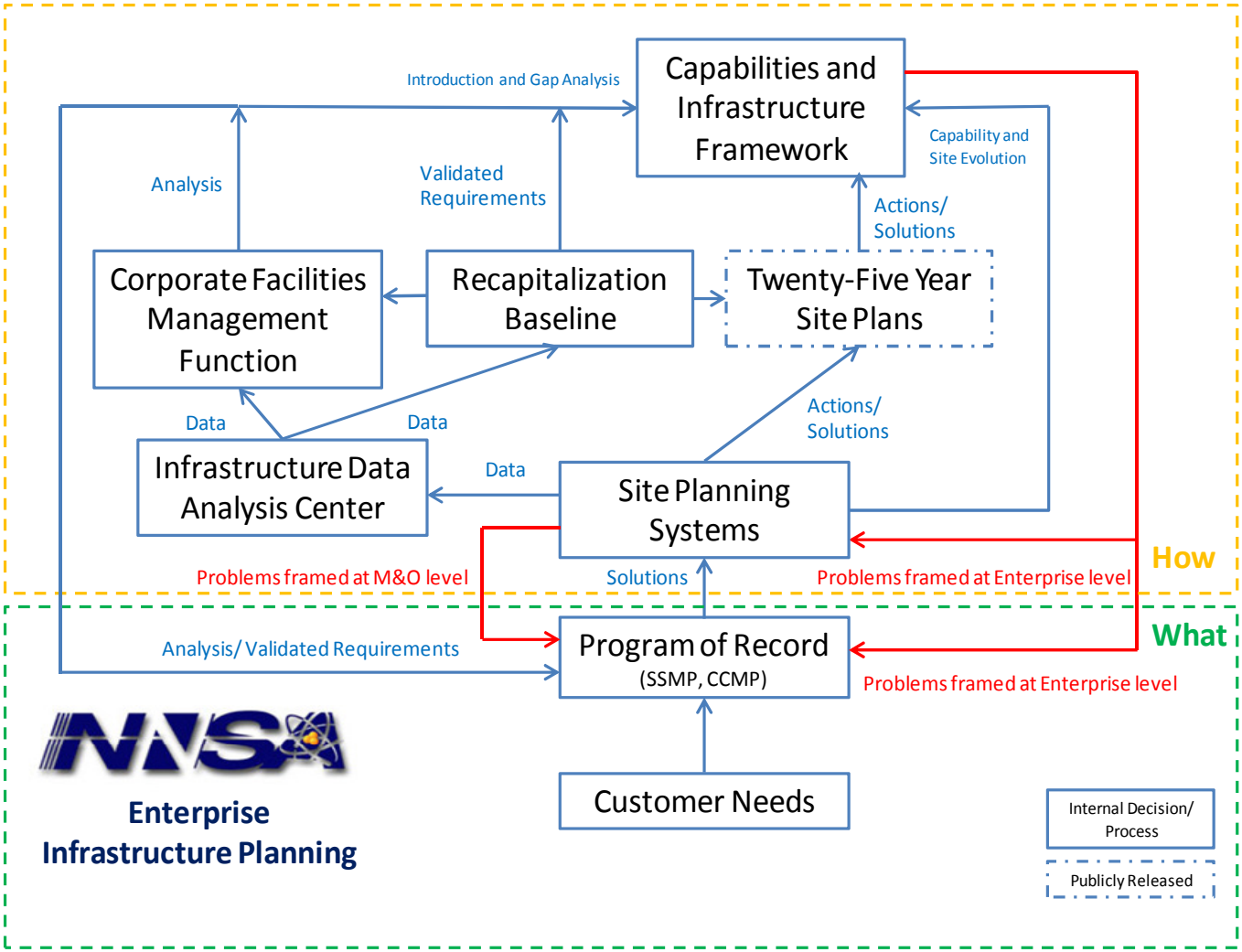
Enterprise Infrastructure Planning System



Enterprise Infrastructure Planning System

A risk-based, capability based, decision support system that

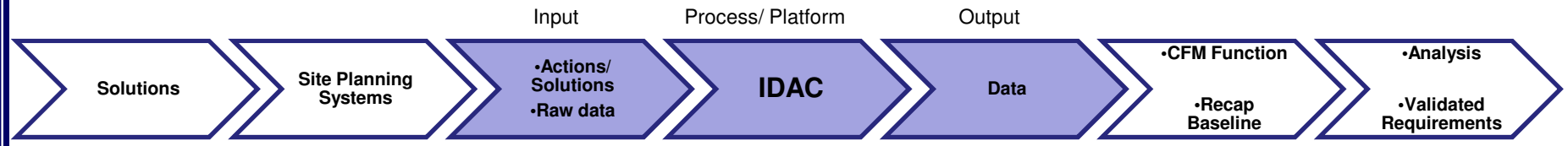
- Integrates infrastructure decisions across sites and programs into a single enterprise level infrastructure vision.
- Tracks progress towards realizing that vision.
- Provides a data-driven infrastructure investment decision framework quantified to a confidence level commensurate with the quality of available data.

Site Planning Systems

- Heart and foundation of all infrastructure planning.
- Integrate the requirements and decisions of the Program of Record with the site's vision and produce recommended infrastructure investments.
- Provide raw data to be synthesized into an enterprise level understanding.

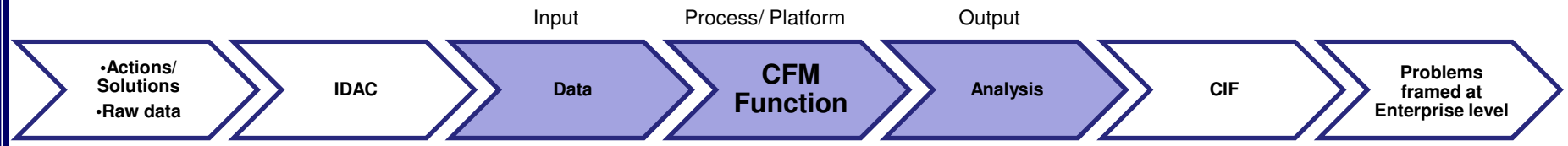
Infrastructure Data Analysis Center (IDAC)

- Collects site and corporate level data and provides that data to analysts for transformation into quantified infrastructure information.
- Works with site and corporate level data owners to identify currently available data and to make that data available with minimal site effort to analysts with a “need to know” for enterprise level analysis.



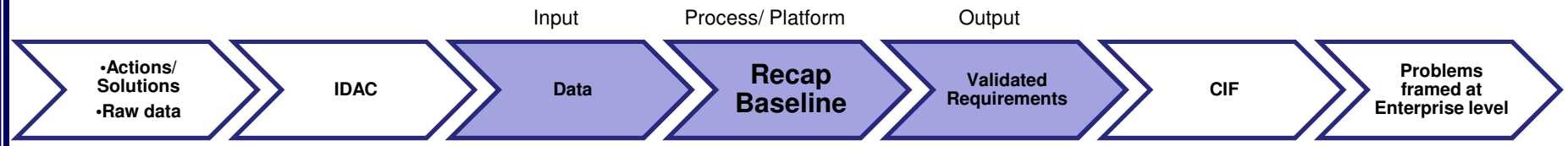
Corporate Facilities Management (CFM) Function

- Develops and evaluates enterprise level investment strategies and recommends investment strategies to program level decision makers;
- Develops and tracks metrics to quantify the investment needed to realize the enterprise level infrastructure vision; and
- Develops and tracks metrics and other statistical measures of the infrastructure risk to mission, translating those measures into framed problems for consideration by decision makers.



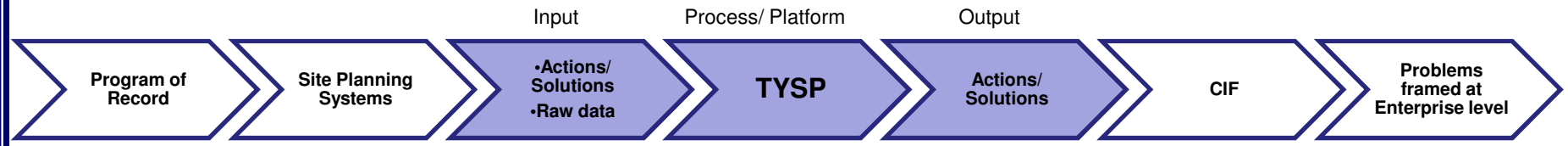
Recapitalization Baseline

- The validated minimum set of infrastructure investments needed to implement the Program of Record.
- Integrates with the CFM process to inform decision makers of the recapitalization investments needed to realize the enterprise level infrastructure vision, the rate at which the vision is being realized at the current level of investment, and when the vision will be realized at current level of investment.



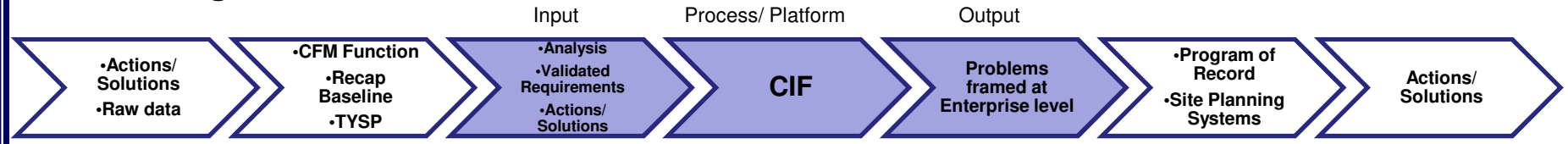
Twenty-Five Year Site Plans (TYSP)

- Translates the Program of Record for all NNSA and non-NNSA work at a site into activities and solutions out to a time horizon that approximates the facility life cycle.
  - Tactical horizon extending to five years past the next FYNSP
  - Strategic horizon that extends 15 years beyond tactical horizon to 25 years beyond the present – commensurate with the increase in uncertainty in the more distant years.
- Developed at the sites by Federal and M&O staff
- Publicly released



Capabilities and Infrastructure Framework (CIF)

- Integrates at the enterprise level the assumptions and planning principles underlying site level plans and integrates of those plans into a capital investment baseline.
- Draws on lower level plans, analysis, and decisions to frame the infrastructure challenges for strategic decisions.
- Uses scenario analysis to understand implications of possible high level decisions and assumptions
- Annually updated document that will be shared with Congressional members and staff.



Four Key Questions

- What's the uncertainty in the data?
- What's the cost range of the "End State" in current dollars?
- What strategies are available to attain the end state?
- Can we get there with current and reasonably foreseeable fiscal constraints?

Accuracy

Accuracy refers to the agreement between a measurement/estimate and the true or correct value. If a clock strikes twelve when the sun is exactly overhead, the clock is said to be accurate. Accuracy cannot be discussed meaningfully because true value of a measurement cannot be known until the work has been performed. Accuracy refers to the *agreement* of the measurement/estimate with the true value and does *not* tell you about the quality of the measurement/estimate. A *stopped* clock is accurate at least once each day

For DM, accuracy is the difference between the estimate reported via CAIS and the actual cost of performing the maintenance. We cannot know the accuracy of an estimate until the work has been done, but we can "tune" the assessment/estimate process to minimize the error of estimates of past work.

Precision

Precision refers to the repeatability of measurement. It does not require us to know the correct or true value. If each day for several years a clock reads exactly 10:17 AM when the sun is at the zenith, this clock is very precise. Since there are more than thirty million seconds in a year this device is more *precise* than one part in one million! We only care that the clock is giving a repeatable result.

For DM, precision is the repeatability of the estimate as determined by all factors affecting the quality of the assessment and subsequent single valued estimate of the cost of performing the work. Precision can be understood and estimated.

Error

Error refers to the disagreement between a measurement/ estimate and the true or accepted value. If an error occurs we will not know it because the true value has not yet been established and there is no other guide.

All estimates, including those of DM, have an error that cannot be known until the work has been performed. We can, however, make more plausible the unavoidable “zero error” assumption by “tuning” the inputs and algorithms of the assessment/estimating process to minimize the error in estimates of previously performed work. We can also estimate the error by studying the errors in estimates of previously performed work and combine that error with the uncertainty assessment/estimating process to create a confidence interval for estimates.

Uncertainty

- Uncertainty of a measured value is an interval around that value such that any repetition of the measurement/estimate will produce a new result that lies within this interval. This uncertainty interval can be understood by quantifying the factors affecting the repeatability of the estimate. We can, therefore, quantify the uncertainty.
- Understanding the uncertainty in estimates of DM allows us to make completely certain statements about an inherently unknowable value. Combining the errors in estimates of previously performed with the quantified uncertainties in the measurement/estimating process allows us to state a confidence interval. Knowing the confidence interval for DM estimates gives them significant value programming funds and enables NNSA to make credible commitments to Congress on management of DM.

Sources of Uncertainty

- Constraints and assumptions.
- Variability of human performance.
- Uncertainty in measurements/observations during uncertainty.
- Limitations on the extent of the assessments.
- …

Why is the uncertainty in DM important?

- Our inability to give Congress accurate estimates of the actual cost of work creates a credibility deficit we must close.
- We are continually asked how much it will cost to bring NNSA's steadily increasing DM under control. Currently we have no credible way to answer with confidence.
- The fuzziness of DM estimates is often cited as a reason for the irrelevance of FIMS for purposes other than reporting numbers to OMB for purposes that have no impact "where the rubber meets the road".

Exercise

Brainstorm 150 things we can do to:

- Tune the assessment/estimating process to minimize the error in estimates of previously performed work.
- Reduce the variability of human performance in assessments.
- Challenge the constraints and assumptions underlying the assessment/estimating process.
- Optimize the quality and quantity of data collected in the assessment process.
- Understand and reduce the uncertainty in estimates.