Blackbox & Whitebox Estimating Techniques

Tips, Trick & Pitfalls

Presented by Pyrros Radimissis at PGCS August 2022

Overview

- Introduction to “Blackbox/Whitebox” estimating concepts
- Their application in the early three phases of the Capability Life Cycle
- Creating credible, defensible, repeatable estimates (tips, tricks & pitfalls)
- Wrap it all together
- Win a prize

Introduction to concepts

Blackbox estimating

$Y = a + bX$ (Design, manufacture, test)

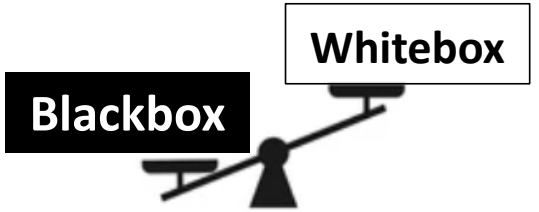
$Y = aX^b$ (Production Run)

Whitebox estimating

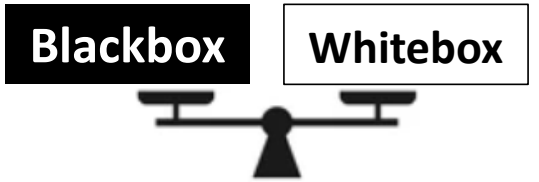
A + B + C + D = E

Application in the early three phases of the capability life cycle

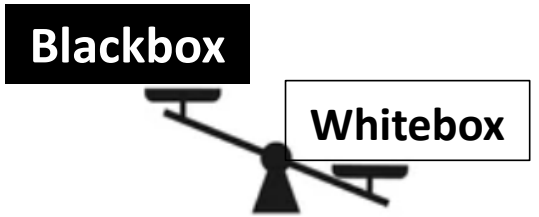
Phase 1: Concept development



Phase 2: Functional Baseline & System Definition



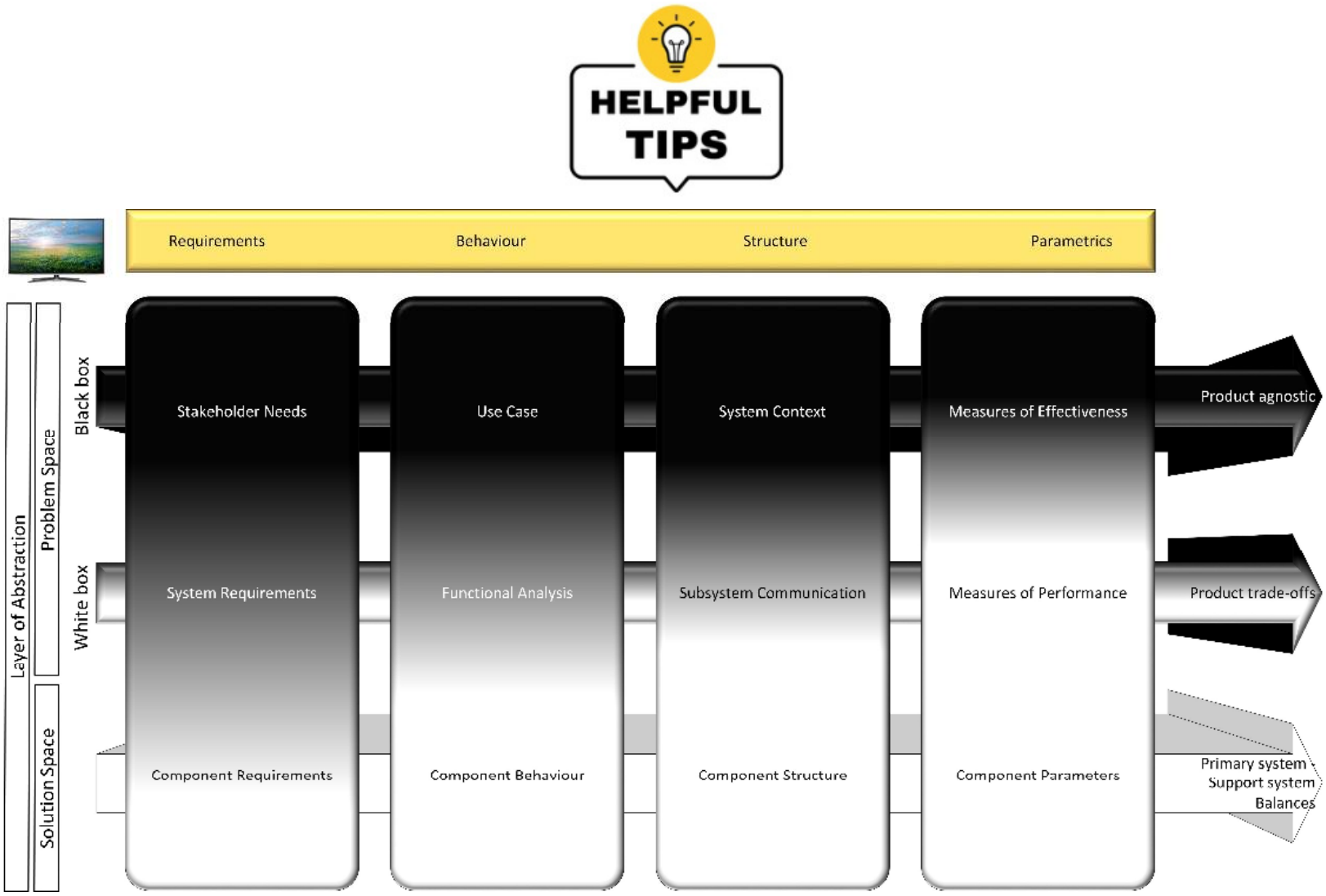
Phase 3: Critical Design Review & System Test Readiness



Creating credible, defensible, repeatable estimates

Tips, Tricks & Pitfalls

Tricks


HELPFUL TIPS
Requirements
Behaviour
Structure
Parametrics
Layer of Abstraction
Problem Space
Solution Space
Black box
White box
Stakeholder Needs
Use Case
System Context
Measures of Effectiveness
System Requirements
Functional Analysis
Subsystem Communication
Measures of Performance
Component Requirements
Component Behaviour
Component Structure
Component Parameters
Product agnostic
Product trade-offs
Primary system
Support system
Balances
END

Tricks

Blackbox estimating

- Figures of merit
- Mix-in Whitebox assumptions as much as possible
- Fully Integrated Cost Schedule Method (FICSM) **subjective** assumptions

Whitebox estimating

- Keep it simple and traceable but detailed enough to be credible & defendable
- Mix-in Blackbox methods as much as possible (use statistically validated cost estimating relationships)
- Fully Integrated Cost Schedule Method (FICSM) **objective** assumptions

Avoid pitfalls

Conway's Law

Blackbox estimating

- Know your left and right of arc
- Document all assumptions as you go
- Use appropriate calibration
- Perform gap analysis
- Validate the estimate for its purpose
- Verify the output using an independent cost estimate

Whitebox estimating

- Develop details to a depth that is easy to maintain
- Keep work breakdown structure (WBS) traceability throughout the Capability Life Cycle

"Conway's Law"

Conway's law suggests that "organizations which design systems…are constrained to produce designs which are copies of the communication structures of those organizations" (Conway, 1968). Systems thinking and Systems Engineering helps organizations avoid the pitfall of Conway's law by ensuring that system designs are appropriate to the problem being addressed.

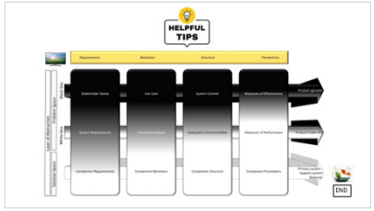
Systems Engineering Handbook, 4th Edn, Chp 3.5, pg 36

Wrapping it all together –

SUCCESS IS NEVER AN ACCIDENT

Keep your estimates credible, defensible & traceable

At all layers of abstraction



Pyrros Radimissis
pyrros.radimissis@defence.gov.au

Management
Resource
Consulting

Question:

Turn your blackbox ……. into a whitebox ……. by linking the system ……. to the cost …….

Answers:

a. estimate / approximation / product breakdown structure / estimate
b. approximation / estimate / product breakdown structure / elements
c. approximation / estimate / architecture / elements
d. TV / fishbowl / elements / estimate