IDC

IDC Metri

Seabed Observatory Control System

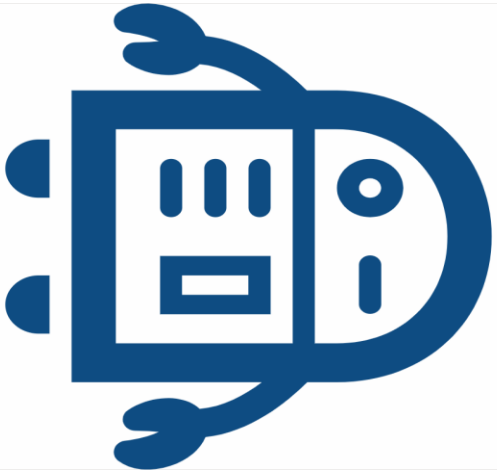
Effort and Duration Estimate

IDC | Metri team

November 9, 2021

Agenda

1. Measurement Strategy
2. Meet the team
3. Approach
4. Assumptions
5. Results



Measurement Strategy

Measurement Strategy

Purpose is to derive an estimate of the effort to develop and implement the 3rd generation Seabed Observatory Control System as a basis for the multi-year financing to be submitted to the Funding Consortium in January 2022.

Scope is the received set of functional requirements for the 3rd generation Seabed Observatory Control System that will replace the current 2nd generation Control System that is now in operation.

Functional User Requirements (FUR) are defined by the received requirements and the assumptions about their completeness.

There is only one application **layer** involved in this estimate

The **functional users** are the different human end-users, the seabed robot system and various hardware in the control room.

Meet the team

Meet the IDC | Metri team

Harold van Heeringen

Captain

Principal consultant
IT Intelligence

Frank Vogelezang

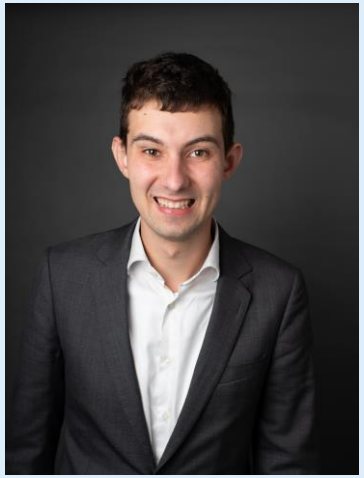
Engineer / Observatory Manager

Senior consultant
IT Intelligence

Tom van Dee

Technician

Consultant
IT Intelligence & Benchmarking

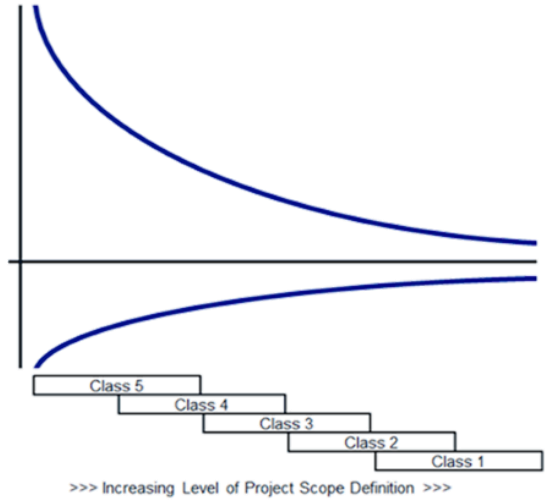


Approach

Approach

System Requirements Specification

- The requirements are in a level of detail that allows for a class 4 estimate according to the AACEi classification.
- This means that deviations of -50% to +100% can be expected.
- This deviation is acceptable for the purpose of this estimate, a multi-year plan for the development of the 3rd generation SOCS.



Average Functional Process

- Software processes are described, but not in enough detail to make distinctions in the complexity.

Iceberg approach

- Given the documentation, growth of functionality is to be expected due to discovery of details and elaboration of Non-Functional Requirements (NFR).

Early & Quick

- To verify the order of magnitude for the other approach.

Assumptions

Assumptions

Functional Requirements

In scope:

52 front-end reqs (ch. 2)

47 operational reqs (ch. 3/4)

Need further requirements design before development

11 operational US (4.5 – 4.7)

Need user story refinement before development

Not in scope:

Observatory Manager tools (2.4)

Non-Functional Requirements

20 NFR (ch 5)

These requirements will all evolve into functional reqs

Effort Estimation

Operational software developed in C/C++

Front-end software developed in Python

60% code reuse from 2nd generation Control System (assumption)

Distributed Agile/Scrum development

Results

Basis of Estimate

BASIS OF ESTIMATE

Estimation purpose Build and implement	**Engagement** Application built as an internal product	**Estimating methodology** Functional Size	**Estimate Classification** AACEi class 4	**Level of detail** Hi-level scope internal product
Design Basis Hi-level scope to be detailed	**Sizing Basis** Functional and NFR complete	**Effort Basis** C/C++ & Python Internal agile proj. No constraints	**Planning Basis** Within regular office hours No overtime	**Cost Basis** Cost is not part of this estimate
Allowances Not included for multi-year plan	**Assumptions** Experience data for early reqs	**Exclusions** No costs included for hardware	**Exceptions** Standard project- and estimation process	**Risks and Opportunities** Only standard contingencies
Containments Cost for mitigation not part of estimate	**Contingencies** Standard for time and effort	**Management Reserve** Out of scope for this estimate	**Procedure** Standard	**Attachment** Initial specs
Estimate QA Internal reviews performed on specs / estimate	**Benchmarking** IDC Metri DB and ISBSG verification	**Reconciliation** No changes Initial version		

Basis of Estimate

As applied for the software services industry

AACE International Recommended Practice 74R-13

Developed together with

nesma

Functional Size

Average Functional Process & Iceberg

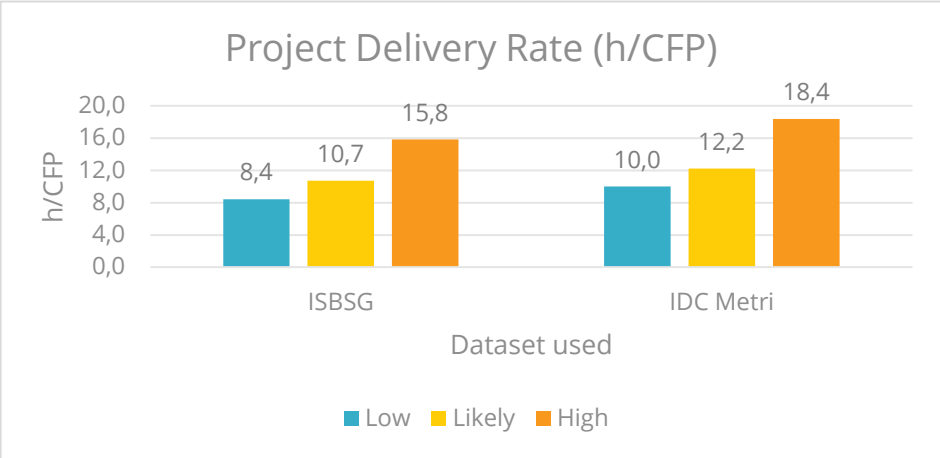
Functional Processes		Iceberg	CFP per func. process		Min	Exp	Max
52	Front-end business functions	3.4 - 4.9	7,9	Administrative env.	1400	**1700**	2450
47	Business functions (sometimes detailed business functions)	3.4 - 4.9	9,7	Technical operational env.	1250	**1900**	2250
20	User-stories (operational requirements)	1.4	9,7	Technical operational env.	200	**250**	270
20	NFR business functions)	3.4	7,9	Administrative env.	200	**550**	750
1	Tools for observatory managers	4.9	7,9	Administrative env.	--	--	--
140 defined processes					**3050**	**4400**	**5720**

Early & Quick

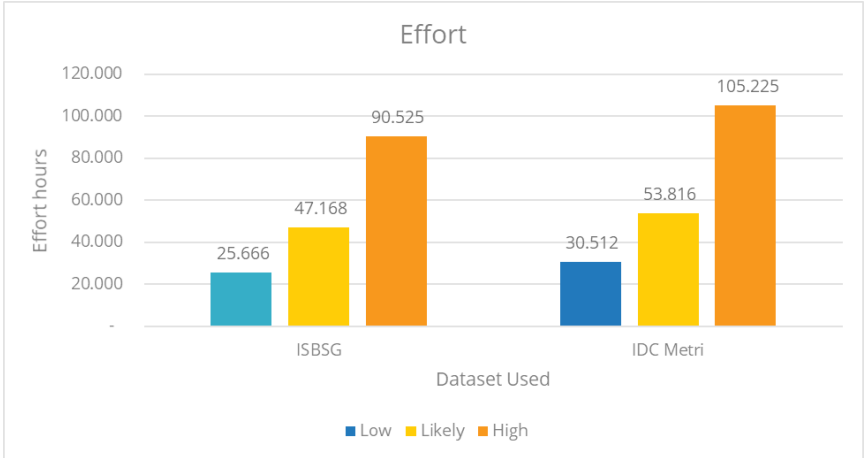
Level	Min	Exp	Max
Macro	720	**1425**	2340
Macro	1680	**2375**	2400
Typical	312	**408**	552
Typical	312	**408**	552
Undefined	--	--	--
	3024	**5091**	**5844**

Effort estimate

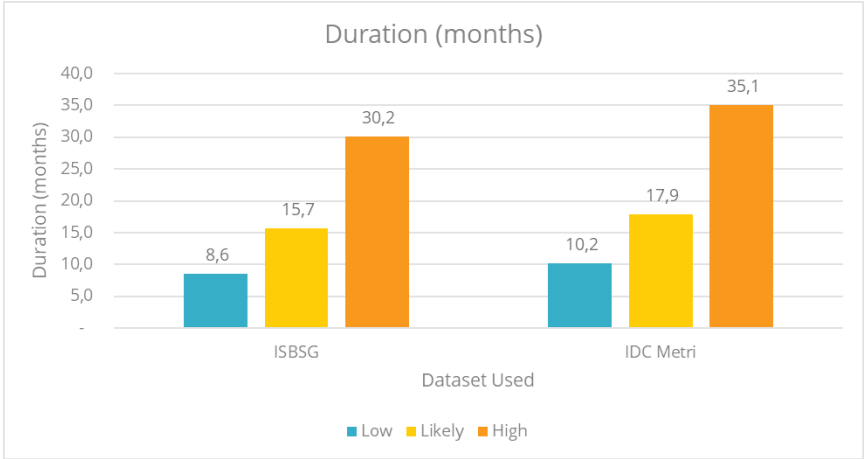
Project Delivery Rate (PDR)



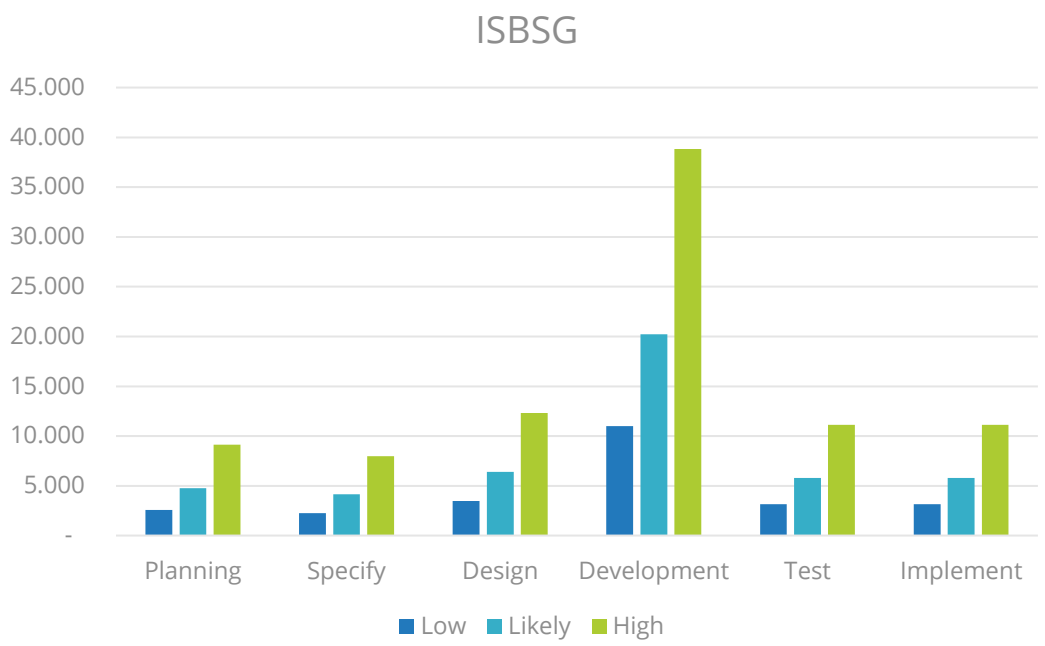
Effort

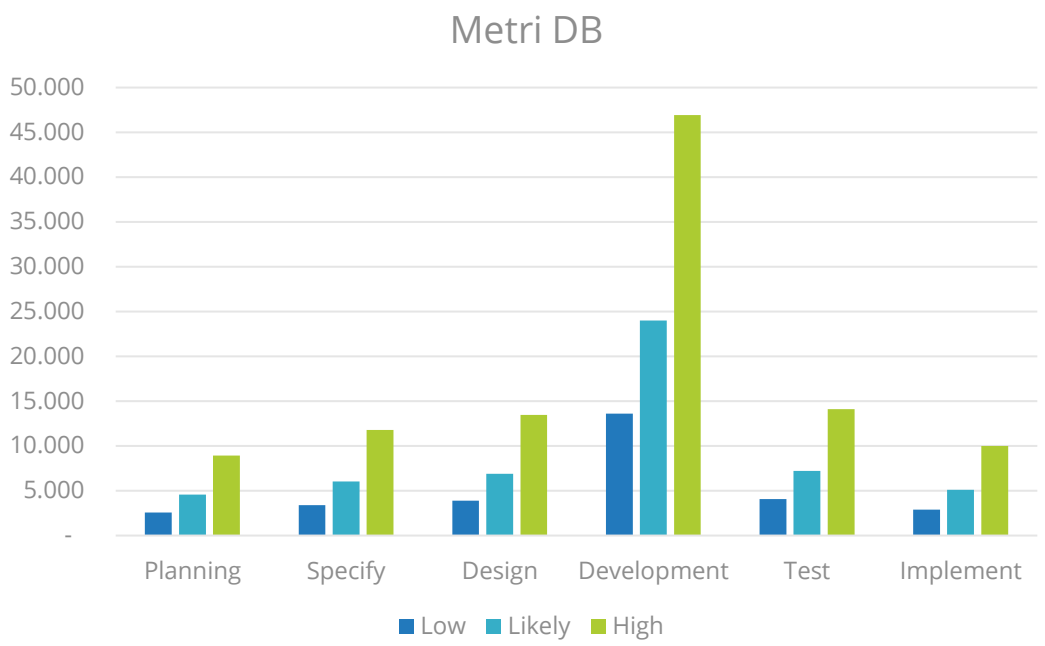


Duration



Expected effort per activity type





Multi-year financing advice

Advice

- Based on the current estimates the board of the Funding Consortium is advised to allocate the full capacity of the 20-person development team for the whole of 2022.
- To allocate the full capacity for H1 2023 as well.
- To reassess the required development capacity in Q3 of 2022 in time for the multi-year budget discussions for 2023.
- Investigate whether 60% re-use is an accurate assumption.
- Assign a Scope Master to make sure that the scope stays in line with expectations.
- Measure project progress regularly and calculate the actual PDR that the teams are realizing.
- Update the estimate periodically when scope and/or Project Delivery Rate are significantly different than expected.