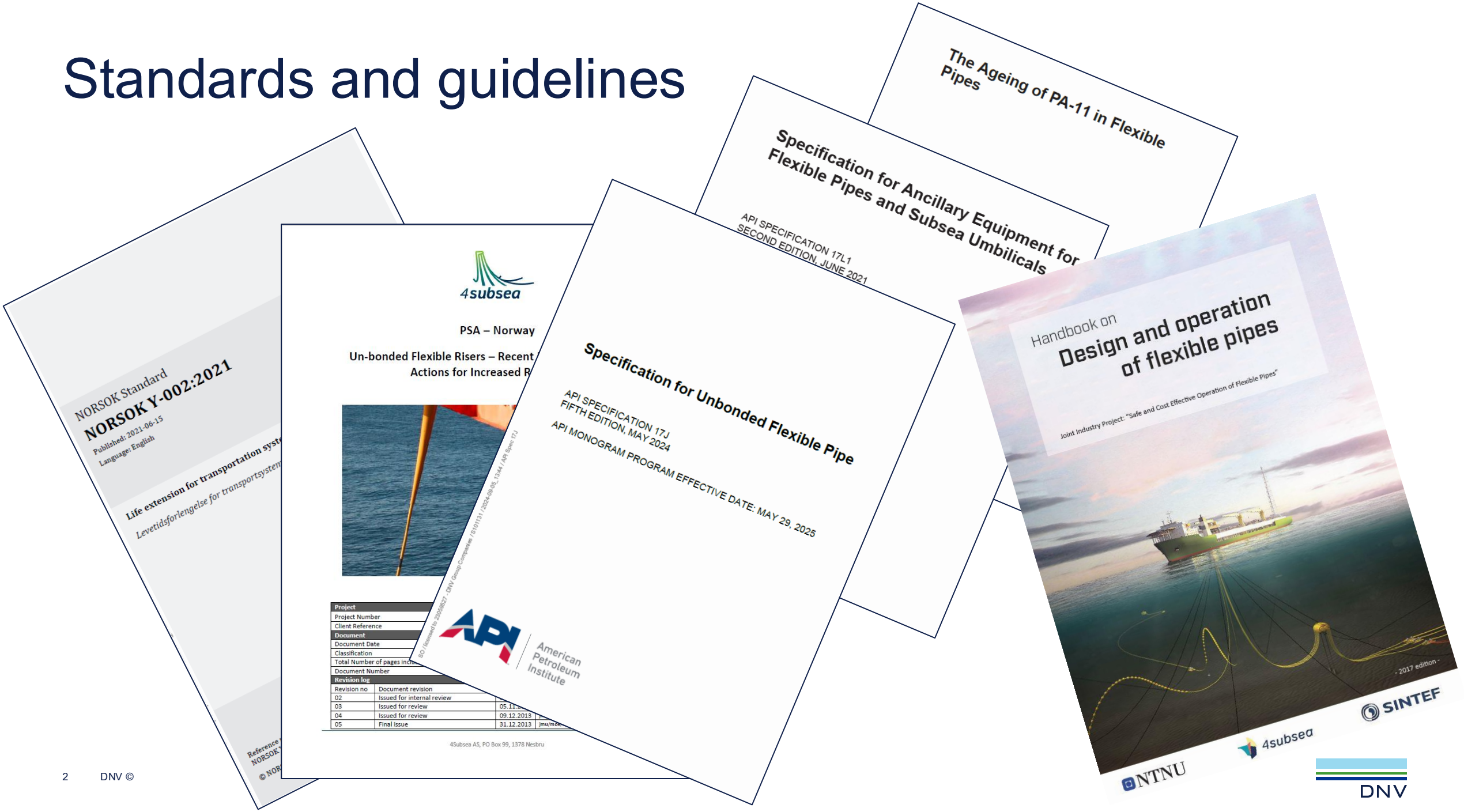
Giving flexible pipes a new life through re-qualification

Havtil - Seminar on flexible pipes, Integrity Management and Aging
Wednesday 2025-11-26

Øyvind Omland; Principal Engineer Pipelines in Operations

Standards and guidelines



Flexible pipes

Multiple layers

- all layers have defined function from design

Carcass and pressure sheet is removed

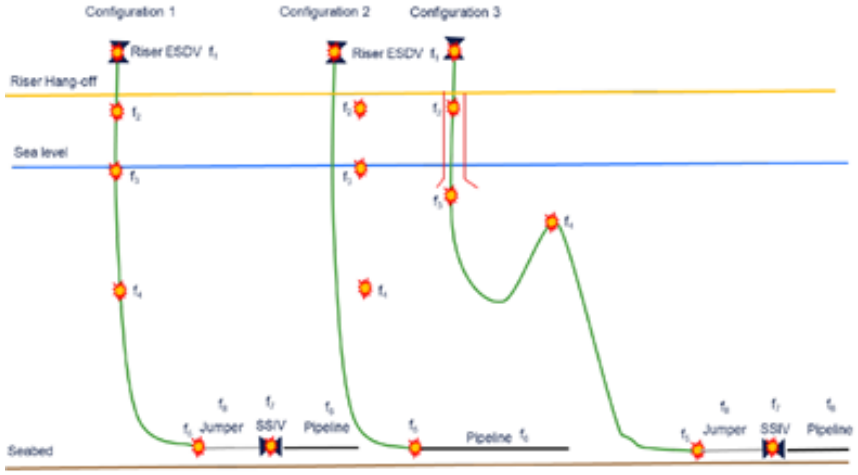
Only pressure layer

Retrospective status of material degradation – is there ways to achieve this ?

- Annulus environment monitoring
- Bore fluid chemical composition
- Response monitoring
- Annulus vent gas testing and monitoring
- Polymer coupons

:

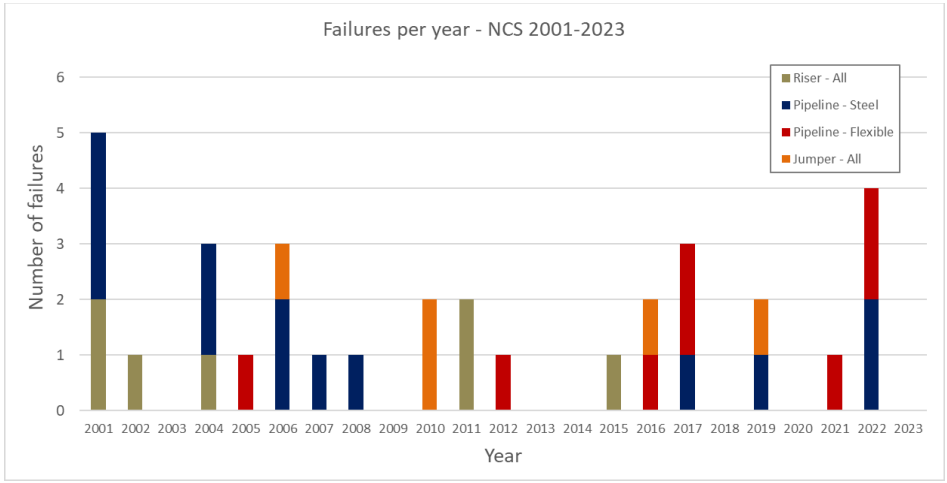
Failure statistics
- Failure defined as Loss of Containment



A study has been performed on behalf of Equinor with recommended failure rates for pipelines and risers November 2025.

This is an update from the 2017 report.

The column diagram below left is NCS data, but the complete dataset also includes other sources.



Sureflex JIP data as replicated in API 17B: 6.ed; 2024

Table 36—Population Database, Total Supplied Inventory (Unadjusted) to End of 2020

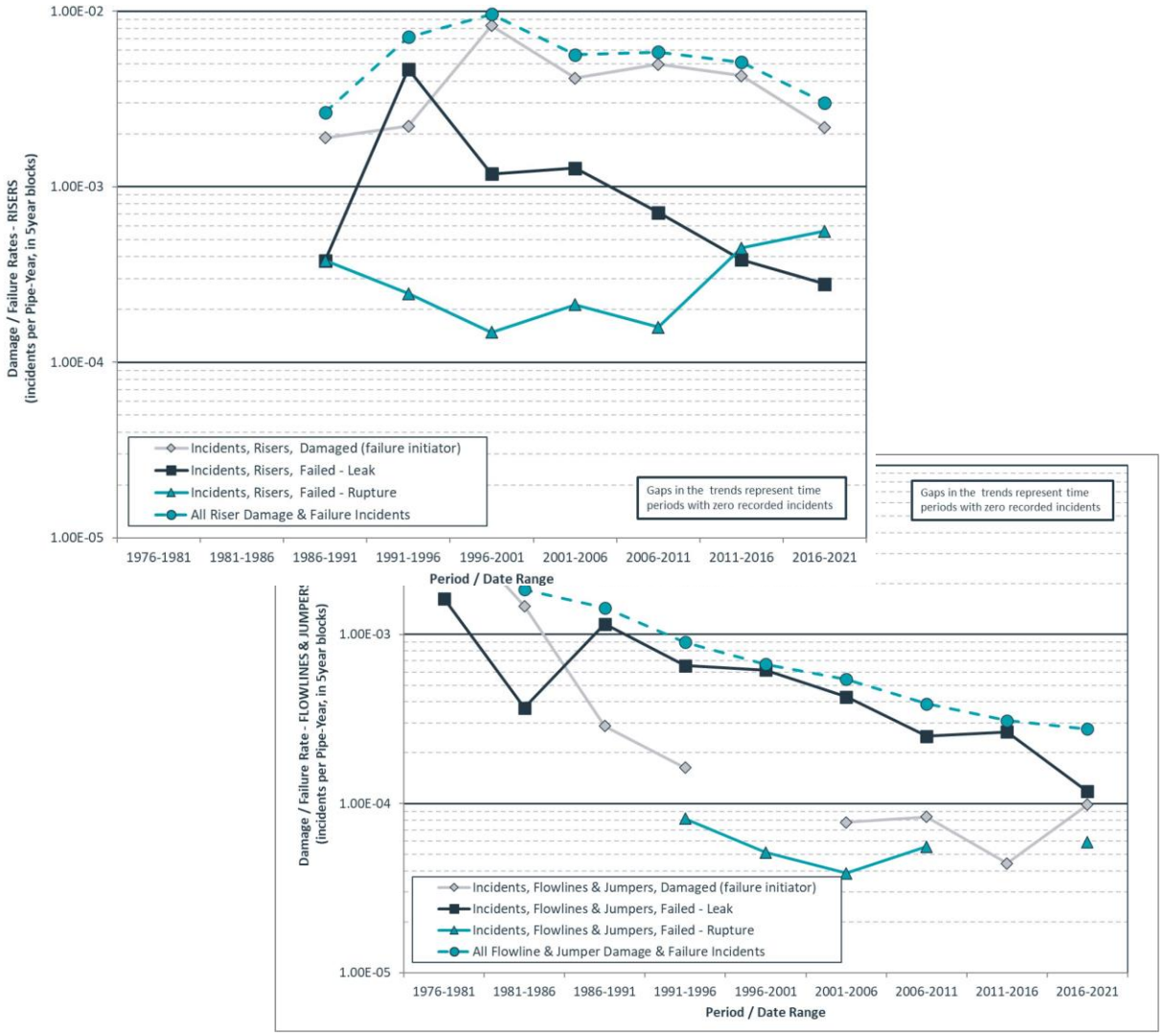
Pipe Type	Total Flexible Pipes Supplied				Average Pipe Section Length
	Sections of Pipe		Length		
	(number)	(% of total)	(km)	(% of total)	(m)
Riser—Static	301	1.5	281.7	1.5	936
Riser—Dynamic	5623	27.3	4203.3	22.6	748
Riser (unspecified)	73	0.4	21.1	0.1	289
Flowlines	10,191	49.5	13,209.1	71.1	1296
Jumpers	3679	17.9	478.6	2.6	130
Unspecified	716	3.5	385.9	2.1	539
Totals (average)	20,583	100.0	18,579.7	100.0	903

NOTE Data are replicated from the Sureflex JIP and include the as-supplied pipe inventory to the end of 2020 for all pipe where the required data were supplied.

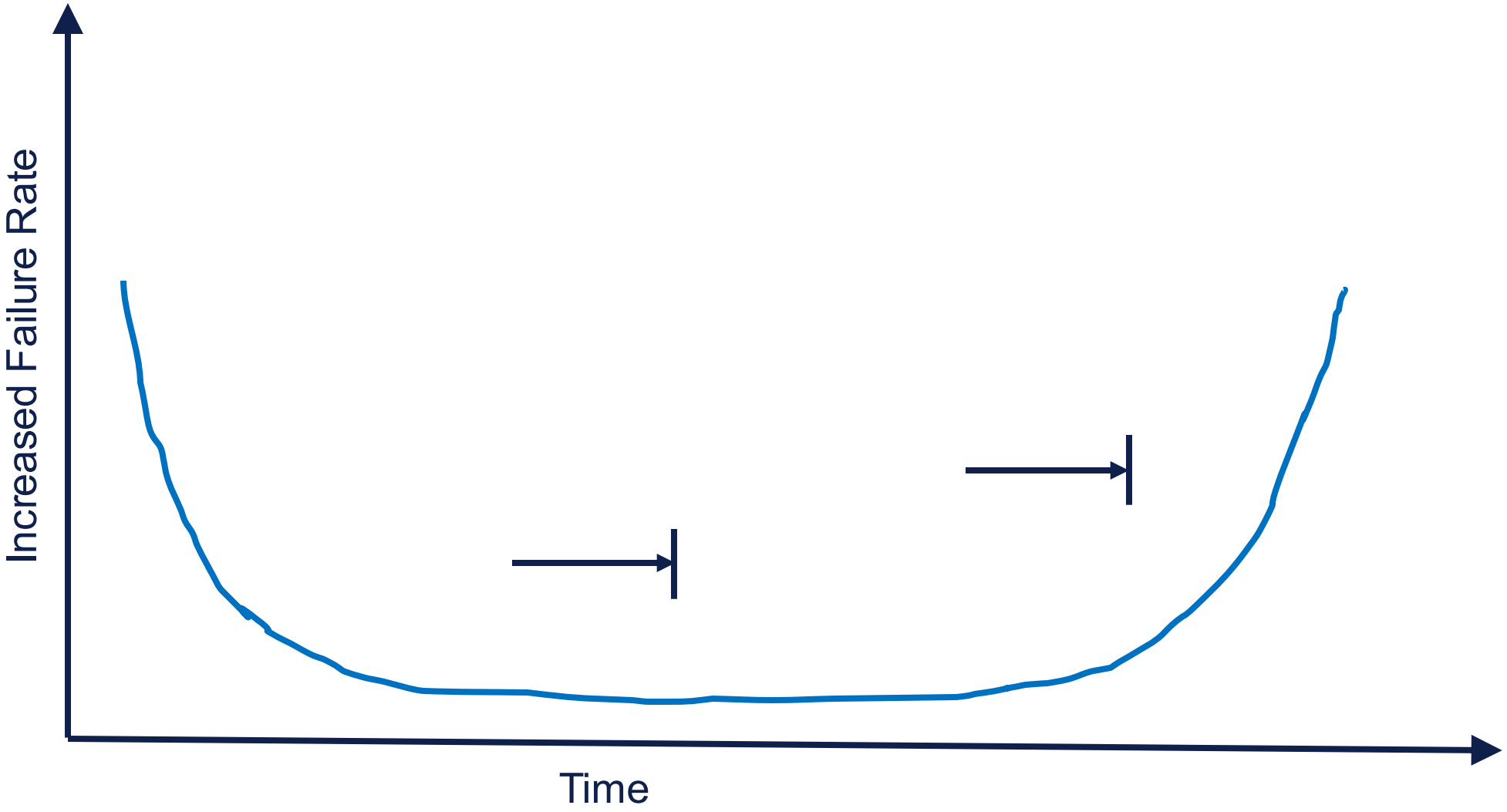
Table 37—Flexible Pipe Operational Experience during 5-Year Periods, Sureflex JIP

Period	Pipe-Years Experience (in Period)		
	Risers	Flowlines and Jumpers	Riser, Flowlines, and Jumpers
1976–1981	144	615	759
1981–1986	1083	2718	3802
1986–1991	2633	6953	9586
1991–1996	4061	12,251	16,313
1996–2001	6753	19,455	26,208
2001–2006	9384	25,773	35,157
2006–2011	12,619	35,979	48,597
2011–2016	15,627	45,235	60,862
2016–2021	17,924	50,788	68,712
Total	70,229	199,768	269,997

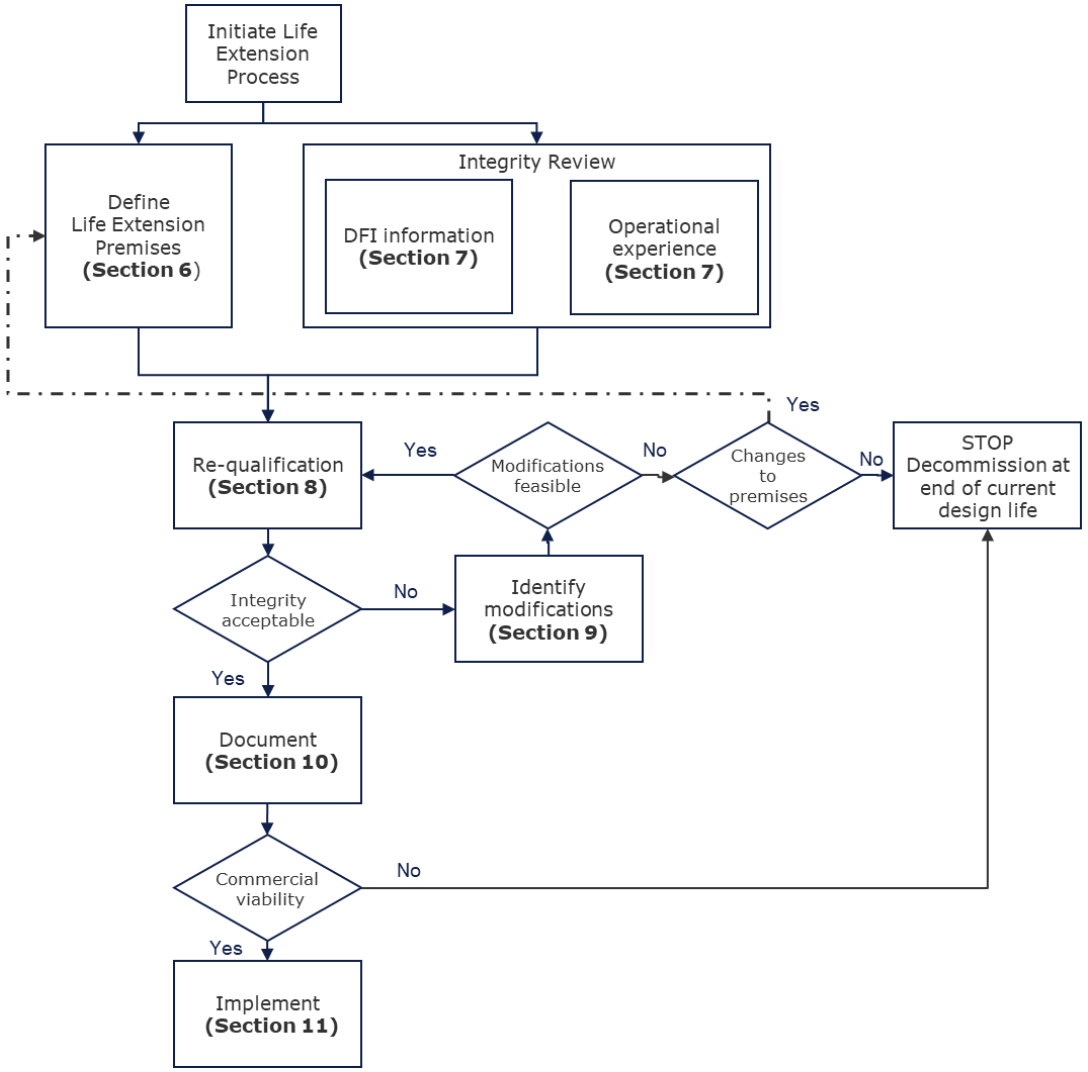
NOTE Data are replicated from the Sureflex JIP. Operational experience is based on datasets that include all of the required parameters in the source datasets.

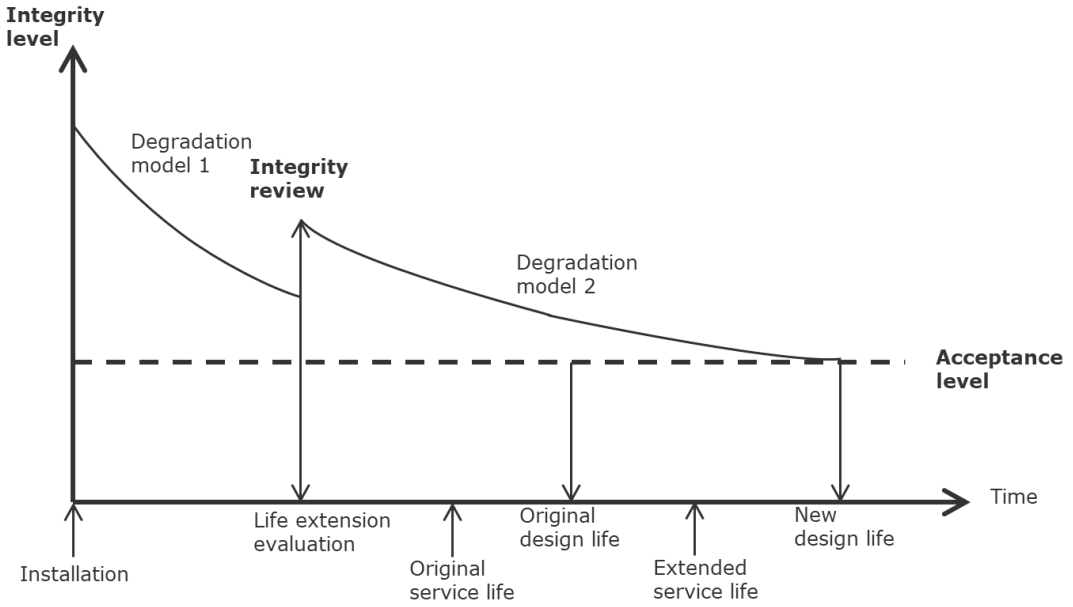


Bathtub model – where are we ?

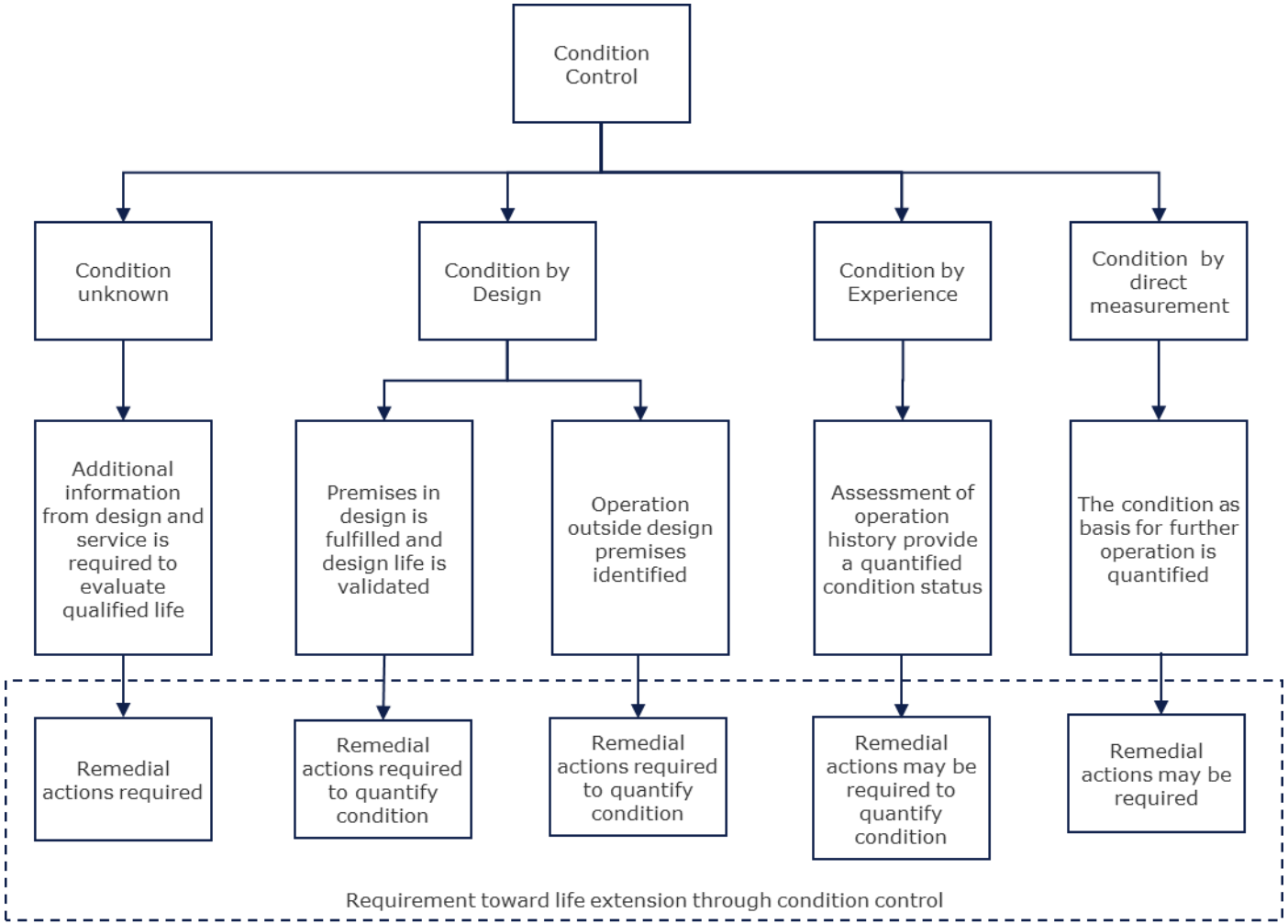


NORSOK Y-002: 2021

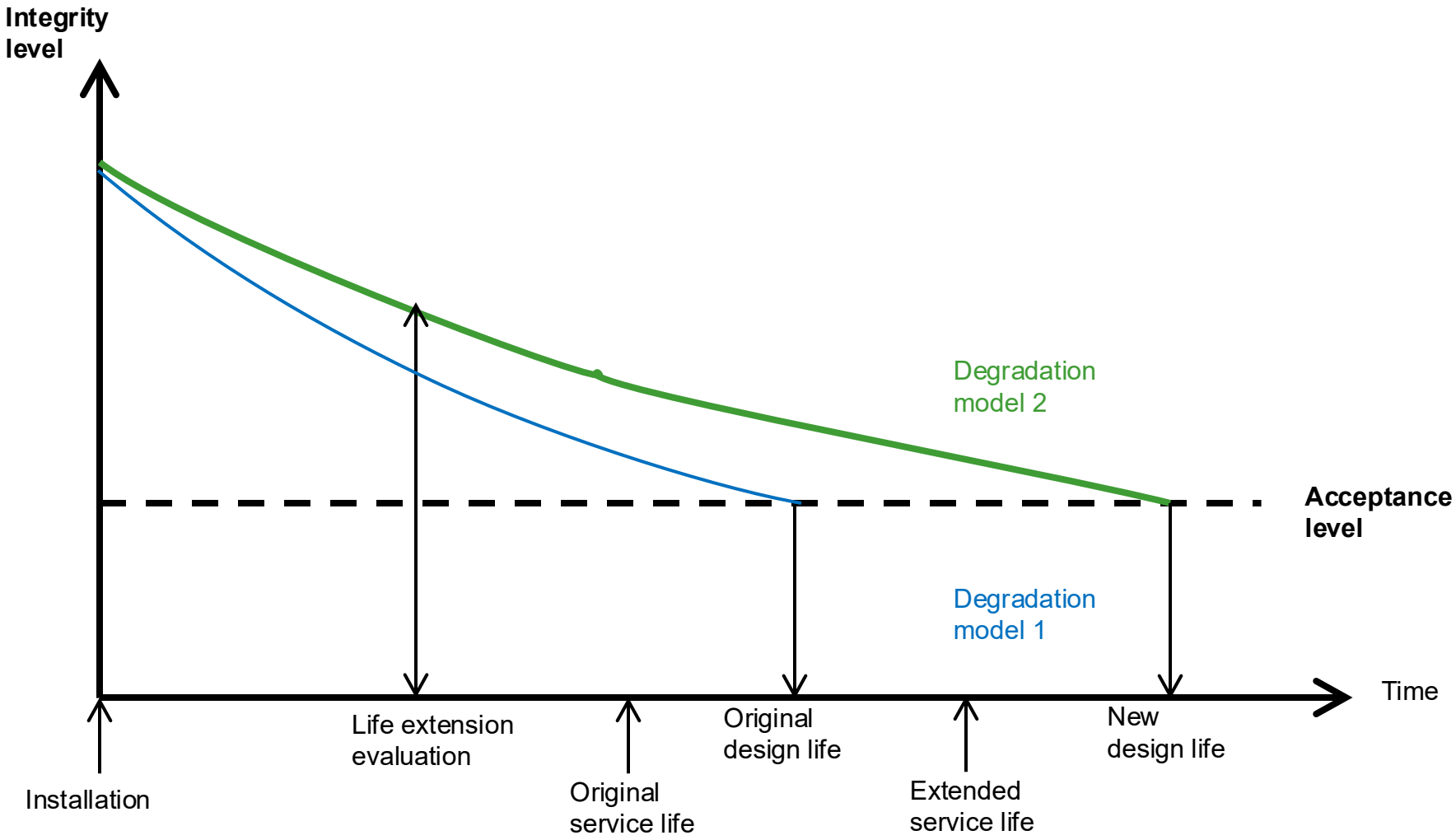




Integrity management system
- sets premises for condition control



Revised understanding of degradation mechanisms



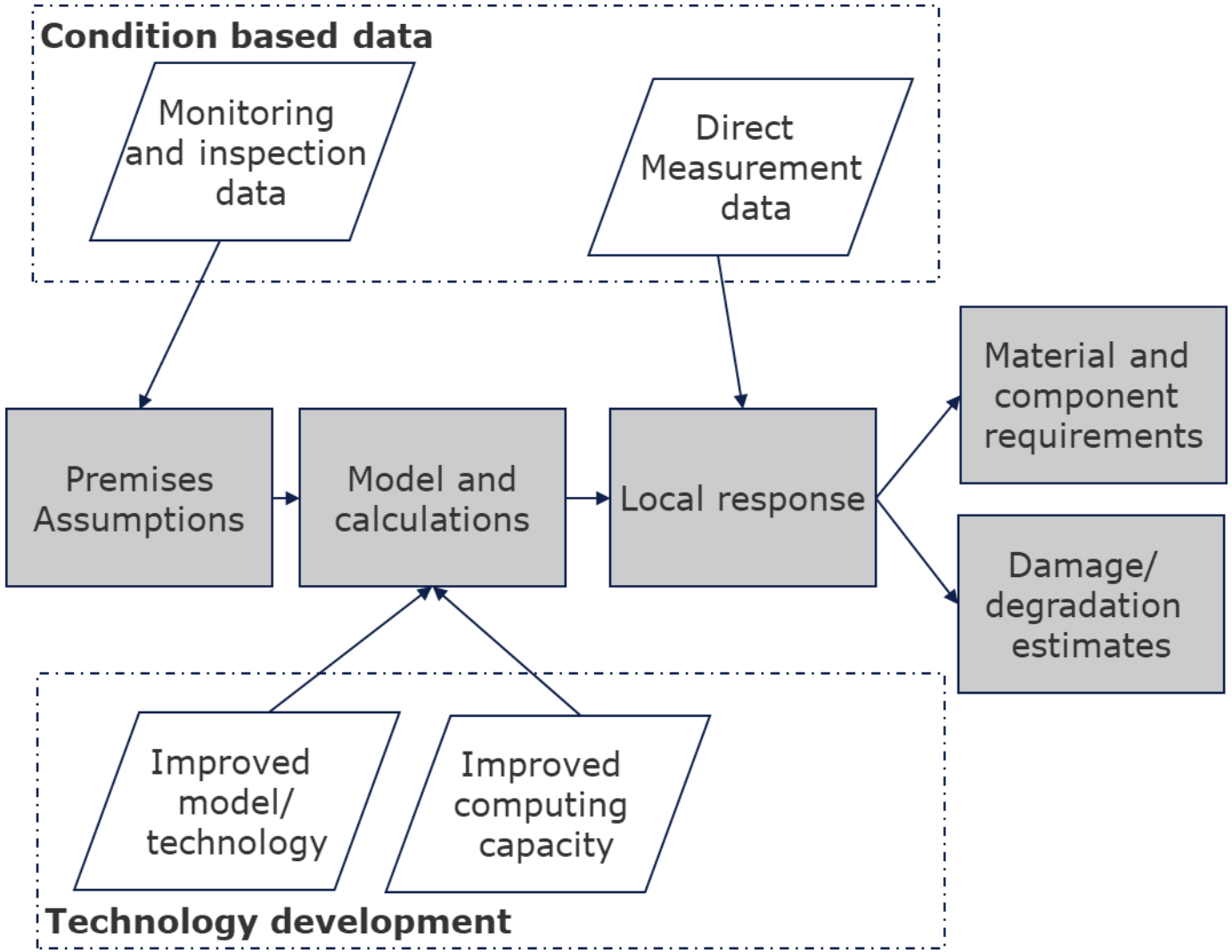
Design premises
- Design standards

- There are several standards relevant for flexible pipes “API suite”
- These have typically been revised since the pipe in use were designed/ manufactured/ constructed

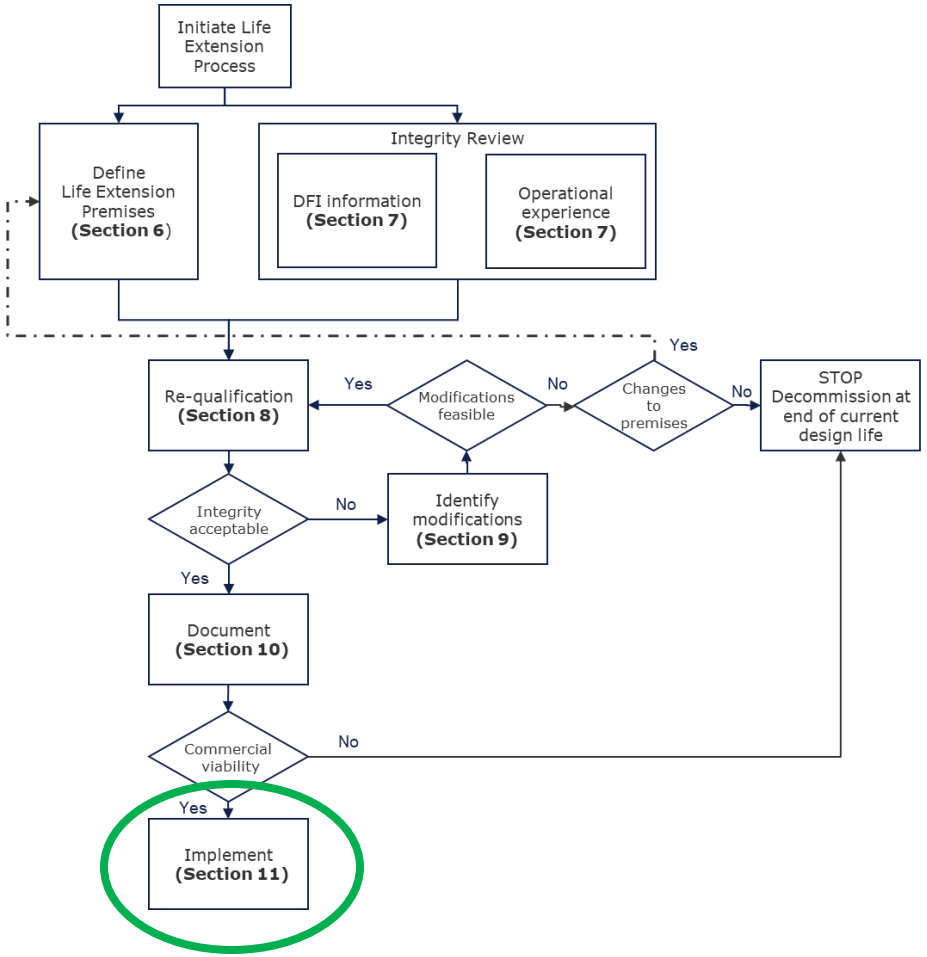
- The requirement by the NORSOK Y-002 is not a requirement to redo the qualifications according to the latest standards and RP’s.
  - Gaps between the original standard and latest revision are to be identified. Then gaps indicating a change in the integrity acceptance level is addressed (loss of containment)

  - Fabrication and construction have been aligned to design standard at time of construction. Gaps need to be addressed in cases the potential benefit of a more recent design standard is pursued.

Feed in from operation and technology development



Life extension process



Oyvind.Omland@dnv.com
+47 948 97 250

www.dnv.com