API RP 2SIM

2014 BSEE Domestic and International Standards

Hugh Westlake

28th January 2014

API RP 2SIM

Agenda:

- Purpose.
- Background.
- Table of Contents.
- Key Concepts.
- Summary.
- Conclusion.



API RP 2SIM - Purpose

- Provide a standalone RP for the Structural Integrity Management (SIM) of existing offshore structures.
- Leave RP 2A to provide the design, fabrication, construction and installation of new structures.
- Clarify the link between data, risk categorization, fitness-for-purpose (FFP) assessment and inspection.
- Provide FFP criteria specific to U.S. Waters.
- Provide a section on decommissioning (placeholder).

- *Adapted to reflect experience from hurri[illegible]es Lili, Ivan Katrina and Rita.*

API RP 2SIM - Background

Basis:

- API RP2A Section 14, Surveys.
- API RP2A Section 17, Assessment of existing platforms.

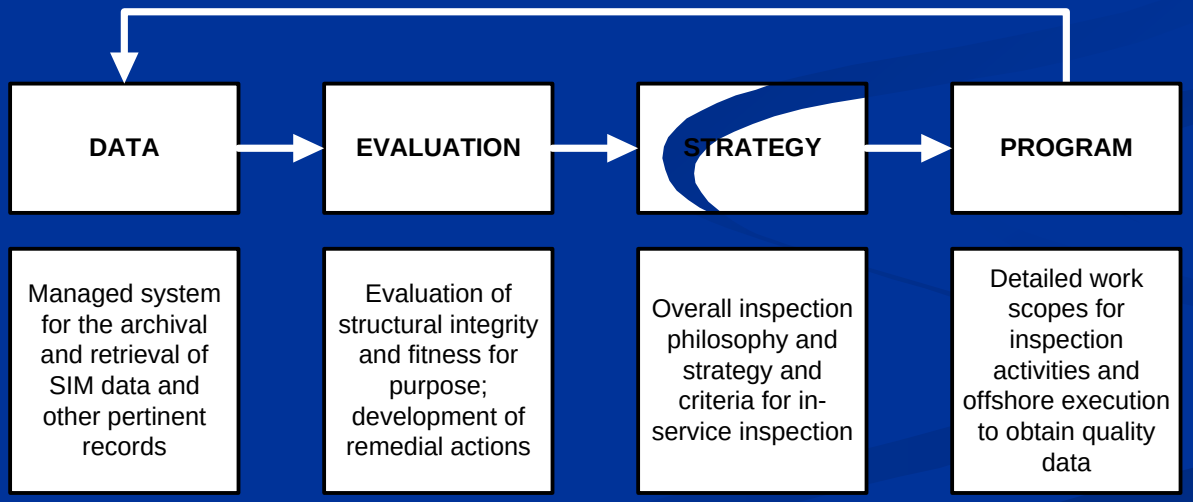
Consistency:

- ISO 19902 Section 23, In-service inspection and structural integrity management.
- ISO 19902 Section 24, Assessment of existing structures.

API RP 2SIM - Background

SIM Process:

- "an ongoing process for ensuring the continuing fitness-for-purpose of an offshore structure or fleet of structures".



API RP 2SIM - Background

Complexity:

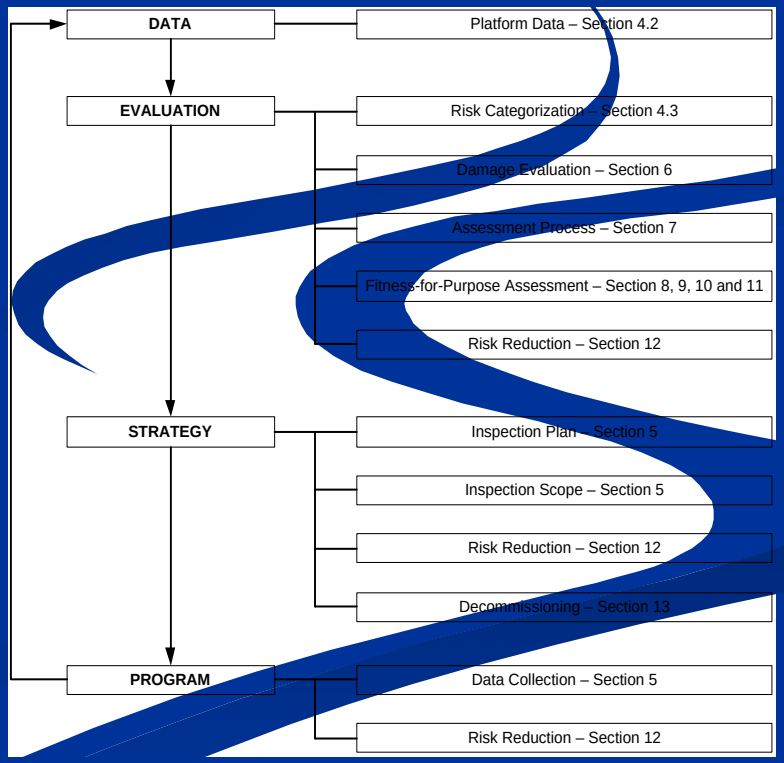
Environmental Consequence	Life-Safety Consequence	Application
High Medium Low	Manned-Nonevacuated Manned- Evacuated Unmanned	Design-use Change-of-use Reuse

Loading	Method	Loading Criteria
Metocean Seismic Ice Fatigue Accidental	Simplified Design Basis Check Design Level Ultimate Strength Alternative	API RP 2A 22nd Edition API 2MET API 2N API 2EQ

Acceptance Criteria	Design Code Vintage	Region
Similarity Reference load Reserve Strength Ratio Probability of Failure Prior Exposure	Before 1st Edition 1st to 19th Edition 20th and 21st Editions 22nd Edition	U.S. Gulf of Mexico U.S. West Coast U.S. East Coast *Outside U.S.*

API RP 2SIM – Table of Contents

1. Scope
2. Normative References
3. Terms, Definitions, and Acronyms
4. Structural Integrity Management Process
5. Surveys
6. Damage Evaluation
7. Structural Assessment Process
8. Assessment for Metocean Loading
9. Assessment for Fatigue Loading
10. Assessment for Seismic Loading
11. Assessment for Ice Loading
12. Risk Reduction
13. Platform Decommissioning



API RP 2SIM – Key Concepts

Risk - Exposure Category:

Life Safety Category	Consequence Category		
	C-1, High Consequence	C-2, Medium Consequence	C-3, Low Consequence
S-1, manned-nonevacuated	L-1	L-1	L-1
S-2, manned-evacuated	L-1	L-2	L-2
S-3, unmanned	L-1	L-2	L-3
In the Gulf of Mexico for sudden hurricanes and winter storms it is possible that the platform will be manned-nonevacuated during these design events.			

API RP 2SIM – Key Concepts

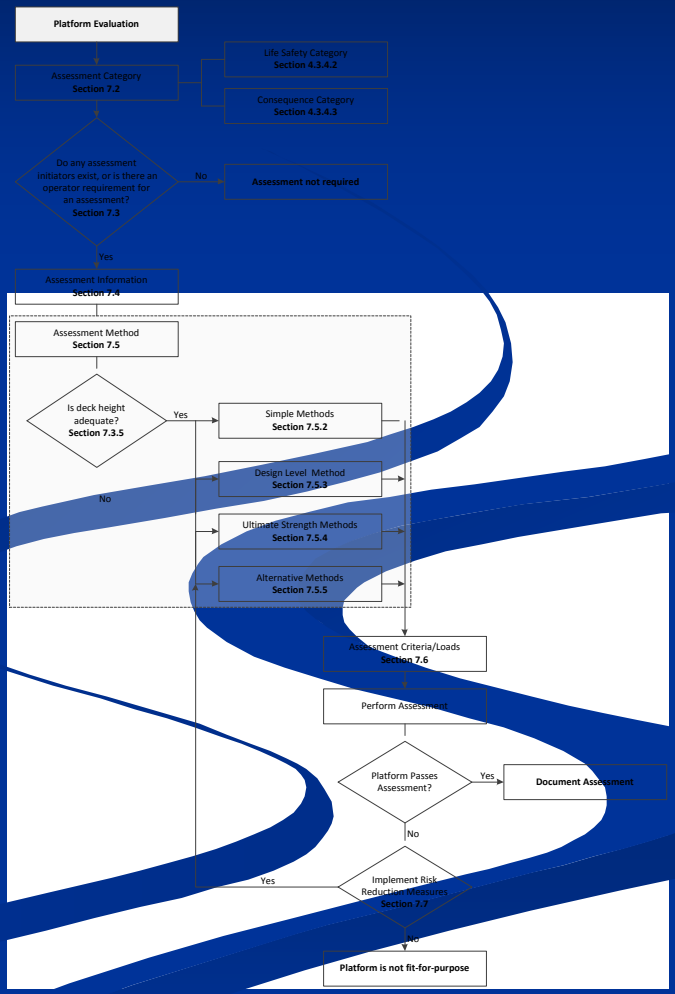
Risk – Likelihood of Failure:

- High likelihood – those structures likely to collapse in a design event (100-year).
- Medium likelihood – those structures likely to sustain damage in a design event, but not collapse.
- Low likelihood – those structures unlikely to collapse or sustain damage in a design event.

API RP 2SIM – Key Concepts

FFP Assessments:

- Evaluate data.
- Categorize structure.
- Assessment initiator.
- Wave-in-deck.
- Assessment method.
- Loading criteria.
- Acceptance criteria.
- Mitigate, if necessary.



API RP 2SIM – Key Concepts

FFP Acceptance Criteria Gulf of Mexico:

- API 2A Section 17 based on curves of wave-height against depth, for three exposure categories.

- API 2SIM based on metocean return periods for three exposure categories.
- API 2SIM includes a life-safety sudden hurricane check.

- *API 2MET can be updated independently.*
- *U.S. West Coast retains RSR based acceptance criteria.*

API RP 2SIM – Key Concepts

Design Level Metocean Criteria, U.S. Gulf of Mexico:

Category	Design Edition		
	API 2A-WSD, 19th Edition and Earlier	API 2A-WSD, 20th or 21st Edition	API 2A-WSD, 22nd and Later
L-1	50-yr FPH	100-yr FPH	100-yr FPH
S-2	Not applicable	Not applicable	Not applicable
C-2	15-yr FPH	50-yr FPH	50-yr FPH
L-3	10-yr FPH	25-yr FPH	25-yr FPH

API RP 2SIM – Key Concepts

Ultimate Strength Metocean Criteria, U.S. Gulf of Mexico:

Category	Design Edition		
	API 2A-WSD, 19th Edition and Earlier	API 2A-WSD, 20th or 21st Edition	API 2A-WSD, 22nd and Later
L-1	300-yr FPH	300-yr FPH	1,000-yr FPH
S-2	2,500-yr SH	2,500-yr SH	500-yr FPH
C-2	25-yr FPH	300-yr FPH	500-yr FPH
L-3	10-yr FPH	100-yr FPH	100-yr FPH

API RP 2SIM – Key Concepts

Risk-Based Inspection Intervals:

Exposure Category				
	L-1	Risk Level 2	Risk Level 1	Risk Level 1
	L-2	Risk Level 3	Risk Level 2	Risk Level 1
	L-3	Risk Level 3	Risk Level 3	Risk Level 2
		Low	Medium	High
		Likelihood of Failure		

Risk Category	Interval
Risk Level 1	3-5 years
Risk Level 2	6-10 years
Risk Level 3	11-15 years
Requires a baseline inspection prior to adoption.	

API RP 2SIM – Key Concepts

Default Inspection Program:

Interval (Years)	Exposure Category [a]		
	L-3	L-2	L-1
	5-10	5-10	3-5
Level II			
General visual survey	X[b]	X[b]	X[b]
Damage survey	X	X	X
Debris survey	X	X	X
Marine growth survey	X	X	X
Scour survey	X[c]	X[c]	X[c]
Anode survey	X	X	X
Cathodic potential	X	X	X
Riser/J-tubes/caisson	X	X	X
Interval (Years)	**Exposure Category [a]**		
	L-3	**L-2**	**L-1**
	[d]	**11-15**	**6-10**
Level III			
Visual corrosion survey	X[e]	X[e]	X
Flooded member detection or member close visual inspection	X	X	X
Weld/joint close visual inspection, after cleaning to bright metal	If required	If required	X
Level IV [f]			
Weld/Joint NDT	g	g	g
Wall thickness	g	g	g

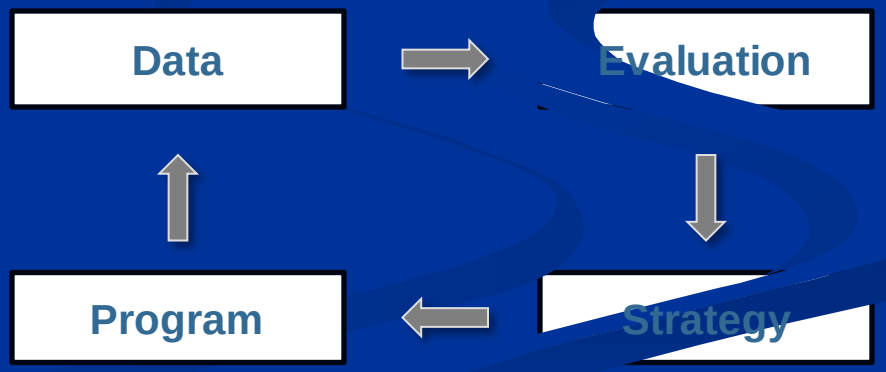
API RP 2SIM – Competency

Should be knowledgeable on:

- Offshore structural engineering and with the specific platform(s) under consideration.
- Offshore construction, repair and installation techniques and technologies.
- Deterioration, damage evaluation, and mitigation.
- The differences between design and assessment engineering.
- Risks to offshore structures.
- Offshore inspection and construction planning, tools and techniques.
- The general inspection findings in the offshore industry.
- Anomalies that may trigger additional inspection or analysis.

API RP 2SIM - Summary

- Promotes a risk-based approach.
- Promotes evaluation of the system capacity.
- Economic risk left to the Operator.
- New practice on:
  - Risk categorization.
  - Acceptance criteria.
  - Damage evaluation.
  - SMR.
  - Decommissioning.
  - Competency.



API RP 2SIM - Conclusion

- Positive industry ballot.
- BSEE to decide on adopting.
- 119 pages.
- Questions?

