A large offshore oil rig is shown against a blue sky with scattered white clouds. The rig's complex steel structure, including multiple levels of decks, ladders, and cranes, is visible. The rig is supported by yellow legs extending into the dark blue ocean. The overall scene is bright and clear.

GEOHAZARDS AND THEIR IMPLICATION FOR THE OFFSHORE INDUSTRY



D • APPOLONIA

Chiara M. Traverso



D'APPOLONIA S.p.A.

Centro Sviluppo Materiali S.p.A.

SeaTech S.r.l.

G.E.T. S.r.l.

COM Services S.r.l.

Sembenelli Consulting S.r.l.

POLARIS S.r.l.

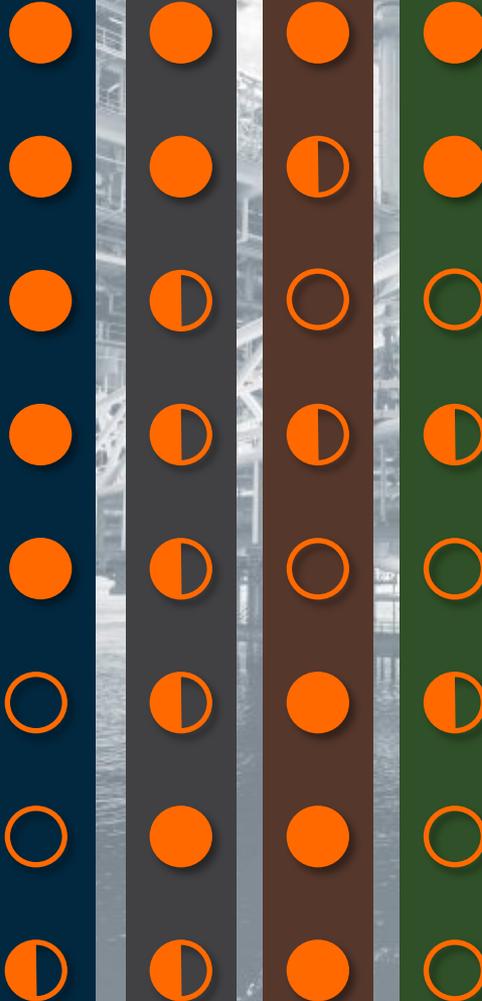
LOGMARIN S.r.l.

OIL & GAS

INDUSTRY &
POWER GEN.

INFRA. &
TRANSPORT

ENVIRONMENT
& SUSTAIN.



RINA

2015 RINA GROUP KEY DATA:

OVER 2,760

EXCLUSIVE RESOURCES

OVER 372

M€ TURNOVER (provisional)



D'APPOLONIA

2015 ENGINEERING KEY DATA:

1300 STAFF

124 M€ TURNOVER (provisional)

ENGINEERING FOR OFFSHORE



SITE CHARACTERIZATION

- Geotechnical, geophysical and environmental surveys
- Laboratory testing
- Geohazards and seismic studies
- Metocean characterization
- Environmental and social impact
- Stakeholder engagement
- Ecosystem protection



ENGINEERING

- Conceptual design
- Basic Design and FEED
- Special Studies
- Safety and Loss Prevention
- RBI
- RCM
- CMMS
- Permitting



CONSTRUCTION

- Project control
- Field engineering
- Field HSE supervision
- Construction supervision
- Commissioning and start-up
- Final Acceptance Test supervision



OPERATION

- O&M Manuals
- Training Design, e-learning and 3D modeling
- Maintenance and Inspection Engineering
- Structural Health Monitoring Systems
- Failure Analysis & Fitness for Service

OBJECTIVE AND OUTLINE

OBJECTIVE:

Offshore geohazards can represent a significant portion of the overall risk of a project. A phased approach for conducting a geohazard assessment in order to mitigate and lower the Project Risk Profile is discussed.

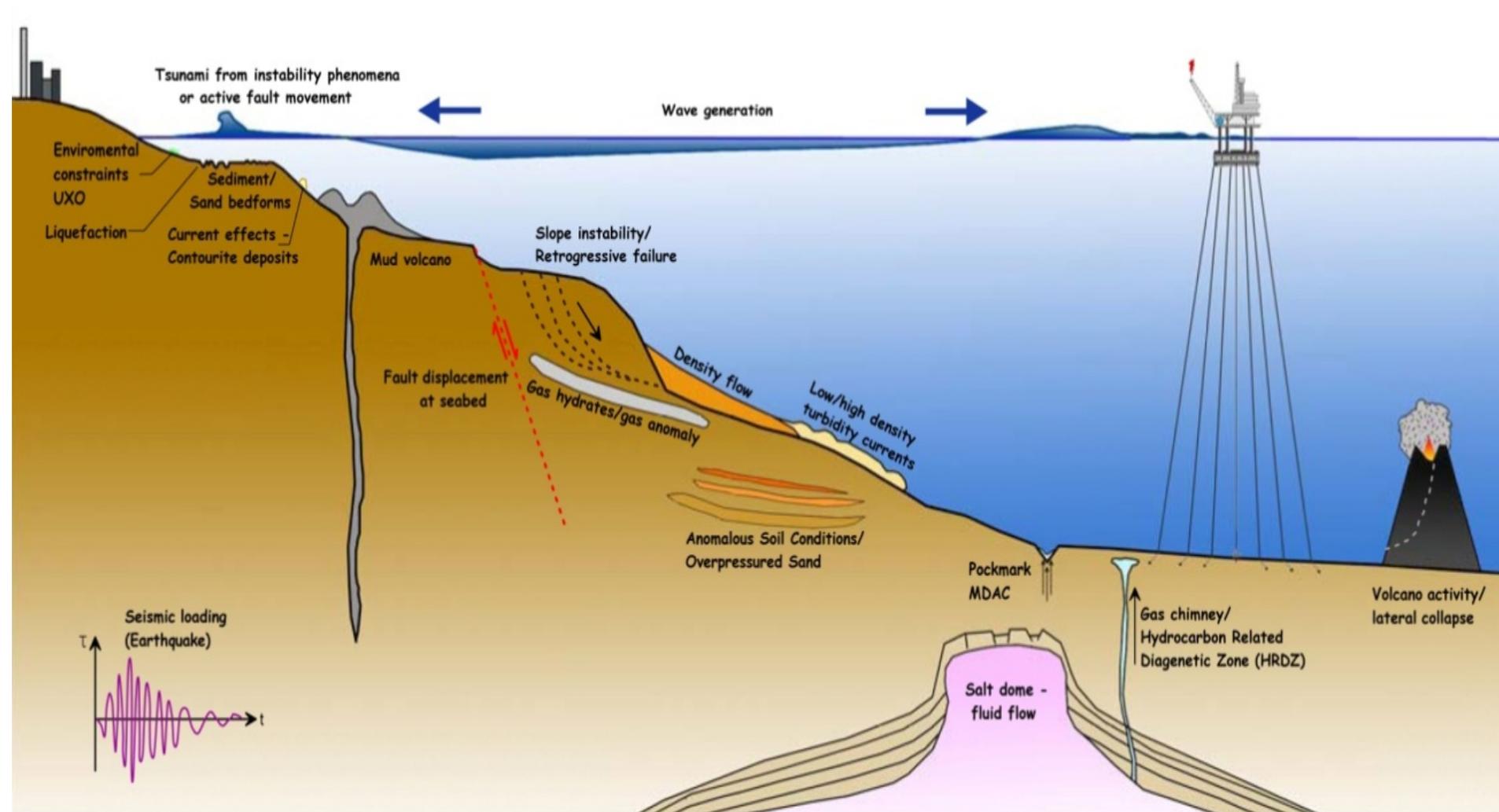
OUTLINE:

- What are geohazards ?
- Implication of geohazards for industry
- Approach and examples
- Conclusions



WHAT ARE GEOHAZARDS?

ANY GEOLOGIC FEATURE WHICH CAN HIT YOUR STRUCTURE



WHAT DO INDUSTRIES ASK US?

- Are geohazards present in the area?
- Does they represent a risk to the project?
- How can this risk be minimized?

HOW CAN GEOSCIENTIST REPLY?

- Identification (survey data)
- Laboratory testing (age/frequency)
- Engineering Evaluation (severity)
- Risk Assessment (register)
- Mitigation (intervention)



PHASED APPROACH

IDENTIFY

CAN BE AVOIDED?

YES

OK

NO

IS IT ACTIVE?

NO

OK

YES

DEFINE
MAGNITUDE /
FREQUENCY

CAN THE STRUCTURE RESIST?

YES

OK

NO

DEFINE RISK AND
MITIGATION MEASURES



IDENTIFY

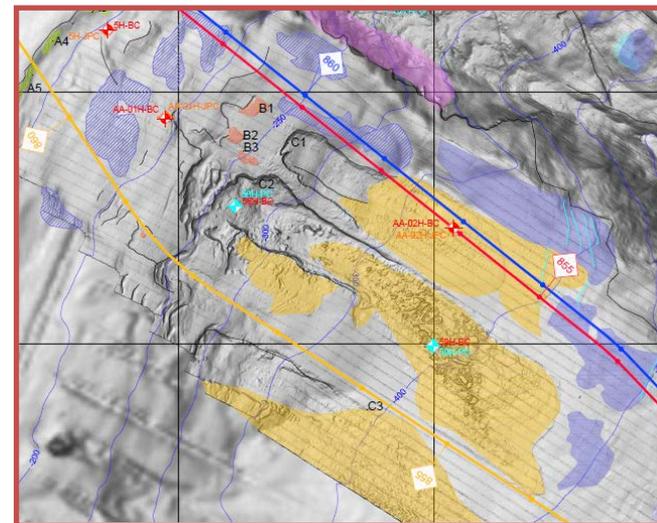
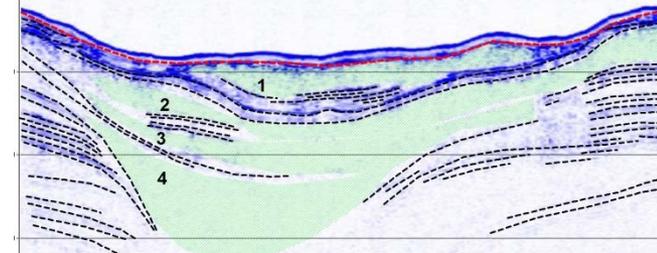


CAN BE AVOIDED?

YES

OK

PHASED APPROACH



IDENTIFY



CAN BE AVOIDED?

YES

OK

NO

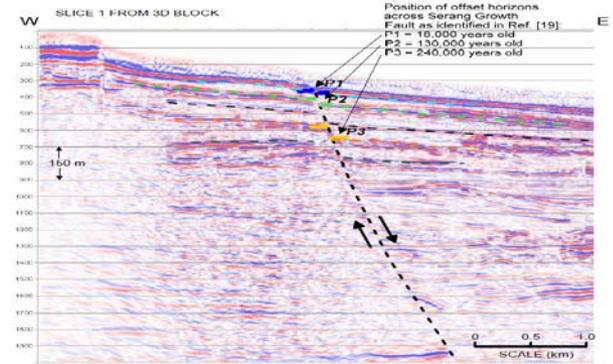
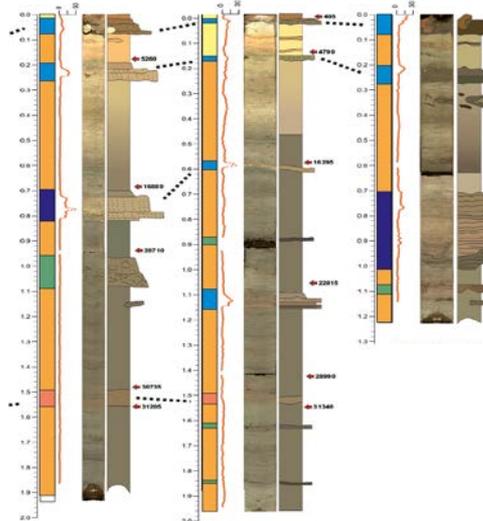
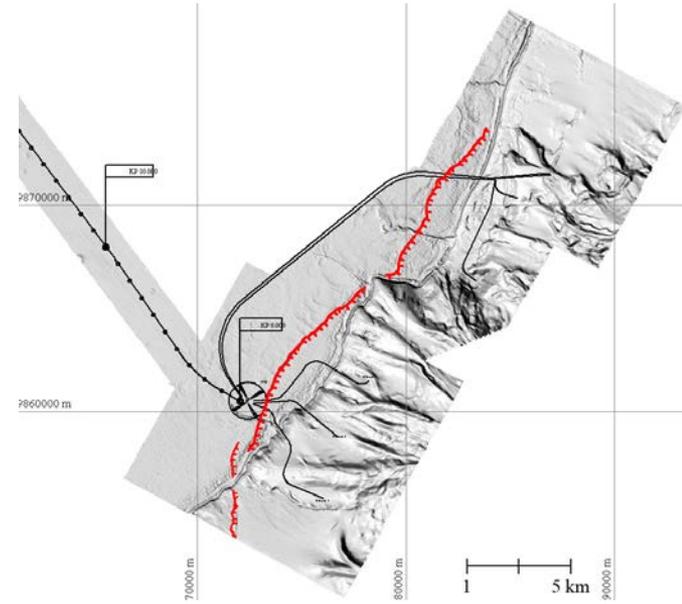


IS IT ACTIVE?

NO

OK

PHASED APPROACH



PHASED APPROACH

IDENTIFY

CAN BE AVOIDED?

YES

OK

NO

IS IT ACTIVE?

NO

OK

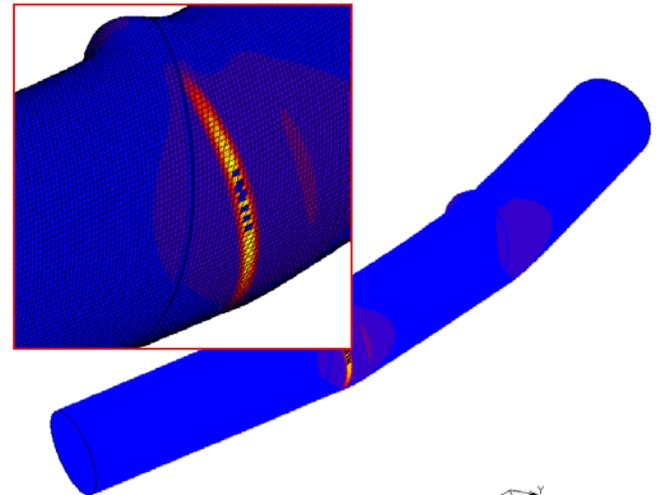
YES

DEFINE
MAGNITUDE /
FREQUENCY

CAN THE STRUCTURE RESIST?

YES

OK



PHASED APPROACH

IDENTIFY

CAN BE AVOIDED?

YES

OK

NO

IS IT ACTIVE?

NO

OK

DEFINE
MAGNITUDE /
FREQUENCY

CAN THE STRUCTURE RESIST?

YES

OK

DEFINE RISK AND
MITIGATION MEASURES

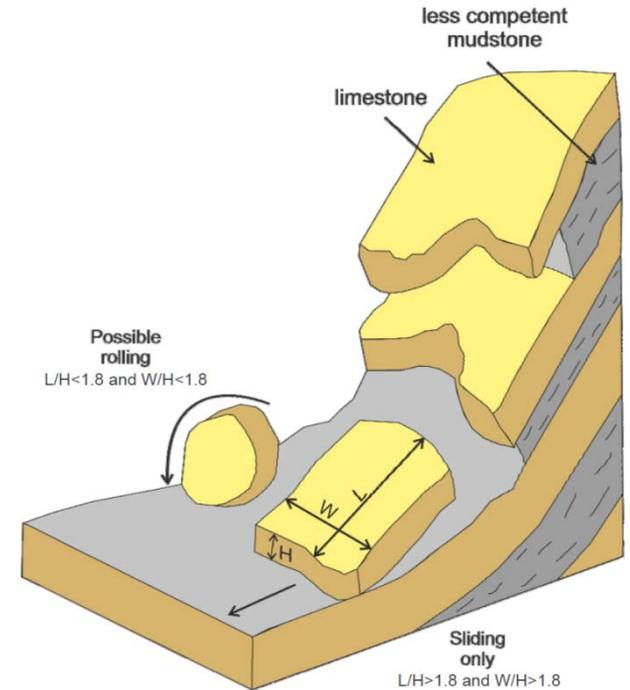


Table B 4.1: Boulder impact hazard matrix

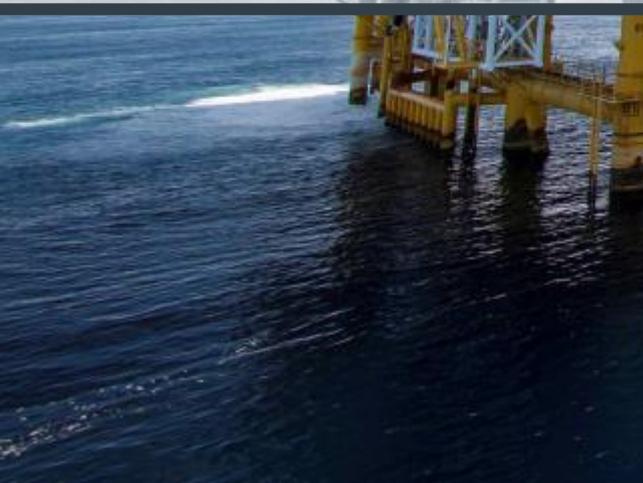
		Probability of boulders impacting with kinetic energy > 110kJ (P_{DAM})				
		$0 < \leq 0.01$	$0.01 \leq \leq 0.15$	$0.15 \leq \leq 0.50$	$0.50 \leq \leq 0.85$	≥ 0.85
Probability of boulders hitting the pipeline (P_{HIT})	≥ 0.85	Low	Medium	High	High	High
	$0.5 \leq \leq 0.85$	Low	Low	Medium	High	High
	$0.15 \leq \leq 0.5$	Low	Low	Low	Medium	High
	$0.01 \leq \leq 0.15$	Low	Low	Low	Low	Medium
	$0 < \leq 0.01$	Low	Low	Low	Low	Low

CONCLUSIONS

- Geohazards must be assessed in the context of the risk they pose to a specific project
- Risk must consider both the potential for the hazardous event to occur and the impact on the submarine structure
- A phased geohazard assessment defined in the early phases of the project can mitigate and lower the Project Risk Profile



D • APPOLONIA



D • APPOLONIA

Chiara M. Traverso
D'APPOLONIA S.p.A.

Via San Nazaro, 19 - 16145 GENOVA - Italy
Tel. +39 010 3628148 - Fax +39 010 3621078

www.dappolonia.it

e-mail: dappolonia@dappolonia.it