# Collision Avoidance
## London – 20th March 2015

# Timeline

Document
and Plan

Document
email exchange

Document
email exchange

1 day event
Approach, Scope
and detail

1.1/2 day event
Detail & Structure

1/2 day event
Review and Approve

May 2014
Long Beach

October 2014
Amsterdam

March 2015
London

September 2015
Houston
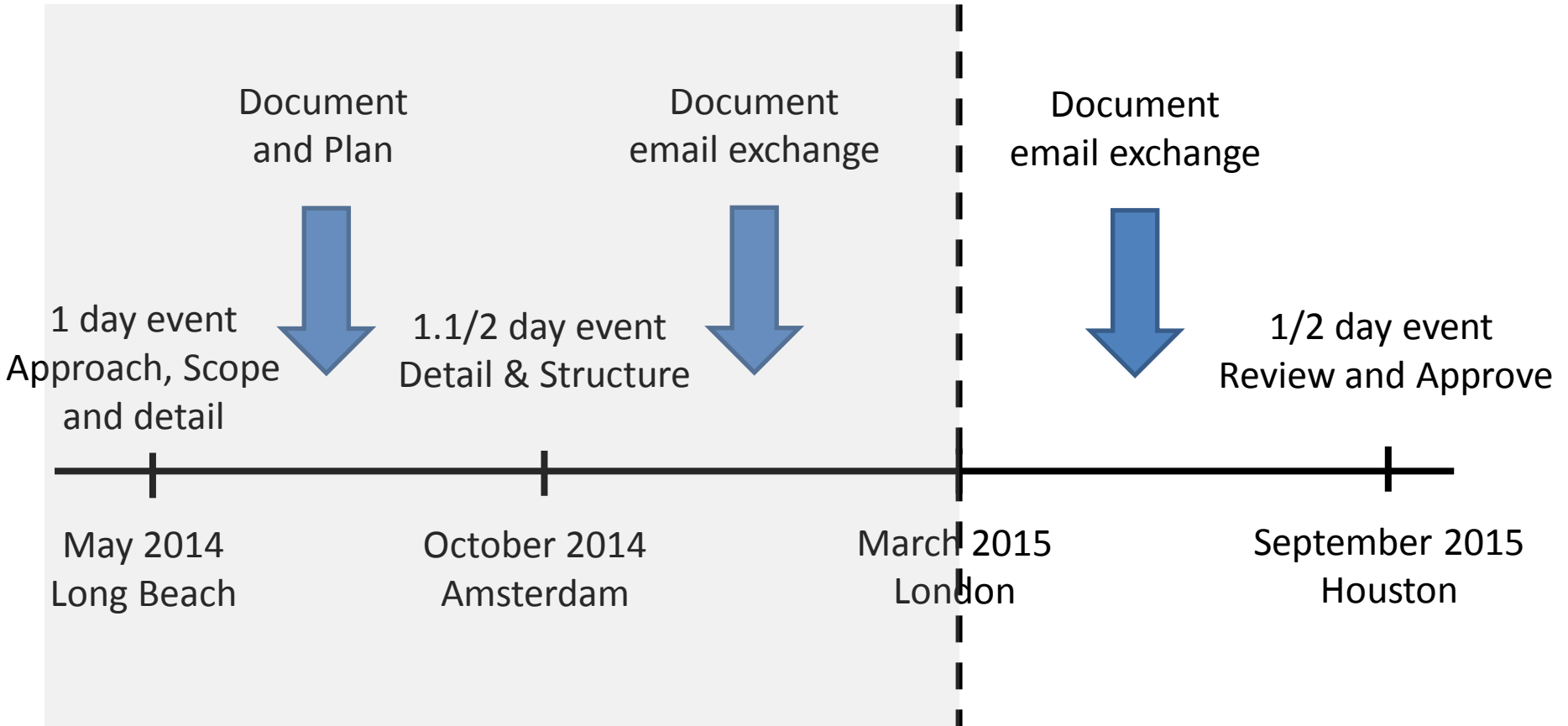
# Principles

- The *recommendations* may only refer to existing methods and algorithms, described in a recognised, publically available paper (preferably peer reviewed).

- We will recognise that future improvements are likely and we will be open to evolving the standard in a controlled manner, through peer review and management of change.

- The adopted method will distinguish between HSE and non-HSE collisions and be risk-sensitive.

- We will address rule(s) for both planning and for execution.

- Qualify first, then quantify.

- We will test the feasibility and practicality of execution of any proposal.

- We commit to developing and adopting the minimum set of rules that satisfies existing operating envelopes.

- We will define the limitation of the stated recommendations, or algorithms.

- The output generated by the attendees from the October 2014 meeting will be compiled into a draft standard by a group of 5 or so members endorsed by the wider group.

# Organisational Structure

The One of the statements made at the New Orleans meeting was that a Collision Avoidance rule needs to be presented within a management framework. Because of this and for completeness, all three goals identified at the meeting need to be addressed. These will be addressed by three teams:

- Unified Collision Avoidance Rule [UCAR – Steve Sawaryn]: Comparison of different collision avoidance methods, advantages and disadvantages.

- Assurance and Verification [A&V – Pete Clark]: When business partner does collision avoidance scan, assurance that SF is acceptably similar? Create test framework and index. Base the approach around the Operator Group work.

- Management Principles [MP – Bill Allen]: General expectation for the collision avoidance process. Base the approach around the existing ISCWSA Fundamentals of Good Collision Avoidance Management document.

# Work Structure
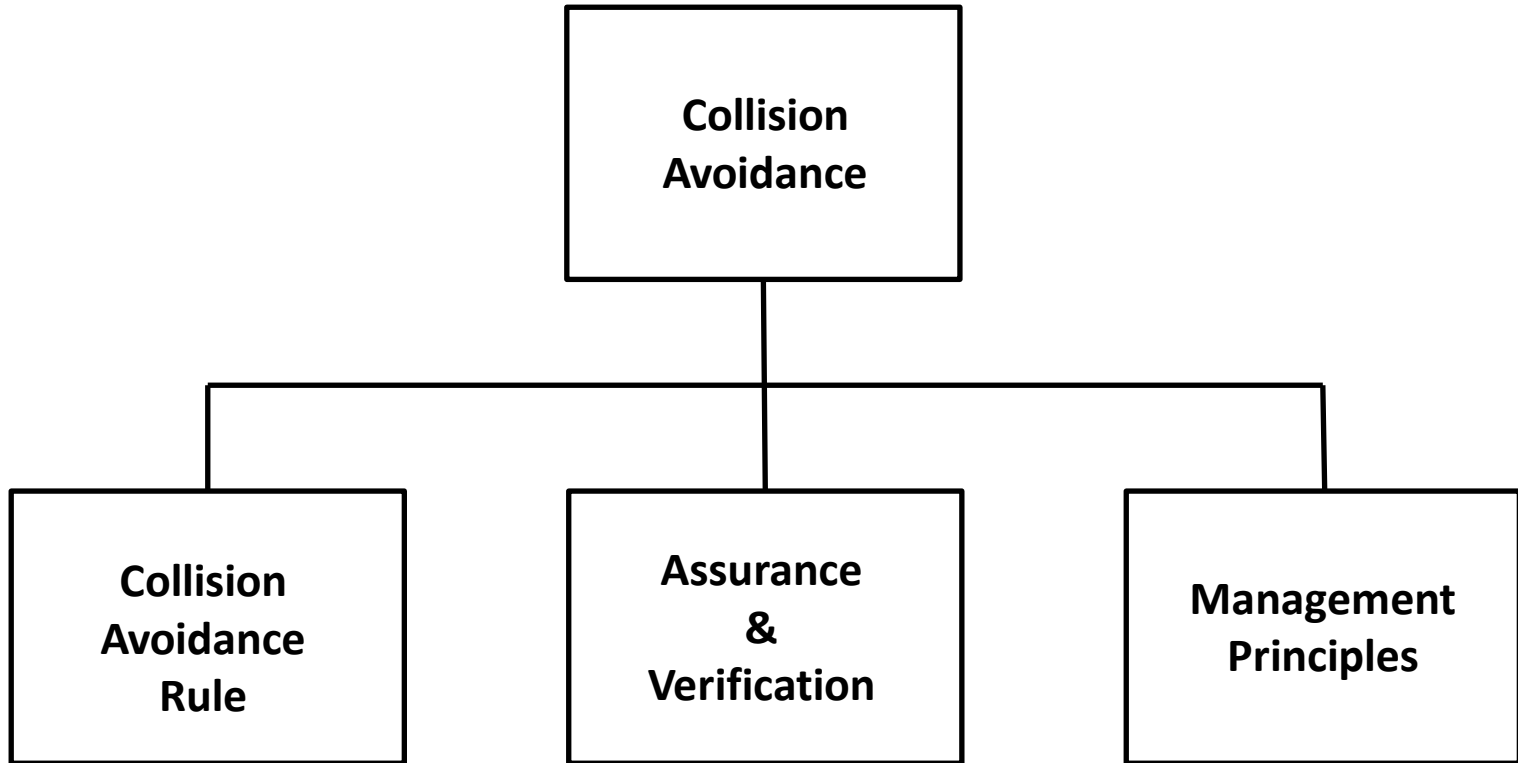
# Collision Avoidance Rule (1)

- Seeking a recommendation largely based on current, documented methods and understanding. Steady, methodical progress to date.
  - Key contributions are being made by participants
- Agree framework in accordance with the principles (October 14)
  - Present errors as if they are associated with the object / drilled well
  - Model will be Separation Factor (SF) based
  - Critical value will be SF = 1 to avoid ambiguity
- Identifying and examining critical issues or weaknesses (October 14)
  - Connection with "probability of incursion / collision"
  - Assess expansion factor, pedal curve and evaluate k = 3.5
  - Error model well correlation (adopt status quo and pass to error model group)
- Identifying and examining critical issues or weaknesses (March 15)
  - Presentation of Pedal Curve presentation (coherent and consistent concepts, results and implementation method)
  - Challenge of conservatism in some cases?
  - Possibly misleading results in other cases – what additional rules, if any can be applied to obviate these (by end May 15)?

# Collision Avoidance Rule (2)

- Agreement on the numerical threshold is still needed
  - Big variation encountered in the industry
  - Complicated by safety factors, terminology and applied conditions
  - Critically underpinned by Procedures Management and Verification
- Discussion and agreement on the distribution function still needed
- Our terminology
- Discussion and agreement on communication / roll-out

# Incursion v. Collision

kσ surfaces (in 3D)
of probability density
function (PDF)

4

3

2

k = 1

$R_0$

V
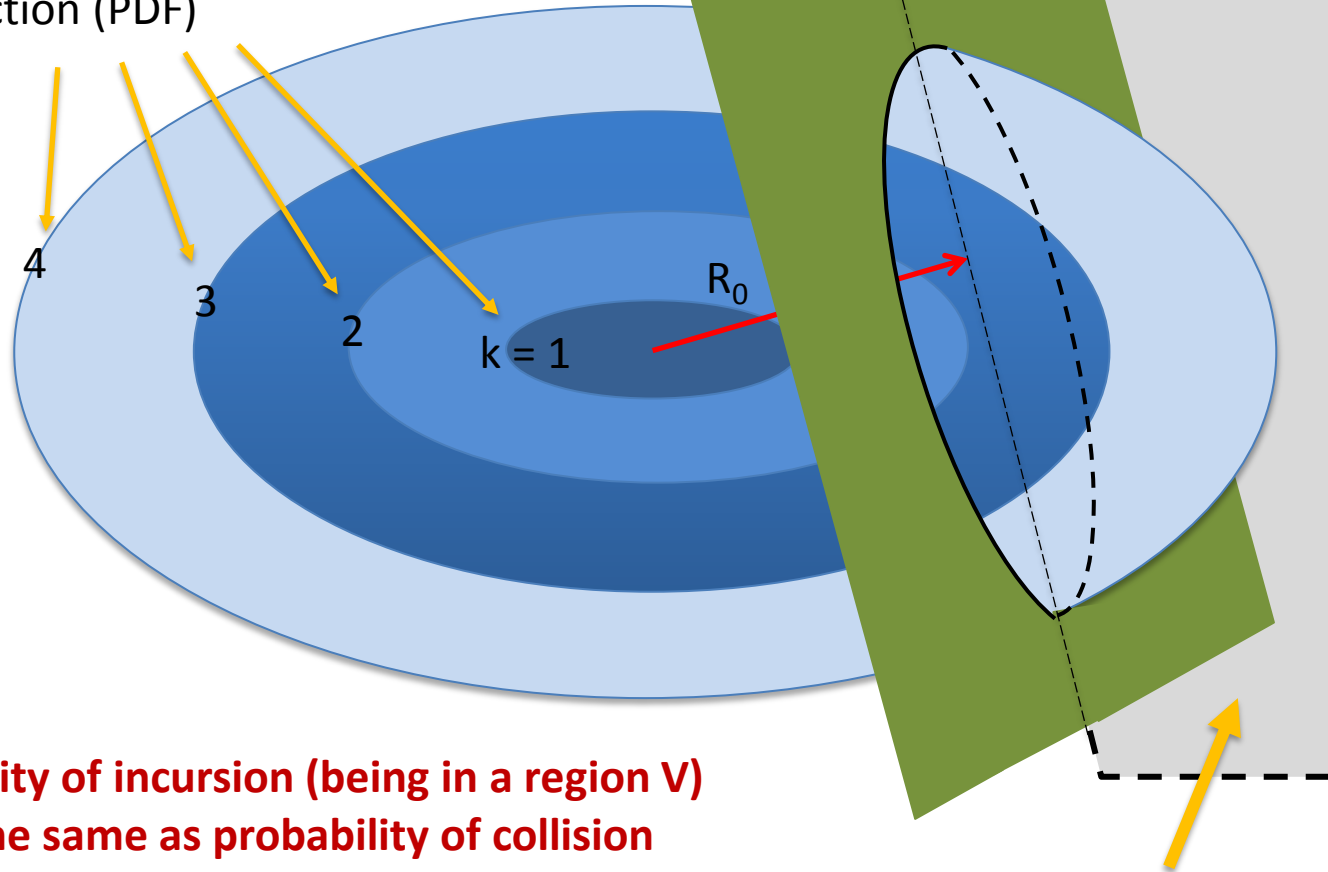
**Probability of incursion (being in a region V)
is not the same as probability of collision**

Probability of being in a certain region V
= integral of PDF*dV over V

# Assurance & Verification

- Cases are documented
- Need to formalise

# Management Principles

- Based on existing, documented principles
- Concept is that there would be two documents (covering requirements and performance)
- Paper abstract submitted for the SPE 2015 ATCE, Houston
- Awaiting confirmation or otherwise
- Fall back is presentation at the 2016 Drilling Conference

# Outline Agenda

| From | To | Description |
|------|------|-------------|
| 13.30 | 13.45 | Introductions, News & Plan |
| 13.45 | 14.00 | Progress |
| 14.00 | 14.30 | Presentation (Pedal Curve & Matrix): Nyrnes/Bang |
| 14.30 | 15.00 | Presentation (Error Model Correlation): Wilson |
| 15.00 | 15.15 | Break |
| 15.15 | 16.30 | Team Activity (3) |
| 16.30 | 17.00 | Team Feedback and Summary |