

# OPEN SESSION

## RISK MANAGEMENT IN TUNNELLING

A systematic framework for the contractual apportionment of construction risk.

### WG3 Contractual Practices

Arnold Dix

Adj. Prof of Engineering QUT, Barrister at Law BSc  
(Hons). Aust Asia Fire Eng.

Martin Smith

BSc MICE CEng. SIA Dipl.Baumeister

# Introduction

- Contracts are the fundamental mechanism for Financial Risk Management in every country in the world.

- Effective delivery of underground construction projects demands sophisticated contracts to manage the special risks of underground projects.

- ITA has always recognised the critical importance of contractual provisions - and has developed 25 key contractual propositions

# BUT...

- Increased complexity in project delivery models
- Financing
- Local Laws
- etc

The FIDIC Contracts Guide  
SUPPLEMENT  
WITH TENDERS AND BIDDING GUIDANCE FOR THE EMPLOYER OF FIDIC  
CONDITIONS OF CONTRACT FOR CONSTRUCTION  
MULTILATERAL DEVELOPMENT BANK HARMONISED EDITION  
DRAFT DECEMBER 2009

Construction  
FOR BUILDING AND ENGINEERING WORKS DESIGNED BY THE EMPLOYER  
GENERAL CONDITIONS  
GUIDANCE FOR THE PREPARATION OF PARTICULAR  
CONDITIONS OF CONTRACT FOR THE CONTRACTOR

Conditions of Contract for  
Plant and Design-Build  
FOR BUILDING AND ENGINEERING WORKS DESIGNED BY THE CONTRACTOR

Conditions of Contract for  
**Construction**  
MDB HARMONISED EDITION  
FOR BUILDING AND ENGINEERING WORKS DESIGNED BY THE EMPLOYER  
GENERAL CONDITIONS  
GUIDANCE FOR THE PREPARATION OF PARTICULAR  
CONDITIONS OF CONTRACT FOR THE CONTRACTOR

Conditions of Contract for  
**EPC/Turnkey Projects**  
GENERAL CONDITIONS  
GUIDANCE FOR THE PREPARATION OF  
FORMS OF TENDER, CONTRACT AGREEMENT  
DISPUTE ADJUDICATION AGREEMENT

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Managing reality  
Book 5  
Managing  
procedures

- This sophistication has challenged ITA to produce a more sophisticated tool to assist with contracts - to manage the core risks

# Specifications

- **Must**
  - be applicable to
    - all countries
    - all legal systems
  - suit all delivery methods
  - capture the collective wisdom of ITA
  - be responsive to change



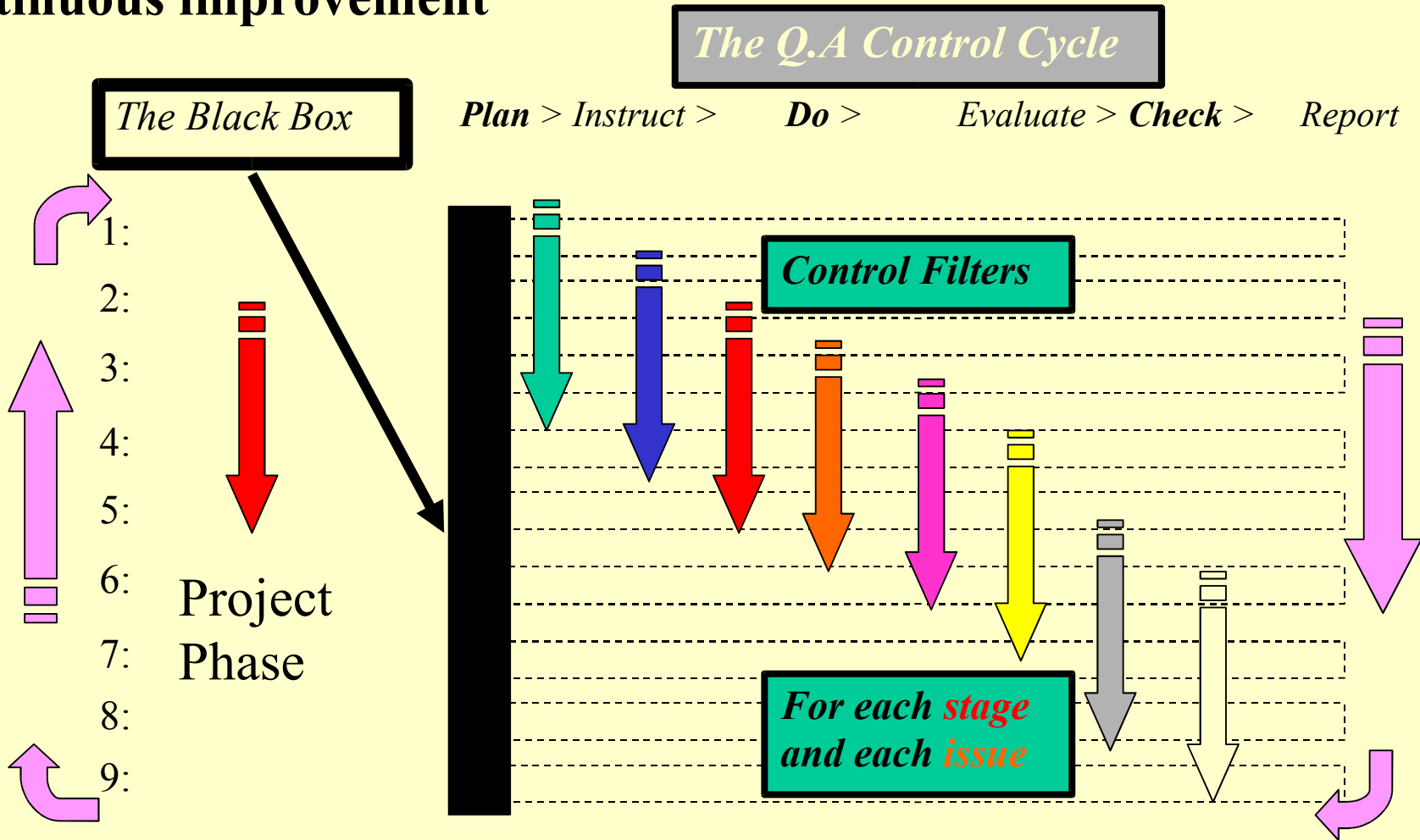
# AN ISSUES FRAMEWORK

- Without a frame of reference there was no context to consider contractual issues
- A frame of reference has been developed to characterise and put in perspective all contractual matters

# The Framework

- THREE CORE UNIFYING THEMES
  - Continuous improvement
  - Project Issues
  - Project Phases

# Continuous improvement



# Project Issues

Environmental

Legal ( *Organisational Responsibility* )

Technical (*Output* )

Programme ( *Time* )

Risk and Insurance ( *Variations* )

Resource and Financial ( *Input* )

Measurement and Commercial ( *Cost* )

Quality Assurance ( *Review* )

Contract Administration ( *Documentation* )

Communication

# **Project Phases:**

- 1: Project Development**
- 2: Design**
- 3: Construction Procurement**
- 4: Fabrication - Construction**
- 5: Construction Supervision**
- 6: Commissioning**
- 7: Operations & Maintenance**
- 8: Repair & Refurbishment**
- 9: Research & Development**

# Illustration of Project Complexity

**Environmental  
& Geological  
Investigation**

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

- 1: Project Development
- 2: Design
- 3: Construction Procurement
- 4: Fabrication - Construction
- 5: Construction Supervision
- 6: Commissioning
- 7: Operations & Maintenance
- 8: Repair & Refurbishment
- 9: Research & Development

**Procedures**

**Bills of  
Quantities**

**Conditions  
of Contract**

**Project  
Organisation**

**Project  
Specifications**

**Contract  
Programme**

**Risk  
Register**

**Materials, Plant,  
Labour, SC,  
Finance**

**Environmental  
& Geological  
Investigation**

a *Design* Contract

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrication - Construction

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**Procedures**

**Bills of  
Quantities**

**Conditions  
of Contract**

**Project  
Organisation**

**Project  
Specifications**

**Contract  
Programme**

**Risk  
Register**

**Materials, Plant,  
Labour, SC,  
Finance**

# Illustration of a *Construction* Contract

**Environmental  
& Geological  
Investigation**

**Project Phase:** Type of Issue: Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrication - Construction

5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development

**Procedures**

**Bills of  
Quantities**

**Conditions  
of Contract**

**Project  
Organisation**

**Project  
Specifications**

**Contract  
Programme**

**Risk  
Register**

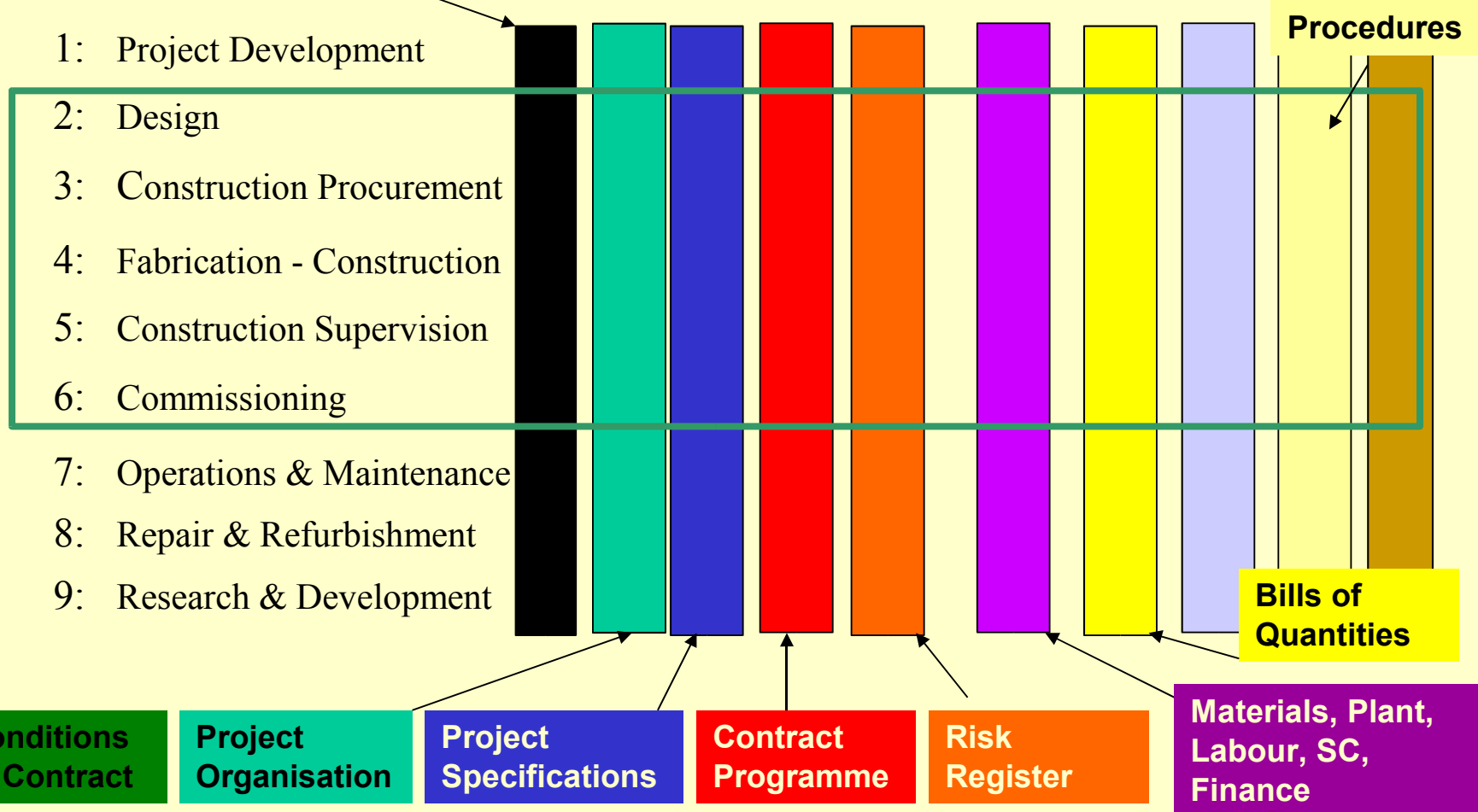
**Materials, Plant,  
Labour, SC,  
Finance**



# Illustration of a *Design & Construct* Contract

**Environmental  
& Geological  
Investigation**

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.



# Illustration of a *Build –Operate – Own -Transfer* Contract

**Environmental  
& Geological  
Investigation**

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrication - Construction

5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development

**Procedures**

**Bills of  
Quantities**

**Conditions  
of Contract**

**Project  
Organisation**

**Project  
Specifications**

**Contract  
Programme**

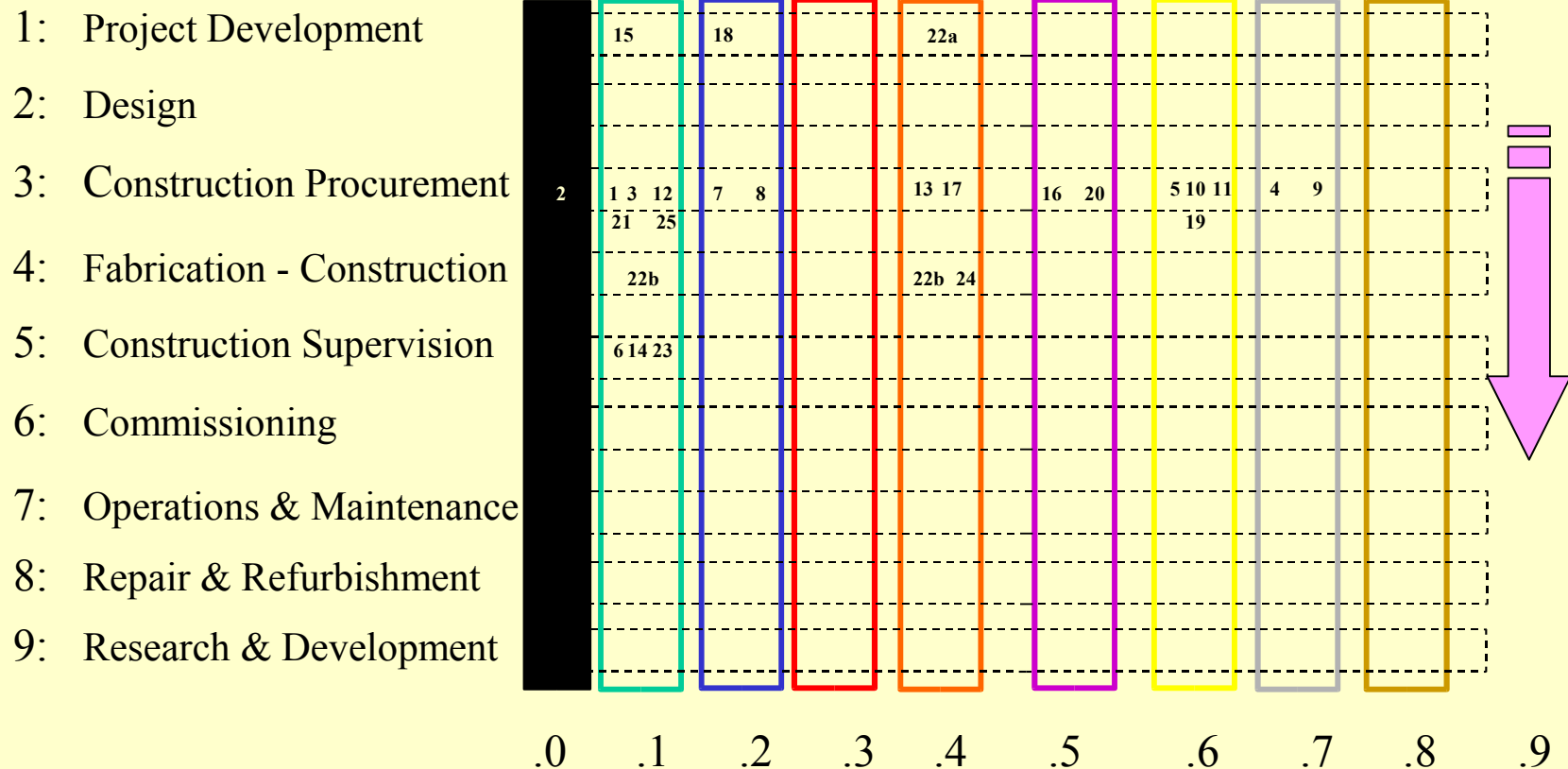
**Risk  
Register**

**Materials, Plant,  
Labour, SC,  
Finance**

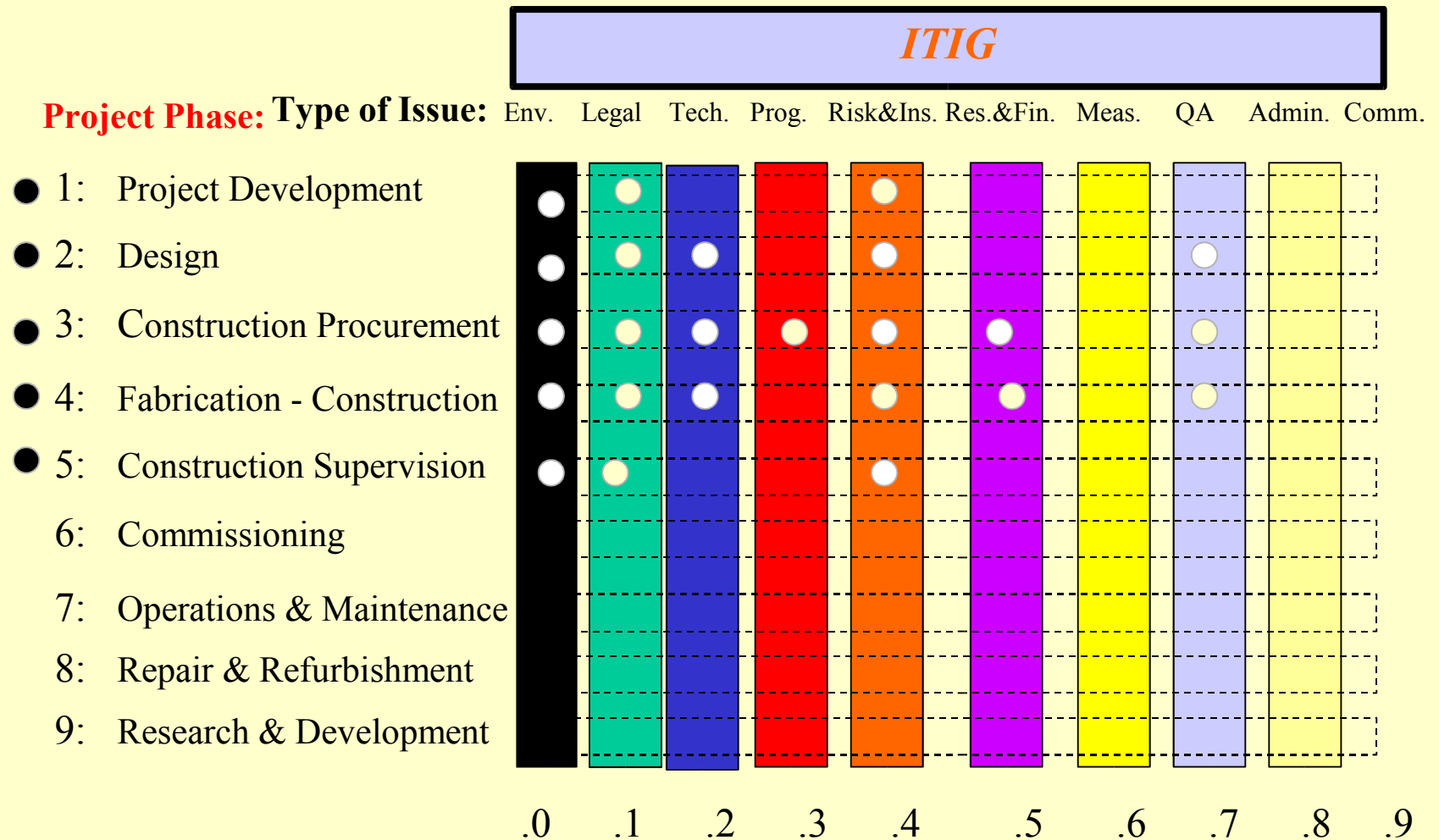
# Applying this to ITAs CONTRACTUAL PROPOSITIONS

# ITA *Contractual Propositions* Footprint

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.



# The *Construction Insurance* Footprint



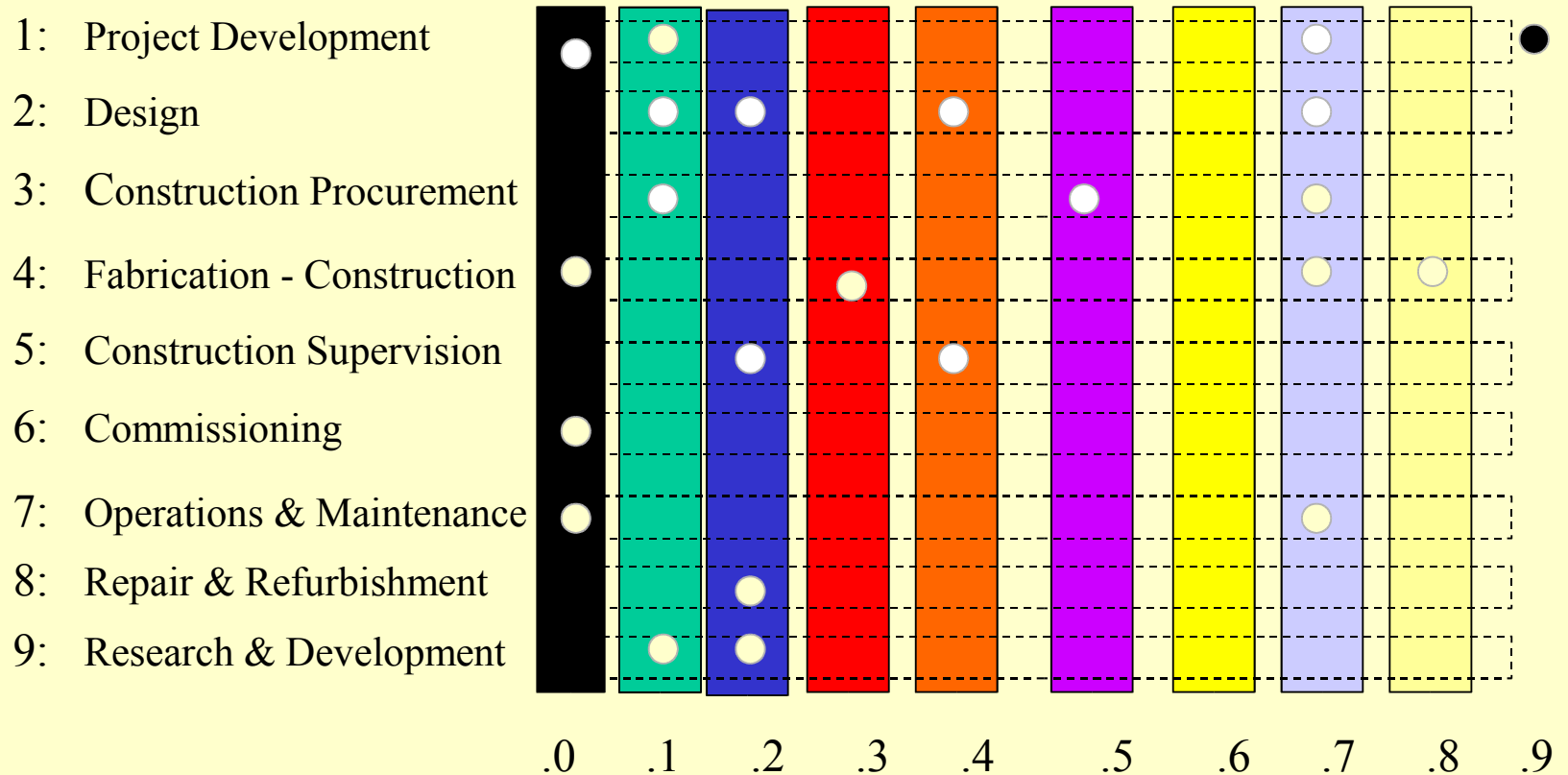
# The *Quality Assurance* Footprint

*ISO 1400*



*ISO 9001: 2000*

**Project Phase:** Type of Issue: Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.



# Application

# Application to Project Risks?

- Use the framework to map your contracts  
ACTUAL risk management footprint
- Strategically characterise project  
documentation  
(strengths and weaknesses)



- Objectively map the adequacy of documentation
- Apply the overarching framework to systematically formulate documents

# Conclusion

- Systematic consideration of risks in the contractual components of a project will directly and favorably impact upon project risk management.

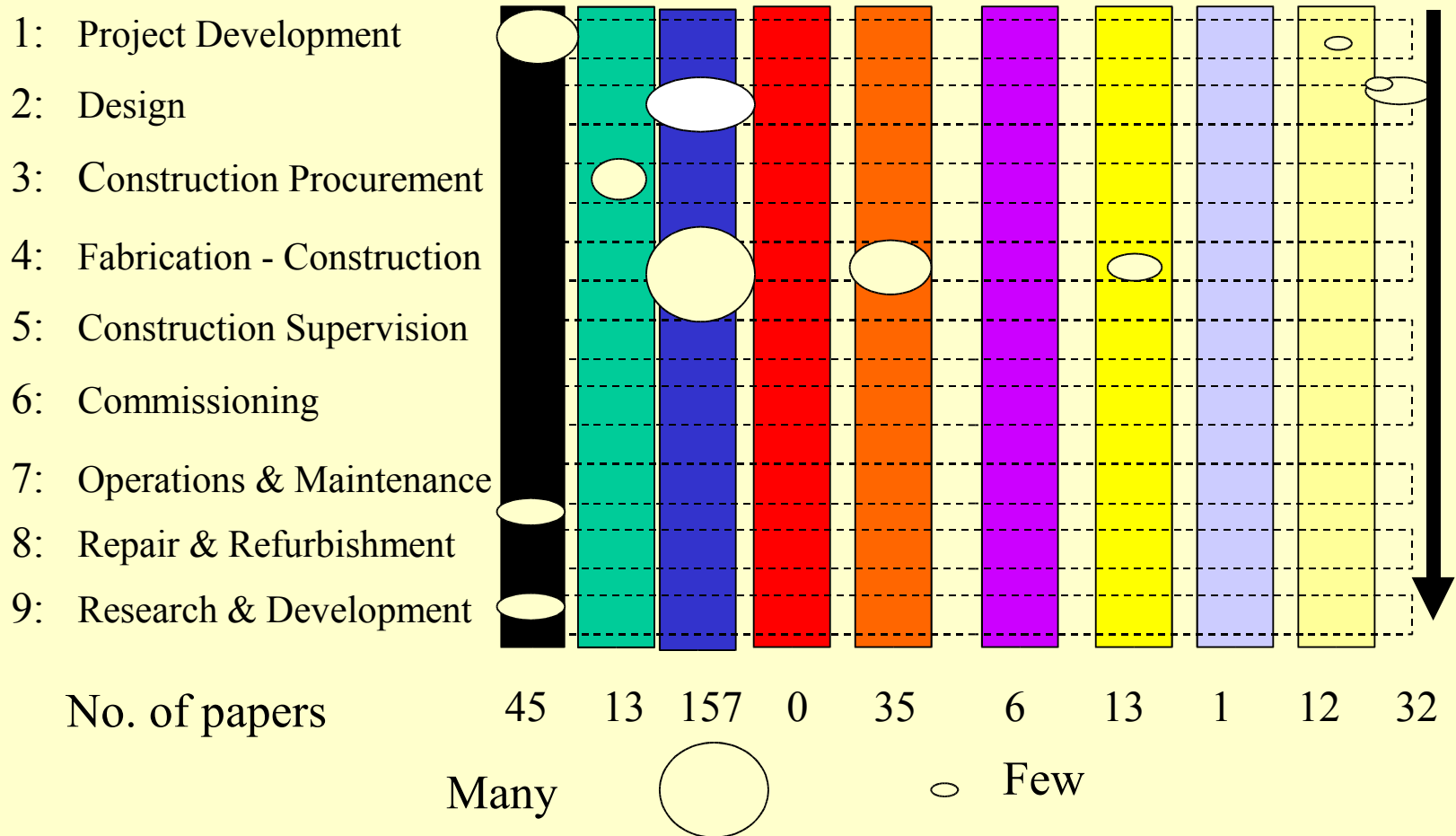




# The *Training* Footprint

## ITA Training Course

**Project Phase:** Type of Issue: Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.



# The ITA Working Group Footprint

## The Working Groups

### Project Phase: Issue:

	Gen	Env.	Legal	Tech.	Prog.	Risk&Ins.	Res.&Fin.	Meas.	QA	Admin.	Comm.
0: Project Management	1	15				20			16	8	
1: Project Development	17	10	4			5					
2: Design	7			9,11,12,13							
3: Construction Procurement			3								
4: Fabrication – Construction							14,19				
5: Construction Supervision											
6: Commissioning											
7: Operations & Maintenance	6										
8: Repair & Refurbishment											
9: Research & Development	2										

*Nos of the Working Groups are placed showing their relationship to the different issues vs phase*

## The ITA *Working Group* Footprint

### *The Working Groups*

#### **Project Phase: Issue:**

	Gen	Env.	Legal	Tech.	Prog.	Risk&Ins.	Res.&Fin.	Meas.	QA	Admin.	Comm.
0: Project Management	1	15				20			16	8	
1: Project Development	17	10	4			5					
2: Design	7			9,11,12,13							
3: Construction Procurement			3								
4: Fabrication – Construction							14,19				
5: Construction Supervision											
6: Commissioning											
7: Operations & Maintenance	6										
8: Repair & Refurbishment											
9: Research & Development	2										

*Nos of the Working Groups are placed showing their relationship to the different issues vs phase*

## 0 3.3 Project Phases (*Level 3*)

- 1 1 Project Development
- 2 2 Design
- 3.15 3 Procurement
- 4 4 Construction
- 5 5 Construction Supervision
- 6 6 Commissioning
- 7 7 Operations and Maintenance
- 8 8 Repair and Refurbishment
- 9 Research and Development



Under Construction



In Operation



# TRAINING MATERIAL

0.11

1

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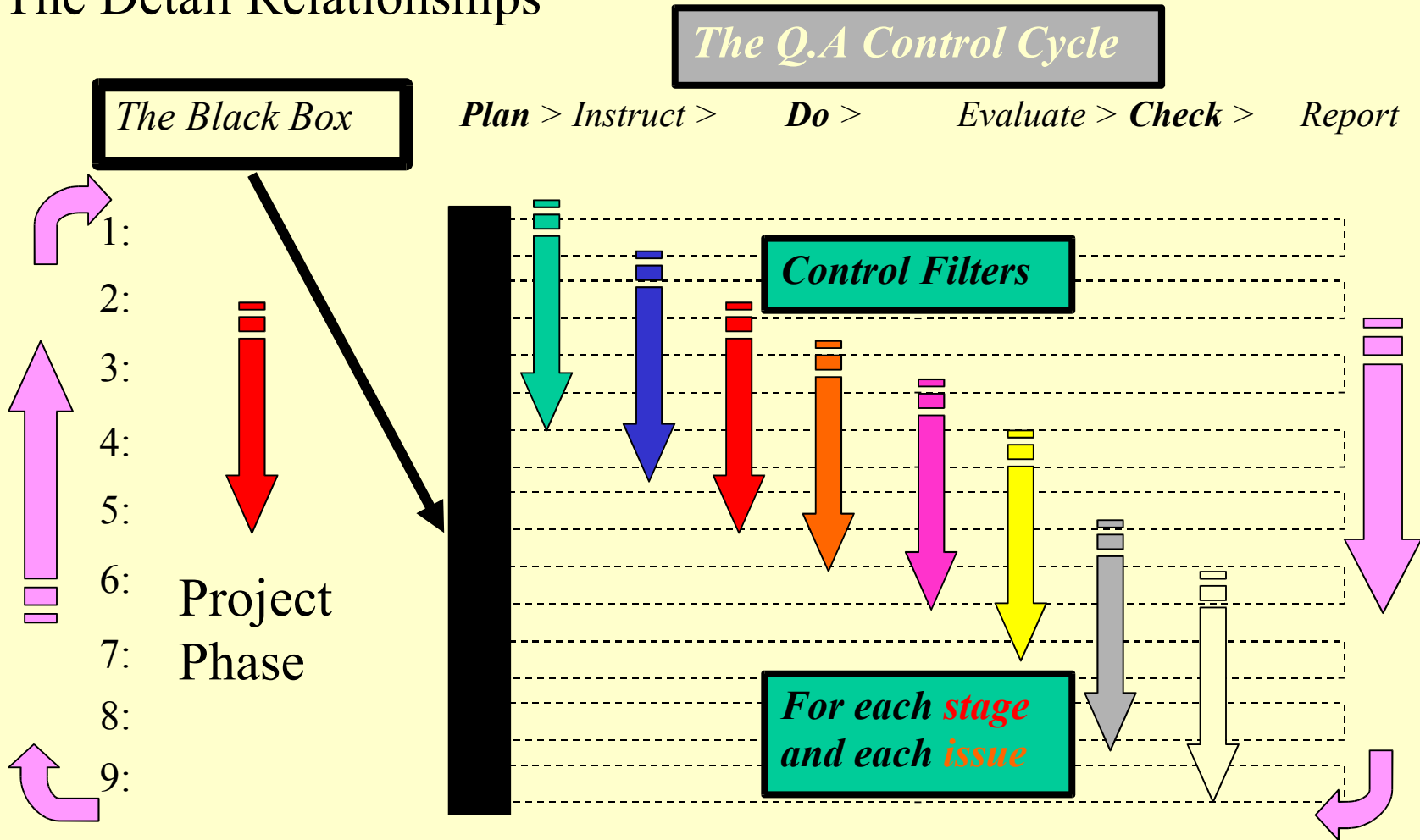
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8



Working Group WG 3 Contractual Practices  
2005

## 4 The Detail Relationships



# TRAINING MATERIAL

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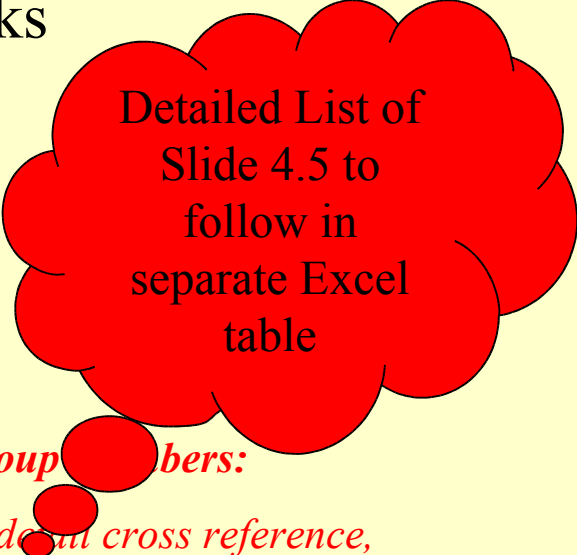
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## Contractual Sharing of Risks in Underground Construct ITA Views



Detailed List of  
Slide 4.5 to  
follow in  
separate Excel  
table

***Draft Slide Show for Checking and Comments by Working Group members:***

*Note: All slides in format :1,2 (a) , (b), (c). etc. for later ease of detail cross reference,  
discussion in italics, statements in bold, photos added for ease of reading. Left column index no.*

***Prepared by***

**Working Group WG 3 Contractual Practices**

**Animateur: Arnold Dix - Australia**

**Vice-animateur: Martin Smith – Switzerland**

**Tutor: Dr. Yucel Erdem - Turkey**

0.13

Standard  
Index  
Overview

## Working Group WG 3 Contractual Practices

*Members of the WG 3 involved in this project:*

**Australia -Arnold Dix**

**Egypt - M.E. Abdel Salam**

**France - Claude Romagny**

**Germany - Joachim Nauman**

**Hungary – Gyula Greschik**

**Korea - Youngheen Yoon**

**Norway – Gisle Alexander Fossberg**

**Netherlands - Paul Janssen**

**South Africa – Wynard Martens**

**Turkey – Dr. Yücel Erdem**

**United Kingdom – Martin Smith**

**USA - Robert Smith**

Standard  
Chapter  
Name and  
Slide No.



0.21

## Index – Chapter Headings

1

Introduction

2

Objectives

3

The General Framework

4

The Detail Relationships

5

Propositions

6

Future Development

7

References

8

Conclusions



0.22

**0 Index - Detail**

1 Introduction

2 Objectives

3 The General Framework: *Parts 1 & 2*

.1 Types of Contract

.2 Responsibilities

.3 Project Phases

.4 Issues

.5 Propositions

4 The Detail Relationships

5 Propositions: *Content – Present Status*

6 Future Development

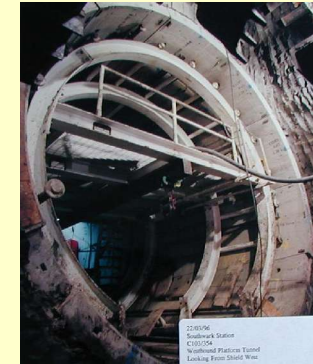
7 References

8 Conclusions



# 1 Introduction

- 1.1 *The management of underground works requires a variety of particular experience in their planning, construction and supervision as the risks due to environmental conditions, geographical location and consequent legal systems vary tremendously from project to project.*
- 1.2 *A further problem is that the best managed project requires practical experience of a large variety of construction methods which greatly influence the success of the project.*
- 1.3 *Rarely does one organisation have the comprehensive and detail experience to design, supply, construct and supervise the development of modern complex underground works especially where innovative techniques are required.*

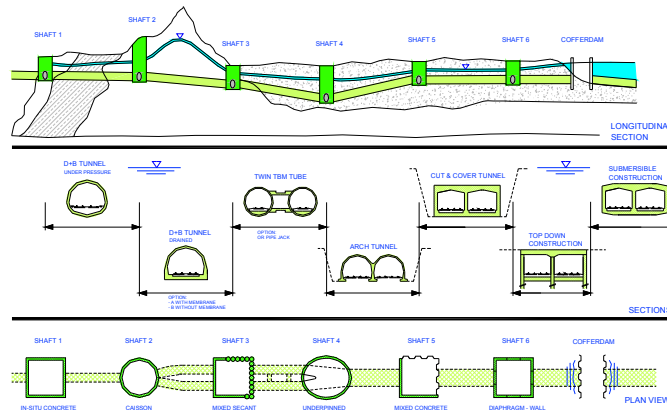




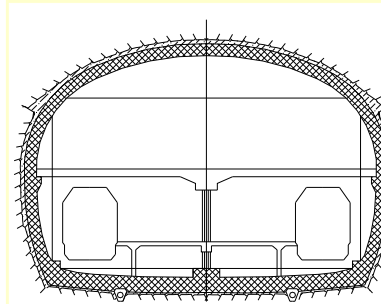
# 1 Introduction

Methods of construction vary from location to location, geology, design shapes, dimensions, methods, danger of water ingress, access, plant... etc.

*The methods chosen have considerable effect on the time and cost of the construction*



Alternative methods depend on experience and availability of resources





1.4 *Consequently the International Tunnelling Association was formed by the cooperation of National Tunnelling Organisations who have collectively pooled their resources together and formed „Working Groups“ to analyze and collect forms of best practise world wide.*

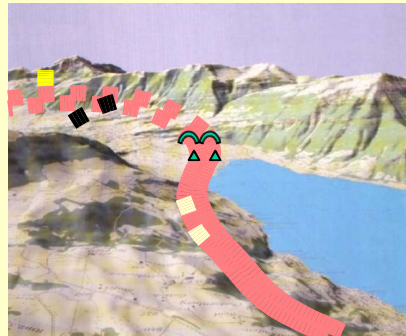
1.5 *Working Group 3 has been charged with producing a set of propositions under the title:*

**„Contractual Sharing of Risks in Underground Construction“**

1.6 *This report is the collective consensus of Working Group 3 pooled from from over 30 countries over a period of 30 years and presented in a user friendly format for international use independent of national, project specific or local contractual practice.*



Varying Geological Conditions: Theory



Alignment Practical Problems: Reality



0

## 2 Objectives

1

2.1 *In order to make the propositions appropriate for the large variety of forms of contract and specific contract conditions in common use world wide, WG3 took*

2.1

The Standard FIDIC Conditions of Contract **Version 4 \***

3

issued by

4

The Federation International des Ingenieurs Conseil, Geneva, Switzerland  
*as the initial basis for good practice.*

5

*WG 3 recommends that the propositions shown in Chapter 5 are adopted in addition to provide best practice and equitable conditions specifically for tunnelling contracts.*

6

7

***\* Note: The comparison is presently being updated to take account of other forms of contract ( see Chapter 6 )***

8

2.2 *In light of recent events in the tunnelling industry*

*WG3 has also taken heed of the following recent publications:*

1)

**The Joint Code of Practice for Risk Management of Tunnel Works in the UK**

*prepared jointly by*

The British Tunnelling Society and The Association of British Insurers

2)

**A Code of Practice for Risk Management of Tunnel Works**

*prepared by*

the International Tunnelling Insurance Group ITIG

*This presentation has been arranged in a format which will enable the propositions proposed by WG 3 and the management of risk as set out in the above Codes of Practice as well as the FIDIC Conditions of Contract to be read in conjunction with each other.*

2.3 *The propositions shall reflect the requirements of  
ISO 9000 Quality Assurance Practice.*



2.4 *In addition, inputs from other successful forms of contract will be investigated over the next few years to find a common demoninator for presenting the information. ( See 7 References ) .*

	WG3	FIDIC	NEC	VOB	SIA	Other.
Issue:	2005	1995	2005		2004	
<u>Clause:</u>						
Changed Conditions	P 01	12	abc	def	ghi	Ground
Ground Support	P 07					Reference Conditions
Coordinated Insurance	P 13					ITIG Risk Register
Site Oversight	P 23	The Engr.		Bauleiter		
Payment	P 19	Unit Rates	Activities	Lump Sums	Time Related	Charges
Settlement of Disputes	P 06	Arbitration		Mediation	DRB	



2.5 *The propositions have been structured to reflect the sequence in which decisions are frequently encountered in practice.*



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Safe Working Conditions in Confined Spaces

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### 3 The General Framework: Part 1

*Classification of Information  
Level*

- .1 Types of Contract
- .2 Responsibilities
- .3 Project Phases
- .4 Issues
- .5 Propositions





### 3 Classification of Information:

*In consideration of the **large variety of issues** to be addressed and inter-relationship between contract formats and clauses, a matrix format has been chosen, irrespective of best management practice, that will enable users to quickly relate to the form of contract that is best suited for any particular project in hand.*

*This **framework** is designed on the basis of a **drop down approach** as shown on the next slides:*

*A **colour code** has been adopted to **assist in analysing the information**.*



## 3.1 Types of Contract (*Level 1*)

*Prior to consideration of any contract format it is paramount to develop a contract strategy, and as a consequence, the individual clauses specified in a contract will very much depend on and reflect the objectives the client is trying to achieve.*

### **\* Traditional separate packages:**

- consultant: design only and/or supervision,
- contractor: fabricate & construct,
- supplier: supply only, design and supply
- operator: commissioning, maintenance, repairs

*Original  
propositions  
based on this  
approach*

### **-\* Modern combined packages:**

- EPC engineering design, procure, construct
- D&B design and build
- BOOT build, own, operate and transfer

*Future  
propositions  
based on these  
additional  
approaches*

## 3.2 Responsibilities (Level 2)

Type of Contract:		Responsible Party:				
		Owner	Designer	Gen. Contractor	Spec. Contractor	Operator
S	Study		X			
D	Design		X			
C	Construct			X	X	
D+B	Design and Build		X		X	
EPC	Eng'g, Proc. & Construction		X	X	X	
BOOT	Build, Own, Operate, Transfer		X	X	X	X

*The form of contract has considerable impact on the method of delivery and consequent wording of the contract clauses changes as responsibilities vary between different types of contract.*

*As a consequence a systematic framework which can cover all forms of contract had to be developed which would enable clauses to be adopted either universally and/or specific to each particular type of contract form.*

## 0 3.3 Project Phases (*Level 3*)

- 1 1 Project Development
- 2 2 Design
- 3.15 3 Procurement
- 4 4 Construction
- 5 5 Construction Supervision
- 6 6 Commissioning
- 7 7 Operations and Maintenance
- 8 8 Repair and Refurbishment
- 9 Research and Development



Under Construction













In Operation

## 0 3.4 Project Issues - Standard Sub-headings (*Level 4*)

( *Brackets = Project Restraints* )

Colour Code

1	- 0:	Environmental		Black
2	- 1:	Legal ( <i>Organisational Responsibility</i> )		Green
3.16	- 2:	Technical ( <i>Output</i> )		Blue
4	- 3:	Programme ( <i>Time</i> )		Red
5	- 4:	Risk and Insurance ( <i>Variations</i> )		Orange
6	- 5:	Resource and Financial ( <i>Input</i> )		Violet
7	- 6:	Measurement and Commercial ( <i>Cost</i> )		Yellow
8	- 7:	Quality Assurance ( <i>Review</i> )		Grey
	- 8:	Contract Administration ( <i>Documentation</i> )		White
	- 9:	Communication		Brown

### 3.5 Propositions (*Level 5*)

#### Proposition Nos.

2	2	3	4	5	6	7	8	9	10
3	12	13	14	15	16	17	18	19	20
21	22	23	24	25	etc.				

The numbering of the **propositions and subheadings (a), (b), (c) etc.**

i.e. **standard clauses recommended for international adoption**

*are purely sequential as developed over the years.*

*The propositions have now been categorized by **form of contract**, **responsibility**, **phase** and **issue** to enable the inter-relationship to be expanded for future situations which can be monitored and developed as changes take place.*

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8

## 3.5 Propositions (*Level 5*)

- 01 Changed Conditions Clauses
- 02 Full Disclosure of Available Subsurface Information
- 03 Elimination of Disclaimers
- 04 Prequalification of Contractors
- 05 Contract Variation in Price
- 06 Disputes
- 07 Ground Support
- 08 Ground Characterisation
- 09 Tendering and Awards of Contract
- 10 Mobilization Payments
- 11 Measurement Problems in Rock
- 12 Performance Bonds
- 13 Coordinated Insurance Program
- 14 The Engineer's Role During Construction
- 15 Rights-of Way and Permits
- 16 Provision of Plant, Equipment, Services and Materials by the Owner
- 17 Alternative Tenders
- 18 Protection of Project Surrounds
- 19 Measurement Problems Related to Water
- 20 Contractor-Supplied Financing
- 21 Subcontracting of Works
- 22 Construction Site Safety
- 23 Project Overview by Third Parties
- 24 Post-Award Alternatives
- 25 Termination or Suspension of Work

*Each proposition is supported by a discussion paper and summarized into detailed sub-headings.*

## 3.5 Propositions (*Level 5*)

- 01 Changed Conditions Clauses
- 02 Full Disclosure of Available Subsurface Information
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- 25 Termination or Suspension of Work

*Alternatively:*

*Each proposition was categorized into general common headings to assist in understanding the individual issues.*



# 3 The General Framework: Part 2

*Linking the Information*

## The Project Restraints

*Level*

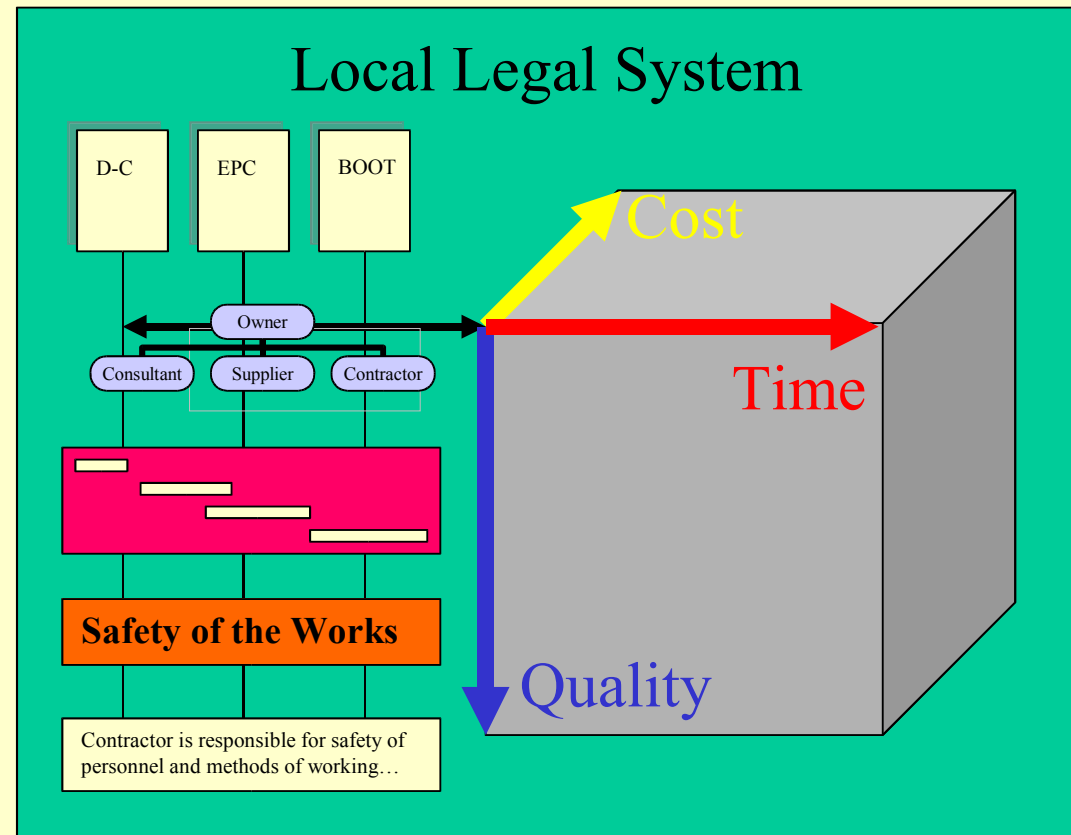
.1 Types of Contract

.2 Responsibilities

.3 Project Phases

.4 Issues

.5 Propositions

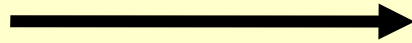


*The restricting parameters within a contractual framework*

### 3 The Framework: Establishing Level 1

*Organisation of Information: Worked Example*

#### .1 Type of Contract



#### **D-C**

Design Construct with separate packages for each phase.

#### **EPC**

Engineering, Procure and Construct with overlapping responsibilities

#### **BOOT**

Build, Own, Operate, Transfer with global responsibilities

Type of Contract		
D - C	EPC	BOOT

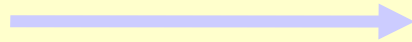


*Responsibilities within a contract are determined by the overall objectives and organisation of the contract strategy*

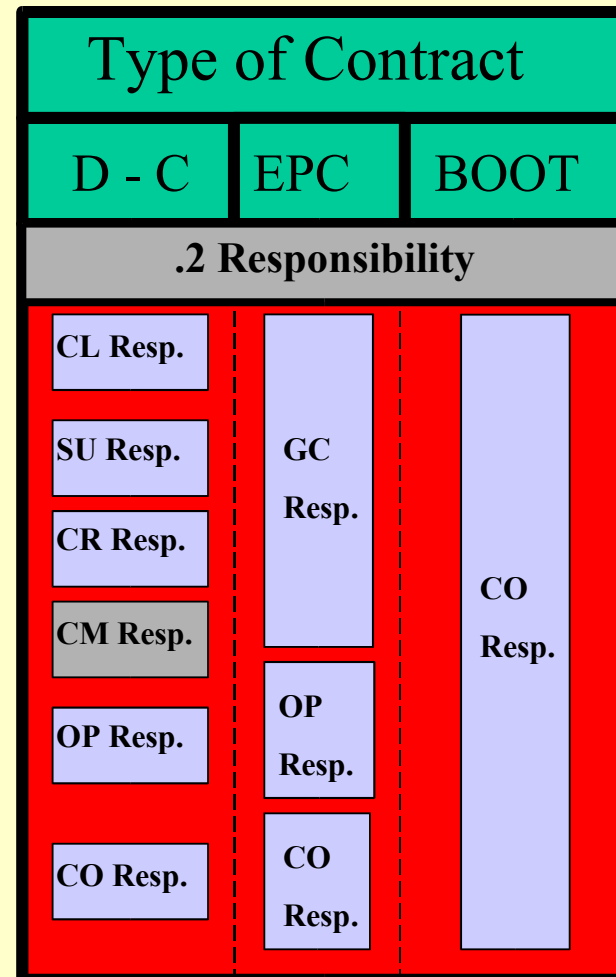
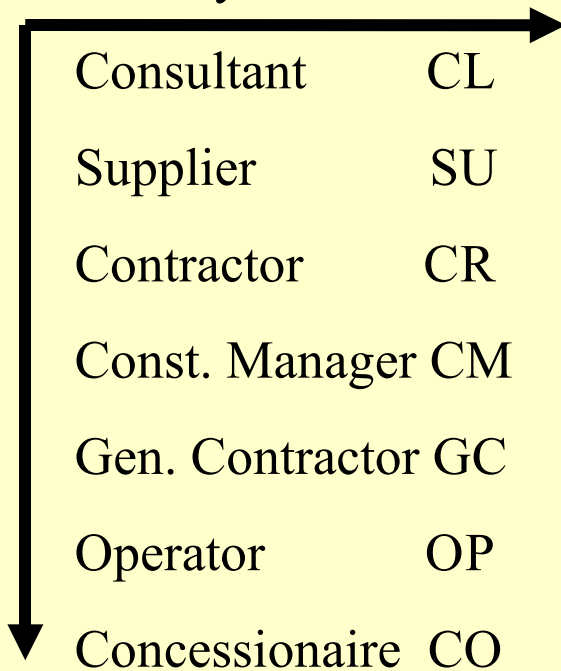
### 3 The Framework: Linking Levels 1 & 2

*Organisation of Information: Worked Example*

.1 Type of Contract



.2 Party to Contract



*Responsibilities within a contract can be packaged in different ways depending on objectives.*

### 3 The Framework: Linking Levels 1, 2 & 3

*Organisation of Information: Worked Example*

.1 Type of Contract

.2 Responsibility

.3 Project Phase

-1 Feasibility

-2 Design

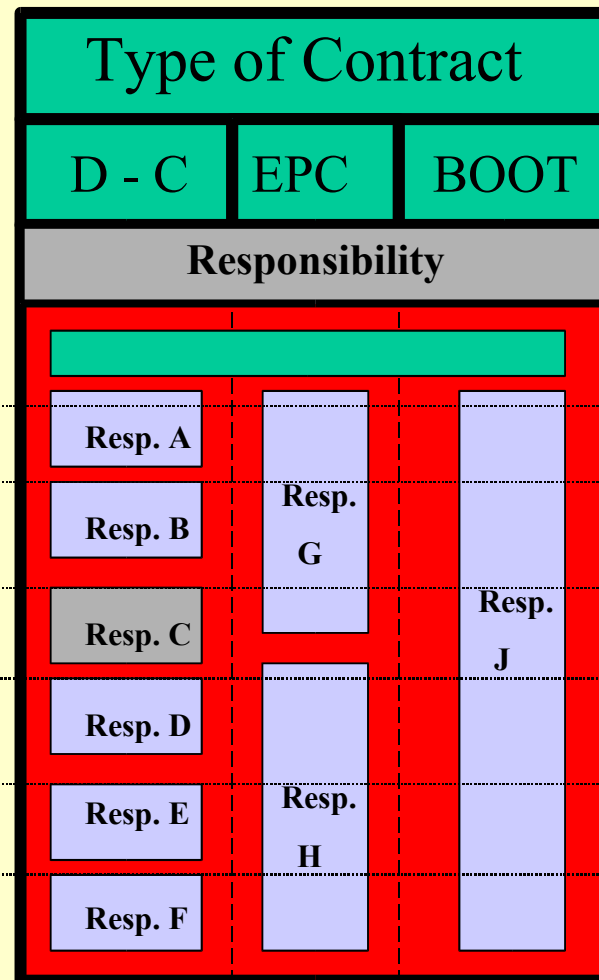
-3 Procure

-4 Construct

-5 Commission

-6 Operate

-7 Maintain



*The Framework shows the different areas of responsibility either as individual responsibilities on a traditional D-C design – construct contract or global responsibilities on a BOOT contract*

### 3 The Framework: Linking Levels 1, 2, 3 & 4

#### *Organisation of Information: Worked Example*

*The text can then  
be allocated to a  
specific issue*

.1 Type of Contract

.2 Responsibility

.3 Project Phase

Design

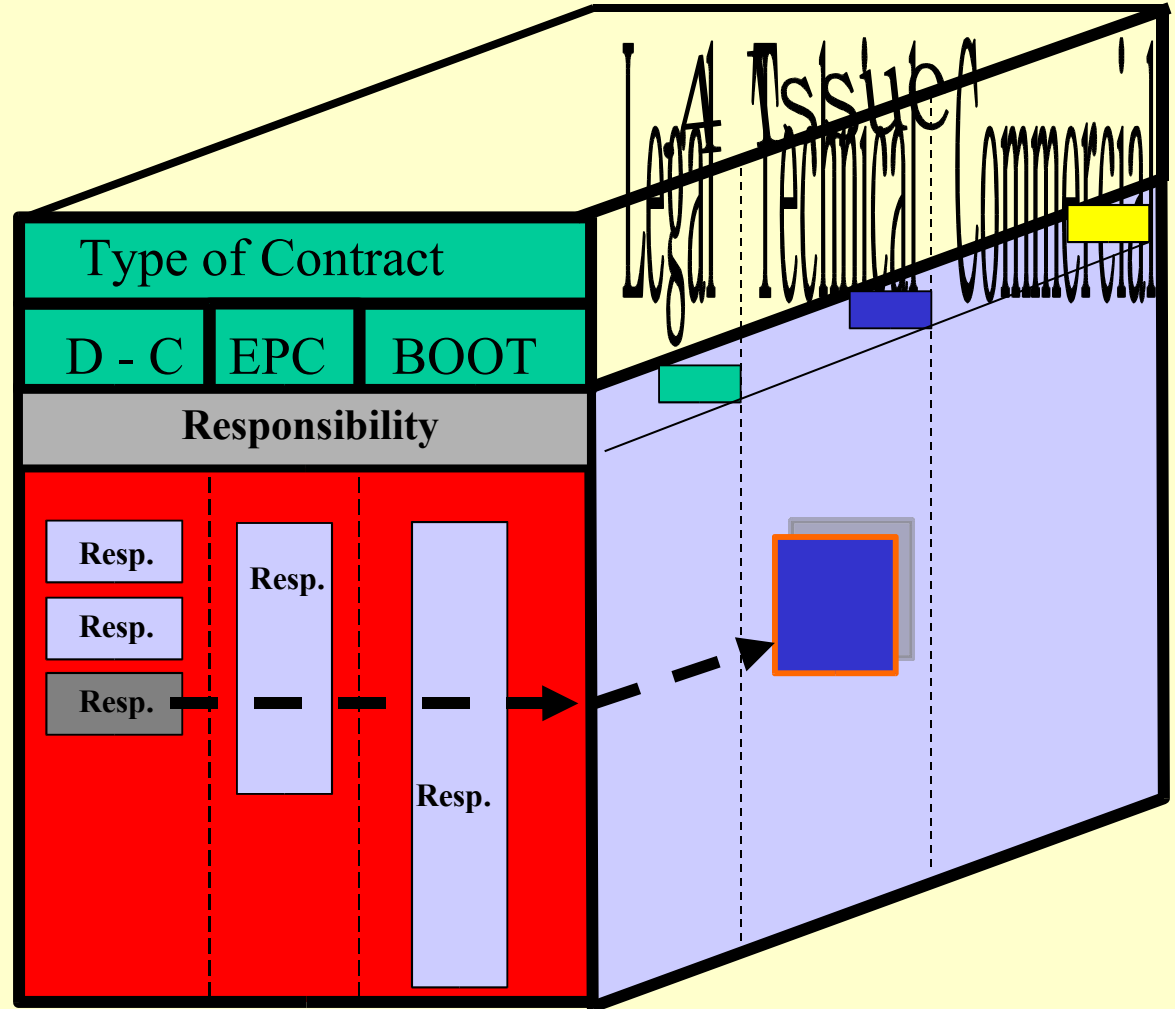
Procure

Construct

Commission

Operate

Maintain



0

### 3 The Framework: Levels 1, 2, 3, 4 & 5

1

*A proposition can now be cross linked to*

2

*any form of contract, phase or issue*

3.26

*independent of project*

.1 Type of Contract

4

.2 Responsibility

5

.3 Project Phase

6

Design

7

Procure

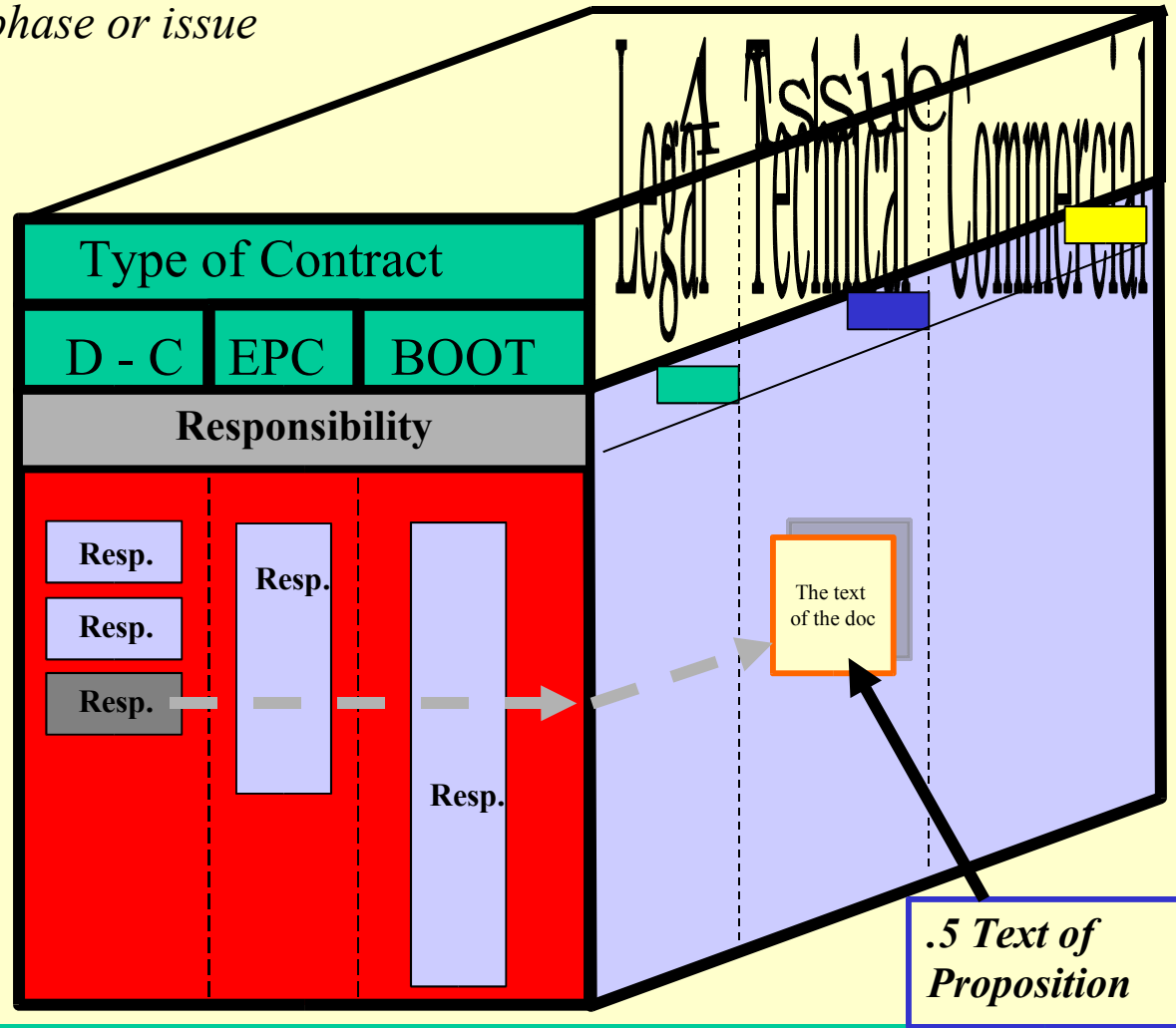
8

Construct

Commission

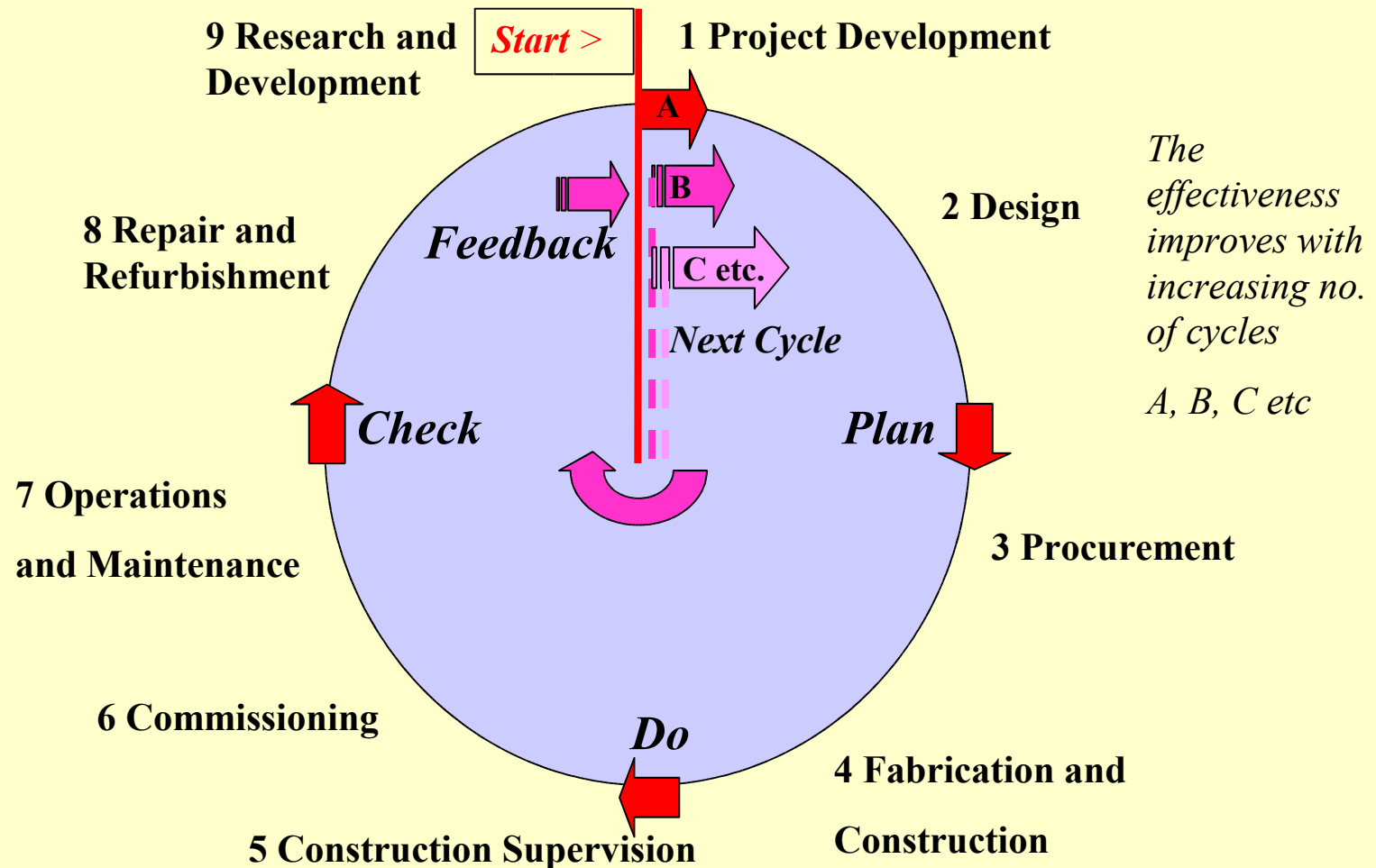
Operate

Maintain



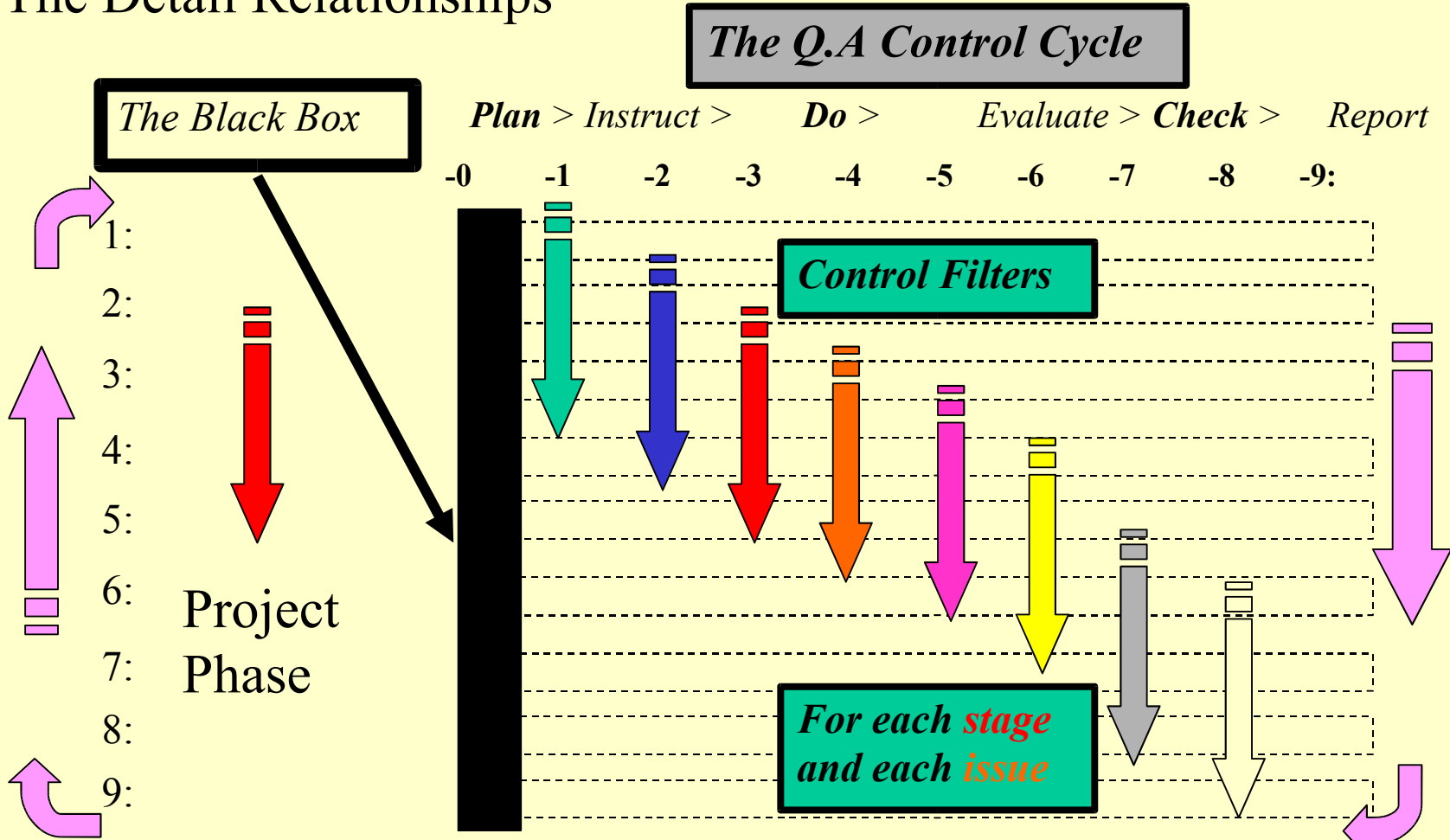
### 3 The Framework: Linking Feedback

Continuous Cycle ISO 9000 Supimposing Project Development and Feedback



New issues can be integrated into future projects and so comply with ISO 9000 requirements

# 4 The Detail Relationships



The **issues** and **propositions** have been arranged into a **cyclic table** where individual items can be compared in a **decimal matrix** which is **independent of local language**, an ideal basis for a web based database. Note: Numbering 0-9 where 0 = all issues 9=link

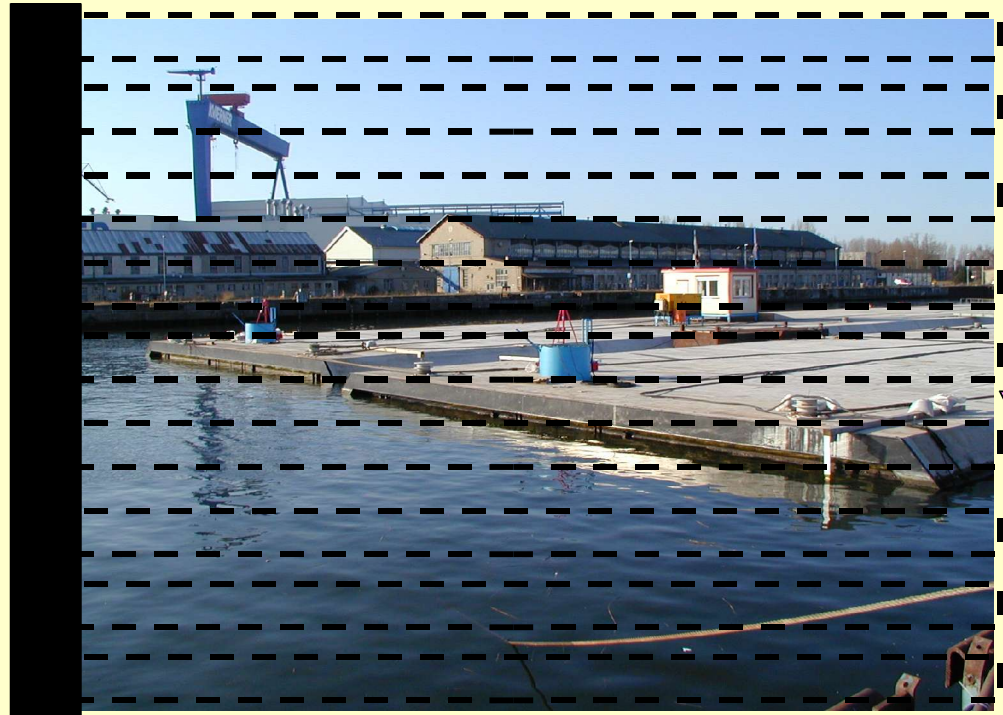


## 4.1 Information Matrix Levels – 3 to 4

***The Project Issues***

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

- 1: Project Development
- 2: Design
- 3: Construction Procurement
- 4: Fabrication - Construction
- 5: Construction Supervision
- 6: Commissioning
- 7: Operations & Maintenance
- 8: Repair & Refurbishment
- 9: Research & Development

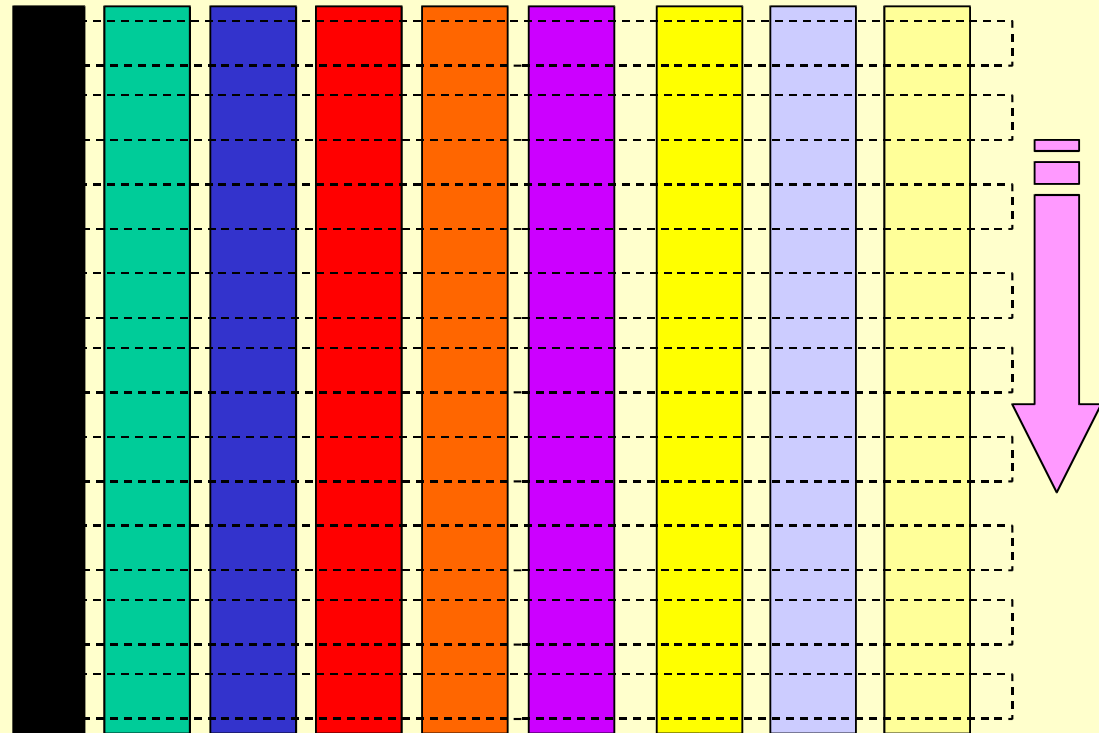


*All issues are related to the use and protection of the environment and consequently there is a distinct link between the environment ( black box ) and the sub issues*

## 4.2 The Information Matrix Levels – 3 to 4

*with colour codes****The Project Issues*****Project Phase: Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

- 1: Project Development
- 2: Design
- 3: Construction Procurement
- 4: Fabrication - Construction
- 5: Construction Supervision
- 6: Commissioning
- 7: Operations & Maintenance
- 8: Repair & Refurbishment
- 9: Research & Development



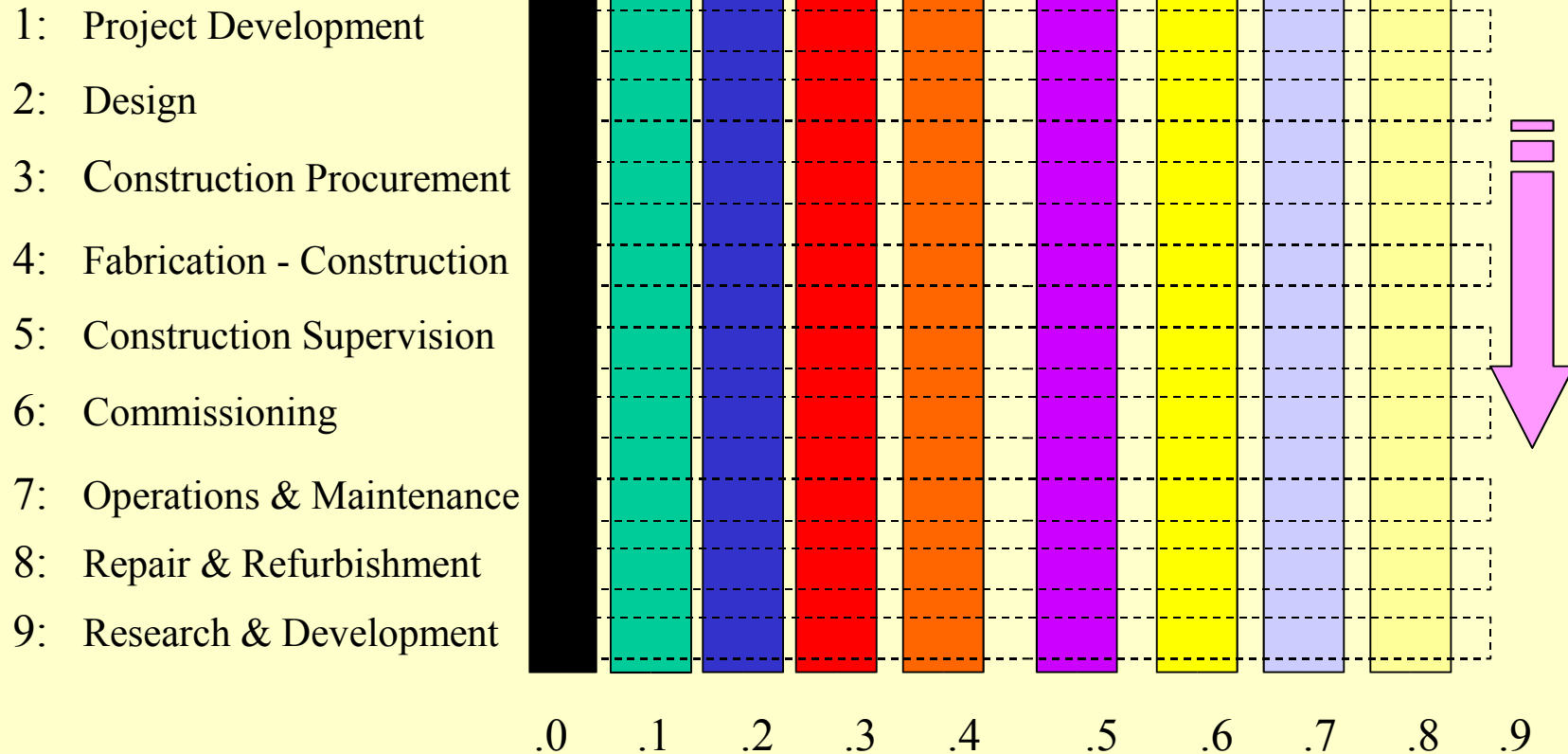
*The use of colour codes enables the presentation of sub-issues to be clearly illustrated.*

## 4.3 The Information Matrix Level – 3 to 4

*with colour codes and sub-heading nos.*

### *The Project Issues*

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.



## 4.4 The Information Matrix Levels – 3 to 4

with colour codes, sub-heading nos. and proposition nos. \*\*, **Approx. Present Status**

**Project Phase:** Type of Issue: Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrication - Construction

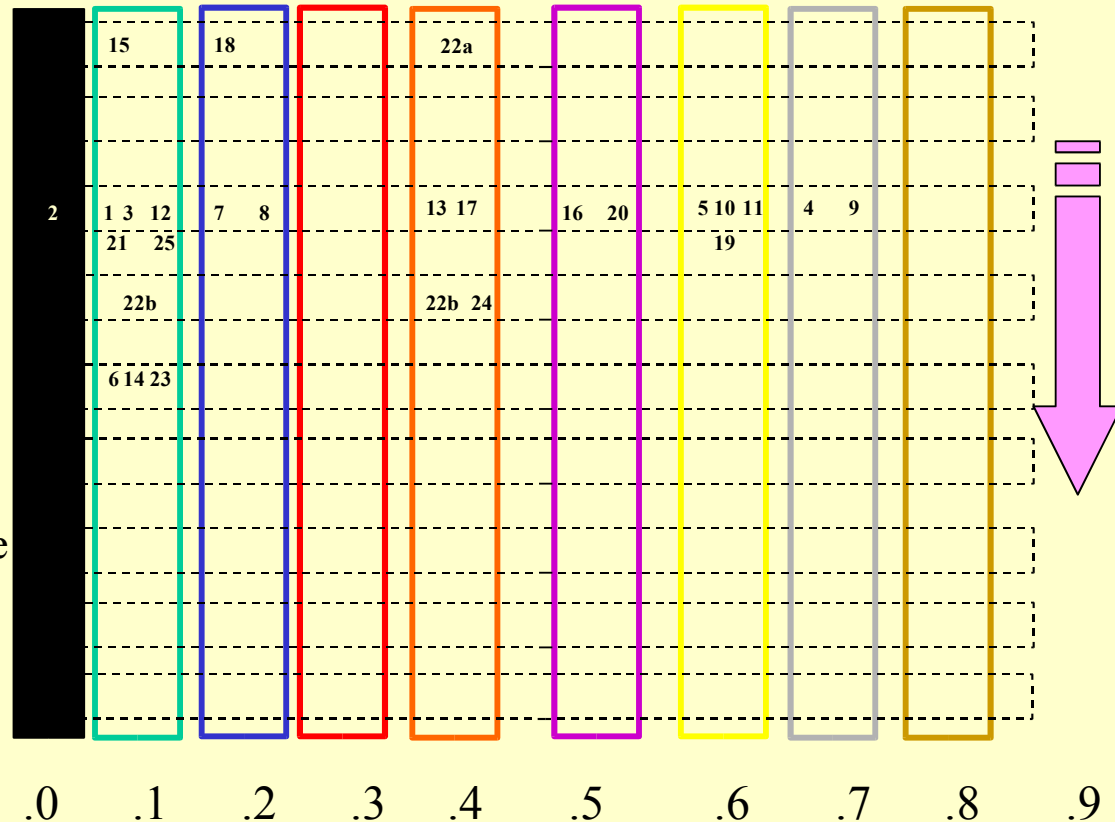
5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development



Note: 1 \*\* Traditional Packages

Note 2: 22a & 22b - Some propositions span more than one phase or issue. Sub-headings to be used to separate where appropriate.

## 4.5 The Information Matrix Levels – 2 to 4

with contract packages: **D – C Design Construct** ( Traditional Packages )

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin . Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrication - Construction

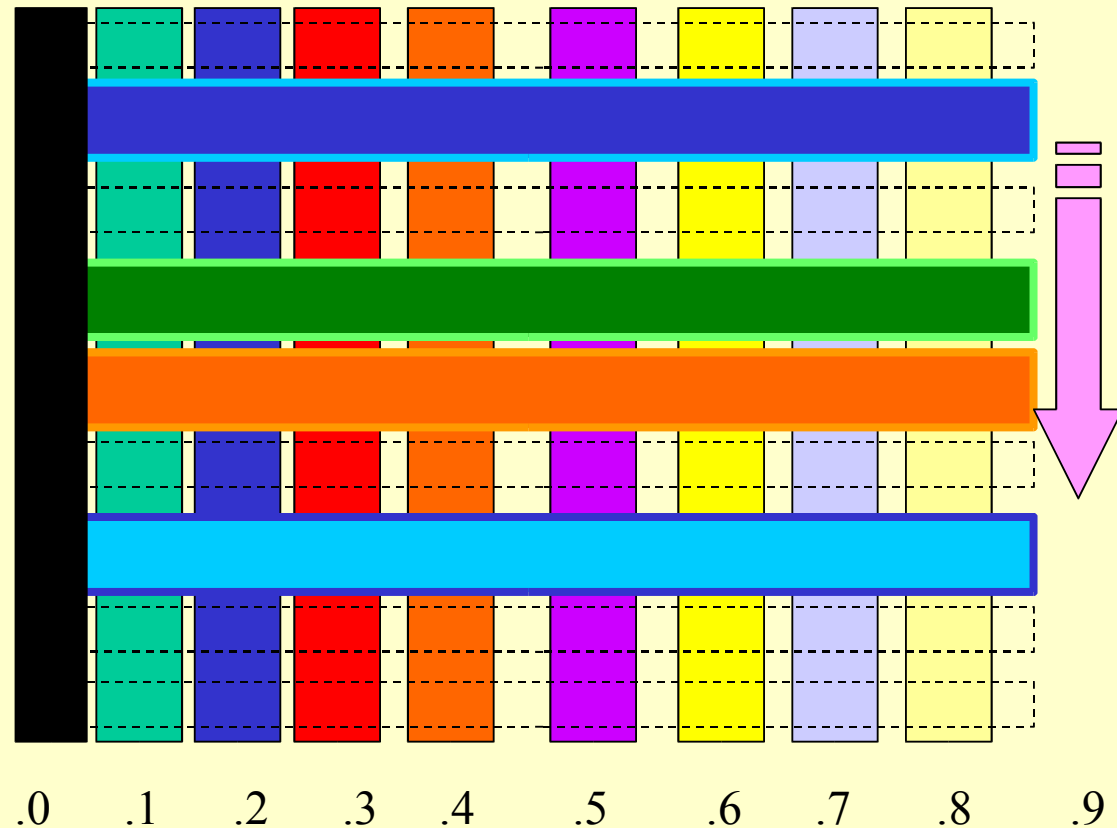
5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development



## 4.6 The Information Matrix Levels – 2 to 4

with contract packages: *EPC Engineering Procure and Construct*

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrication - Construction

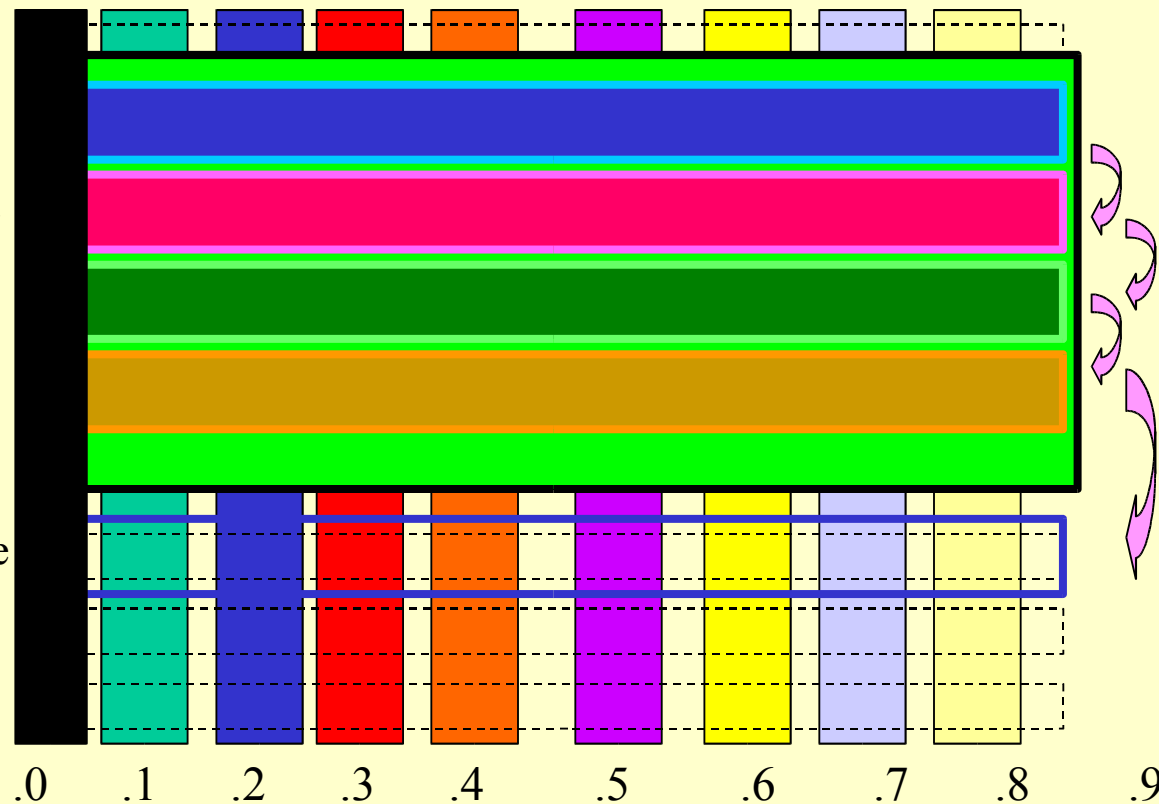
5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development



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## 3.5 Propositions (*Level 5*)

- 01 Changed Conditions Clauses
- 02 Full Disclosure of Available Subsurface Information
- 03 Elimination of Disclaimers
- 04 Prequalification of Contractors
- 05 Contract Variation in Price
- 06 Disputes
- 07 Ground Support
- 08 Ground Characterisation
- 09 Tendering and Awards of Contract
- 10 Mobilization Payments
- 11 Measurement Problems in Rock
- 12 Performance Bonds
- 13 Coordinated Insurance Program
- 14 The Engineer's Role During Construction
- 15 Rights-of Way and Permits
- 16 Provision of Plant, Equipment, Services and Materials by the Owner
- 17 Alternative Tenders
- 18 Protection of Project Surrounds
- 19 Measurement Problems Related to Water
- 20 Contractor-Supplied Financing
- 21 Subcontracting of Works
- 22 Construction Site Safety
- 23 Project Overview by Third Parties
- 24 Post-Award Alternatives
- 25 Termination or Suspension of Work

*Each proposition is supported by a discussion paper and summarized into detailed sub-headings.*

## 4.7 The Information Matrix Levels – 2 to 4

with contract packages: *BOOT build own operate and transfer*

**Project Phase:** **Type of Issue:** Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrications - Construction

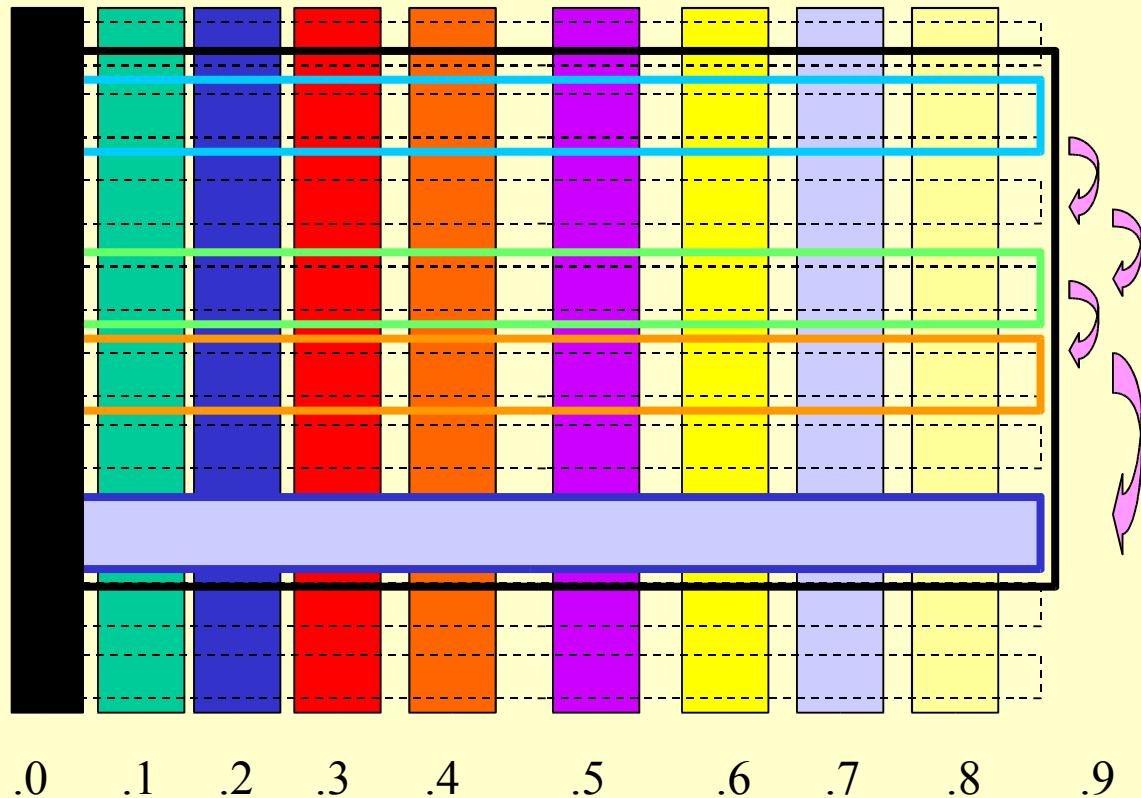
5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development





## 4.8 The Information Matrix Levels – 3 to 4

*with interrelation between phases , issues and **communication***

**Project Phase:** Type of Issue: Env. Legal Tech. Prog. Risk&Ins. Res.&Fin. Meas. QA Admin. Comm.

1: Project Development

2: Design

3: Construction Procurement

4: Fabrications - Construction

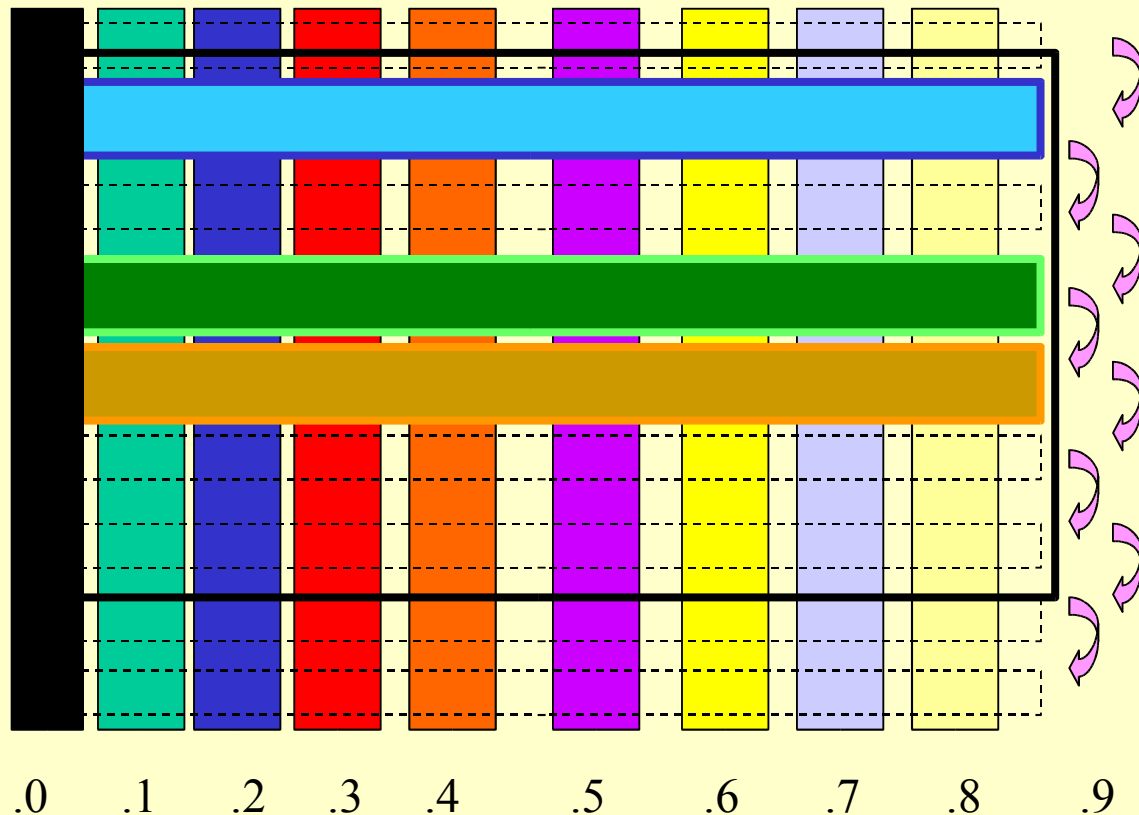
5: Construction Supervision

6: Commissioning

7: Operations & Maintenance

8: Repair & Refurbishment

9: Research & Development



## 4.1 Information Matrix Levels – 3 to 4

***The Working Groups*****Project Phase: Issue:**

	Gen	Env.	Legal	Tech.	Prog.	Risk&Ins.	Res.&Fin.	Meas.	QA	Admin.	Comm.
0: Project Management	1	15				20			16	8	
1: Project Development	17	10	4			5					
2: Design	7			9,11,12,13							
3: Construction Procurement			3								
4: Fabrication – Construction							14,19				
5: Construction Supervision											
6: Commissioning											
7: Operations & Maintenance	6										
8: Repair & Refurbishment											
9: Research & Development	2										

*Nos of the Working Groups are placed showing their relationship to the different issues vs phase*

0

## 5.1 Propositions

1

### *General Information*

2

*The Propositions are sorted by phase-issue with a cross reference no. as developed to date and a colour code to show latest classification by issue.*

3

*The reader is reminded that these propositions are based on traditional packaging of contracts similar to **FIDIC Version 4** and therefore some of the statements may not be valid for other forms of contract.*

4

*These propositions will be amended accordingly to suit the various forms of contract strategy over the next review period.*

5.0

*The propositions have been grouped according to project phase and issues e.g. [3-1] „ **Change Conditions Clause**“ 2/3 means*

6

**Phase 3** - Procurement – **Issue 1** Contractual – **Proposition No.** - Text / Slide 2/3

7

*Note 1: Some propositions cover more than one phase and are marked „&“ accordingly*

8

*Note 2 : No categorisation has been proposed to date for the type of contract .*

*This will be the subject of later versions of this document*

## [1-1] Rights-of-way and Permits:

*The International Tunnelling Association recommends that:*

(5) All tunnelling contracts shall clearly define the owner's and contractor's responsibilities to acquire rights-of-way for the tunnel and the agreements and permits necessary to build and operate it.

(2) The owner's responsibilities should include the securing of all permanent rights-of-way, agreements and permits essential to constructing and operating the project, including all rights to underpin adjacent structures.

(3) Only in cases where the rights-of-way or permits are required by the particular method of construction proposed by a particular contractor should the contractor be responsible for securing such rights.

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P 15

## [1-2] Protection of Project Surrounds:

*The International Tunnelling Association recommends that:*

(5) Advance investigations be conducted by the owner to obtain a full knowledge of the risks that will be encountered, the nature of the subsoil, the water conditions, and the surrounding buildings and structures (including their foundations and services).

(2) During the owner's design phase, the maximum amount of information be obtained in order to allow a judicious choice of:

(a) The type of temporary works and other support structures.

(b) The working methods to be anticipated by the owner and selected by the contractor.

(c) The quality controls to be carried out.

(d) Any necessary measures to protect or reinforce the existing buildings themselves or installations in the buildings.

(l) A scope of pre-construction surveys to record the existing conditions of nearby buildings, other structures, services and the project surrounds generally. (*contd.*)

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5.12  
P 18-1

## [1-2] Protection of Project Surrounds:

*The International Tunnelling Association recommends that: (contd.)*

(5) The owner be responsible for developing whatever designs are reasonably needed for construction and specification of protection methods for anticipated methods of construction and their impacts on project surrounds; and for including such structural, construction and mitigation methods in the tender documents to be priced by the tenderers.

(7) The contractor be responsible, beyond faithful execution of the specified work, for additional efforts, distress and damages caused by construction methods or operations that may produce or do produce adverse impacts on project surrounds beyond those reasonably anticipated by the owner.

(9) The owner be responsible for establishing monitoring systems and procedures in advance of construction by which the Engineer may be alerted to evolving conditions that could adversely affect the project surrounds or the incomplete work in progress.

## [1-4] & [4-4] **Construction Site Safety:(NB)**

*The International Tunnelling Association recommends that:*

(5) The contract between the owner and the contractor shall make the contractor responsible (\*) for construction site safety and for maintaining the site in an orderly state appropriate to the accordance of danger to persons thereon. *Note \**

*This may not be in accordance with the local law and consequently this proposition shall follow local legislation.*

(2) The contract shall include a section devoted to safety of the construction site, wherein the duties and responsibilities of the contractor are spelled out. These may include requirements that the contractor:

(a) Draft safety plan for the project and submit to the Engineer for review and comment.

(b) Implement the safety plan, which would cover the other safety stipulations listed herein and would establish a safety training program for the personnel of the contractor and his subcontractors.

(c) Assign a safety supervisor to oversee the contractor's operations as they may present danger to persons entitled to be upon the site and to act expeditiously to mitigate perceived hazards. *(contd.)*

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## [1-4] & [4-4] Construction Site Safety:(NB)

*The International Tunnelling Association recommends that: (contd.)*

(3) The contract shall also:

(a) Assure that the contractor provide and maintain all lighting, guards, fencing, personal safety equipment, air testing equipment, first aid facilities and equipment, fire protection and fire fighting equipment and warning signs, when and where necessary or as required by duly constituted authorities or by the Engineer for the protection of the works and for the safety of onsite personnel and the public.

(b) Make clear the powers of the Engineer to act and enforce safety matters at the site and recognize that the Engineer is employed to intervene in the operations of the contractor where, in the opinion of the Engineer, a site condition or the construction process poses an immediate threat to the safety of on-site personnel, the public, the works or the property of third parties. In each case, the Engineer may direct changes in the immediate operations including the stopping of work.

(c) Identify other entities not a party to the contract who will also be present at times with some role in the providing of a safe working environment at the site, and define the rights and authority to each such entity with respect to the parties to the contract. *(contd.) ( see also note \* on previous slide P 22-1/3 )*

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P 22-2

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## [1-4] & [4-4] **Construction Site Safety:(NB)**

*The International Tunnelling Association recommends that: (contd.)*

(4) When changes in site conditions, such as the tunnelling medium or the presence of ground water, require revised construction methods or procedures, these be developed and agreed to include all reflective changes in matters of safety.

(5) The ITA's "Guidelines for Good Tunnelling Practice" and use of recommended safety signs should be adopted by the owner for application by the contractor.

*( see also note \* on previous slide P 22-1/3 )*

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P 22-3

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## **[3-0] Full Disclosure of Available Subsurface Information:**

*The International Tunnelling Association recommends that:*

All available subsurface information, including both factual and interpretive data, be fully disclosed to tenderers for all tunnelling contracts.

0

**[3-1] Changed Conditions Clauses:**

1

*The International Tunnelling Association recommends that:*

2

A “Changed Conditions” clause be incorporated in all tunnelling contracts.

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## [3-1] **Elimination of Disclaimers:**

*The International Tunnelling Association recommends that:*

Adequate resources be employed on ground investigations at the pre-tender stage, and that disclaimer clauses be eliminated from all tunnelling contracts.

## [3-1] Performance Bonds:

*The International Tunnelling Association recommends that:*

(5) All types of bonds (bid bonds and performance bonds) should aim at a balance between the rights and the obligations of the parties and at a reasonable coverage of the risks.

(2) An international effort should be made to standardize the rules and formats under which bonds are required.

(3) The value of the bonds, expressed as a percentage of the contract sum, should be limited to moderate and equitable levels, thus resulting in more economic coverage of the risks. Here, too, international standardization is highly desirable.

(4) Prequalification procedures of the tenderers should reduce the size of the performance bonds required. (*contd.* )

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P 12-1

## [3-1] Performance Bonds:

*The International Tunnelling Association recommends that: ( contd. )*

(5) The value of the performance bonds required should decrease as the work progresses.

(6) On-first-demand or unconditional guarantees shall never be requested because of the risk of an arbitrary call and the increasing cost of covering this risk.

5.31  
P 12-2

## [3-1] Sub-contracting of Work:

*The International Tunnelling Association recommends that:*

(5) Owners approaching a tendering process for development of tunnels or other underground facilities shall state in their tender documents which portions of the work must be performed by the contractor's own forces and not be subcontracted.

(2) Owners shall require all tenderers to describe specifically what portions of the work will be subcontracted and shall require that no additional work be subcontracted except with prior written approval of the Engineer, including approval of the proposed subcontractor.

(3) Selection of subcontractors shall be a matter for the contractor to resolve since he bears direct responsibility for the work of its subcontractors, however, the owner may stipulate certain basic qualifications of any company to be engaged as a subcontractor, the terms of the prime contract which shall be also reflected in the subcontract and the basic qualifications of the individual(s) in responsible charge (e.g. the proper licensing of design engineers for design of temporary works). *(contd.)*

### [3-1] Sub-contracting of Work:

*The International Tunnelling Association recommends that: (contd.)*

(4) (a) The owner should avoid nominating or naming subcontractors to perform work of the prime contractor or naming of suppliers of equipment and materials, except where there are extenuating circumstances. When the owner intends to impose a nominated subcontractor or supplier on the contractor, the tender documents should call this out and make available for tenderers' review the actual or proposed terms of reference under which the nominated subcontractor or supplier is to be engaged, including its time of performance and any intermediate milestone dates of its program.

(b) It is recommended that the general conditions of the subcontract be the same as those of the prime contract. In the event the performance, workmanship, supplies or materials of a nominated subcontractor or supplier prove to be unsatisfactory or otherwise not consistent or in conformance with the specifications or established program, the owner shall bear responsibility under the terms of the contract and the contractor shall be allowed appropriate adjustments in its compensation and time of performance.



## [3-1] Termination or Suspension of Work:

*The International Tunnelling Association recommends that:*

(5) When the terms of reference or general conditions of a tunnelling construction contract include provisions by which the owner is given the right to stop the performance of work by the contractor or to terminate the work and the contract, for whatever reason, in whole or in part, the tender documents and the contract shall clearly define the rights of the parties, including items of critical plant which are not the property of the contractor. Under such circumstances, it is the duty of the owner to describe in writing the actions to be taken by the contractor to minimise the impact of work stoppage on the works and the project surrounds.

(2) The owner should appreciate the character of the work underway that is being halted and the need to allow and encourage the contractor to shut down operations in a manner that minimizes the cost of such stoppage and which will facilitate either resumption of work at a later time by the contractor (or another contractor) or recovery and salvage of equipment and materials, when the stoppage is long-term or permanent. *(contd.)*

## [3-1] Termination or Suspension of Work:

*The International Tunnelling Association recommends that: (contd.)*

(3) A stop-work order by the owner should include:

(a) A clear definition of the work to be suspended.

(b) Instructions to the contractor as to issuance of further orders for materials and services.

(c) Guidance about action to be taken with respect to subcontractors and subcontracted work.

(d) Any extraordinary field activities to be taken by the contractor to preserve the work site and to protect the partially completed works; the contractor's equipment, plant and materials; and the project surrounds; and to protect the general public.

(e) The period of work stoppage and how such delaying action by the owner affects the time of completion of the work, should it resume.

(f) The basis of payment of the contractor for extraordinary work derived from carrying out the stop-work order (unless already stated in the contract). *(contd.)*

## [3-1] Termination or Suspension of Work:

*The International Tunnelling Association recommends that: (contd.)*

(4) When a stop-work order by the owner is not cancelled or extended, the owner shall initiate contract termination procedures, for such reasons as are applicable and covered by the contract. In such cases, the owner should provide additional instructions to the contractor by which the work site and incomplete tunnel facilities are preserved for future resumption of work.

(5) The owner should compensate the contractor for his reasonable costs resulting from the stop-work order whether or not the contract becomes terminated for any cause, including the cost of subcontracted work.

5.31  
P 25-3

## [3-2] **Ground Support:**

*The International Tunnelling Association recommends that :*

All tunnelling tender and contract documents define:

- (a) The assumed character of the ground throughout the construction site.
- (b) The parameters required for the design of ground supports and, more particularly, whether the ground support has been included in the design of the “permanent” structure.
- (c) The bills of quantities for ground support, covering a reasonable range of site conditions.
- (d) Methods to take account of changes in the quantity or type of ground support, dictated by actual site conditions when they differ from those assumed.

5.32  
P 07

## [3-2] Ground Characterisation:

*The International Tunnelling Association recommends that:*

All tunnelling contracts incorporate the following:

(7) Definitions of the character of the site or ground as they vary over the proposed extent of tunnelling or other underground construction, using definitions and graphical methods commonly accepted by the prospective contractors.

(2) The owner's estimate of the extent and occurrence of each discrete set of site characteristics, as a uniform basis for the call for tenders or bids.

(3) Procedural provisions by which the owner and the contractor may, during the course of the work, agree in the shortest possible time on changes to the work plan and the contractors' payment, as a result of encountering actual site conditions differing from those understood to exist at the time of contracting.

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P 08

## [3-4] Coordinated Insurance Programme:

*The International Tunnelling Association recommends that:*

All tunnelling contracting be based on the following procedures and stipulations:

(5) Prior to preparation of tender documents, the owner should determine whether the scope, complexity and site conditions of the project warrant proceeding with a Coordinated Insurance Program.

(2) If the evaluation reveals the appropriateness of a Coordinated Insurance Program, the owner shall determine the types of coverage, limits, deductibles, and discovery periods that best fit the project, and shall obtain such a Coordinated Insurance Program. ( *contd.* )

5.34  
P 13-1

## [3-4] Coordinated Insurance Programme:

*The International Tunnelling Association recommends that:*

All tunnelling contracting be based on the following procedures and stipulations:  
( 2 contd. )

(f) Prior to advertising for tenders for tunnelling or other underground construction on the project, the owner and the insurer shall prepare an insurance specification describing the Coordinated Insurance Program for all prospective tenderers. They will issue this document as part of the tender documents for each contract for the information and reference of tenderers and, ultimately, to form part of the contract.

(h) During the course of the project and for a reasonable period following completion of the constructed works, having regard for the legal liabilities of the parties concerned, the owner shall maintain the Coordinated Insurance Program intact and will provide coverage for him/herself, the design engineers and the contractors for the project.

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## [3-4] Alternative Tenders:

*The International Tunnelling Association recommends that:*

(1) Whenever possible, an alternative offer should be accompanied by a basic offer in accordance with the specification. In the case of a major departure from the basic offer, submittal of a conforming tender should be mandatory as well.

(2) The tenderer should be obliged to draw up contract documents for the alternative offer that are comparable in scope, detail, intent and content to those prepared by the owner for the basic offer.

(3) The tenderer should clearly indicate how the risks associated with the basic documents will be altered by adopting the alternative. The tenderer must define not only the risks that he or she will bear if the alternative is adopted, but also those which the tenderer wishes the owner to bear. (*contd.*)

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## [3-4] Alternative Tenders:

*The International Tunnelling Association recommends that: (contd.)*

(4) If an alternative entails a major departure from the design prepared by the owner, the owner must evaluate such a design to the extent that he or she can assume full responsibility for it. To this end, Tender Validity should be extended to at least 180 days. If there is insufficient time for such an extension, the alternative tender should not be accepted.

The consequences of awarding a contract when there is not absolute agreement that the alternative design will perform correctly is unacceptable, and no one should be subjected to the risks that would exist under these conditions.

Fortunately, alternative tenders often offer the potential for a shortened construction period. Hence, it may be possible for the owner to recover some of the extra time spent in the tender evaluation.

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P 17-2

## [3-5] Provision of Plant, Equipment, Services and Materials by the Owner:

*The International Tunnelling Association recommends that:*

(4) The contractor normally should be required to provide all plant, equipment and materials necessary for the completion of the work.

(2) When the owner decides, under special circumstances, to provide plant, equipment, services or materials, the following (as a minimum requirement) should be clearly defined in the contract documents:

(a) Ownership of the property (whether plant, equipment or materials) before, during and after completion of the contract.

(b) The quantity, quality and condition of plant, equipment or materials.

(c) The terms under which plant, equipment, services or materials will be made available, eg. free of charge or on hire.

(d) The contractor's obligations with respect to maintenance, damage, operating costs, insurance, etc.

(e) The procedure for inspection, handover and return to the owner.

(f) The point of delivery and responsibility for loading, transport and unloading.

(g) The procedure for dealing with any oversupply or shortage of materials.

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## [3-5] Contractor Supplied Financing:

*The International Tunnelling Association recommends that:*

(5) Where an owner desires that tenderers submit offers of financing in connection with tunnel construction, the owner require that all tenders include financing to specified limits and that such financing offers not be left optional with the tenderers.

(7) Calls for tender which require that the tenderers and the selected contractor provide financing of the construction and related procurements shall specifically establish the minimum acceptable proportion of such financing required by the owner, the form of assurance of financing to be submitted, the period prior to start of repayment, the repayment period and the guarantees intended by the owner that the repayment schedule will be met.

(9) The owner in issuing its call for tenders shall define the method by which tenders will be evaluated, including the weighing of the construction cost as bid and the companion offer of financing. (*contd.* )

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## [3-5] Contractor Supplied Financing:

*The International Tunnelling Association recommends that: ( contd. )*

(5) The owner in scheduling the tender and award periods shall make additional time allowances for tender preparation, securing of financing commitments, a pre-tender conference, issuance of clarifying addenda, evaluation of tenders and financing offers and final negotiation of contract terms.

(7) Should delays in the work or in the payment of financing occur during the contract period due to causes not within the control of the owner, the interest due on the funds advanced by the contractor shall not be thereby increased.

5.35

P 20-2

## [3-6] Contract Variation in Price:

*The International Tunnelling Association recommends that:*

Variation in price clauses be included in all tunnelling contracts, preferably of the index reimbursement type and applicable to:

(6) Labour supervision and staff,

(2) Materials used in significant quantities  
(whether permanent, temporary or expendable),

(3) Energy and

(4) Equipment incorporated in the works,

Formulae used in such clauses should be as representative as possible of the price structure of the works.

This recommendation should decrease the ultimate cost of tunnelling works.

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P 05

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## [3-6] Mobilisation Payments:

*The International Tunnelling Association recommends that:*

All tunnelling contracts include suitable mobilization items, independent of the work rates and covering the expenditures for setting up. In addition, advance payments at the beginning of the works and/or on supplies may be foreseen and provided for. Such a system of payments should reduce the cost of underground construction works.

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P10

## [3-6] Measurement Problems in Rock:

*The International Tunnelling Association recommends that:*

All tunnelling contracts make provision for the following:

(7) Specifications and the Bill of Quantities are to be based on distinct sets of geological conditions that are expected to prevail on-site.

(2) Measurement of work is based on a geologic classification system appropriate to the geology as well as to the tendered method and rate of excavation. The number of classes of geologic conditions should be restricted to no more than five. All classes should be bounded by upper and lower limits and must not overlap. If support beyond these limits is required, such cases should be treated on an *ad hoc* basis. The support classes should deal only with that support which is required to be installed as an in-line operation.

*(contd.)*

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## [3-6] Measurement Problems in Rock:

*The International Tunnelling Association recommends that: (contd.)*

(3) Bills of Quantities are to be structured and priced in such a way that the implication on price of any changes in the work can be established easily. Distinction is to be made between fixed costs and time-related costs. Where appropriate, items in the Bills of Quantities should be related to the relevant clauses in the specifications. Both the description of items and the quantities should be realistic. Items that are included as a precautionary measure with a view to negotiating changes shall be set forth separately and clearly identified as provisional items.

(4) The price tendered for any billed item must be deemed to be sufficient to cover the cost of all activities implicit in that item. (*contd.* )

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## [3-6] Measurement Problems in Rock:

*The International Tunnelling Association recommends that: (contd.)*

(5) Items that cover both the excavation and filling of overbreak should be provided for each rock class measured per unit area of specified excavation surface. In doubtful ground, a limit profile should be defined within which the contractor is expected to be able to excavate. In cases where it is agreed that excess overbreak outside this nominal excavated profile was due to physical or geologic conditions beyond the contractor's control and did not arise from the method of working or from carelessness, such excavation and subsequent backfilling outside the specified excavation surface are to be measured *in situ* and paid for at billed rates under items describing excess overbreak and filling to excess overbreak. Under these circumstances, the items for excavated surfaces would still be measured.

(6) If the owner elects to make use of "payment lines" and "clearance lines", these limits must be clearly defined geometrically in the contract documents.

## [3-6] Measurement Problems related to Water:

*The International Tunnelling Association recommends that:*

(5) During the ground investigation, special care be taken by the owner to detect the presence of water and to monitor fluctuations in the level of water; to measure strata permeabilities; and to determine the pressure, temperature and chemical composition of the ground water.

(2) If lowering of water tables might be a problem, it should be clearly indicated in the ground investigation report.

(3) The tender documents should clearly indicate the different types of precautions that the owner anticipates may be taken to handle water in the tunnel or at the construction site. The tender documents should provide bill items for the expected quantities of water, specifying the intended methods of dealing with water problems and the time involved. The tenderer's alternative methods of dealing with the anticipated water should be fully priced in similar detail.

*(contd.)*

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## **[3-6] Measurement Problems related to Water:**

*The International Tunnelling Association recommends that: (contd.)*

(5) If the contractor decides that dealing with some amount of water should be included in unit prices for other works, e.g. tunnel excavation, the contract documents should clearly state this need, and the statement should set a limiting quantity for such work. Rates to cover probe drilling, pre-grouting, dewatering, and other techniques, if envisaged, also should be included.

(7) To evaluate the effect of changes to the works caused by variations in the quantities of water expected, detailed programs should be submitted by the tenderers, based on bill items in the tender documents.

(9) Practical procedures for notification, inspection, verification, measurement and control of water occurrence should be established and specified in the contract documents in order to avoid lost time later in prolonged discussions and disputes.

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## [3-7] Prequalification of Contractors:

*The International Tunnelling Association recommends that:*

Owners seek bids only from contractors who have satisfied a rigorous technical and financial prequalification procedure.

## [3-7] Tendering and Awards of Contract:

*The International Tunnelling Association recommends that:*

With the objective of enhancing the fairness of the tender process and thus presenting equitable risks in the investment of effort to respond to a call for tenders, the following procedures be followed in the tendering and awarding of contracts :

(7) All tenders that contain unpriced conditions or qualifications should be disallowed.

(2) Alternative tenders offering other methods of construction or means of fulfilling the owner's objectives should be encouraged. The confidentiality of such alternative offers should be respected.

(3) Alternative offers will preferably be accompanied by an offer conforming to the owner's invitation.

(4) All tenderers' alternative offers may be considered. (*contd.*)

## [3-7] Tendering and Awards of Contract:

*The International Tunnelling Association recommends that: (contd.)*

(5) All tenders should be evaluated on bases that include methods and specific means (equipment and personnel) as well as price.

(6) Pre-tender meetings between all tenderers and owner's representatives should be recommended and held on a formal basis an adequate time prior to the tender date.

(7) Sufficient time for tendering should be allowed, especially when alternative tenders are requested or encouraged.

(8) Pre-contract meetings with short-listed tenderers should be held to confirm both parties' understandings of what is required and offered. Such meetings should not be used for pre-contract bargaining to attempt to reduce the tenderer's offer.

(9) Tenderers who have no chance to be awarded the contract should be informed as soon as possible.

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## [1-4] & [4-4] Construction Site Safety:

*The International Tunnelling Association recommends that:*

(5) The contract between the owner and the contractor shall make the contractor responsible (\*see note below) for construction site safety and for maintaining the site in an orderly state appropriate to the accordance of danger to persons thereon.

(2) The contract shall include a section devoted to safety of the construction site, wherein the duties and responsibilities of the contractor are spelled out.

These may include requirements that the contractor:

(a) Draft safety plan for the project and submit to the Engineer for review and comment.

(b) Implement the safety plan, which would cover the other safety stipulations listed herein and would establish a safety training program for the personnel of the contractor and his subcontractors.

(c) Assign a safety supervisor to oversee the contractor's operations as they may present danger to persons entitled to be upon the site and to act expeditiously to mitigate perceived hazards. (*contd.*) Note \*

*This may not be in accordance with the local law and consequently this proposition shall follow local legislation*

## [1-4] & [4-4] Construction Site Safety:

*The International Tunnelling Association recommends that: (contd.)*

(3) The contract shall also: (a) Assure that the contractor provide and maintain all lighting, guards, fencing, personal safety equipment, air testing equipment, first aid facilities and equipment, fire protection and fire fighting equipment and warning signs, when and where necessary or as required by duly constituted authorities or by the Engineer for the protection of the works and for the safety of onsite personnel and the public.

(b) Make clear the powers of the Engineer to act and enforce safety matters at the site and recognize that the Engineer is employed to intervene in the operations of the contractor where, in the opinion of the Engineer, a site condition or the construction process poses an immediate threat to the safety of on-site personnel, the public, the works or the property of third parties. In each case, the Engineer may direct changes in the immediate operations including the stopping of work.

(c) Identify other entities not a party to the contract who will also be present at times with some role in the providing of a safe working environment at the site, and define the rights and authority to each such entity with respect to the parties to the contract. *(contd.) ( see also note \* on previous slide P 22-2/3 )*



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## [1-4] & [4-4] **Construction Site Safety:**

*The International Tunnelling Association recommends that: (contd.)*

(4) When changes in site conditions, such as the tunnelling medium or the presence of ground water, require revised construction methods or procedures, these be developed and agreed to include all reflective changes in matters of safety.

(5) The ITA's "Guidelines for Good Tunnelling Practice" and use of recommended safety signs should be adopted by the owner for application by the contractor.

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P 22-3

## [4-4] Post Award Alternatives:

*The International Tunnelling Association recommends that:*

(5) The tender documents of owners developing tunnels or other underground facilities should include a clause which invites the contractor to make value engineering change proposals and provides incentive toward most cost effective projects by stipulating that cost-benefits derived by such proposals, when accepted by the owner, shall be shared between the parties, outlining the proposal submittal requirements and the general terms of cost reduction sharing. The cost-benefit should be apportioned equitably, taking into account the risks or change of risk to each party.

(2) Tunnel contractors should take advantage of the value engineering incentive clauses by proposing changes to the facility design, the construction methods or sequence, the site constraints or conditions, the specified materials, or other aspects of the prescribed work that will reduce the net cost of construction or otherwise afford a more desirable construction process or finished facility.

*(contd.)*

## [4-4] Post Award Alternatives:

*The International Tunnelling Association recommends that: ( contd. )*

(3) The owner and the Engineer should be prepared to promptly review all value engineering change proposals and suggest modifications to improve their acceptability, as appropriate. The Engineer shall submit recommendations regarding acceptance of each proposal to the owner.

(7) When the Engineer cannot concur with the contractor's proposal, he should provide constructive, technical reasons for disapproval or negotiate the proposed change so that it becomes acceptable. When a proposal is not acceptable, and cannot be adjusted to become acceptable, it becomes re-jected by the owner and the work proceeds as originally specified.

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P 24-2

## [5-1] Project Overview by Third Parties:

*The International Tunnelling Association recommends that:*

(1) In the development of the designs and the preparation of tender documents, the owner shall determine to the best of his ability what third-party overview entities will operate during the contract period and what objectives and concerns each is likely to have.

(2) To the extent predictable, the presence and purpose of each third-party overview entity should be stated in the tender and contract documents, together with the procedural steps which apply to the parties of the contract with respect to potential impacts on either party caused by directives of the overview entity.

(3) The recognition and allocation of added costs expended by the owner and/or by the contractor, including administrative costs and delay costs caused by the operations, of each third-party overview entity, should be a subject of a contract clause. Similarly, the contract's time of completion and any liquidated damages provision should be referenced as to how they might be changed or mitigated when delay in the progress of work is traceable to the activities of third-party overview entities.

## [5-1] The Engineer's Role During Construction:

*The International Tunnelling Association recommends that:*

Irrespective of what role, responsibilities and authority the owner desires to delegate to the Engineer, all tunnelling contracts shall:

(7) Identify what entity will represent the owner as Engineer during construction.

(2) Clearly define the duties, responsibilities and authority of the Engineer and the limitations that apply in the Engineer's service to the owner during construction.

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## [5-1] **Disputes:**

*The International Tunnelling Association recommends that:*

(5) The early resolution of disputes be given high priority at all levels of management.

(2) All steps be taken to avoid any influence of the resolution of disputes on the development of the works.

(3) Where possible, disputes be disposed of by the parties at the work site, as soon as they arise.

(4) As a minimum, agreement with regard to the facts be recorded  
(a daily, written, countersigned report is advised as normal practice).

*( contd. )*

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## [5-1] **Disputes:**

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*The International Tunnelling Association recommends that: ( contd. )*

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(5) The use of a conciliation procedure, such as referral to one or more mediators selected prior to the works, be considered.

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(6) If mediation proves ineffective, arbitration be considered before resorting to litigation in the courts.

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## 6 Future Development:

*ITA WG 3 recommends that the following topics also be considered:*

Alternative Types of Contracts

Effect of Alternative Methods of Measurement

Contractor Selection Methods

Performance Guarantees and Security

Procurement Procedures for Tunnel Boring Machines

Construction Management

Quality Assurance and Guarantees

Avoidance of Claims

Evaluation of Claims

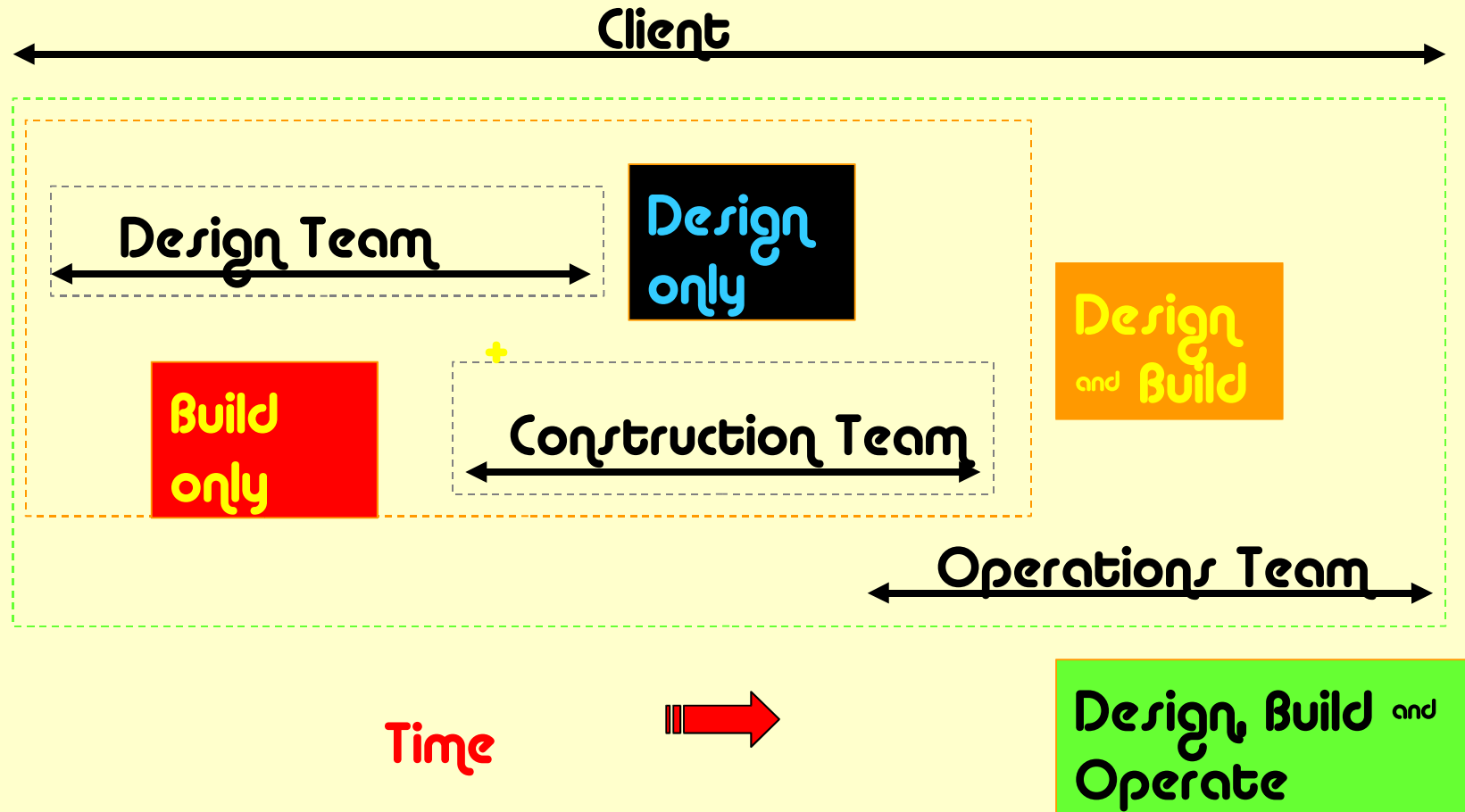
Liquidated Damages

Settlement of Disputes



# Legal Boundary Conditions

## Insurance Brokers



## 7 References:

*ITA WG 3 invites all members and interested parties to ITA to submit any comments, additional proposals and/or experience to the ITA for consideration and incorporation in these proposals during the current review.*

*Please forward your comments to the ITA Secretariat for the attention of Working Group 3.*



## 7 References:

*Research is presently being undertaken to compare the following publications:*

FIDIC red and yellow books

NEC New Engineering Contract Version 3 issued by the ICE June 2005

American Society of Civil Engineers

VOB German Standard Form of Contract

French Conditions of Contract

SIA Swiss Conditions of Contract Latest Revision November 2004

Norwegian, Dutch, Korean and possibly Japanese Conditions of Contract

etc.

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*WG 3 is endeavouring to analyse the consequence of different forms of measurement which also have a considerable bearing on the contract clauses*

*Different methods for different situations*

## Methods of Measurement:

Dayworks

Unit Rates

Lump Sums

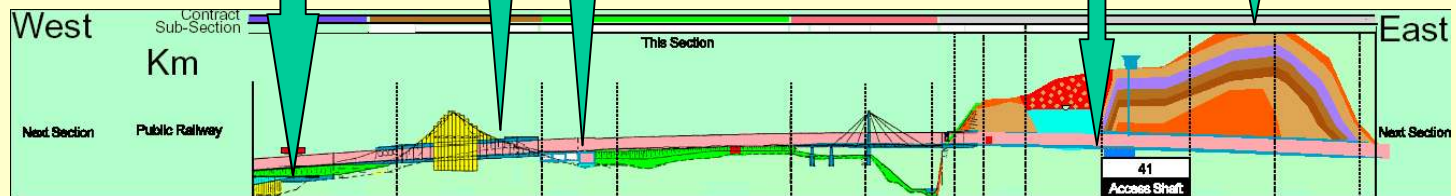
Time Related Costs

Milestone Payments

Cost Plus

Target Contracts

Provisional Sums



**Method:** Submersed Cut & Cover

D&B Shield TBM Open

## 8 Conclusions:

*ITA WG 3 will be presenting a summary of their findings in the proceedings and a demonstration of their approach to the full plenum at the next ITA meeting in Seoul, Korea April 2006.*



*Annyong haseyo ! See you in Seoul 2006*