

OHS and contracts in the construction industry

What contractual factors affect the health and safety in construction?

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CONSTRUCTION CONTRACT

1. **THE PARTIES.** This Construction Contract (the "Agreement") is made between:

Client: _____ (Client name) with a mailing address of _____ (the "Client"), AND

Contractor: _____ (Contractor name) with a mailing address of _____ (the "Contractor").

WHEREAS, the Client intends to pay the Contractor for Services provided, effective _____ (mm/dd/yyyy) (the "Effective Date"), under the following terms and conditions:

2. **SERVICES.** The Contractor agrees to perform the following for the Client:

Hereinafter known as the "Services."

3. **PAYMENT.** In consideration for the Services to be performed by the Contractor, the Client agrees to pay the following: (check one)

- \$ _____ / Hour.
 - \$ _____ (total) for the Services.
 - Other: _____

The Contractor agrees to be paid: (check one)

- Within _____ days upon delivering an invoice.
 - Upon the completion of all Services.
 - On a _____ (e.g., weekly, monthly) basis starting from the Effective Date.
 - Other: _____

Completion shall be defined as the fulfillment of Services as described in Section 2 in accordance with industry standards and to the approval of the Client, not to be unreasonably withheld.

4. **DUE DATE.** The Services provided by the Contractor shall: (check one)

- Be completed by _____ (mm/dd/yyyy).
 - NOT have a due date.
 - Other: _____

5. **TERMINATION.** This Agreement shall terminate upon the: (check all that apply)

- Completion of the Services provided.
 - Date of _____ (mm/dd/yyyy).
 - Other: _____



The problem(s)

- Continuously a high number of OHS risks
 - Involves manipulating heavy objects
 - In temporary organisations
 - With many stakeholders
 - Highly competitive environment – push for prioritizing price



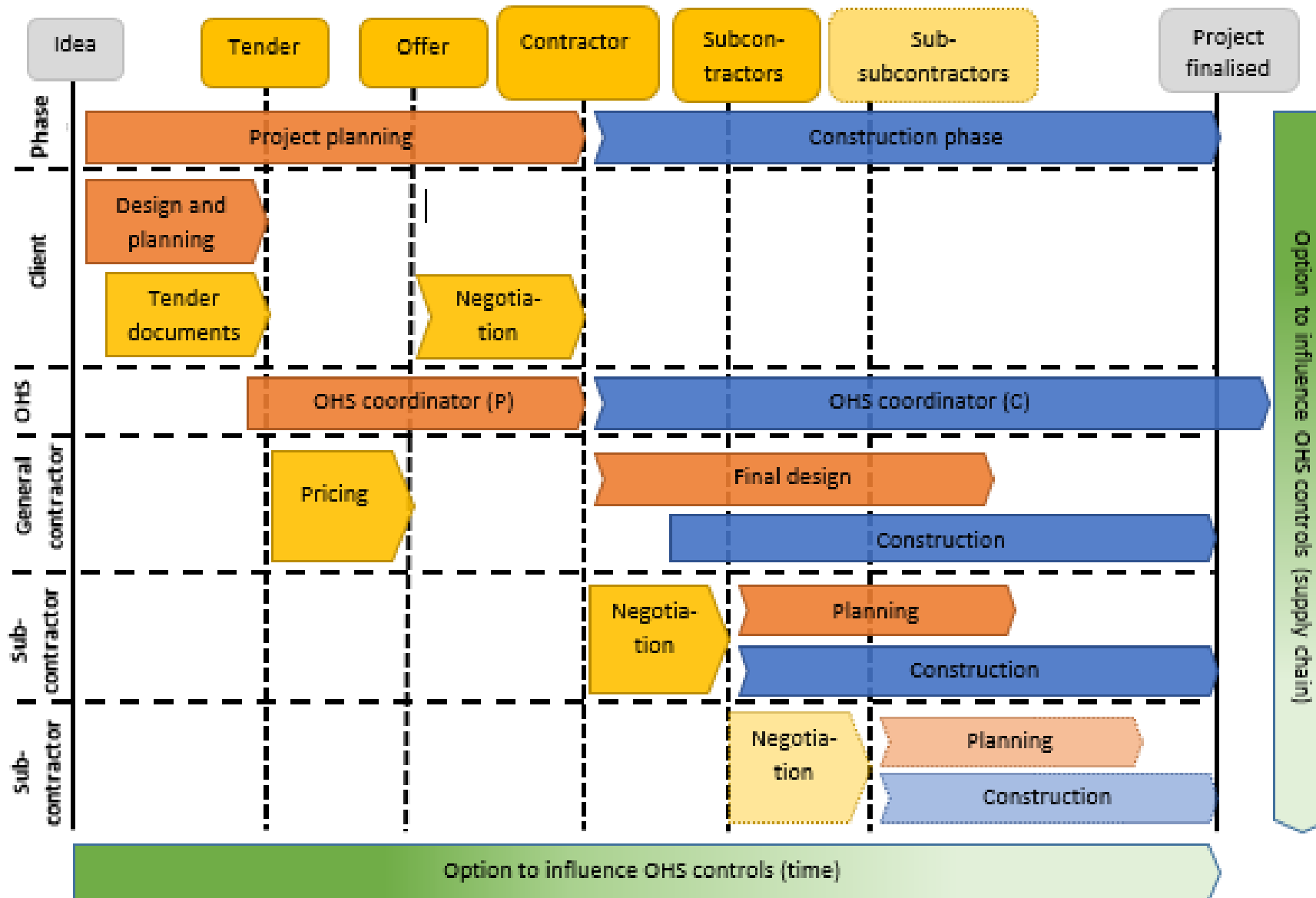
Oswald et al.2020; Spangenberg 2010; Lin & Mills 2001

Options to mitigate

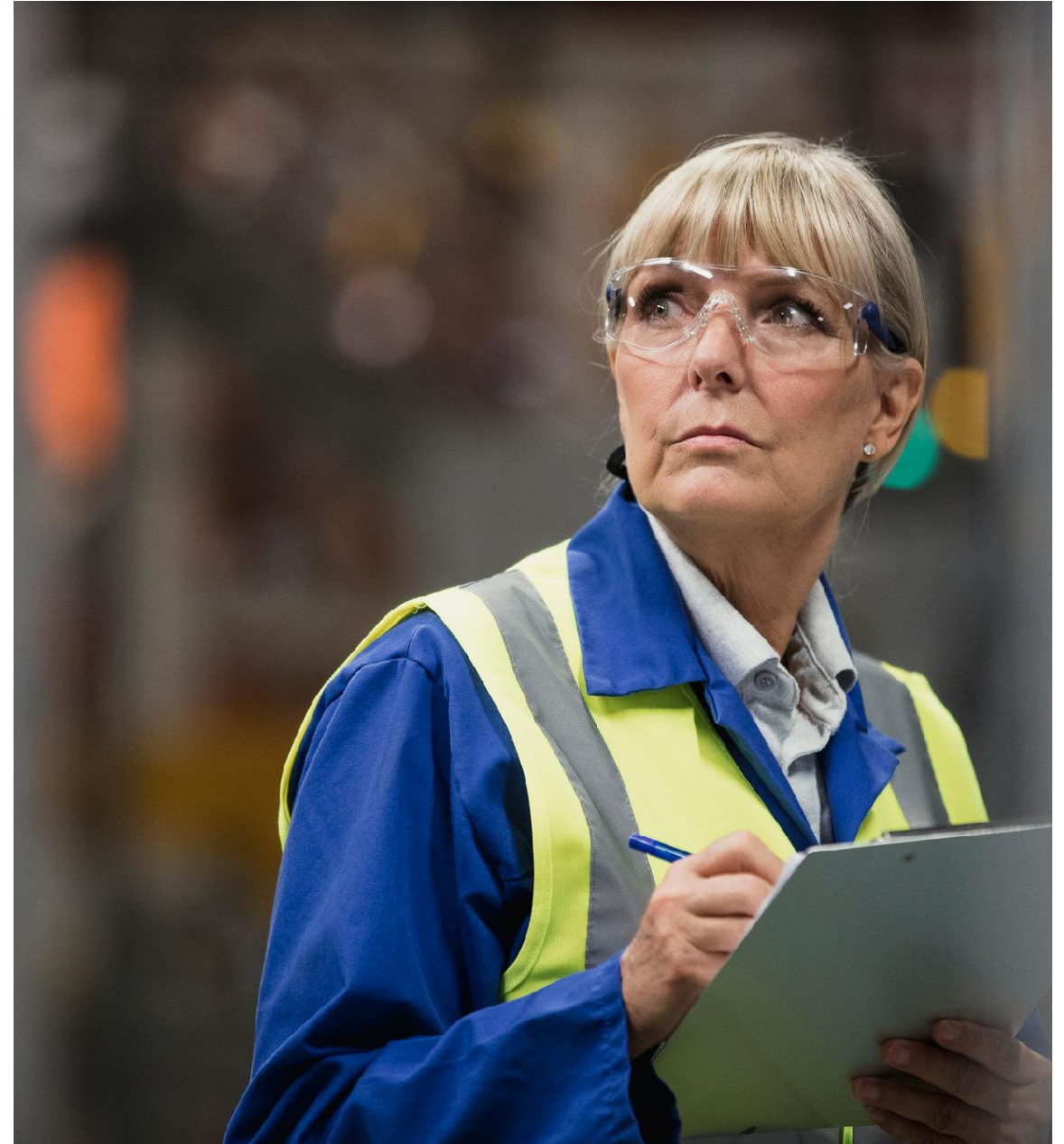
- If OHS is prioritized and integrated in both design and execution
- Prevention through design
- Client's engagement
- Early involvement of coordinator
- The contract is key



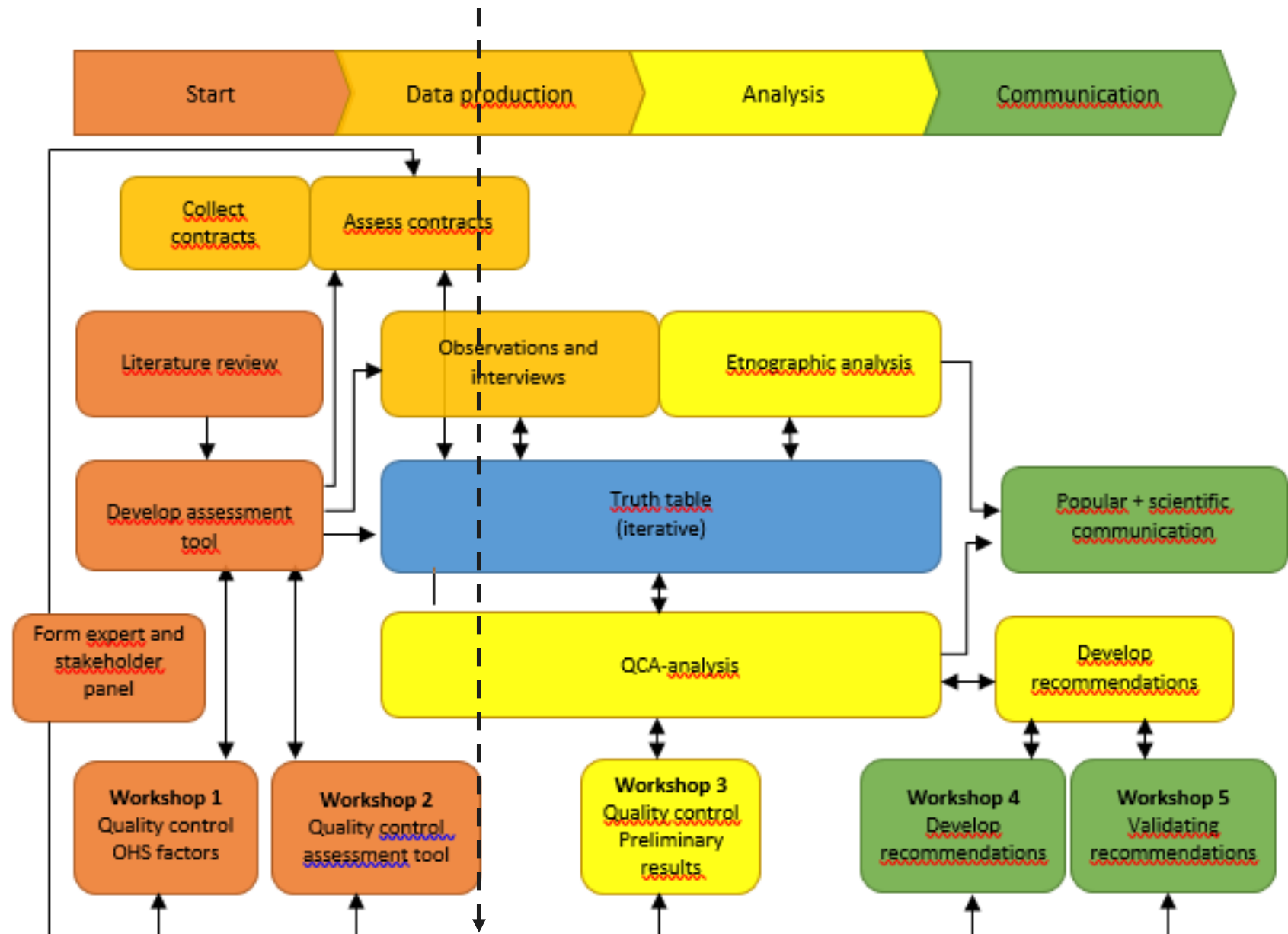
Behm 2005; Adaku & Ndekugri 2021; Huang & Hinze 2006; Zwetsloot et al. 2020



- Identify quasi causal relations between OHS in contracts and in construction practices
- Develop knowledge-based assessment tools
- Recommendations for tenders
- Co-created with clients and experts



Project design



Research activities

- Develop assessment tools
- Collect and score contracts for 16 construction projects
- Ethnographic fieldwork on 16 construction sites
- Qualitative comparable analysis
- Workshops with clients and experts



The development of assessment tools

Document assessment tool

			Subject not relevant	Subject not described	Section where subject is described?	Responsible person identified?	Reference to regulation or other evidence	Holistic assessment: how well described is the subject considering risk mitigation? (Se scoringsvejledning)
Theme		Subject (risks, relevant factors, procedures)	Mark	Mark	Refer page number	Refer page number	Refer page number	Score 0-10
O. Example	1	Factor 1			13-17	2	2	
	2.	Factor 2	X					
		Factor 3			14, 7	2	2	2
		Factor 4			13-17	2	2	3
		Other relevant factors						
1. Chemical and biological	a	Pre-investigations						
	b	Miljøvurderinger						
	c	Chemical risk assessment						
	d	Waste management						
	e	PPE						
	f	Chemical risk factors						
	g	Biological risk factors						
	h	Radiation						
	i	Dust						
		Other described factor						
	Other relevant, but not described factors							
3. Ergonomic		Heavy lifting						
		Vibrations						
		Work positions						
		Dust						
		Technical aids						
		repetitive tasks						
		PPE						
		Other described factor						

The development of assessment tools

Safety practice assessment tool

- Observations
 - Each case is observed for 5 workdays focusing on the OHS practices of key actors
 - Each level of the value chain is observed
 - Key actors are interviewed (client, contractor, advisors, OHS coordinator, sub contractor, workers)
 - Safety practice is documented using Safety Observer (Pete Kines)

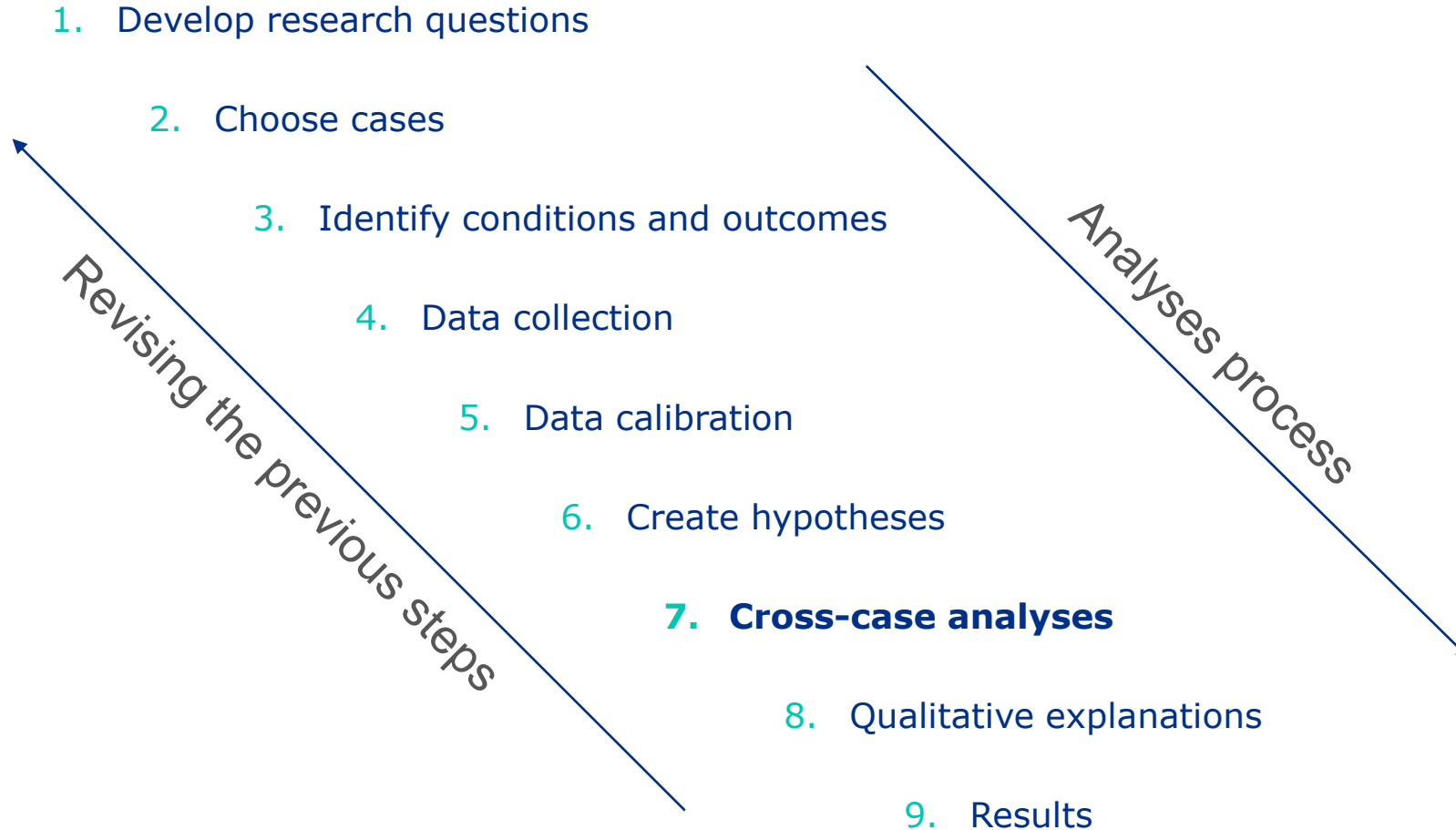
Mapping factors

(conceptual map)

	1. Planning	2. Design	3. Tendering	4. Contract	5. Detail design	6. Organising	7. Execution	8. Maintenance
Phase specific factors (conditions and outcomes)	Project materiality Type of contract Client ownership Timeframe realism	Systematic OHS work Dealing with environmental risks Buildability Appointing OHS coordinator	Tendering type Detail level of OHS work OHS incentives Safety induction Client's OHS management system	As in tendering	Updating the health and safety plan Mitigating risks Number of simultaneous trades	OHS coordinator placement Worker salary incentives Wellbeing measures OHS work organisation	Safety practice Health and safety in general OHS work in practice Accidents	OHS at delivery
Factors across phases	OHS integration	Client's OHS engagement	Construction management engagement	Safety coordinator practices	Motivation	Employer engagement	Cooperation	

Qualitative comparative analyses

Principles of analyses process



Comparing large qualitative data sets

Data calibration and developing hypotheses

Case	Safety practice (outcomes)						Contractual factors (conditions)																											
	GOD	UDG	FORT	AND	COM	REL	AND	KONB	KONE	IDEB	IDEE	IDEM	FUN	COMP	REL	SAM	TILS	TILF	INDF	INDT	OEK	INTB	INTE	SNY	INF	KLA	OPLE	EGEB	EGEE	FORB	MOTE	ITKE	SAN	
1	0,33	0,67	0,67	0,00	0,67	0,33	0,67	0,33	0,33	1,00	0,67	0,67	1,00	0,67	0,33	0,67	0,67	0,00	0,33	0,67	0,33	0,33	0,00	0,33	0,67	0,33	1,00	0,33	0,00	0,33	0,33	0,67	0,00	
2	0,67	0,33	0,00	0,33	0,67	0,00	0,33	0,33	0,00	0,67	0,67	1,00	0,67	0,67	0,67	0,67	0,67	0,67	1,00	1,00	0,33	0,00	0,00	0,33	1,00	1,00	0,67	0,67	0,33	0,67	0,00	1,00	0,67	
3	0,67	0,67	0,67	1,00	0,33	0,33	1,00	0,33	0,67	0,67	0,67	0,67	0,33	0,33	0,33	0,67	0,33	0,00	0,33	0,67	0,33	0,00	0,00	0,67	0,67	0,67	0,67	0,00	0,33	0,67	0,33	1,00	0,67	
4	0,67	0,67	1,00	1,00	0,67	0,33	1,00	0,67	0,33	1,00	0,67	1,00	0,33	0,67	0,33	1,00	1,00	1,00	1,00	1,00	1,00	0,67	0,67	0,67	1,00	0,67	0,67	1,00	0,67	1,00	1,00	1,00	0,67	
5	1,00	1,00	1,00	1,00	0,67	0,67	1,00	0,33	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0,67	1,00	1,00	1,00	1,00	0,00	0,00	1,00	1,00	1,00	0,67	0,33	1,00	1,00	1,00	1,00	1,00	
6	0,00	1,00	0,67	0,00	0,33	0,67	0,67	0,67	0,67	0,33	0,00	0,33	0,67	0,67	0,33	0,33	0,00	0,67	0,67	0,67	0,67	0,33	0,33	0,33	0,67	0,33	0,00	0,33	1,00	1,00	1,00	1,00	1,00	
7	0,67	0,00	0,33	0,33	0,33	0,00	0,33	0,67	0,33	0,67	0,67	0,67	1,00	0,33	0,33	0,00	0,33	0,67	0,67	0,00	0,67	1,00	0,33	0,67	0,33	1,00	1,00	0,00	0,67	0,67	0,33	1,00	0,67	
8	0,67	1,00	0,33	0,67	0,33	1,00	1,00	1,00	1,00	0,67	0,67	1,00	1,00	0,67	0,33	1,00	0,67	0,33	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0,67	0,67	0,67	1,00	1,00	1,00	0,67	0,67	
9	1,00	1,00	1,00	1,00	1,00	1,00	0,67	1,00	0,67	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0,33	1,00	1,00	0,67	0,33	1,00	0,67	0,33	1,00	0,67	1,00	0,33	1,00	1,00	0,00	1,00	1,00	
10	0,67	0,33	1,00	0,67	0,33	1,00	0,67	1,00	0,33	0,67	0,33	1,00	1,00	0,67	0,67	0,33	0,33	0,33	0,67	1,00	1,00	1,00	0,33	1,00	1,00	1,00	1,00	1,00	0,67	0,67	0,33	1,00	0,67	
11	0,67	1,00	1,00	0,33	1,00	1,00	1,00	1,00	1,00	1,00	0,00	0,67	0,67	1,00	0,33	0,67	0,33	1,00	0,67	0,67	0,67	0,67	0,67	0,67	0,33	0,00	0,33	1,00	0,33	0,33	1,00	1,00		
12	1,00	0,67	0,67	0,00	0,67	0,67	0,33	0,00	0,33	0,67	0,67	0,33	0,33	1,00	1,00	1,00	1,00	1,00	0,33	0,67	0,33	0,67	0,33	0,67	0,67	0,67	1,00	0,67	0,33	0,67	0,67	0,67	0,67	
13	0,33	0,67	0,33	0,00	0,33	0,67	0,67	0,33	0,33	0,67	0,67	0,33	0,33	0,33	0,67	0,33	0,67	0,67	0,33	0,33	1,00	1,00	1,00	1,00	0,67	0,67	1,00	1,00	1,00	1,00	0,67	1,00	0,67	
14	1,00	0,00	1,00	0,67	1,00	0,67	1,00	0,67	0,33	0,67	1,00	0,33	0,67	0,33	1,00	1,00	0,67	0,33	1,00	0,67	1,00	0,33	1,00	0,33	1,00	1,00	0,67	0,33	1,00	1,00	1,00	1,00	1,00	
15	1,00	0,67	1,00	0,33	1,00	0,67	1,00	0,33	0,67	1,00	1,00	1,00	1,00	0,00	1,00	1,00	1,00	0,00	1,00	0,33	0,33	1,00	1,00	0,67	0,67	0,67	1,00	1,00	0,67	0,67	0,33	0,33	0,67	
16	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0,33	0,00	0,33	0,67	0,67	0,33	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	0,67	0,33	0,67	0,67	0,67	1,00	0,67	0,67	0,33	1,00	

Comparing large qualitative data sets

QCA analyses

- For each outcome, the following analyses can be made
 - The different routes
 - The shortest route
 - Necessary atomic and combined conditions
 - Sufficient atomic and combined conditions
- Each result is qualitatively validated

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Thank you

Outputs will be available here: <https://nfa.dk>

Or find me and connect at LinkedIn

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