



Occupational safety in road transportation – What can we learn from the accident statistics

(A+A Congress 2021: Vision zero when working with goods vehicles)

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Background – getting familiar to OSH at trucking industry

OSH risks and problems in trucking can be divided to

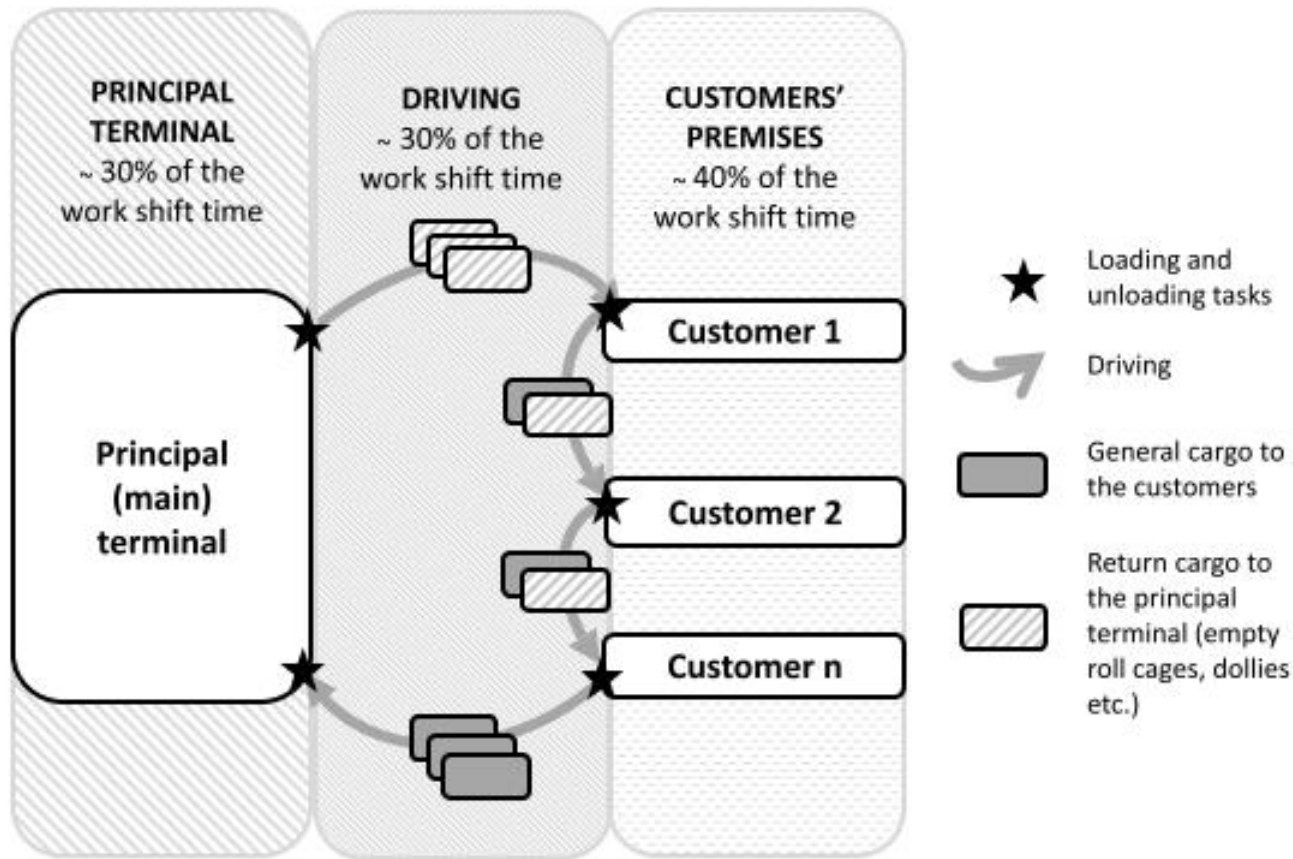
- 1) Tasks outside the cab
 - 2) Driving related activities
- Truck driving is one of the most hazardous occupations globally
 - In driving risks such as collisions and whole-body-vibration and prolonged static working postures are commonly acknowledged
 - Research literature is quite consistent that a majority of OSH risks and occupational accidents are related to tasks outside the cab



Safe deliveries are a basic prerequisite to a modern society – OSH risks are in many ways known, yet not always adequately managed



Short haul distributions / deliveries



Tasks include:

- Multiple delivery locations,
- frequent manual materials handling,
- variable customer environments
- The drivers may, based on the mode of transportation, participate in loading and unloading, checking and securing the load for, administrative work, commercial interaction with customers, and to different supportive tasks concerning the truck, cargo compartment or mechanical handling devices

Ojel-Jaramillo Romero et al. (2018): <https://doi.org/10.1186/s12544-018-0299-3>



OHS&HFE challenges – for how long?

“We’re at least a decade away from having trucks with no driver in it”*

It is not likely that the drivers disappear from the cabs, however their role and duties might change

MIT* Technology Review

10 Breakthrough Technologies 2017

Self-Driving Trucks

Tractor-trailers without a human at the wheel will soon barrel onto highways near you. What will this mean for the nation’s 1.7 million truck drivers?

Availability: 5 to 10 years

By David H. Freedman





Objectives – perspectives to human asset management



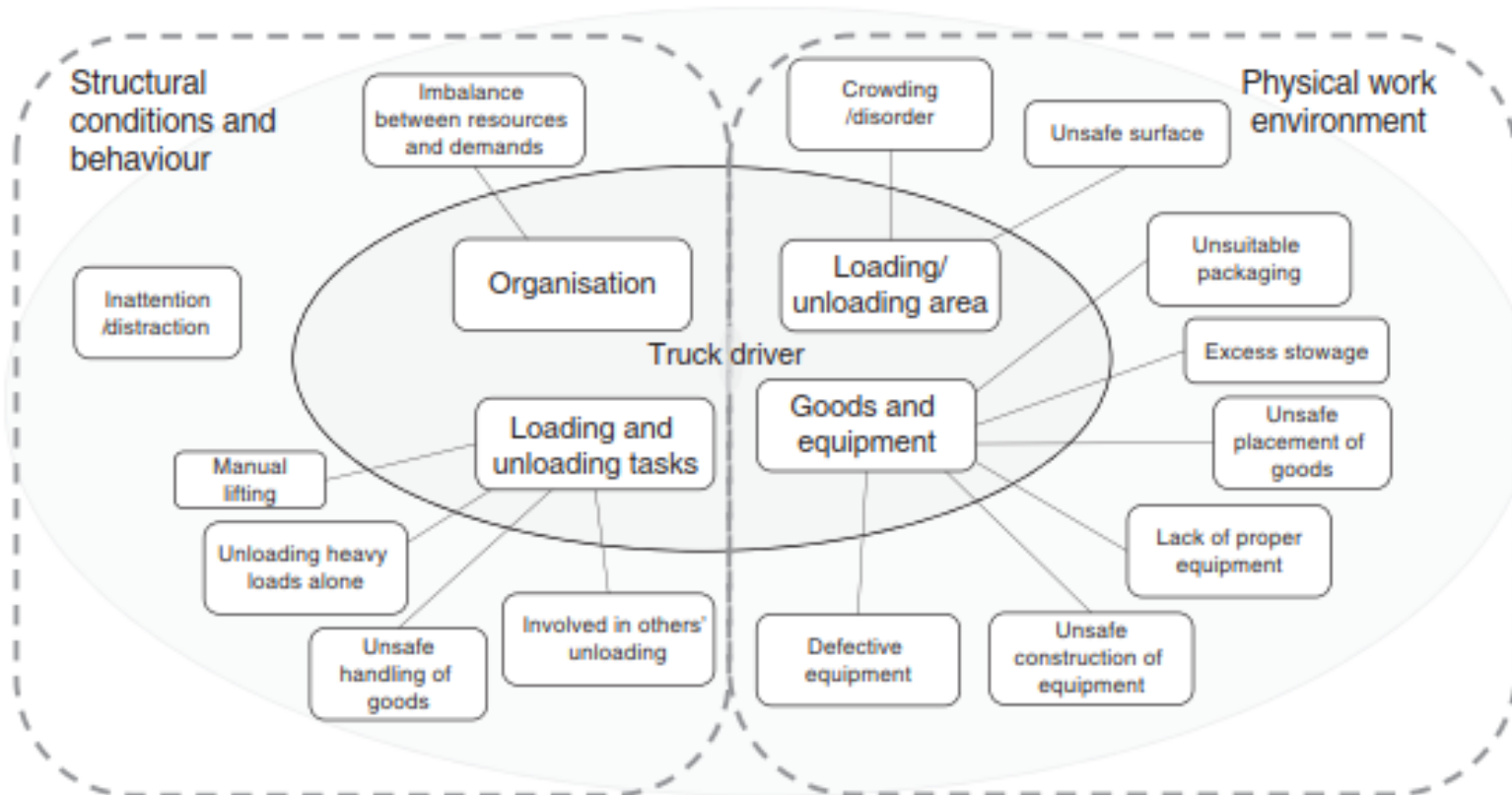
Truck drivers as "lone riders" are affected to various kinds of health and safety risks – what can we learn from the past?



Kärmeniemi et al (2014):
<https://www.julkari.fi/handle/10024/110652>



Earlier accident analyses



The contributing factors identified were categorised into 14 categories. In all, 13 of these were grouped into four sections reflecting the drivers' work outside the cab: "Goods and equipment", "Loading/unloading area", "Loading/unloading tasks", and "Organisation". A single risk factor was associated with 40 accidents while the other 34 involved combinations of factors.

Reiman et al. (2018):
<https://www.emerald.com/insight/content/doi/10.1108/IJPDLM-06-2017-0216/full/html>



Databases 2005-2014

SWEA database contains 12 659 accident reports that are coded using ESAW codes.

Altogether 5226 accident reports from SWEA among the 6817 compensated accident cases by AFA were matched.

From those matched accidents 3188 contained reliable coding information in which the coding system on European Statistics on Accidents at Work by the Eurostat had been utilized.

AFA contains 6817 accidents that had been approved, i.e. in which monetary compensation has been paid among truck drivers in 2005-2014. The accidents are not coded, but they contain short descriptions of the accidents: What did you with when the accident occurred, What went wrong? What injured you?

Reiman et al. (2019):

<https://www.julkari.fi/handle/10024/139157>



ESAW coding

Deviation

Code	Label
00	No information
10	Deviation due to electrical problems, explosion, fire - Not specified
11	Electrical problem due to equipment failure - leading to indirect contact
12	Electrical problem - leading to direct contact
13	Explosion
14	Fire, flare up
19	Other group 10 type Deviations not listed above
20	Deviation by overflow, overturn, leak, flow, vaporisation, emission - Not specified
21	Solid state - overflowing, overturning
22	Liquid state - leaking, oozing, flowing, splashing, spraying
23	Gaseous state - vaporisation, aerosol formation, gas formation
24	Pulverulent material - smoke generation, dust/particles in suspension/emission of
29	Other group 20 type Deviations not listed above
30	Breakage, bursting, splitting, slipping, fall, collapse of Material Agent - Not specified
31	Breakage of material - at joint, at seams
32	Breakage, bursting - causing splinters (wood, glass, metal, stone, plastic, others)
33	Slip, fall, collapse of Material Agent - from above (falling on the victim)
34	Slip, fall, collapse of Material Agent - from below (dragging the victim down)
35	Slip, fall, collapse of Material Agent - on the same level
39	Other group 30 type Deviations not listed above
40	Loss of control (total or partial) of machine, means of transport or handling equipment, hand-held tool, object, animal - Not specified
41	Loss of control (total or partial) - of machine (including unwanted start-up) or of the material being worked by the machine
42	Loss of control (total or partial) - of means of transport or handling equipment, (motorised or not)
43	Loss of control (total or partial) - of hand-held tool (motorised or not) or of the material being worked by the tool
44	Loss of control (total or partial) - of object (being carried, moved, handled, etc.)
45	Loss of control (total or partial) - of animal
49	Other group 40 type Deviations not listed above
50	Slipping - Stumbling and falling - Fall of persons - Not specified
51	Fall of person - to a lower level
52	Slipping - Stumbling and falling - Fall of person - on the same level
59	Other group 50 type Deviations not listed above
60	Body movement without any physical stress (generally leading to an external injury) - Not specified
61	Walking on a sharp object
62	Kneeling on, sitting on, leaning against
63	Being caught or carried away, by something or by momentum
64	Uncoordinated movements, spurious or untimely actions
69	Other group 60 type Deviations not listed above
70	Body movement under or with physical stress (generally leading to an internal injury) - Not specified
71	Lifting, carrying, standing up
72	Pushing, pulling
73	Putting down, bending down
74	Twisting, turning
75	Treading badly, twisting leg or ankle, slipping without falling
79	Other group 70 type Deviations not listed above

Contact-Mode of injury

Code	Label
00	No information
10	Contact with electrical voltage, temperature, hazardous substances - Not specified
11	Indirect contact with a welding arc, spark, lightning (passive)
12	Direct contact with electricity, receipt of electrical charge in the body
13	Contact with naked flame or a hot or burning object or environment
14	Contact with a cold or frozen object or environment
15	Contact with hazardous substances - through nose, mouth via inhalation
16	Contact with hazardous substances - on/through skin or eyes
17	Contact with hazardous substances - through the digestive system by swallowing or eating
19	Other group 10 type Contacts - Modes of Injury not listed above
20	Drowned, buried, enveloped - Not specified
21	Drowned in liquid
22	Buried under solid
23	Enveloped in, surrounded by gas or airborne particles
29	Other group 20 type Contacts - Modes of Injury not listed above
30	Horizontal or vertical impact with or against a stationary object (the victim is in motion) - Not specified
31	Vertical motion, crash on or against (resulting from a fall)
32	Horizontal motion, crash on or against
39	Other group 30 type Contacts - Modes of Injury not listed above
40	Struck by object in motion, collision with - Not specified
41	Struck - by flying object
42	Struck - by falling object
43	Struck - by swinging object
44	Struck - by rotating, moving, transported object, including vehicles
45	Collision with an object, including vehicles - collision with a person (the victim is moving)
49	Other group 40 type Contacts - Modes of Injury not listed above
50	Contact with sharp, pointed, rough, coarse Material Agent - Not specified
51	Contact with sharp Material Agent (knife, blade etc.)
52	Contact with pointed Material Agent (nail, sharp tool etc.)
53	Contact with hard or rough Material Agent
59	Other group 50 type Contacts - Modes of Injury not listed above
60	Trapped, crushed, etc. - Not specified
61	Trapped, crushed - in
62	Trapped, crushed - under
63	Trapped, crushed - between
64	Limb, hand or finger torn or cut off
69	Other group 60 type Contacts - Modes of Injury not listed above
70	Physical or mental stress - Not specified
71	Physical stress - on the musculoskeletal system
72	Physical stress - due to radiation, noise, light or pressure
73	Mental stress or shock
79	Other group 70 type Contacts - Modes of Injury not listed above

Material agent

Code	Label
00.00	No material agent or no information
00.01	No material agent
00.02	No information
00.99	Other known group 00 situation not listed above
01.00	Buildings, structures, surfaces - at ground level (indoor or outdoor, fixed or mobile, temporary or not) - not specified
01.01	Building components, structural components - doors, walls, partitions etc. and intentional obstacles (windows, etc.)
01.02	Surfaces at ground level - ground and floors (indoor or outdoor, farmland, sports fields, slippery floors, cluttered floors, plank with nails in)
01.03	Surfaces at ground level - floating
01.99	Other known buildings, structures and surfaces, - at same level, in group 01 but not listed above
02.00	Buildings, structures, surfaces - above ground level (indoor or outdoor) - not specified
02.01	Parts of building, above ground level - fixed (roofs, terraces, doors and windows, stairs, quays)
02.02	Structures, surfaces, above ground level - fixed (including gangways, fixed ladders, pylons)
02.03	Structures, surfaces, above ground level - mobile (including scaffolding, mobile ladders, cradles, elevating platforms)
02.04	Structures, surfaces, above ground level - temporary (including temporary scaffolding, harnesses, swings)
02.05	Structures, surfaces, above ground level - floating (including drilling platforms, scaffolding on barges)
02.99	Other known buildings, structures, surfaces - above ground level, in group 02 but not listed above
03.00	Buildings, structures, surfaces - below ground level (indoor or outdoor) - not specified
03.01	Excavations, trenches, wells, pits, escarpments, garage pits
03.02	Underground areas, tunnels
03.03	Underwater environments
03.99	Other known buildings, structures, surfaces - below ground level, in group 03 but not listed above
04.00	Systems for the supply and distribution of materials, pipe networks - not specified
04.01	Systems for the supply and distribution of materials, pipe networks - fixed - for gas, air, liquids, solids - including hoppers
04.02	Systems for the supply and distribution of materials, pipe networks - mobile
04.03	Sewers, drains
04.99	Other known systems for the supply and distribution of materials, pipe networks, in group 04 but not listed above
05.00	Motors, systems for energy transmission and storage - not specified
05.01	Motors, power generators (thermal, electric, radiation)
05.02	Systems for energy transmission and storage (mechanical, pneumatic, hydraulic, electric, including batteries and accumulators)
05.99	Other known motors, systems for energy transmission and storage, in group 05 but not listed above

material agents associated to the deviations and contact modes of injuries

last event differing from the norm and leading to the accident

the contact that injured the victim

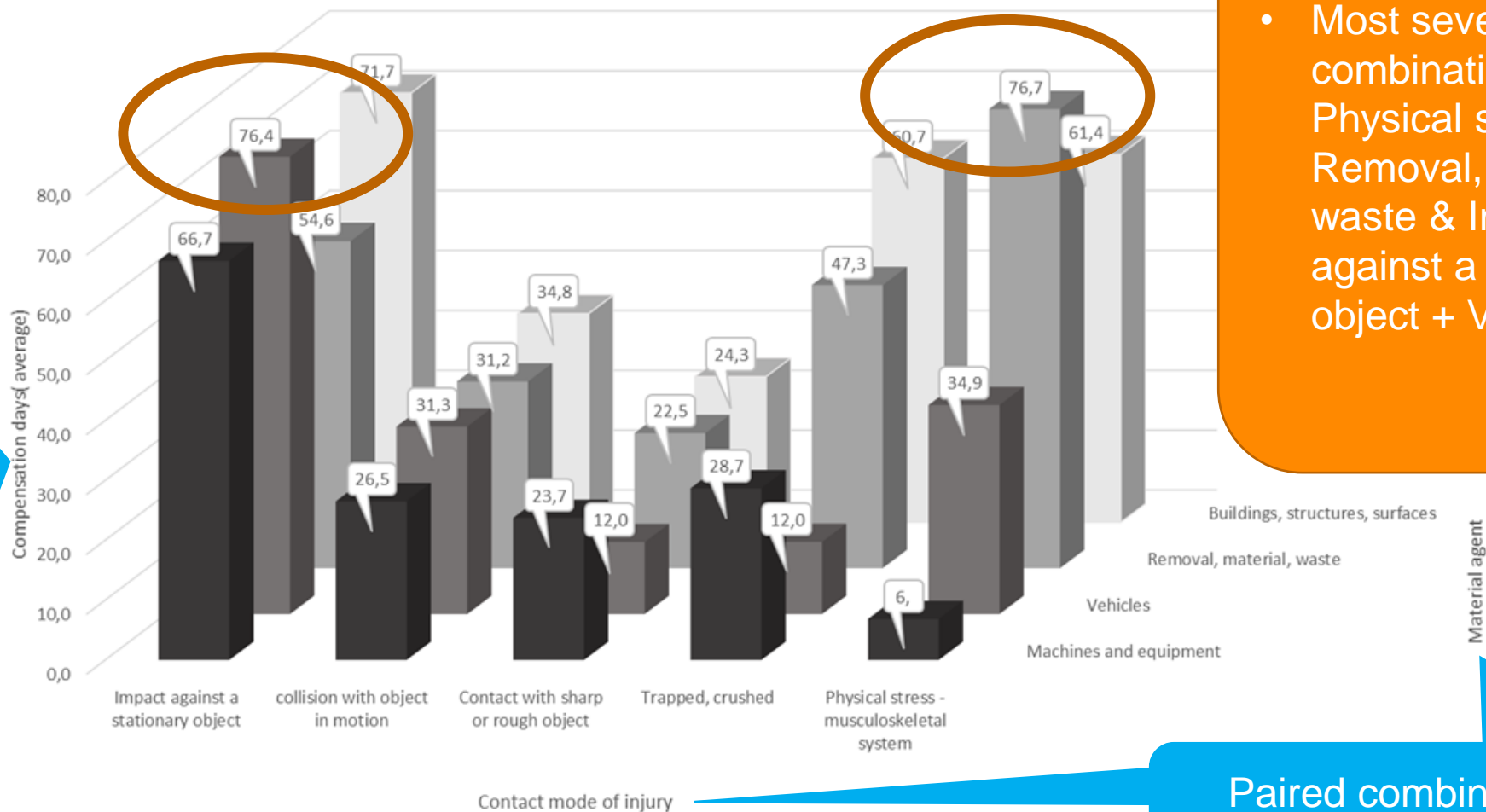
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Findings

As variables:

- compensated days on average,
- the total number of compensated days and
- the invalidity percent



- Altogether 159 305 lost workin days
- Most severe combinations: Physical stress + Removal, material, waste & Impact against a stationary object + Vehicles

Reiman et al. (2019):

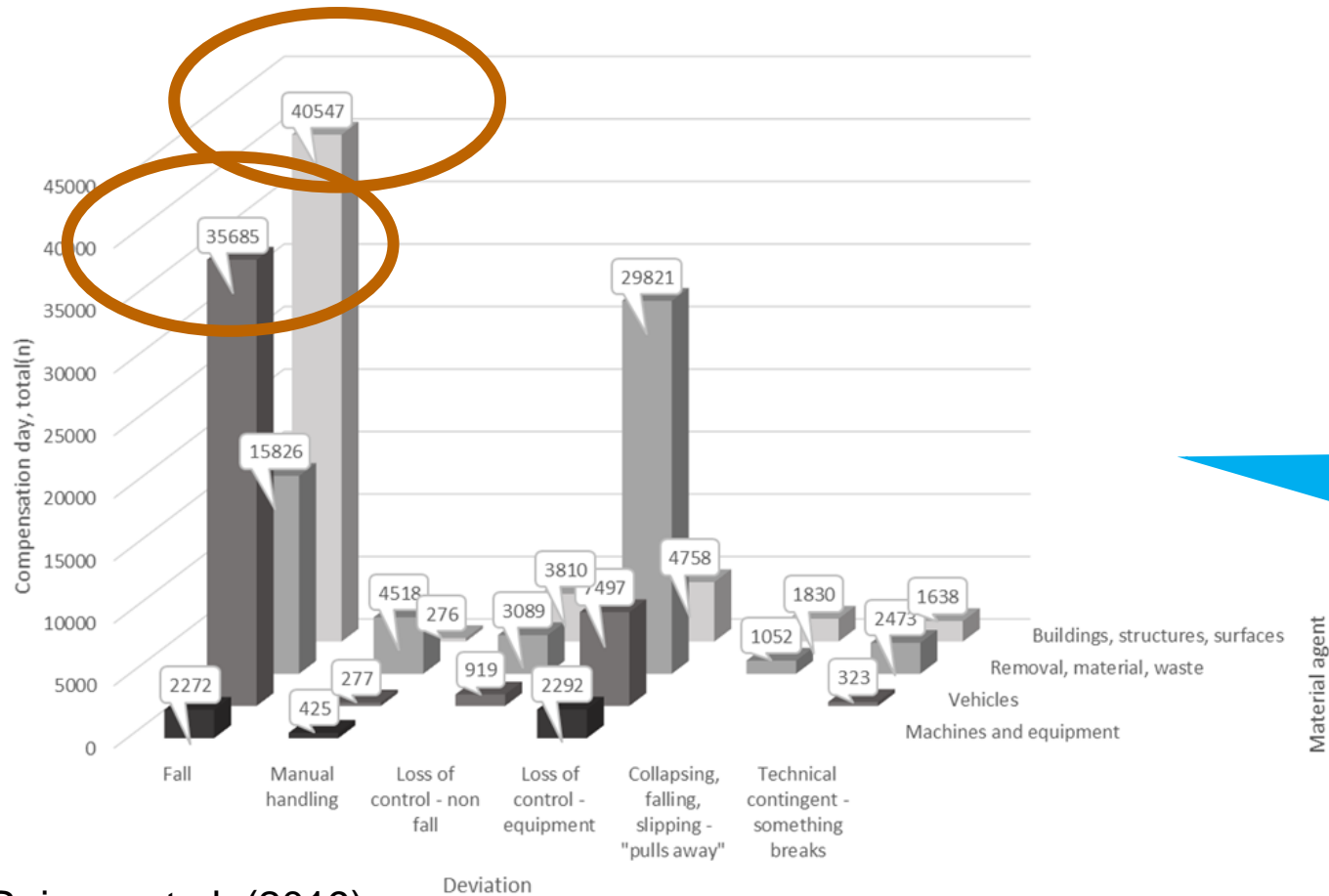
<https://www.julkari.fi/handle/10024/139157>

Paired combinations of
ESAW variables

Figure 1. Compensated days on average against the contact mode of injuries and the material agents.



Findings



Falls were the most significant deviation group and associated to buildings, structures, surfaces and Vehicles

It is easy to produce these kinds of statistics and figures...But the big question is "what do with these and how to interpret them?"

Reiman et al. (2019):

<https://www.julkari.fi/handle/10024/139157>

Figure 2. Compensation days (total) against the deviations and material agents.



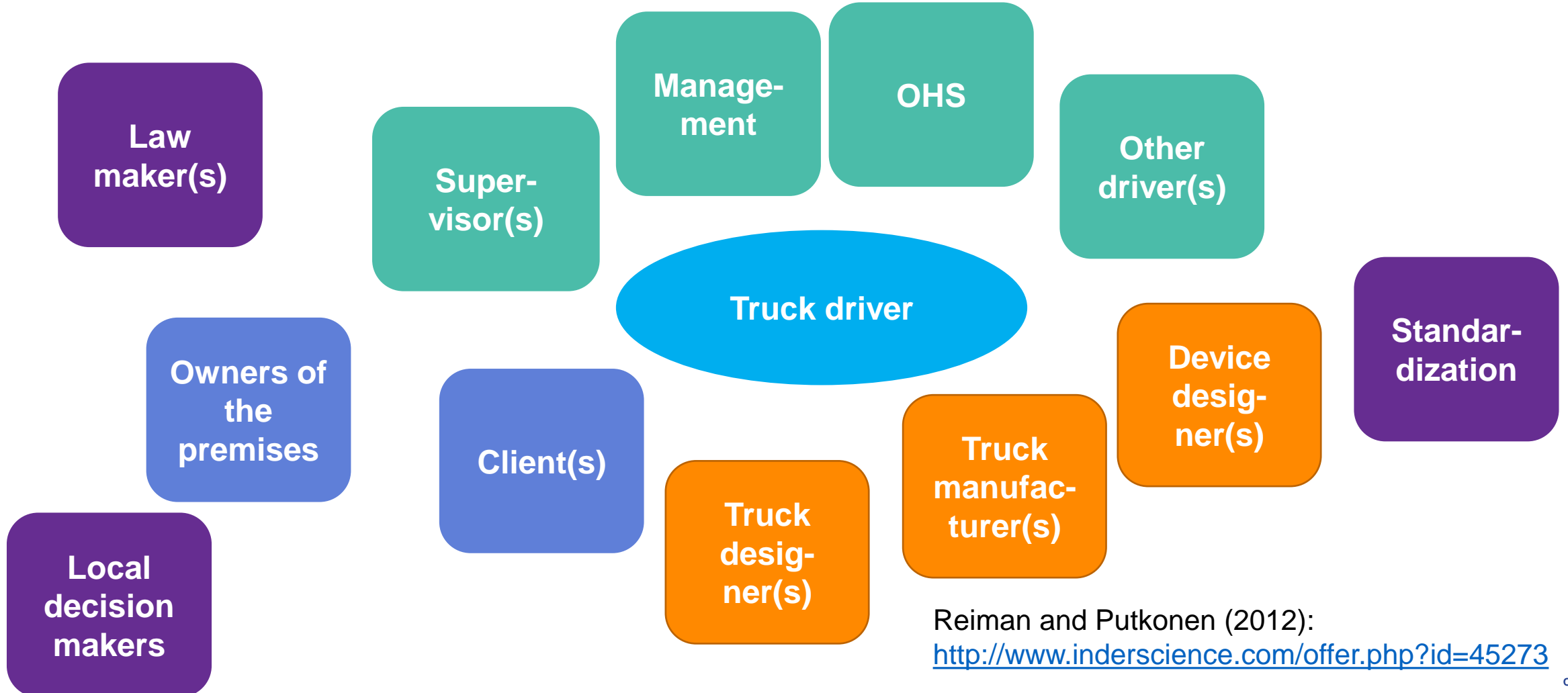
Deepening statistics data – qualitative perspective needed?



- Find out the most significant combinations and focus OSH actions and management on those?

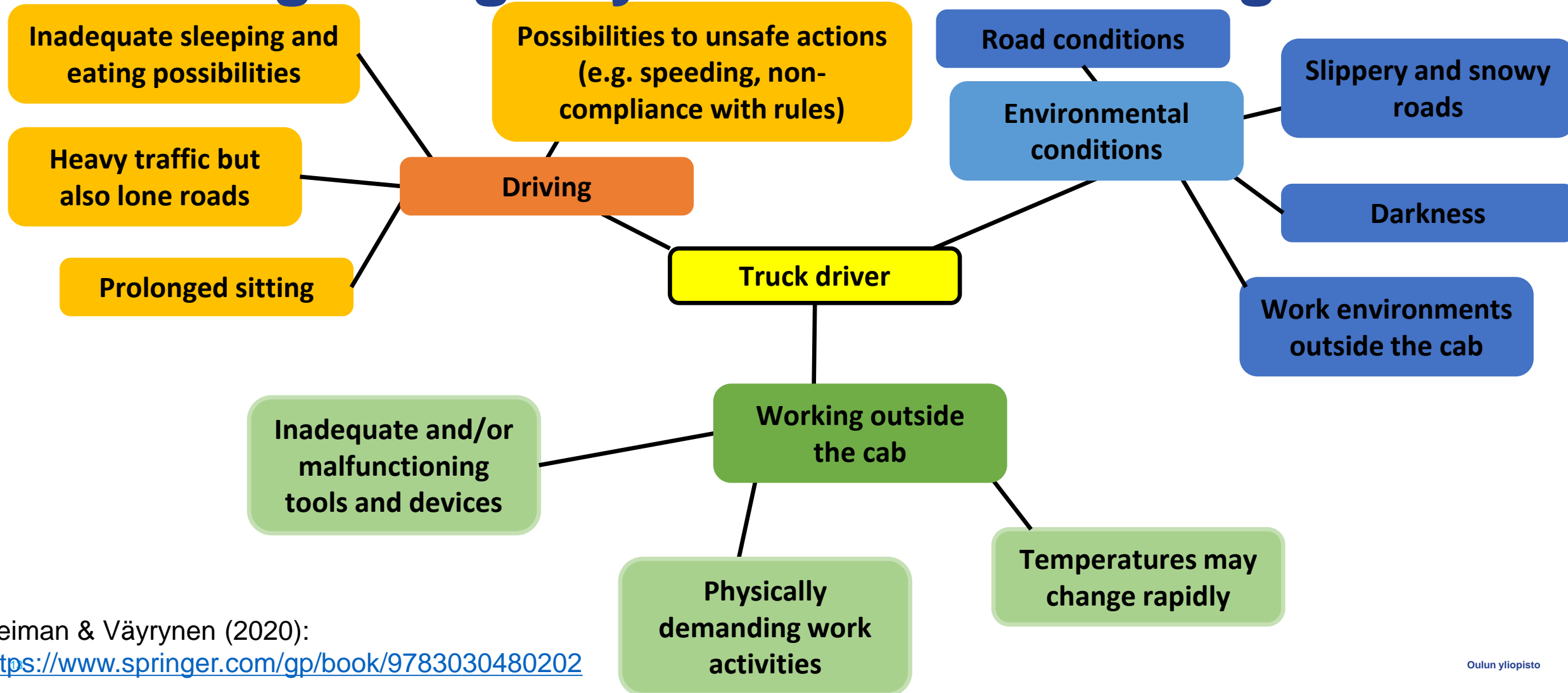


Who is the OHS process owner, and how are other relevant stakeholders heard?





How about the Nordic context – do they bring along any additional challenges?





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Thank you and have a nice
autumn!



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