University of Southampton

Courses for horses: why and when to use human factors methods in investigations

Professor Mark Young

RAIB Railway Accident Investigation Seminar
19 November 2025

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ERGONOMICS

The art of making B.R. jobs safer, efficient and more comfortable

Mr. Paul Branton, the British Railways ergonomist, demonstrating a sitting posture with his 'tame' model, Eusebius.

by Ray Lowther

PROBABLY you will not find the word "ergonomics" in your dictionary. But it is beginning to creep into if not everyday, certainly occasional use; and it is likely to crop up more regularly in the future.

What has it got to do with transport? To find out the answer to that question I went through the door marked "Chief Medical Officer" on Platform 1 at Marylebone Station and along to the end of the corridor on the first floor where in an unpretentious office, I found Mr. Paul Branton, British Rail's ergonomics expert.

Degree

Mr. Branton is not only an expert, he's an enthusiast, a fact which was quite evident even before he announced that he could talk for hours about the subject.

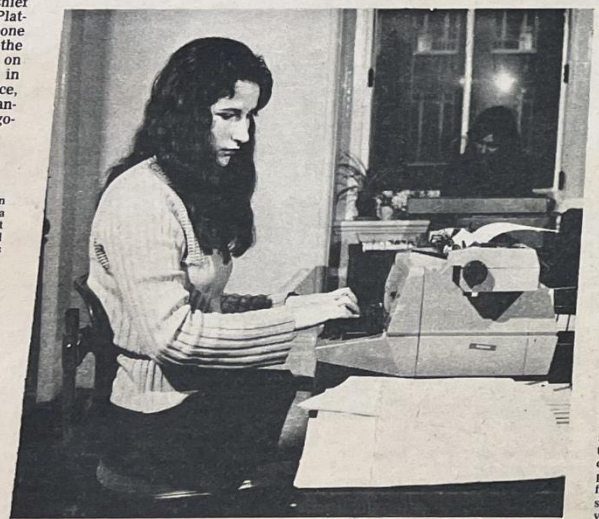
An Austrian refugee from the Nazis, he served in the Royal Navy in the second world war. On demobilisation, he worked for a while in industry and then got a degree in experimental psychology at Reading University.

His first connection with the Railways was as a consultant to assist in the evaluation of the XP 64 train — a special train which contained all the latest design concepts of passenger amenities and comfort and which toured the country for several years in the late 60's to obtain passenger reaction before British Rail embarked on its present fleet of new coaches.

Subsequently he was employed by the Medical Research Council on problems of industrial psychology, particularly in connection with shift working and with accidents in factories.

His appointment to the staff of the Railways Board is a recent one — and his section, including himself, can be numbered on one hand.

Mr. Branton speaks six languages and one of the first things he did in the interview was to assure me that it was not possible to sum up ergonomics in one sentence. The word itself was dreamed up by a friend and former colleague of his. It came from two Greek words — ergon, meaning effort, and nomos, meaning the law. Mr. Branton explained "So ergonomics is about the laws of effort. The effort does not consist only of heavy physical work but also mental work. We study people's behaviour and capabilities and the limitations of their capabilities — in relation to things that are used or made."



Seventeen year old Lynda Fletcher, a member of the T.S.S.A. British Transport No. 1 branch, demonstrating the ideal position for effortless typing. Lynda works in one of the B.R.B's headquarters typing pools.

He said that the ergonomics specialist was interested in individuals, not as individuals alone but how they represented the generality of people. "If someone moves a lever or sits in a certain position, we want to know how often this occurs in the normal run of situations and people. It might be because we have got to design something or arrange an organisation or train somebody. It is bad enough to do it for one person but we have to do it for a whole range of persons. People vary mentally and physically and so we are linked with the medical side as well as with the engineers and designers."

Dealing direct with the application to transport, Mr. Branton stated there were three areas where "we get in" — safety and efficiency of operations at work; passenger amenities; and personnel training, selection and organisation of staff, "although we do not do this ourselves but merely provide the information upon which judgements may be made."

Evidence

●Mr. Branton was anxious that his science should not be misunderstood — "Perhaps some of your readers will think we are 'head shrinkers' and have people on the couch. But this is not so. Neither are we high priests performing obscure rights. We do, however, try to collect factual evidence before we make any recommendations. For instance, I have been going around on the footplate to find out what the driver does. We can't get inside the person; we don't want to. We find out about him and his skills by questions and observations. Then we try to design the cab equipment to fit his needs."

Ergonomics has its own jargon. Work places are known as work stations. These stations are basic to the skilful performance of his job. Mr. Branton emphasised that when he said: "We are very interested in all aspects of them. For instance, the immediate surroundings of the person where he or she is in direct contact with a seat, table, desk or piece of equipment or machinery.

"Two things about this are important. One is the dimensions and the other is the facility or ease with which the person can perform the operation.

Critical

"The relationship of a sitting person's hands to the seat and the floor is critical when, say, a typewriter is being operated. The upper arm should be hanging down loosely, freely, vertically; and the lower arm and the hand should be at 90 degrees or more. Then you get the greatest accuracy, greatest speed and least fatigue."

He went on to say that many people tried to take up positions which were most suitable to them to carry out their work but that in the process they either misused the equipment or used it differently from the way it was designed. This was not necessarily the user's fault but rather the fault of the designer.

He stressed "The basic thing of ergonomics is making the equipment adaptable to people rather than people having to adapt to equipment. This is true of a driving cab, a booking office—or a kitchen."

Mr. Branton made it clear that he and his colleagues were usually called in too late and considered that industry in general should have been carrying out studies like this years ago — "Some of them have but there are not enough people about doing this kind of work. In Britain, there are only 500 members of the Ergonomics Research Society. Some aspects of ergonomics are being taught to industrial designers and to a few engineers but it is all still in its early days."

He affirmed that the design of modern office desks and chairs in some Railway offices was "excellent" and said that was because they were specially designed by medical experts from the BR Medical Department.

From what has already been written, it can be seen that the subject overlaps work study and when asked to comment on that Mr. Branton replied "This is so but we are not concerned with determining rates of pay. We just want to make the work more effective and more suited to people's capacities."

Still developing his theme, he said that there was a limit to what people could do; a limit imposed by reading speeds, talking speeds, writing speeds or operating capacity. These varied as between individuals and so a person should be self-disciplined and controlled to choose the most suitable means of communication for the occasion. Perhaps it would be a choice as to whether it should be a letter or a telephone call.

Here, perhaps, the layman might be forgiven for thinking that this is a matter of commonsense anyway. But Mr. Branton was adamant that ergonomics could help — "I am concerned with people. How they can make themselves effective and how we can help them to be effective. We want people to have greater control over themselves and their environment." He intimated that this was an aspect to which greater attention might be given in the training of staff. His job would be to research and provide the management with evidence on how that kind of communication could be improved.

Skill

The ergonomist regards everyone as having specific skills — "Skill is anything which is done in the first instance slowly and deliberately and later becomes virtually automatic. At the most simple level this applies to walking and standing, whereas a very highly complex skill is that of a musician who sits and plays a piece without any score in front of him knowing the timing, strength of stroke and how to fit in with an orchestra. Within that range we are trying to make the people with these skills more effective."

●To anyone talking to an ergonomist without having undertaken any prior study of the subject, there could arise a conflict of credibility. Mr. Branton gave the assurance that the science could equally as well be applied to the porter who has to lift, hump and put down parcels as to the most senior manager—"Each one has his skills and each one is capable of improvement. How to do this is a matter for study and observation."

Having said that he then introduced a new note—"Any skill depends on motivation. That is whether or not the person derives some satisfaction from its exercise. This is difficult with some jobs because they are routine. Motivation goes right through the whole spectrum of work. It makes or mars a performance." Asked what he could do about that, Mr. Branton could give no magic formula — "Well, I don't know but I am sure that something can be done."

Beginning

Mr. Branton works very closely with the Chief Medical Officer, the Systems & Operations Department, the Research Department and the Industrial Design Department. His briefs come either from these departments or are self-generated. He stressed that they were very much at the beginning in all this and that no-one should expect a revolution. It would take a long time and a great deal of money to renew or replace present equipment. Almost any suggestion he made for a modification on say, a locomotive, would have to be done on all others of the same type. That would run into many thousands of pounds and take at least five years to become practical reality. "But if a start is not made now things never will be changed."

He claims that no-one has anything to fear from a visit by him. To quote his own words "It is very likely that I could help to bring about general improvements at the work place. So far in my contact with staff I have been amazed at the enormous interest and even sometimes enthusiasm with which they have co-operated. I hope we can keep it that way."

At least two other railway administrations have a similar group at work — the Japanese railways, who have about 80 doctors doing the same thing as Mr. Branton and his colleagues; and the Dutch railways. Mr. Branton's team cooperates very closely with the Dutch on research.

He is very proud of the fact that at the Railway Medical Congress in Madrid last year he and the Chief Medical Officer were able to show that British Rail was in the forefront of European railways in this field.

One aspect which he studies is where people are working in limitations and one of his contacts for this is the American Space Agency (NASA)—"They work at the extremes of human capacities and they tell us what man can do or can't do and where the man is better than the machine."

Could it be that sometime Mr. Branton's work will lead to staff cuts? Questioned on that, he answered: "At this stage I could not possibly tell. Our main aim is to ensure and increase to the maximum possible the safety and efficiency of the Railways."

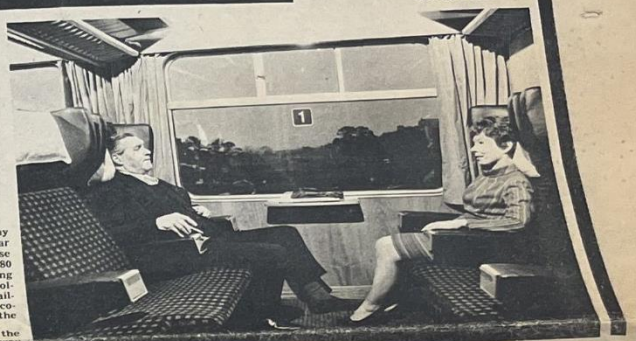
Most people know little about ergonomics and when I asked five members of the T.S.S.A. Executive Committee for their comments, they freely admitted to having only a superficial understanding of the subject.

Reactions

They were shown Mr. Branton's remarks and then they gave their reactions.

Mr. Don Thompson (44) is a full load manager at Southampton and has worked for British Rail since 1942. He said: "If this is going to help with accident prevention and assist in easing the labour in a person's job, then it must be to the benefit of the staff. But if it results in just an O. & M. study of a person instead of his job, there will be very little interest shown by the staff. It won't alleviate the monotony of some jobs."

An initial examiner, **Mr. Roger Robinson** (57) has been at the York Carriage & Wagon Works since he left school 42 years ago. He stated: "My first impression as I began reading Mr. Branton's remarks was that ergonomics had something to do with work study. I then found that it had but that it had nothing to do with rates of pay.



Passenger comfort in one of British Rail's Mark IIB coaches.

Study

"Anything that is going to help in the design of something and make it more easy to use or result in some good advice to the person using it, should be encouraged. I would like to think, however, that when it gets down to the lower level of Management, they will give it full study and not just treat it as something to be 'tolerated'."

Mr. Robinson added: "If Mr. Branton is going to make any studies, then the staff must first of all be taken into consultation and told what it is all about. The Management have obviously not set up this organisation for nothing and we should know about it as a staff."

Mr. Idris Foulkes (53) is shift manager at Margam Yard and has 33 years' railway experience behind him. He commented: "My reaction largely centres around the remark that the aim is to ensure the maximum safety and efficiency of the Railways. It does not say how this will be done in respect of the safety aspect. All the staff should be aware of the hazards on the Railways but new machinery or new implements could change the functions of a person's job. New equipment could entail a new job or a different type of job."

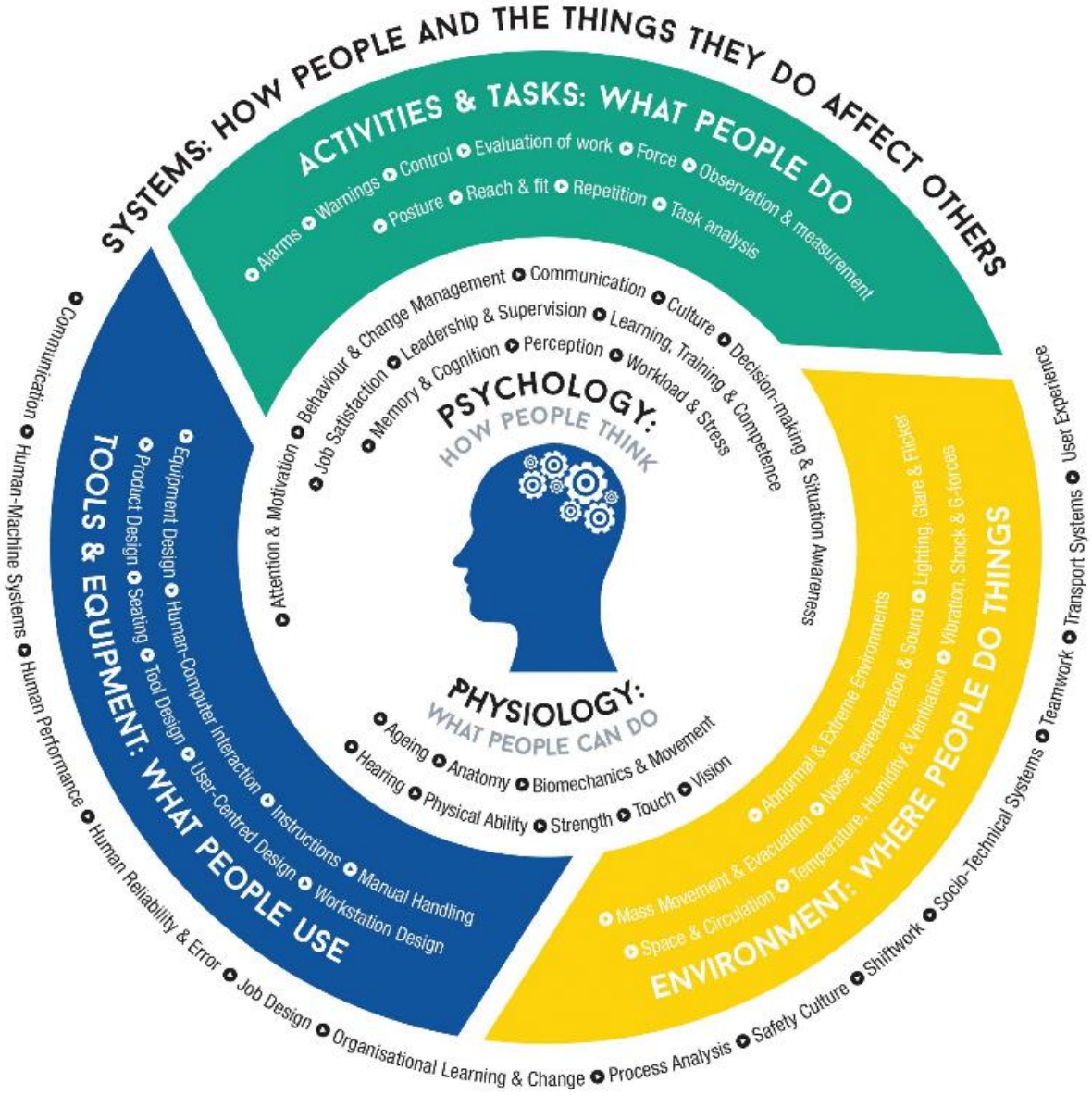
Mr. Foulkes went on: "The best way to do a job is the easiest way: if you can walk three steps instead of four, that is efficiency and it is less fatiguing. I am not against giving this a run out."

The chief staff clerk to the Area Manager at Middlesbrough is **Mr. Tom Moorhouse** (50). He has been with British Rail 20 years. His reaction was, "Ergonomics was a word I had heard but had no idea of what it meant. I still have no positive idea of what it is now. But turning to the main aim of the expert, it is a most laudable one and has my support. I was most interested to read the reference to motivation and consider that in this connection it is most important. I think that all levels of Management could do much more in their lines of communication but I am also most concerned to learn that the so-called expert does not know what he can do about motivation."

More

Continuing, Mr. Moorhouse said: "It appears to me that a great deal more research is necessary into the overall subject before a hard and fast opinion can be given as to its value to the industry. At the same time, I welcome anything that can improve the lot of the worker, even if this is only in making his job less boring."

And finally, **Mr. Stan Wood** (47), a clerical officer in the Divisional Manager's Office at Cardiff with 31 years' railway service. He declared: "I feel that the staff would want to know more about the subject before they took part in a study but that they would not be opposed to anything which would assist them to do their job more effectively. There must be a lot of British Rail equipment which could be improved, to the benefit of the Board and the user."



Source: CIEHF

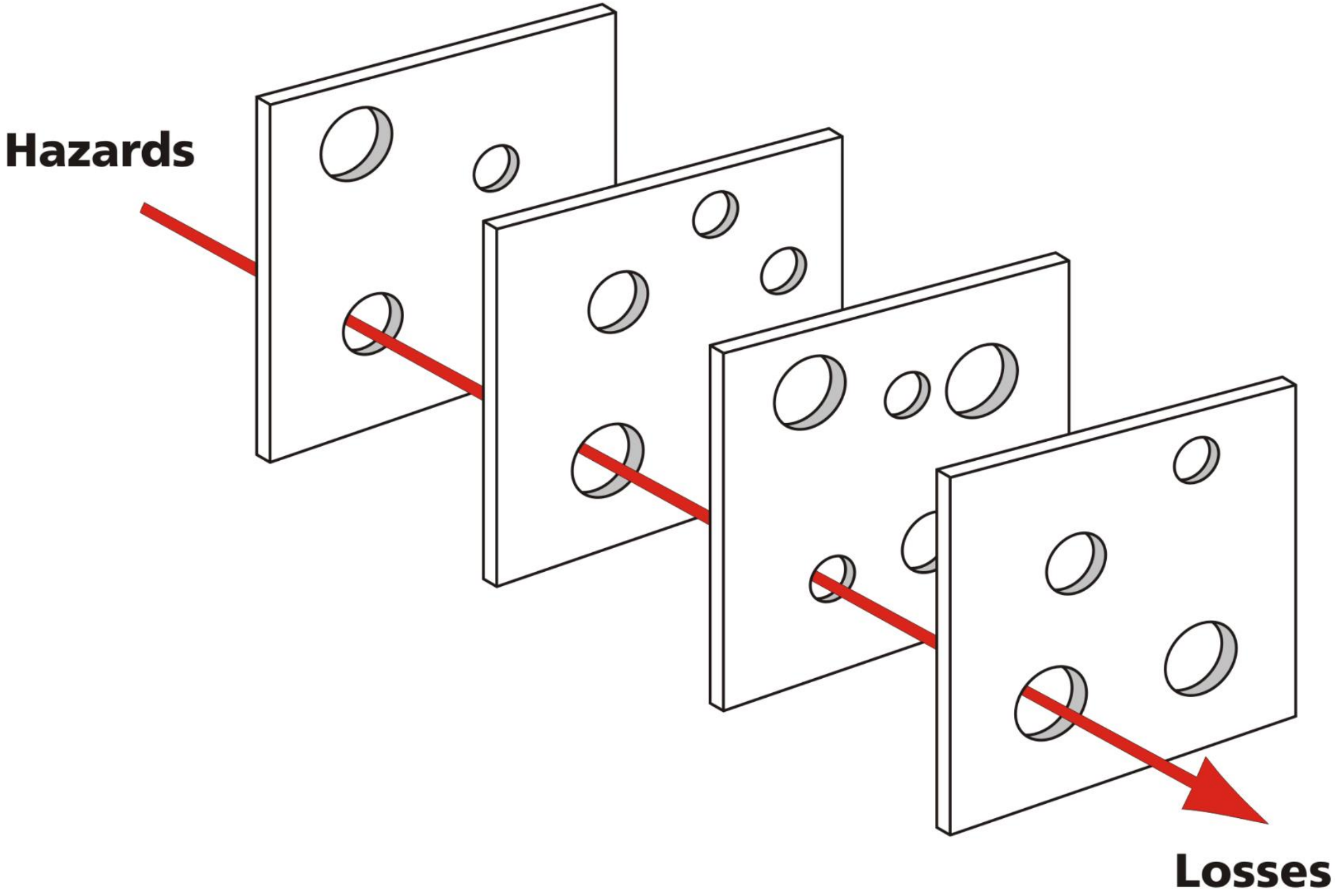
Human error to blame for train crash - Greek PM

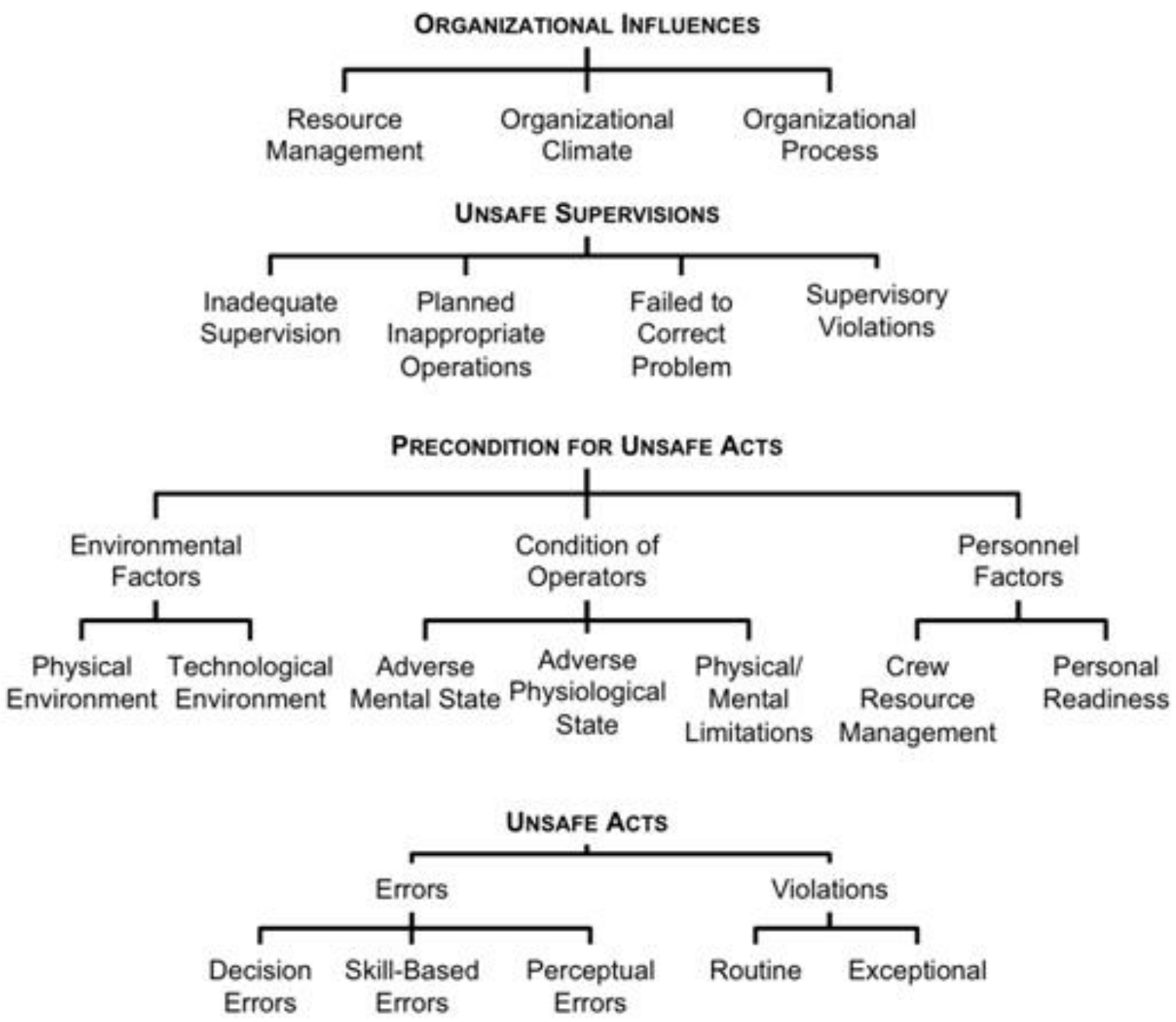
By George Wright
BBC News

1 March 2023

It smells like burning metal and plastic - BBC reporter sends video from scene of fatal crash

One of Greece's worst-ever rail disasters, which claimed at least 43 lives, was due to "tragic human error", the country's prime minister has said.


Hazards
Losses



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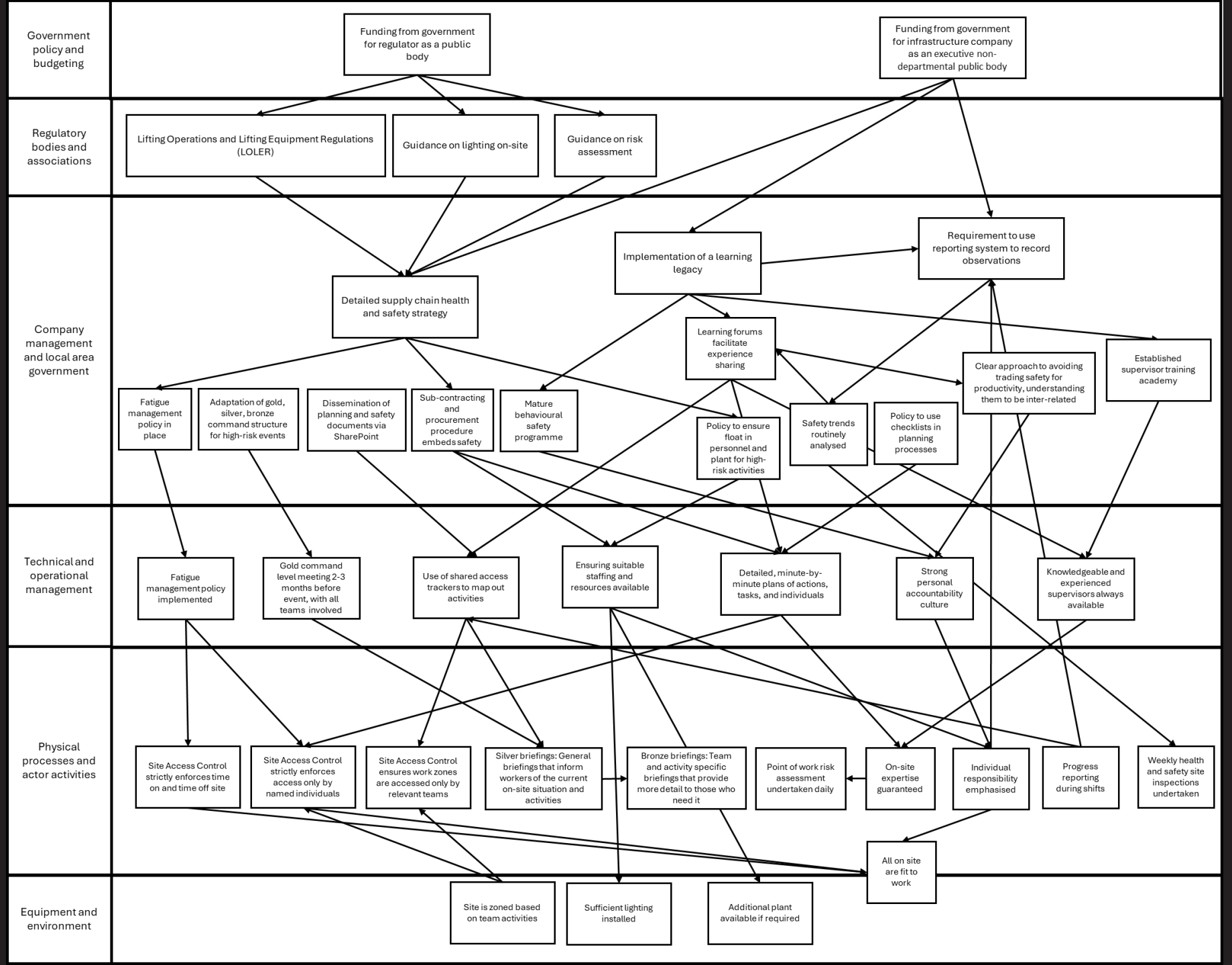
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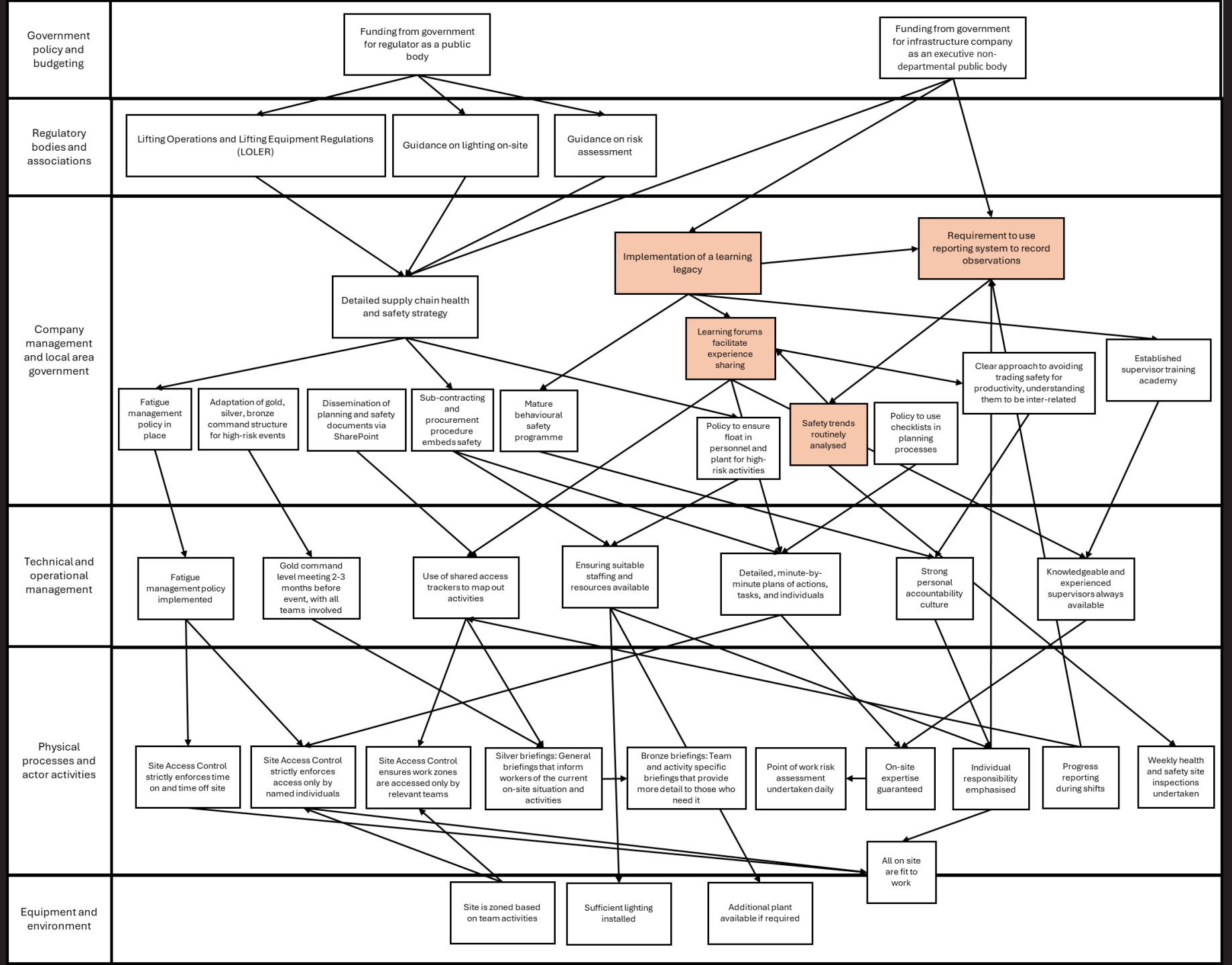
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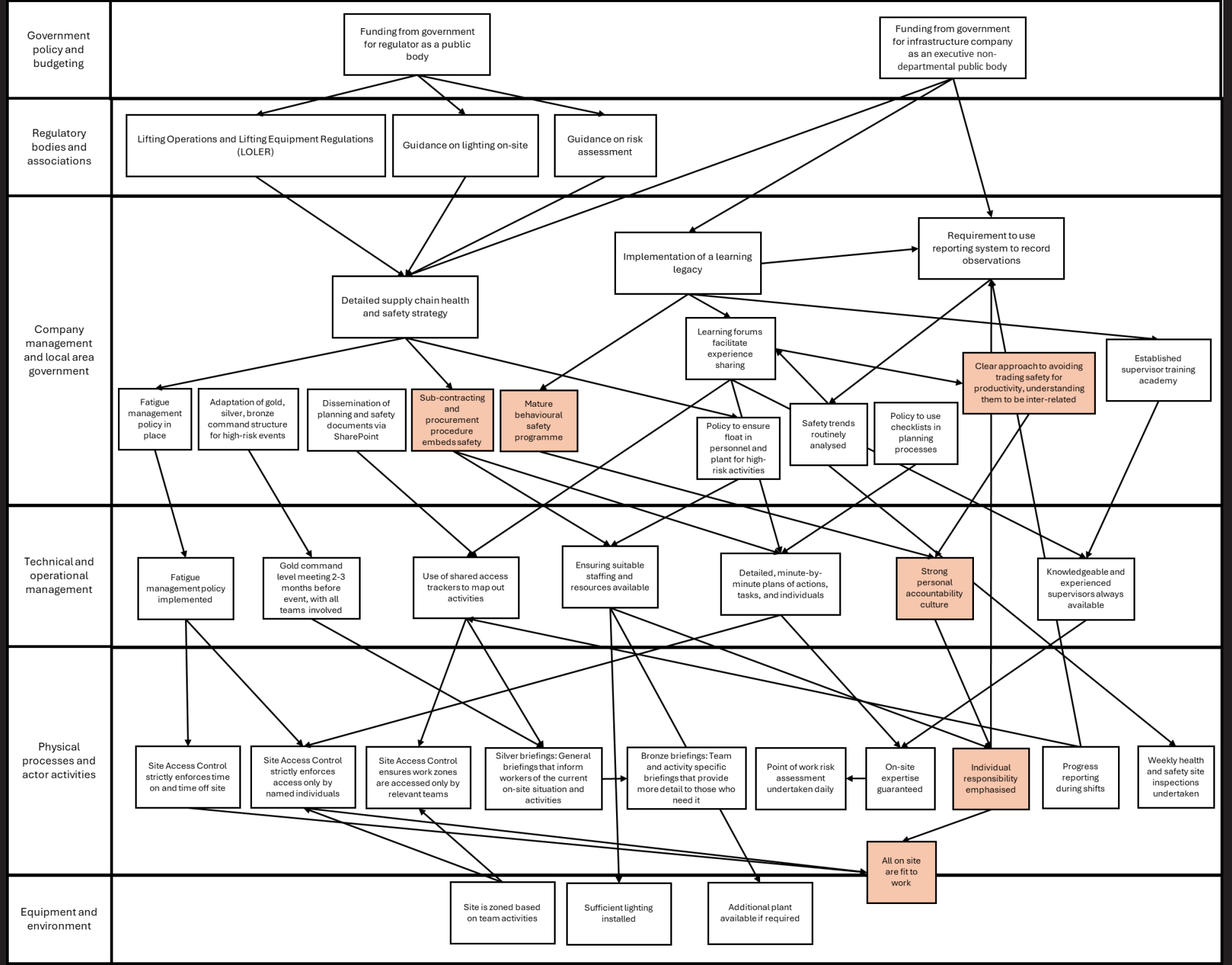
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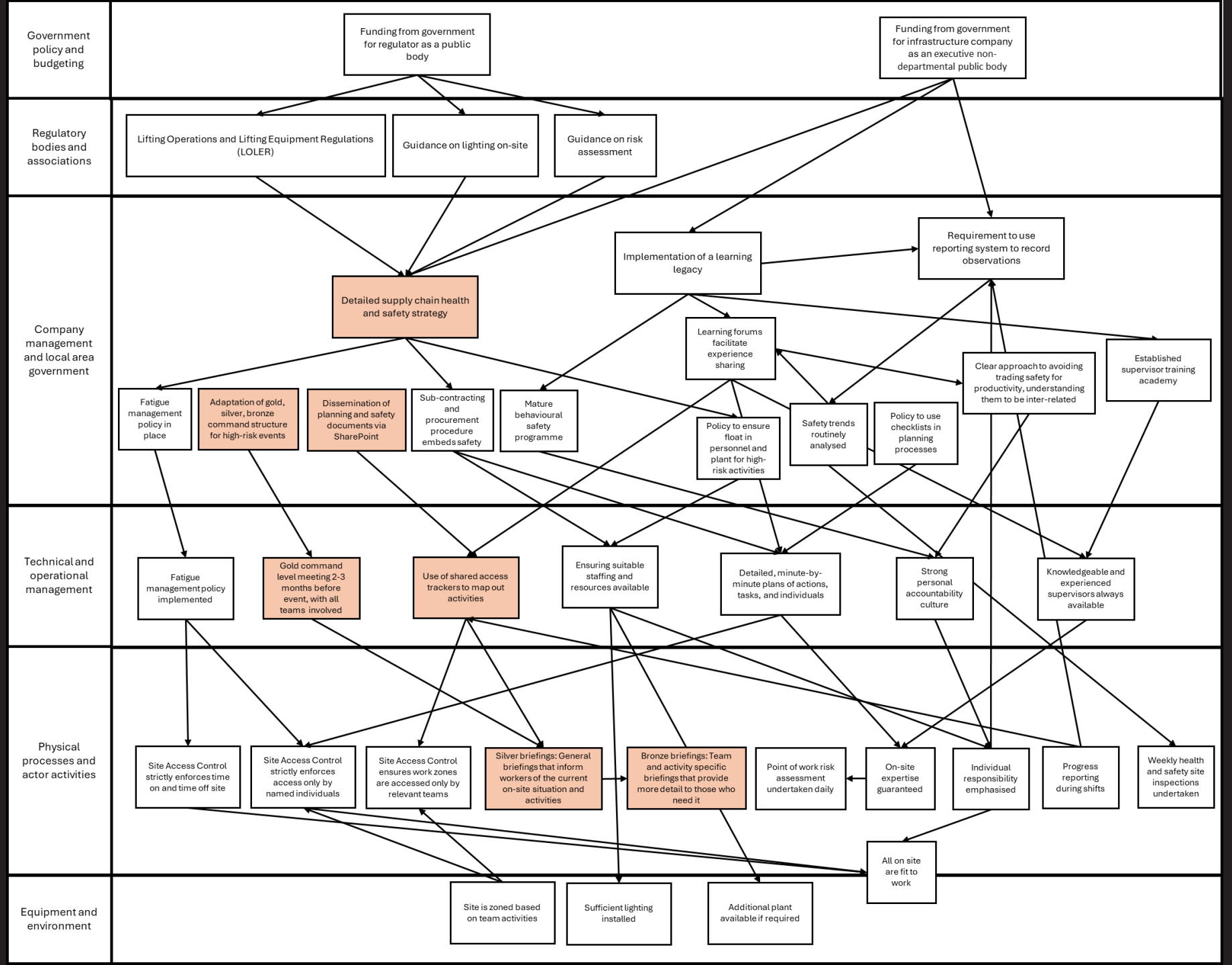
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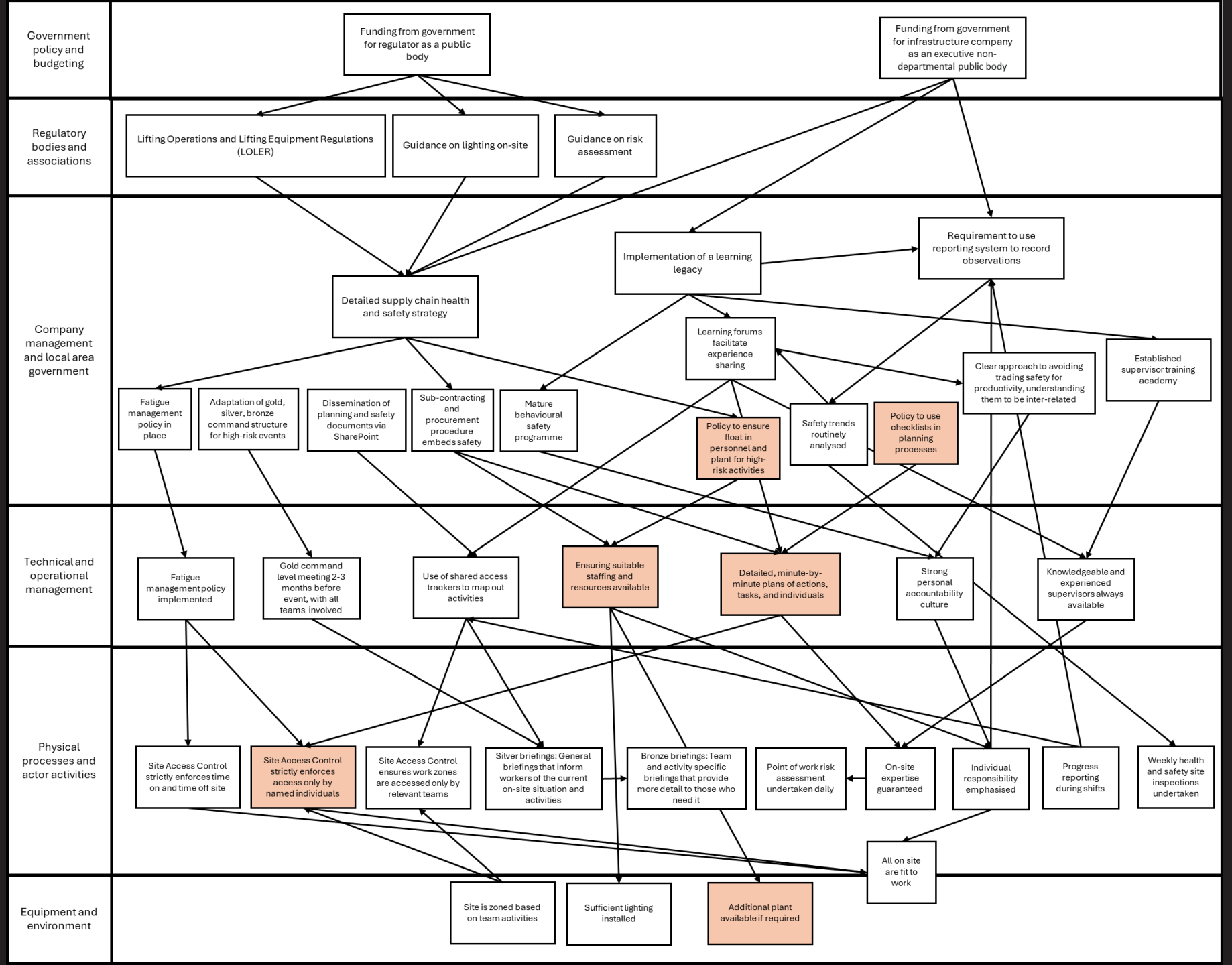
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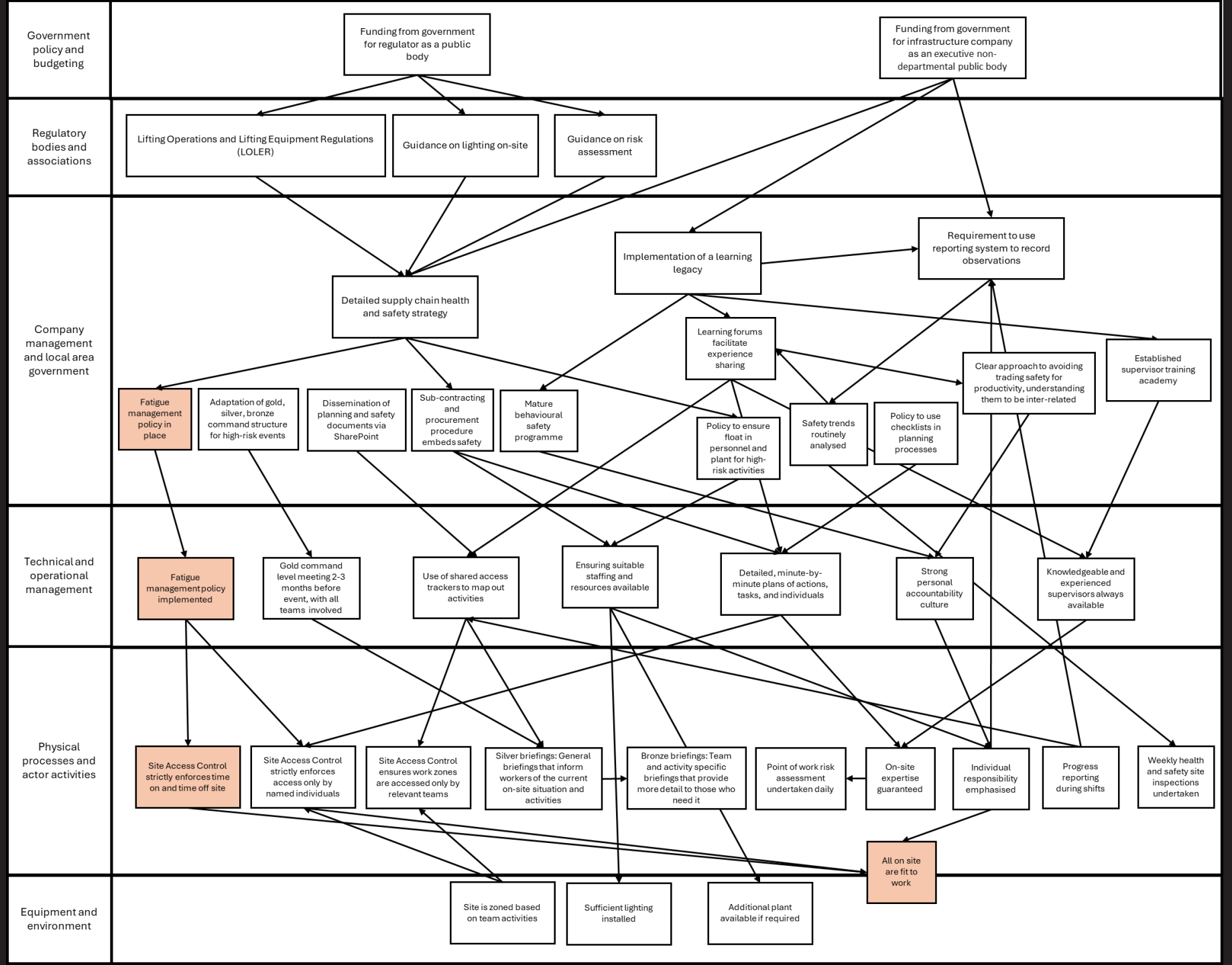
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University of Southampton

Courses for horses: why and when to use human factors methods in investigations

Professor Mark Young

m.s.young@soton.ac.uk