A look at things (impartially, of course) from a rigging point of view . . .

> "Even assuming this estimate was reliable, the practice was a bit dodgy (to use the technical term) since the chain motor that replaced the chandelier was likely to be able to lift 1000kg rather than the 500kg or so the hanging point was normally used to support."

The law requires equipment used for lifting to be strong enough and stable enough for the foreseeable forces likely to be imposed on it. This includes the attachment to the supporting structures. The information on strength (lifting capacity) should be available to a user in an understandable form. This means you have to know how the load will be applied, and where to look for the information you need. It also means you have to know what load you want to apply at a given point, not always easy, but I'll assume you have an idea of what you want to hang.

If you can't find the necessary load information, you have two choices; either take the decision based on your experience and judgement or don't hang the load at all.

Typically, the view seems to be that the decision has been taken already - "I have to hang the lights there". Do you? Naturally, you are trying to do your job. That is where the lights need to be. Is the need for ideal lighting angles more important than risking a structural failure potentially during an event? In our industry such collapses are comparatively rare, but when it happens it may be catastrophic.

If all goes well, you're everyone's best mate, the most conscientious rigger in the world. Should something collapse, you'll find no-one else thought you should have hung it there either. While you (the 'competent person') are happy to take that decision, the rest of the production will be happy. That's your call, being the rigger. The pressures you feel are that the rest of the production are relying on you. You are understandably concerned about the risk to your reputation and future employability, and potentially your liberty, if it all goes pear-shaped (I'm trying to use the correct terminology).

Your options are to rig or not to rig? If it's patently obvious that the load is but a fraction of the capacity of the structure you are contemplating rigging from, you would probably continue. If it isn't that obvious, you need to discover what the allowable load is, or use an alternative method of support.

The traditional alternative to overhead rigging is a ground-supported structure. How often has a touring production been prevented from hanging the show and opted for ground support? Has the same consideration been given to the floor as to the overhead structure? The perception, even by the venue, that the floor will be a 'safer' option may be flawed (geddit?) - even if it is a concrete slab. Loads need to be considered.

Four point loads on a suspended floor could be far more onerous that optimizing the capacity of overhead structures.

Spreading temporary loads is generally easier to achieve from above than below. Very often the available positions for towers or supports are limited because of sightlines, seating or access requirements. This may result in concentrations of load over quite small areas - typically less than a metre square, often approaching half that.

Floor-loading in public buildings is often 5kN/m^2 or 500kg/m^2. Stages often have a higher figure of 7.5kN/m^2, but often a ground support won't be used on a stage. Consequently, a standard ground support tower could significantly overload the floor area it occupies, even before considering any other floor loads in the vicinity (audience occupancy, access and traffic routes to stored equipment, for example).

With regard to suspension, think of the number of hotels that provide rigging points in their conference suites. The information (if available or considered) on the capacity of their rigging points is often given as a point load or load per orthogonal metre. You have that information to use in calculating the quantity of equipment you can safely hang, taking into account such things as the dynamic load created by using motors which may significantly increase load values. Is the information supplied with a dynamic load in mind? Not often.

What if the allowable load is woefully inadequate for the proposed lighting design? Very often the allowable load is exceeded by a large factor. In this case, were there an accident, the employer (typically the production manager or producer) may be held responsible for allowing the work to take place. The rigger or rigging company will usually be engaged by the production manager or producer. Smaller venues seldom appoint a 'house' rigging contractor, presumably on the grounds of cost, but such an arrangement could resolve many of these issues. Applied loads are pre-notified and the contractor has intimate knowledge of the venue and the ways loads can be applied.

Ballroom facilities have often used chandelier hanging points for the rigging points for trusses for events. These very often had no loading information - the only data available was a pessimistic estimate of the weight of the chandelier. Even assuming this estimate was reliable, the practice was a bit dodgy (to use the technical term) since the chain motor that replaced the chandelier was likely to be able to lift 1000kg rather than the 500kg or so the hanging point was normally used to support. Moreover, a typical hoist lifting speed of 4m per minute creates an initial 'surge' load roughly equal to 125% of the load being lifted.

Many more recently built 'conference' venues have a system of hanging points or channels to provide low profile, maximum headroom rigging for lighting. These usually negate the use of trusses and chain motors; the load is well spread by using multiple supports and lightweight components. This allows a reasonable payload - lots of lights - to be rigged: the trade-off is the ball-ache (another technical term) of having to rig every luminaire individually at height from access equipment, not to rig at ground level and push a button.

The other problem with channel systems is that they are often 'invisibly' supported. I have seen chain motors rigged to single eyebolts in a channel and the motors 'towing' at a sharp angle, twisting the channel significantly. Not a safe method: it would have been designed for static vertical loads and will be rated accordingly. SWL values need to be qualified or the rigger needs to check.

Interestingly, the Work at Height Regs would push architects and designers towards systems that allow as much work as possible to be done at ground level. More recently designed facilities often provide a reasonably rated eyebolt every 6m or so, which means lighting can be rigged at ground level on trusses. Of course, the eyebolts are often no more than 4m from the floor, but you can't have everything. Architects, please note.

The fact remains that the law requires the person responsible for the rigging ('the employer', which could be the producer or director) to ensure that the rigging load is known, the allowable load on the structure or facility is known and the two are checked to be compatible by a competent person. It is incorrect to assume that because the lighting is relatively well spread out and the bar or truss is picked up in, say, four places along its length, the total weight is divided by the number of supports.

Riggers should know that a uniformly loaded bar or truss that is supported by three or four points will need to be checked to ensure the centre point(s) are not more than the specified allowable load. In the case of chain motors, it is quite easy to change loads dramatically by simply 'bumping' the motors up or down, and consequently the actual point loads may be very different from the intended loads. Without using a load-cell to measure each point load, or unless there is a very healthy margin allowed, the loads will almost certainly exceed the allowable load on the suspension point unless the rigger is extremely careful.

Thankfully, the SWL of the rigging point provided should have an allowance for this built in, but the SWL should not be knowingly exceeded. The user is unlikely to know what safety factor was used in the design. A good estimate of the load is something every production should be able to produce; asking for the loading information from the venue is equally straightforward. Since British and European standards typically quote the safety factor to be used when lifting overhead is typically double that used for normal lifting, the rigger should be looking to maintain an 8 or even 10:1 factor in such situations.

As the experts, we should know that getting such information from the venue may well take weeks, and as such, we need to allow as much time as possible to get the information to work with.

Being pressurised at the eleventh hour is not acceptable in such a high risk decision, as a venue, a contractor or as a client.