Infrastructure Planning and Management
Polycentric Governance and Incomplete Design Part 1

Today is the last sort of you know theoretical session where we were going to discuss some ideas, so after this what we were going to do is we were going to take the next couple of classes and look at some case study and essentially sort of look at what could have been done earlier which of these things that we have talked about from you know social network analysis power interest matrices to industrial ecology based thinking design thinking I mean what of all of this could we have possibly used on these cases so we have three cases we have the Delhi Airport, we have the Tiripur water supply and I think the Mysore water supply.

So those are the three cases that we have so all of those three cases will be cases that all of prepare and submit and we will sort of throw a draw of lots figure out who presents and so yeah so next will so what we will do is according to the schedule we are supposed to do daily alone on Wednesday and the Mysore and Tiripur or on Thursday but past experience that some time it is difficult to do classes two cases in a class so we might do one and a half one and a half, so what I had like you guys to do is prepare Delhi and Mysore for Wednesday if we can do Mysore great otherwise we will do Mysore and Tiripur for Thursday.

So that is the plan so everyone prepares Delhi and Mysore on Wednesday we pick one or two luck groups and we then do Mysore if it is not yet done and Tiripur on Thursday and again we pick good alright so today we are going to talk a little about a different sort of idea what sort of incomplete design and polycentric government and all of that again what we will do is we will have the presentations first and then it is cached, so who is presenting today, so both of you are presenting which of you is presenting the incomplete design paper all right so then you come, so you go first and then we will have a discussion and then we will get to the incomplete design.

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So we are going to see understand a strategy capability for megaproject architecture so in this so first of all mega project everything we doing it to produce long lived capital intensive assist the stake are high and thus they are like new for in structure development are one with the inter organizational conflict.

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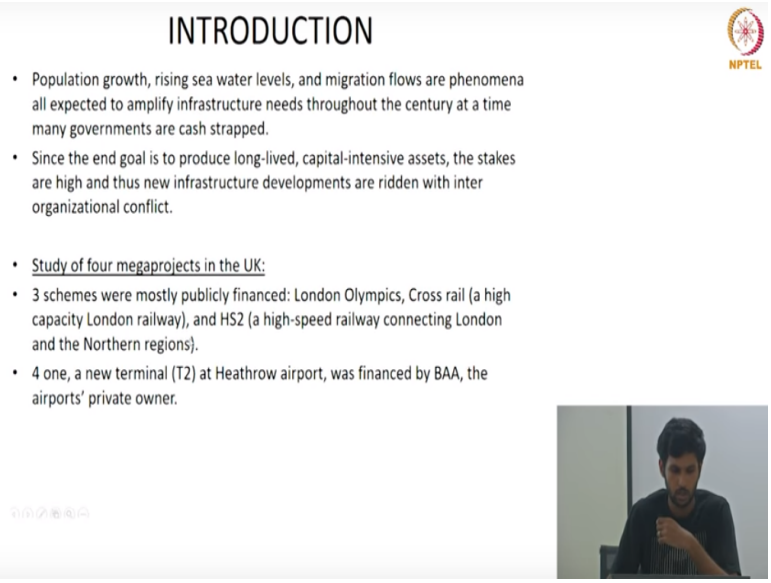

So in this case we are going to see 4 mega project in UK so three schemes are like London Olympics cross rail and the high-speed railway connecting London and north region and the

fourth will be a new terminal at Heathrow airport which was like financed by BAA the airports privates owner.

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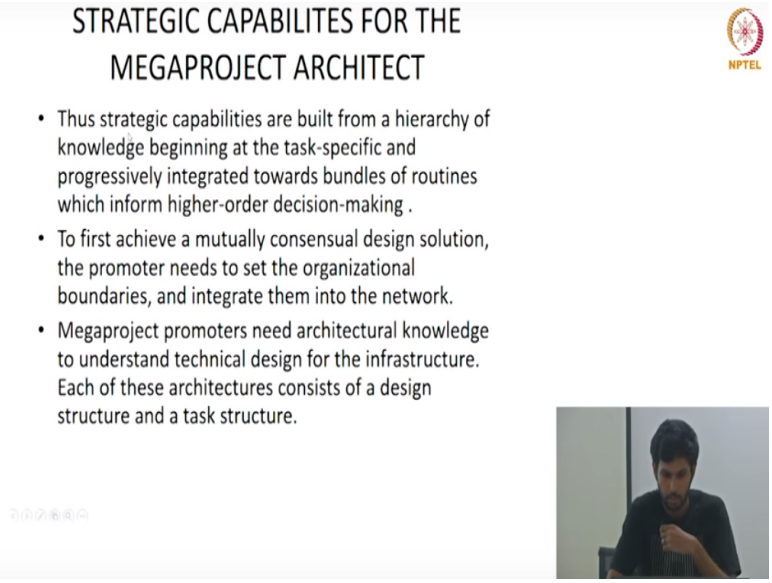

So strategic capability for the megaproject architecture though that is the strategic capabilities are built from a hierarchy of knowledge beginning at the task-specific and progress have integrated toward bundle for routine which inform higher order decision making to achieve a mutually consensual design solution the promoter needs to set the organizational boundaries and integrate them into the network remember megaproject promoters need architecture knowledge to understand technical design for the infrastructure each of this architecture consist of a design structure and a task structure.

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So the task structure of the mega project promoter is a one set of the new infrastructure development a mega project promised two phases main tasks grow the organization network to attract much needed resources and development a technical design for the new infrastructure mega project promoter treads a precarious path on the one hand development choices terms of technical issues and cost and schedule forecasts must be kept flexible enough to accommodate differing preference on the other hand those choices must be robust enough to attain and maintain firm commitments from the first actors to join the networks.

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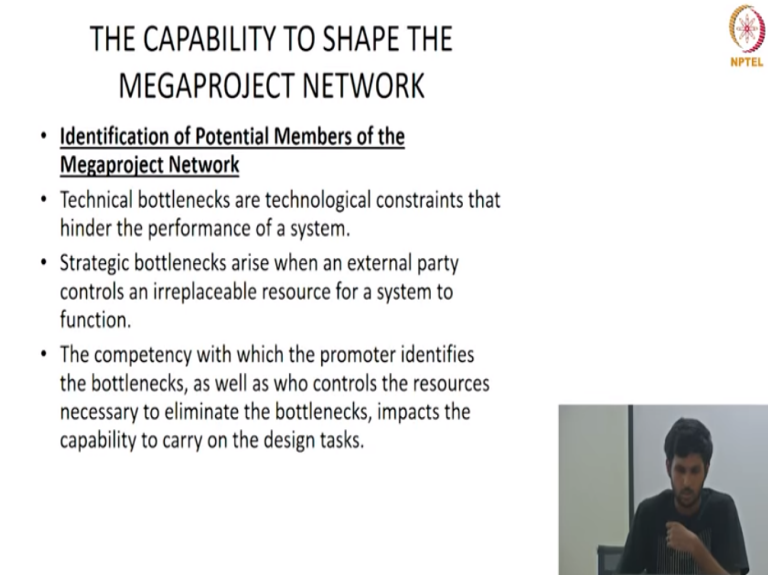

So the capability to shape the mega projects the identification potential members of the megaproject network technical bottlenecks or technical constraints that hinder the performance of a system so strategic bottlenecks arise when external party controls an irreplaceable resource for system to function a competency with which the prompter identifies the bottlenecks as well as who controls the resources necessary to eliminate the bottleneck impact the capability to carry on the design tasks.

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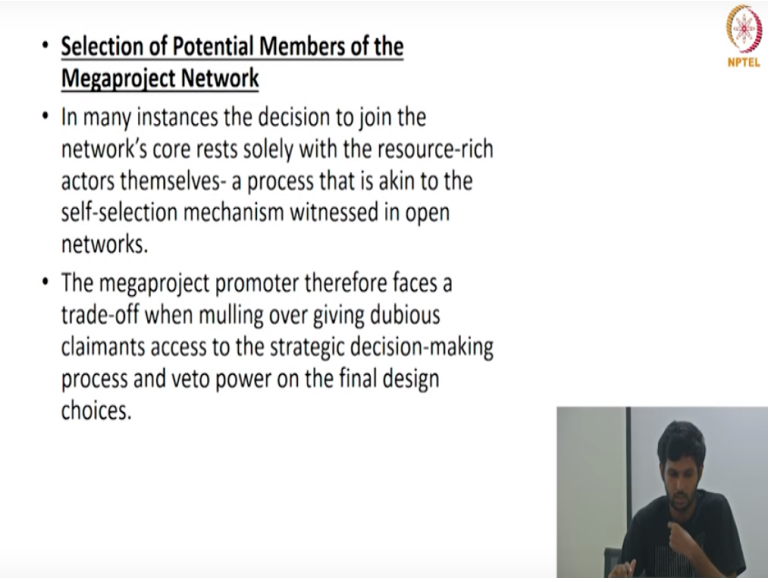

Selection of the potential member of the mega project in many instance the decision is to join the networks core rests solely with the resource rich actors themselves a process that is skin to the self-selection mechanism witnessed in open network the megaproject promoter therefore faces a trade of mulling over dubious claimants access to the strategic decision making process and veto power on the final design choices.

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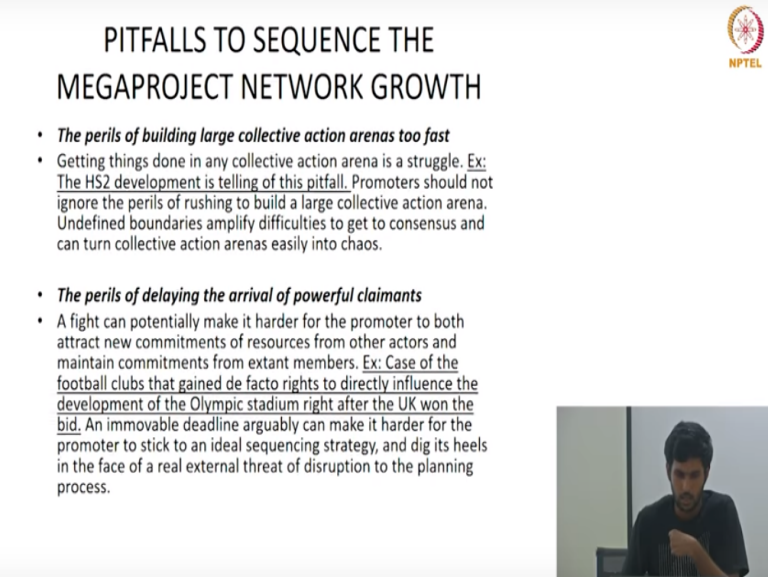

The pitfalls to sequence the megaproject network growth the perils of the building large collective action arenas too fast example is the HS2 developed is telling of this pitfall then the perils of delaying arrival of powerful claimants the case the football club that gained de facto rights to directly influence the development of the Olympic stadium right after the UK won the bid.

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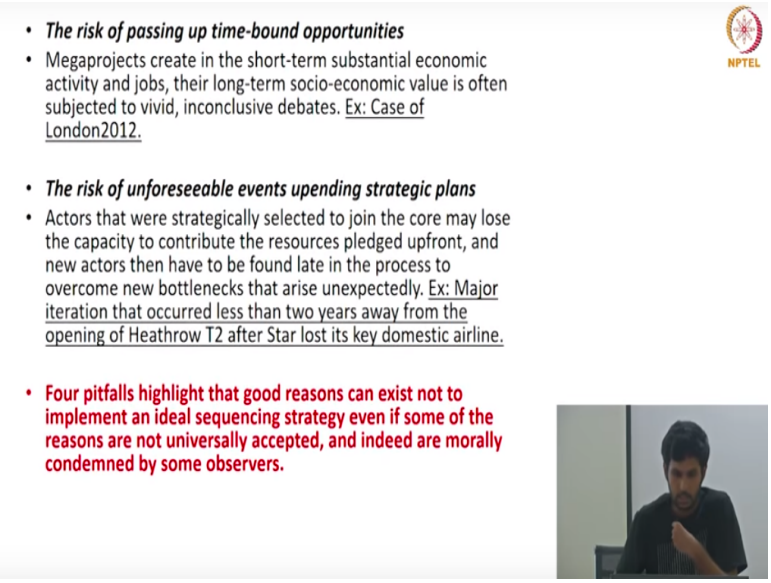

Then is the risk of passing up time bound opportunity so that is the example if the to like case of London 2012 the case of unenforceable events up ending strategic plans, so that is the major

iteration that occurred less than two years away from the opening of Heathrow T2 after star lost it is key domestic airline the four pitfalls highlights the good reasons can exist not to implement an idea sequencing strategy even if some of the reason are not universal accepted and indeed are morally condemned by some observers.

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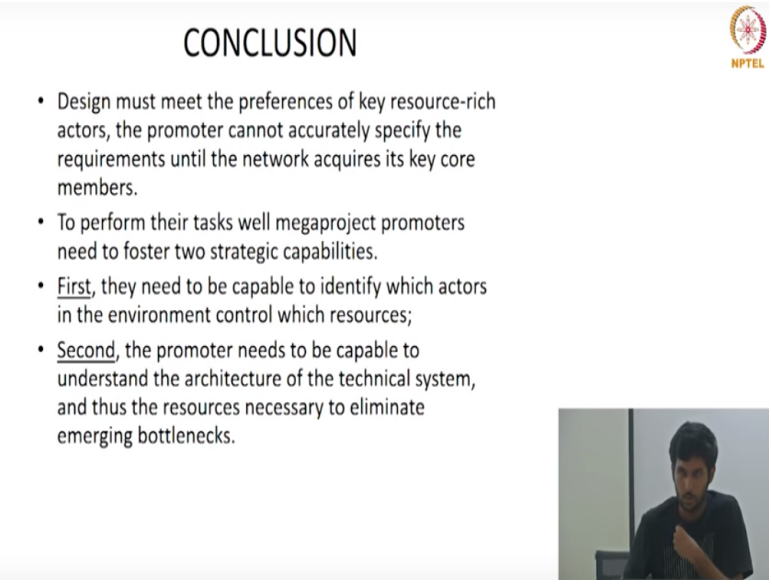

So conclusion of this is like design must be made the preference of the key resource which actors the promoters cannot accurately specify the requirements until the network activates it is key with core members to perform their tasks well megaproject promoters need to foster two strategic capabilities first they need to be capable to identify which actors in the environment control which resources second the promoter needs to be capable to understand the architecture of the technical system and thus the resources necessary to eliminate emerging bottleneck.

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Next is the sustaining highly fragile constants oriented development so in this the capital infill development of megaproject underperform have fuel to use one is the promoters underestimate cost and there schedule target because of strategic misrepresentation lack of planning and again they may not be planned because a promoters are hostage to scope creep escalation of commitment this research adopts a multiple case study approach with embedded units of analysis this research consist of same four megaproject which we saw on the last things this chapter will organized as follows the first we will be reviewing on the literature on the conscious oriented development then introduce to the methods and the analysis and the chapter conclude with a discussion that puts the sustainable highly-fragile consensus oriented developments.

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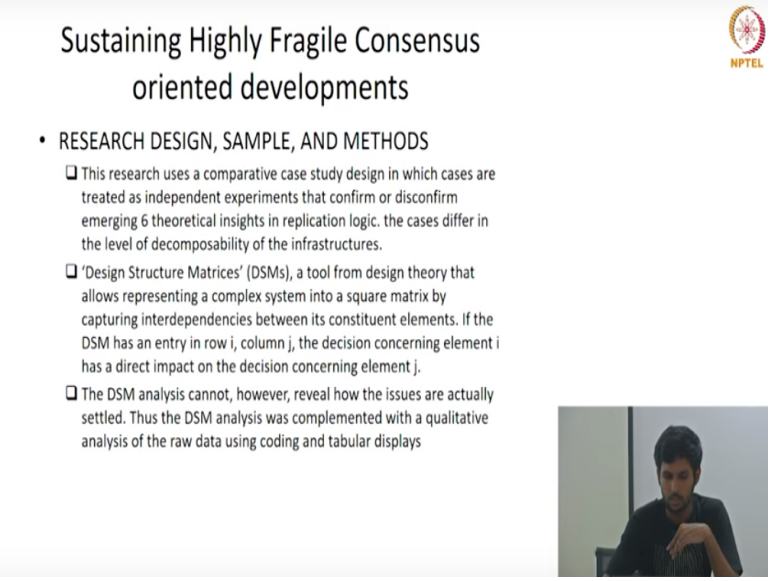

So if you come to the research design sample and methods research uses a complicated case design in which cases are treated as intimate experiment that confirm ones or discussions emerging six theoretical insights in the relational logic cases differ in the level of decomposition of the infrastructure, so if you see decomposability of the infrastructure in the sense for example if you take a London Olympic park it like it will be like different types of thing there will be a football stadium there will be assuming pull everything which the designs will not be interlinked but for that thing it will all be like it will be interdependent.

But for example if you take the railway station or something or everywhere the design of thing will be the same the same rail like the same train is going to pass through all the station, so it will be like somewhat interlinked but if you take the case of airport and kind of thing it will be like hyperlink hyper interdependent how in the sentence like if a runway and the tunnel of the people to get out will be it will depend upon the design of that both but it will not be depending upon the parking and the hotel which is which are outside next is like the design structure matrix a tool from the design.

Theory that allow representing a complex system into a square matrix by capturing in interdependence between this constituent element if the DSM has an entry in row I column J the decision concerning element I has a direct impact on the decision concerning element Jif you take the DSM analysis cannot however reveal how the issues are actually settled thus the DSM

analysis was complemented with a qualitative analysis of the raw data using coding and tabular displays.

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So if we come to the analyst part the polycentric structure governing panel projects polycentricity is an intuitive approach to structure large collective action arenas that decentralizes governance across a nested structure of centers of decision making and power and shared rules in case of the Olympic park the high level decision for one venue are independent of those decision for another venue thus the Olympic park is sparsely populated off the component clusters then comes the relaxing performance target the aquatic center is a good example the budget was set at 70 million pound in there 2004 prices a figure insufficient to deliver an iconic venue one year in planning the budget had duplicated and it keep on delay and that later by 2008 it came to like 242million pound.

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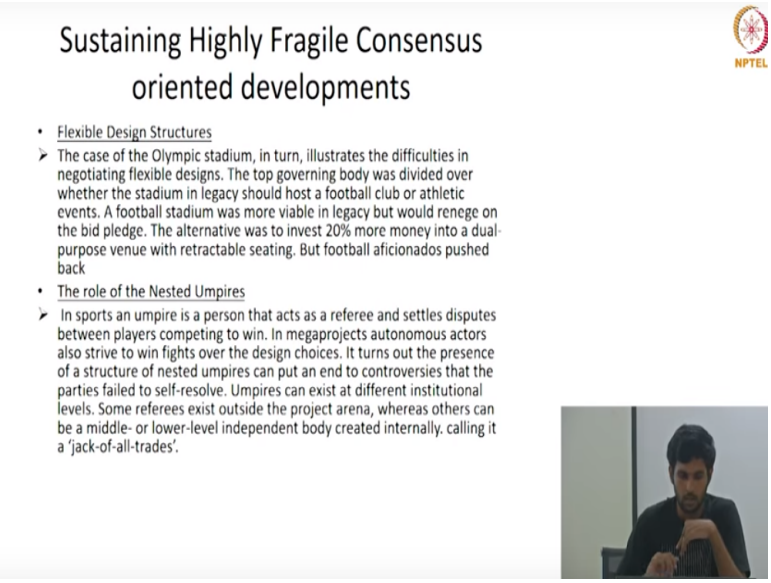

Then is a fixable design structure then the case of like London one big stadium like first they have a debate on whether they need to build only football or like athletics events kind of the ground and then the football stadium was more viable legacy but there was an alternative route in like just to invest 20 percent more into the ground and have dual purpose venue but football in this is just supposed to push it back and just they build the football stadium the role of the nested umpires in sports an umpire is a person that acts as a referee and settles dispute between players competing to win in megaproject autonomous actors also strive to win fights over the design choices it turns out the presence of a structure of nested umpires can put an end to controversies that the parties failed to self-resolve umpires can exist at different institutional levels some referees exist outside the project arena whereas other can be a middle-or lower level outside the project arena whereas other can be a middle-or lower level independent body created internally calling it a jack of all trades.

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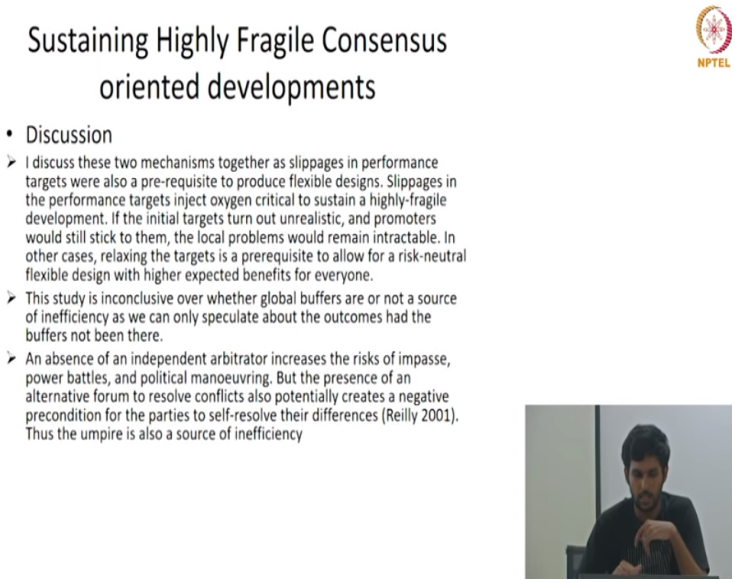

Like in this like I would like to discuss about two mechanism together as slippages in performance targets were also pre-requisite to produce flexible design slippage is in the target inject oxygen critical to sustain a highly-fragile development if the initial targets turn out unrealistic and promoters would still stick to them the local problem would remain intractable in other cases relaxing the targets is a pre-requisite to allow for a risk-neutral flexible design with higher expected benefits for everyone this study is inconclusive over whether global buffers are or not a source of inefficient as we can only speculate about the outcomes had the buffers not been there.

As an absence of an independent arbitrator increase the risk of impasse power battles and the political manoeuvring but the presence of an alternative forum to resolve conflict also potential creates a negative precondition for the parties to self-resolve their difference thus the umpire is also a source of inefficiency, so I think a lot of information is been presented but I think a few threads need to be tied together on what all of this means and where all of these nested umpires and flexible design and all of that comes in so here we go.

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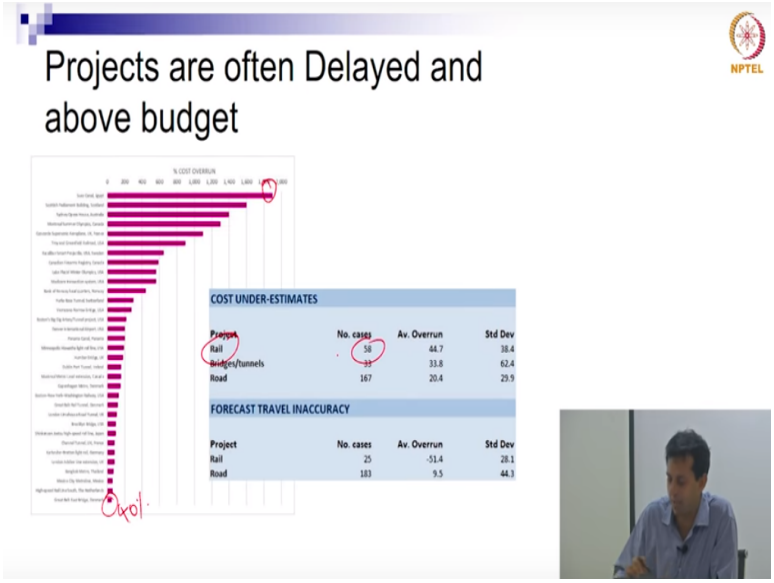

So let me sort of provide also little bit of context to what we are trying to discuss so the first thing to sort of understand is that we have been talking a lot about stakeholder all but if you forget external stakeholders and all of that and we just look at the project performance in terms of time and cost there are enough statistic that show that project are heavily delayed most projects are heavily delayed particularly these mega projects many of them are above budget so this is you know there are many you know papers like this but you can see that certain project like the Suez canal was about thousand eight hundred percent or 18 times delayed down to project that are only about 20 percent well or a zero to 200 scale that is probably about 40 percent delayed.

But when you look at the value of these projects that is actually a very large number so you have lot delays and you have all of these you know people have written papers who sort of said look in about number of 58 cases in rail project the average cost over runs are 4 percent with a standard deviation of 38 percent and, so 44 percent on a rain projects., rain projects are several thousands of crores or whatever currency you change them in, so there is a lot of data that shows that these projects are mega project tend to be heavily delayed have a lot of cost overruns, so that is the starting point now the question is what causes these delay and starting points, so these delays and cost overruns.

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So as one person's guys in the picture here his name is Brent flymburg he is a professor at Oxford university in the UK and he has some reasons, so he says first he talks about something called optimism bias right so he says fundamentally whenever human being undertake a task we tend to be optimistic about how long it will take to complete it is just sort of a psychological condition even if you are presented with data saying that you know let us say it is possible to do an assignment in three hours but the data shows us that on average it takes people five to six hours to so this assignments but still very often when you start with the gung-ho optimism of course I can do it in three hours possible to do in three hours I can so it in three hours.

So I am smart I am dedicated all these other guys whose took five six they must have been some issue there that maybe that had to take a break whatever but I can do it in three hour, so there is an sort of a psychological condition it is been proven in several sort of test like this give you data on past performance, so it will give a minimum give you an average and people tend to be closer to the minimum, so the question is are we having the same kind of optimism bias and megaprojects as well yes theoretically I can draw a construction schedule that can get this road completed in twelve months or 18 months but practically when I look at road projects they typically tend to take 24 months because there is always a little bit of a problem with supply material does not arrive on time or there is some land acquisition issue some permit issue etcetera.

So there are things that end up delay but very often you know you have promoters that say no-no I am going to put my best sort of man power on this project I am going to really planet I am going to use all of these new age project management tool and therefore I think I completed within 12 months or 18 months so the question is are we and that essentially is an optimism sort of bias so question is, so flying burg says maybe that is one of reasons why project are delayed it is just that we are leaving over optimistic in the prediction, so the you know road a power plant or whatever actually the median time it takes is 30 months but we in our optimism promise 24 months and against that promise of 24 months we are actually being delayed

So because delay is always relative to a benchmark relative to what you promise me to what I am going to mention with regards to it which is what I am going to do to calculate the delay, so what is the optimism bias second one you know he says is also this notion of purposeful deception where he says look it is not that I do not know that it will takes 30 months but I am saying 24 months for a purpose because I want to sort of start you know and get the project done if I told you it was 30 months then maybe you would not want to do this project so if I told you what the real cost and time of the project were then you might sort of have second thought.

But if I you know tell you that it is actually only going to cost you 70 percent of what you think and I could do it in 70 percent of the time then perhaps I can hook you into doing this project at once I hook you doing this project after I start the project midway there is no point abandoning a bridge after you know one span has been built you mean you have to then go ahead complete the bridge, so therefore he talks about it as you know a very purposeful deception where I sort of lead you along and get to a point where you cannot look and no longer go back and therefore the projects gets completed whereas if I had actually told you the true cost of the project and the true time taken by the project you might have said no in the first place.

So he says this is possibly another reason why there are cost and time overruns again he says it is not really a cost and time overrun I knew it would take 30 months or whatever but o told you to take 18 months, so that you would actually say to the project and then it ended up costing 30 months or taking 30 months but because we benchmarked at 18 right I am seeing a cost overrun or a time overrun, so that was that is another sort of reason and the third thing he sort of talks about these you know what calls these sub light right he says people get seduced into building

things that you know so architects for instance like to build monuments to them self so they like pointing at structures and say you know I build this structures

S you can see all of these iconic structures you now frank Gehry builds the Guggenheim Museum in Bilbao or you know some other architect builds something else somewhere, so you have all of these you know the guy who build know the Sydney Opera House is the Danish architect, so people like associate themselves with these iconic structure and therefore we tend to enter into the projects which by necessary take a longer time to complete because they tend to be more complex then we give them credit for, so again we go in saying based on the cubic volume of concrete you know they should take this long but it is not pouring goes it is doing something sort of architectural precinct similarly engineers like building extremely complex you know structures because again that is a testaments to engineering.

So when you say what are the you know as an engineer what can you think about people talk about you know all of these wonderful bridges that span you know large rivers engineering marvels or structures tall structures etcetera, so you try to build things again the level of complexity of these things are high predictability is low and therefore you have time and cost overruns right again people tend to build again large complex projects because you try to explain the reason you are building them is for economic growth, so there is no real economic growth if you build a couple of single story house but if you build large metro rail systems you are giving a lot of employment to people to build that system because of that travel time is reducing for large numbers of people in the economy and so you have these multiplier benefits.

So because of the pursuit of these kind of sublimes he says we enter into particularly complex projects on which it is very difficult to figure out what the time estimates are because we have not really done these kinds of project before and when you couple that with an optimism bias we always end up starting with a low starting point, so normally when you say time overrun when we say I expected you to you finish at 12 and you finished at 15 months or 18 months what we seem to imply is that there was some negligence in your part that 12 the number 12 months that we selected was a fair sort of number and you guys ended up taking 15 or 18 which means you did something wrong.

You did something sort of poor you did not plan properly you did not execute with the level of productivity your people were lazy they were incompetent whatever there is a deficiency on your part but all these explanations sat it is not a deficiency on your part you just picked the wrong number to start with right the number should have been 15 the number should have been 18 you picked 12 this is why if I ask you to estimate the time it would take you to run the 100 meters and we all picked to sign bolds time we had all be delay what you need to do is picked a time that is reasonable for you know each of it is based on whatever parameter.

So the analogy that sort of fly bug is making is it is not that because you ran at 12 second or 15 seconds dos not mean you ran purposefully slowly it is just that you should have been struck to yourself or nine point six seconds or whatever you know the world record is in the first place you should have benchmarked yourself at 12 seconds 13 seconds then if you ran at 15 then you did not perform optimally, so he talks about all of these reason for projects being delayed all right because you chose the wrong benchmark you were highly optimistic you pick project that were too complex you could not find the benchmark you know them you the benchmark.

But you purposefully did not sort of reveal it because felt that if you know for instance if I go and tell an elected government it is going to take you seven years to finish this project who in their right minds to approve it because you know that is in the next election term and you may not really be there to cut the ribbon on the project what is the gain to you whereas if I told you to know we could do it in four years then you are likely to approve it and at the end of the second year if we say pause it is going to take a little bit longer it is going to cost a little bit more you are already spent so much money that you cannot really back up, so these are a set of explanation that bent Gibbs as to why projects are delayed and what is the productivity that I will use is comes down to a decision made by a single person.

So finally when I come up with an estimates somebody is putting in productivity's and that person is likely to be optimistic and because and also they are likely to be aggressive because they want to win the project particularly in a competitively bid scenario people tend to be not only optimistic they also tend to be aggressive because if I am pessimistic about duration and cause and actually put in real costs and real durations I am likely to lose these kinds of bits and there actually studies that are showing that the more you lose the more optimistic and aggressive

you actually pick up, so if I compete multiple time on various bids and I keep losing then I start becoming more and more aggressive

So what you see at an individual level holds perfectly true at an organizational level as well and there is enough research you can read fly bugs works elsewhere to show that this is true so as far as I can tell what I have told you formally is you know the twelve months or whatever very difficult for you to established that I knew that it was 18 months or 24 months ahead of time but I did not purposefully say it at that time in order to deceive very difficult I will just come out and say no-no I mean now I realize it is 24 months but at the time I also thought it was 12 months because I looked at this project I look at that project whatever.

So there is been very difficult, if you can prove it here of course but very-very difficult to prove the purposeful design you know we have talked about this when in sort of the Vadodara Hallol toll road case the demand was highly optimistic why was that perhaps was it could have been because of an optimism bias right because these guys know picked a demand scenario and sort of picked the most optimistic scenario but it could also have been because if I had given you the real picture you might have never PPP in this project in the first place, so I needed to give you a picture where there is a 15 percent rate of return that you will PPP as well but now how do I go back and say you purposefully deceive me as opposed to you made an honest mistake that anyone is capable of making.

So that is the good point liquidated damages is there exactly for that purpose but if you look at most liquidated damages clauses they cap off at a certain point normally it is 0.5 percent of contract value or whatever beyond that cap the LD is do not really kick it, so yes there are safeguards against doing this purposefully but again it depends on who you are talking about the contractor for instance yes is comes to the LD but the architect does not and the architect is one that sort of created the project came out with the initial BOQ and all of those kinds of thing, so the point here is these are some explanations they are all somewhat reasonable explanation I mean you can sort of think about then and rationalize that each of these could be happening.