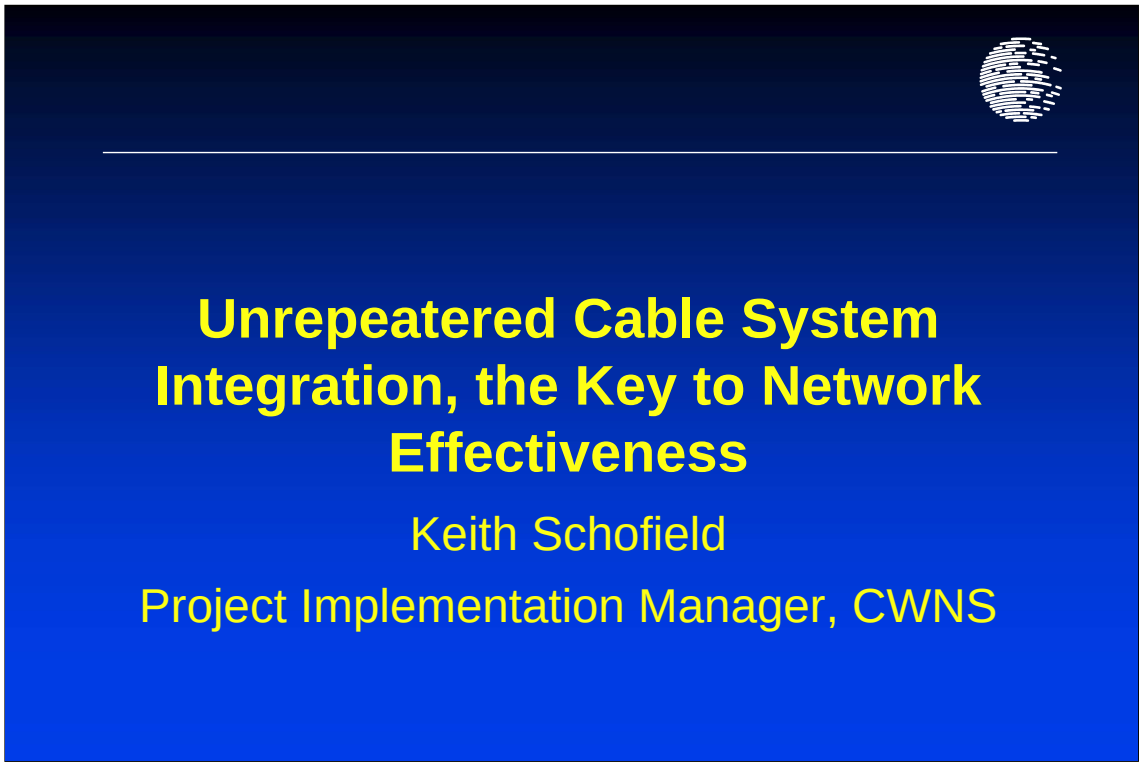
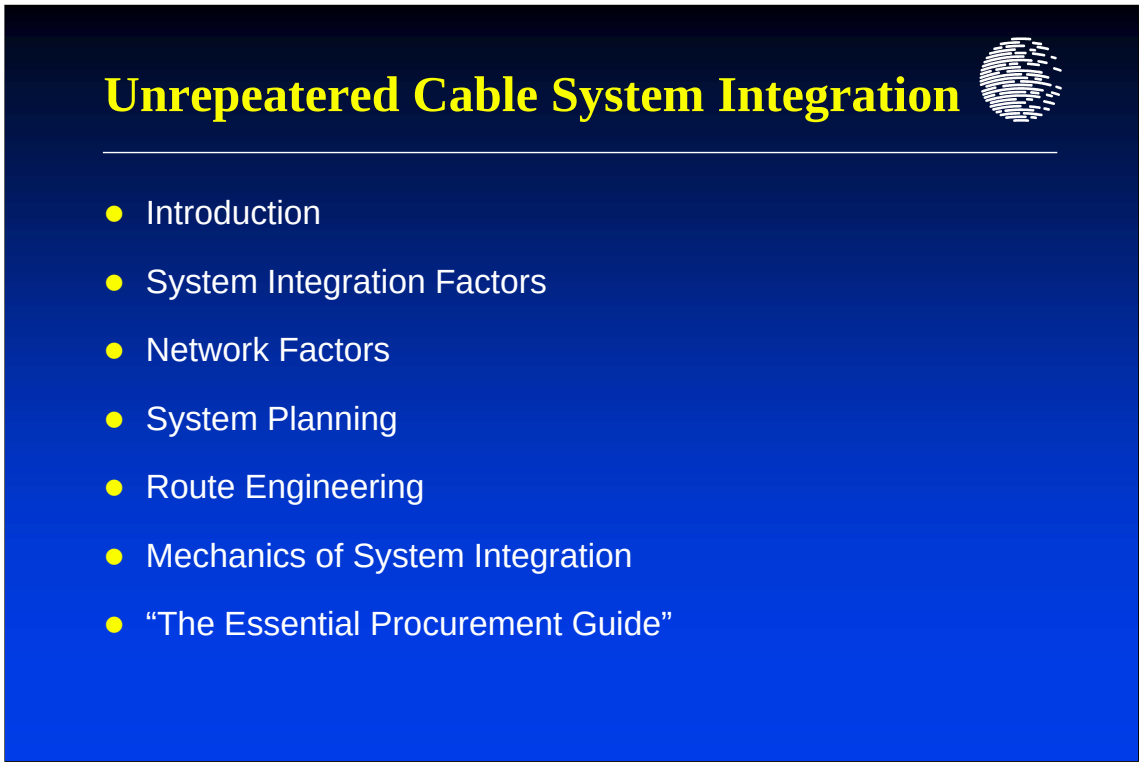
Intro slides -

Thank-you for your kind introduction, and for the invitation to come and speak here at SubOptic.



As you know, my name is Keith Schofield from Cable and Wireless Network Services, and I am here to talk to you this morning about unrepeatered cable system integration. By the end of the presentation I'm about to give, I trust that you will also agree that good system integration makes effective networks.



Unrepeatered cable networks are growing in number throughout the world. We can try and keep up with the new rules, but what are they anyway?

In the next 10 minutes or so, we will establish that system integration simply cannot be taken for granted. Indeed, we will see how an investment in good, sensible system integration and project management can yield excellent results for unrepeatered systems, and we’ll look at the new rules for system integration including the impact of Network planning, design, engineering -finally, if we get time we will take a brief look at an essential procurement guide and an interesting corollary to the new rules.

Unrepeatered System Integration

- The Parts must fit together
  - Engineering
  - Management
  - Innovation
  - System Design
  - Cable
  - Installation

I suspect that sometimes you, like me, want to sprinkle magic dust over our projects to make them work well. We want easy answers to the problems of pulling together projects, but of course there aren't any..

However, I'm here to tell you that an equally good substitute exists in the form of System Integration. I want to speak with you today about Cable and Wireless's experiences and innovations in system integration - and the process of managing, unrepeatered network projects.

What is system integration? - Well, imagine you see before you a car like the one in the picture - it doesn't matter what kind it is - it may have a complex engine management system, galvanised bodywork and a maintenance manual in the glove box. Unrepeatered submarine cable projects are just the same **all the parts must work together.** So we define sytem integration as the process by which all the parts of a project are made to fit together.

It doesn't matter if the system integrator sits with the network supplier or the network operator - the principles discussed here apply equally in either case. **If you leave here with a good idea of the benefits of system integration, I'll have done my job today!**

Worldwide Trunk Repeatered Network

Big capacity international repeatered networks are in vogue right now, but a new market area has arrived that can't be ignored. Unrepeatered submarine cable networks are here, and they are quite different from repeatered networks in terms of the challenges which must be overcome - for instance...

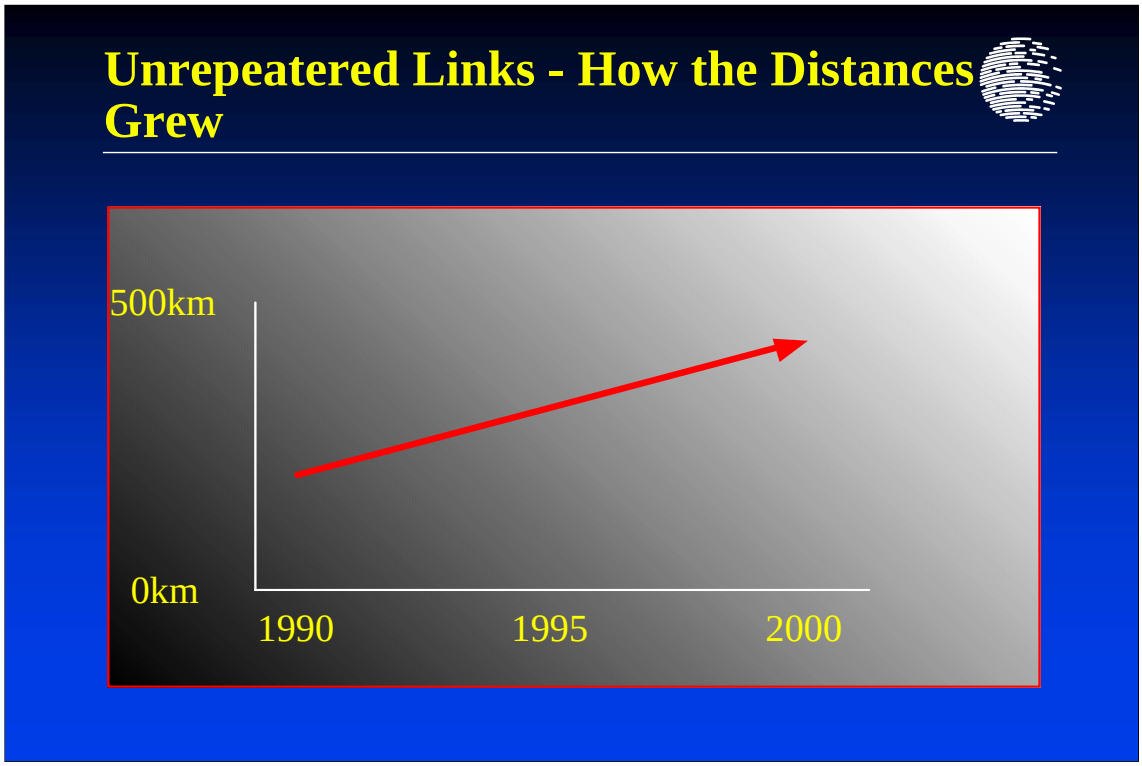
Brazil Domestic Cable System

- Multiple Links to International Landlines avoid difficult marine environment.

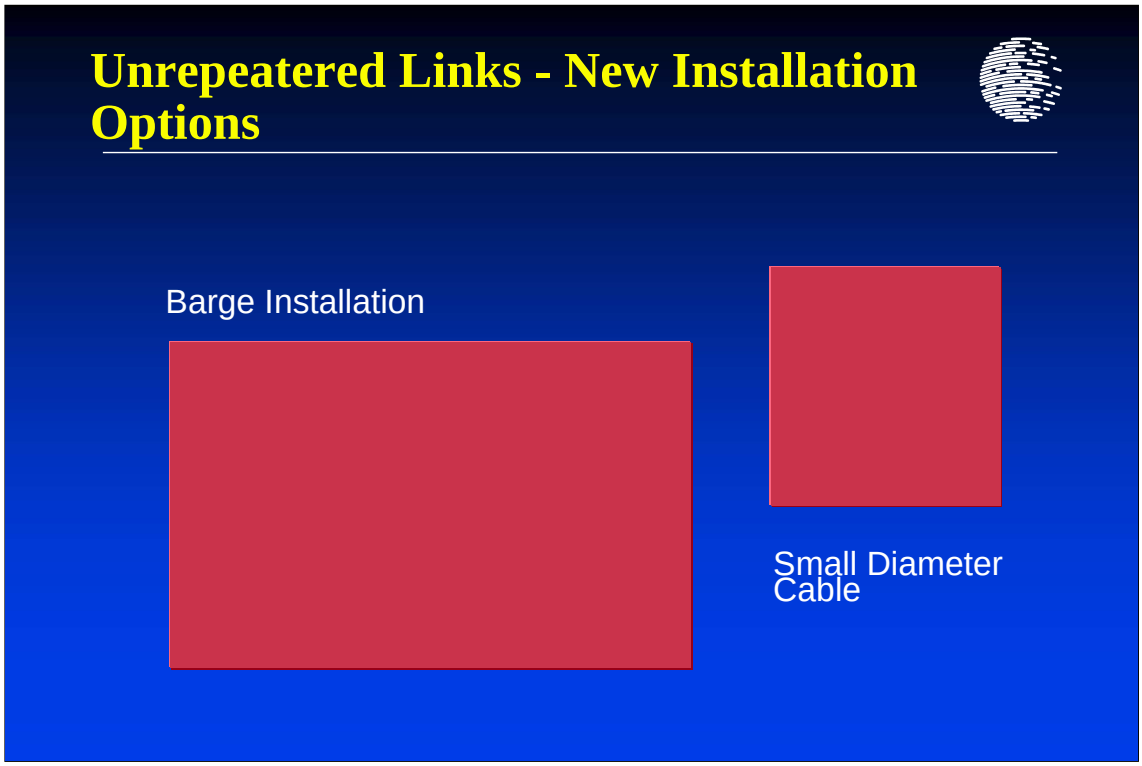
...take the Brazil Domestic Cable Network... look how many landings there are, and anyone who knows the size of Brazil will see that we are talking about a big project here!

When we provided system integration services for this system, we had to make special consideration for the landing points - the network management, power budgets and system design. This was no point to point system!

I reckon you'll agree that this is no point-to-point system, and therefore system integration can't be taken for granted.



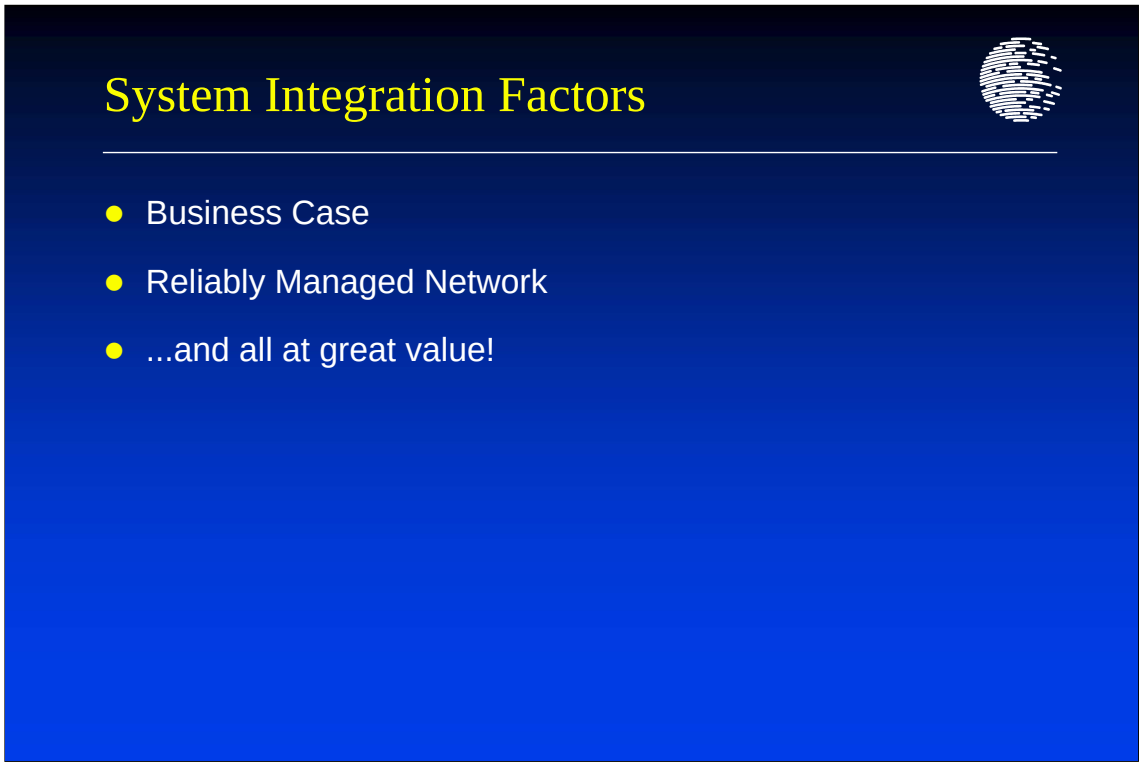
One of the reasons unrepeatered networks can’t be ignored is that the maximum distance we can span with high bandwidth has increased dramatically, and this has opened up the way for many more inter-island and coastal links.



...Another reason for the growth is that many more cable and installation options are now available - for instance small diameter cables and barge installation.

And here's another thing, with better network management, repeatered systems are now part of a reliable web of connections linking national and international destinations, just like the airline routes!

Pretty impressive, really!



...So projects have to be stitched together just like the network itself, and **that's** the role of the system integrator. We've seen that system integration is at its most effective when performed by someone who can bring a professional, experienced view to the project.

Now, given that, **what is** the **role** of the system integrator? - Well, no system is going to be successful unless it can deliver three basic achievements:

• The **business case** must be **good** - the costs need to be known and the ability to plan the system to deliver the goods is **essential!** So, the feasibility study must be right! **Good advice** then gives **good results** later and can pay for itself many times over!

• No system can pay if it sits on its own these days - it has to be part of a **reliably managed network.** Think of a spider's web. What use would the long strands from the centre to the outside be unless they were linked by the shorter cross-links in between? Unrepeatered links represent those cross-strands of undersea communications...

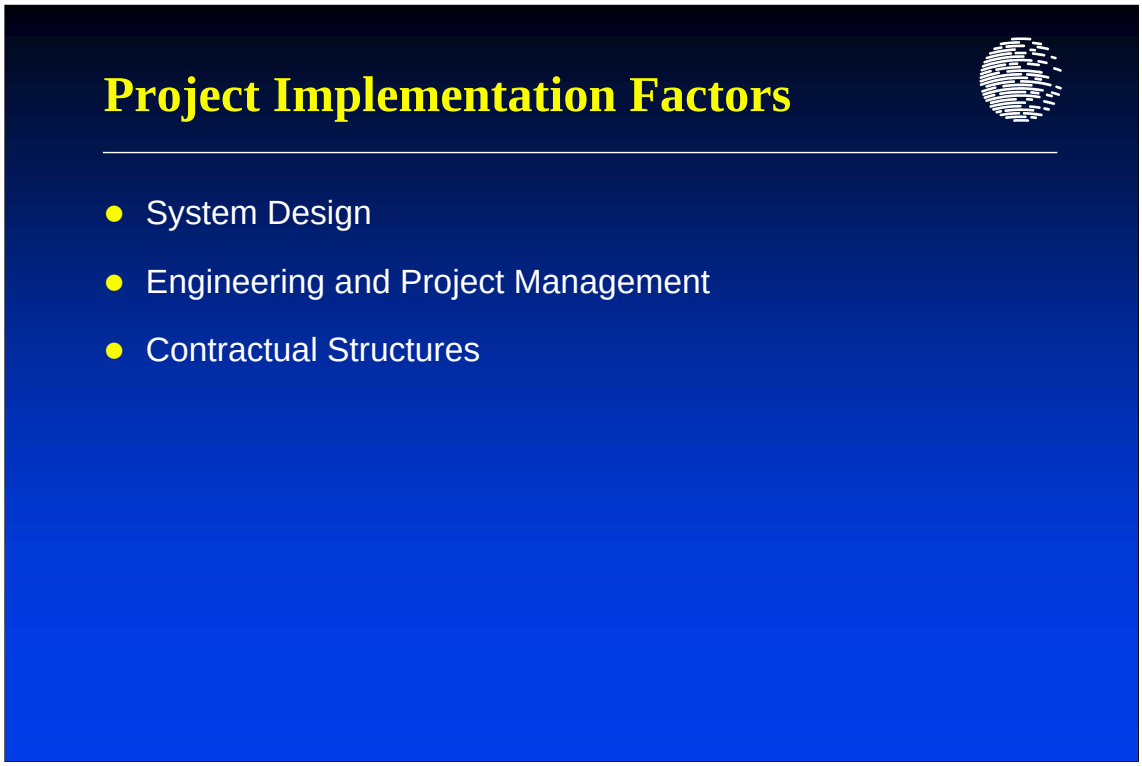
• Many new owners of unrepeatered systems want to see traditional methods and cost assumptions challenged - but **if**, like a bad surgeon, you carve out the **wrong bits** the result can be a **terrible mess!**

So, we see that system integration must be **appropriate** and **add value.**

"It's cable, Jim, but not as we know it!"

OK! Let's assume the feasibility study is done, our system integrator has given us the right advicethe business case is watertight, and like Captain Kirk on the Starship Enterprise, we're ready to meet the challenges "out there"!

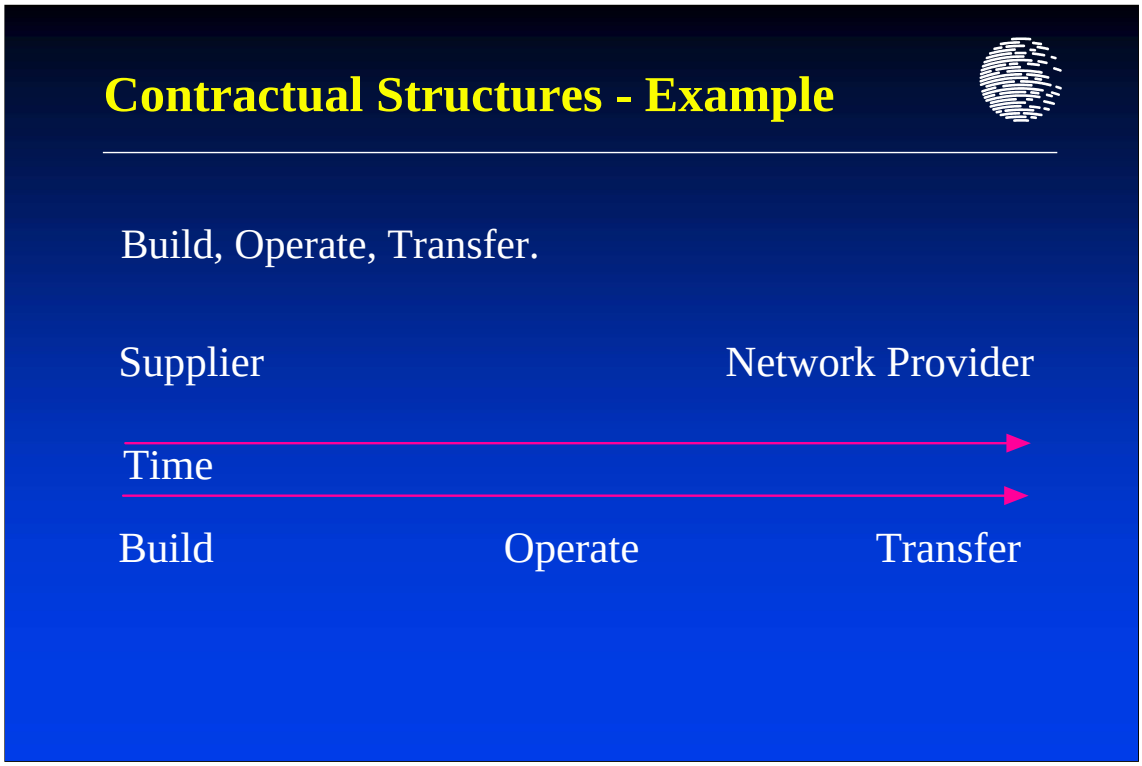
What are the factors which affect implementation of our unrepeatered cable project?



Firstly, key parts of the **system design** need to be specified - what about **landings, system availability, protection, reliability, system life** and more?

Next, we have to look at how we will carry out the engineering and project management - the right expertise, the right time frame. **Independent minded, professional engineering advice** is critical in getting this right! Organisations, like Cable and Wireless, can offer a service which is tailored to the specific needs of unrepeatered networks, as well as the other more conventional projects.

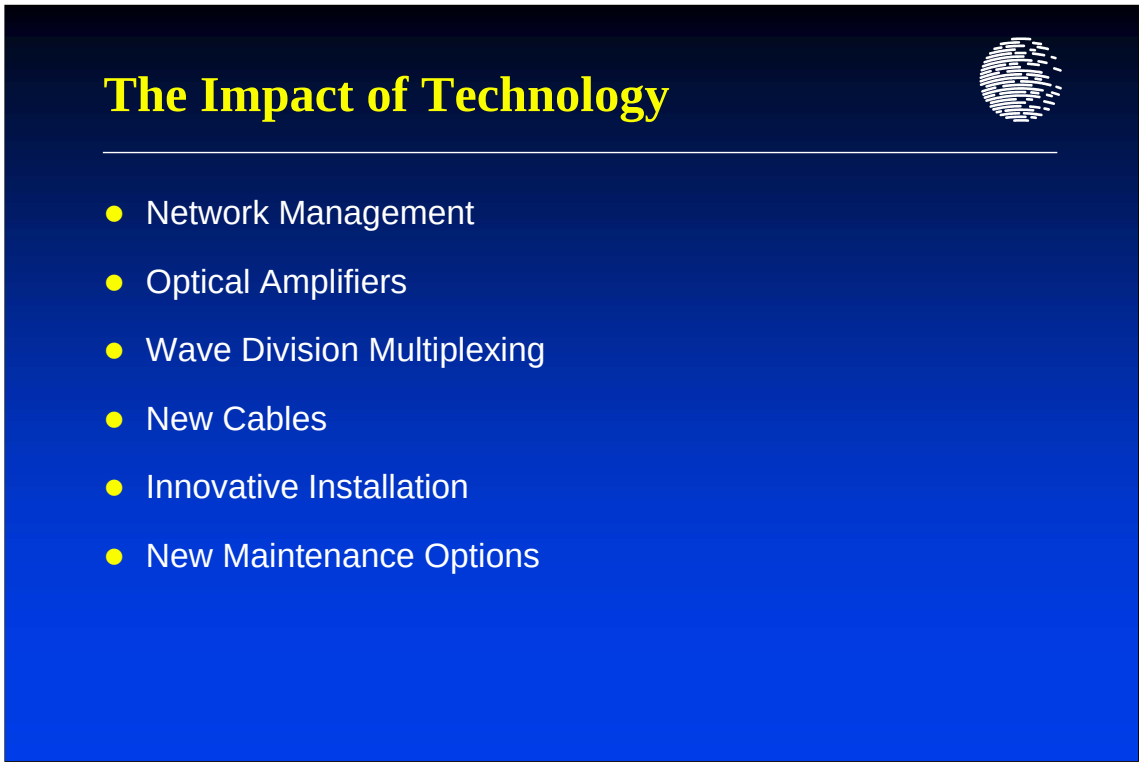
This is a very effective way of dealing with the high peaks of workload which occur, and with dealing with the new procurement rules which are developing for unrepeatered systems. And we can see that the new owners and suppliers have entered the market with new ideas for solving the many issues which arise - this has led in turn to new contractual structures to deliver the goods.



One example of this is the build operate transfer model. On the diagram, time goes from left to right, and as the system is put into service, the revenue generated can be used to pay off any financing which is used to build the system. Ownership may gradually transfer to the supplier.

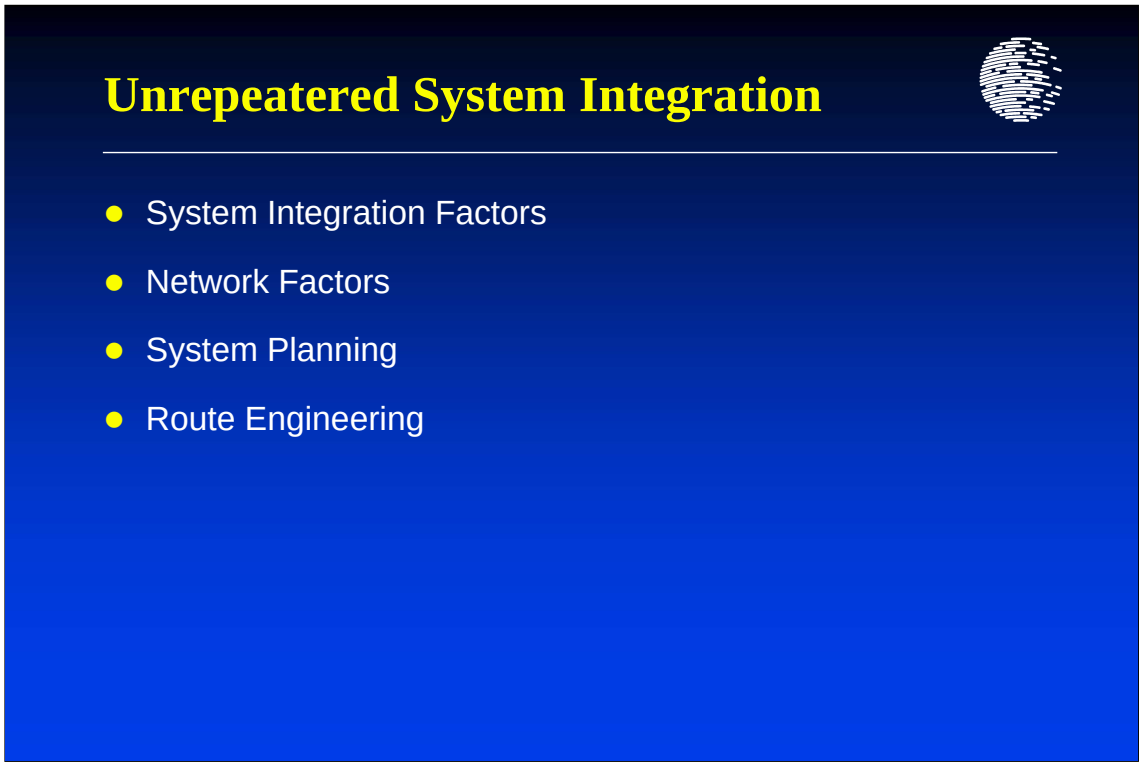
Another model is the traditional Construction and maintenance agreement club arrangement.

...Or alternatively, a network purchaser can employ a local company to provide a turn-key service. The local company (for instance, Schahin Cury in the case of Brazil Domestic), can then buy in all the constituent parts to supplement its own expertise, even system integration services (like Cable and Wireless Network Services, in the case of Brazil Domestic). It can assemble a fully skilled team to deliver the project, and the system integrator can oversee the engineering of the network in order to ensure that all the parts fit together.



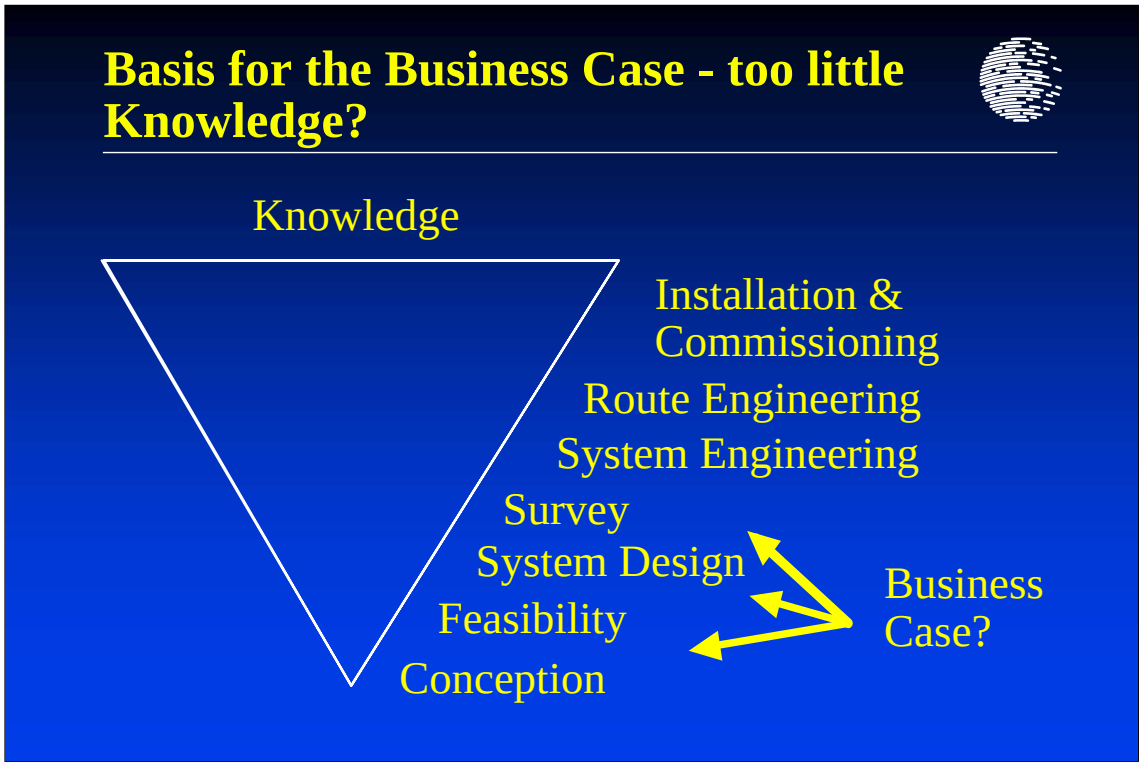
Systems are designed to be used for up to 25 years, but technology changesand has an impact. Wise owners make use of system integration service providers who are technology aware - they want the system to be future proof as much as possible. Time is limited, so the slide here shows some of the key issues we routinely consider on our projects (pause).

Since the last SubOptic, SDH networks have come of age, both for repeatered and unrepeatered networks, so let's move on to consider the network factors...

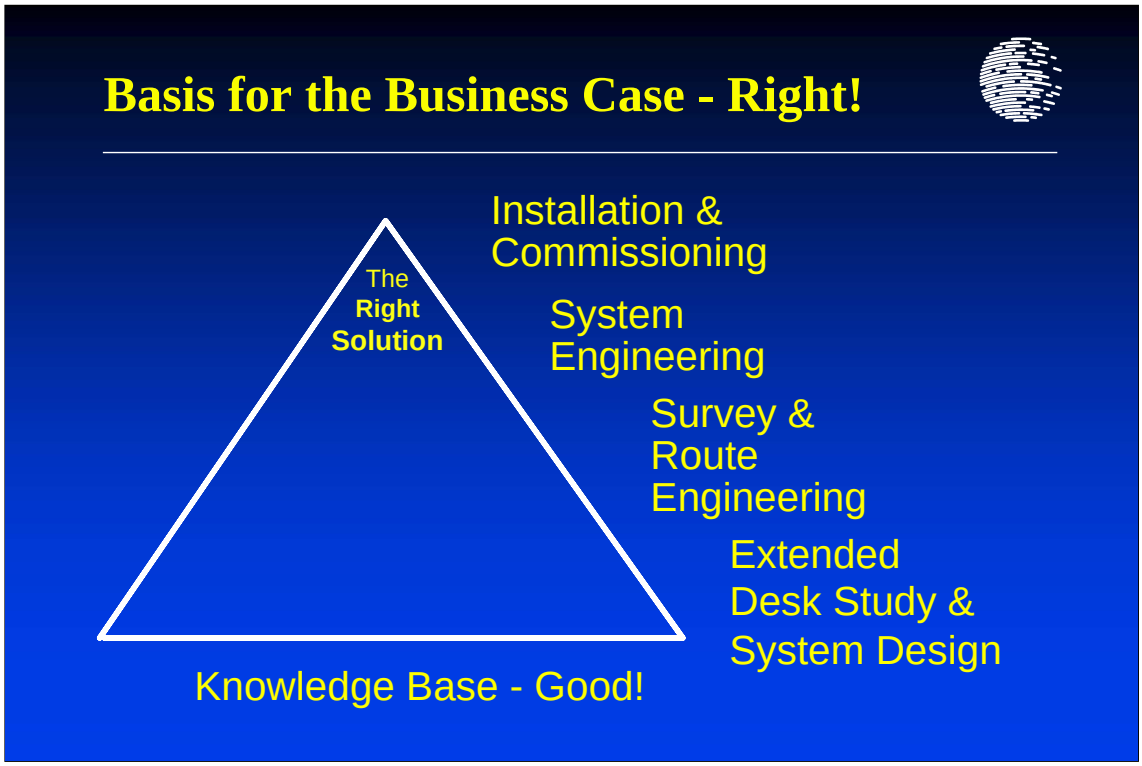


....Suppliers can no longer afford to offer systems based on point to point assumptions - **network** resiliance, restoration and reliability are now the key words. Suppliers to take note! - because unrepeatered systems are part of a wider network whole, their performance must often be **planned** to be at least as good as a repeatered system.

To optimise system performance, early planning must include **route engineering**.....which is vital to system safety. As a system drives through from feasibility until the time the contract is let, a kind of Knowledge pyramid develops....



...however, due to business factors the temptation is to build the pyramid the wrong way up, meaning that business decisions get taken on little information, when in fact....



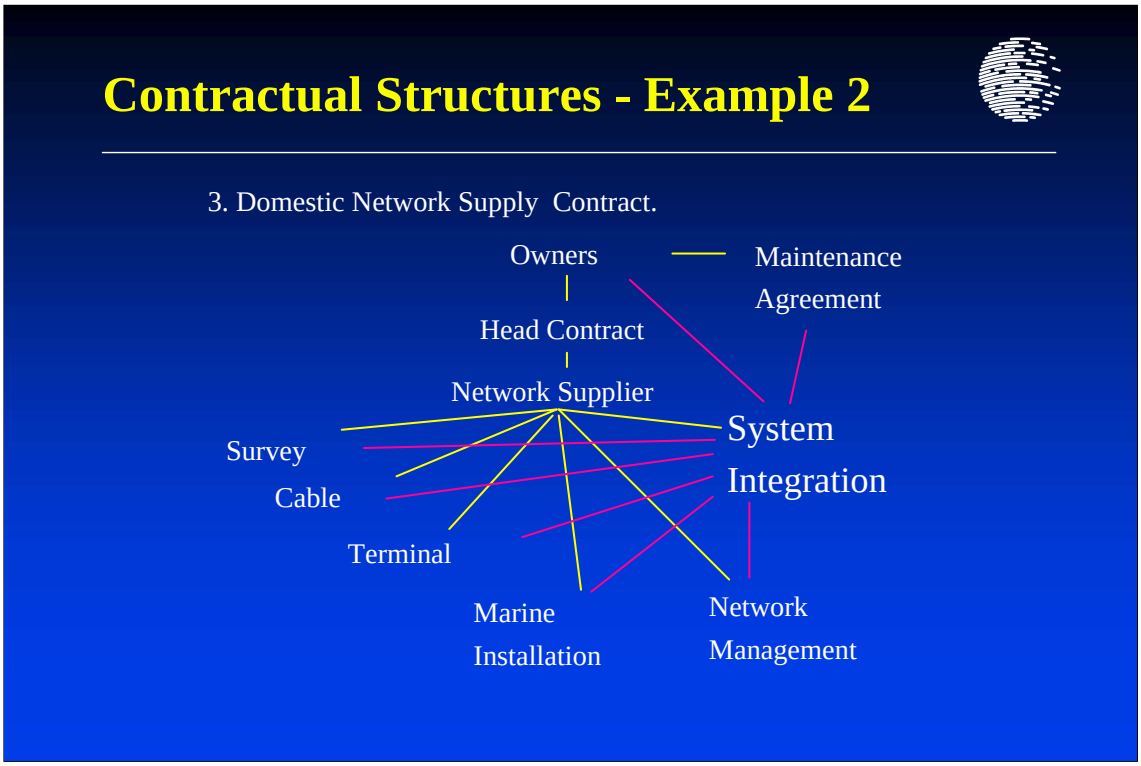
... an extended range of options should be looked at early in the life of the project. So, the system can be properly scoped and costed at an early stage. This helps both supplier and owner avoid unwelcome contract variations later on. For an unrepeatered network, installing and protecting shore ends must be well understood at an early stage in order to underwrite project success. Early investment rewards richly in dividends later.

Let's look now at some of the mechanics of system integration. It's useful to review a number of key areas such as...

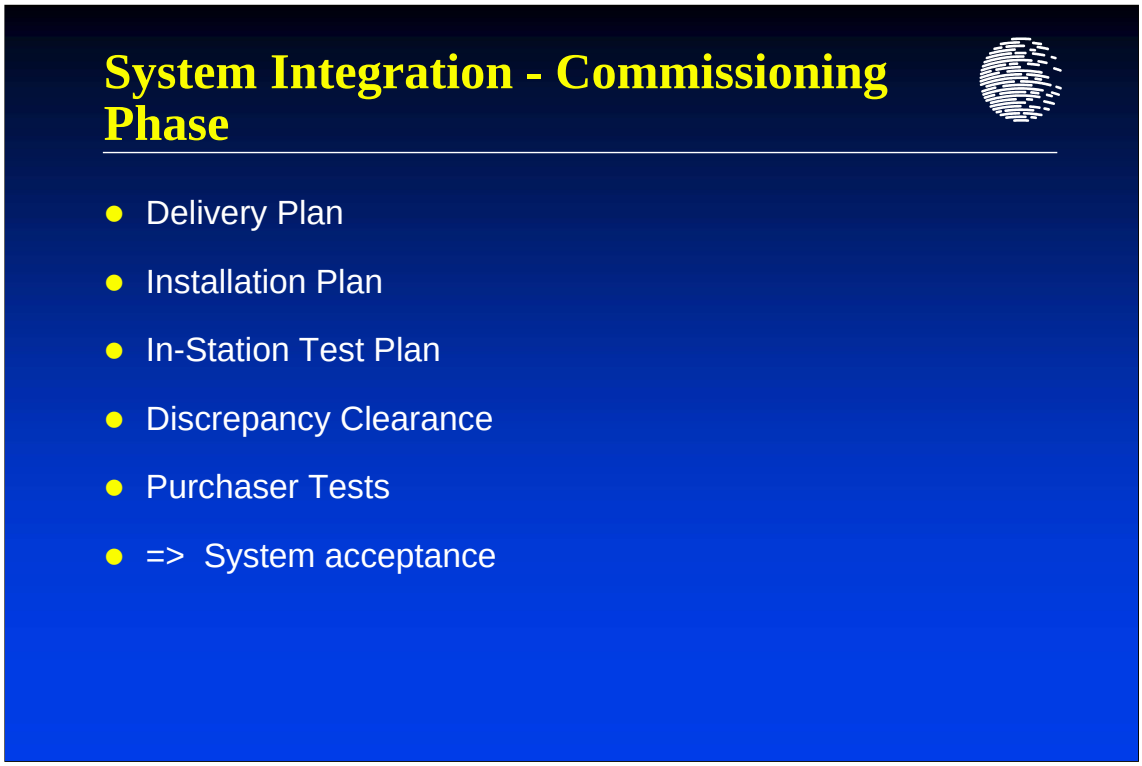
(slide showing Design, Commercial, Engineering, Quality, Project)

- Design Review (will the parts function together?)
- Commercial Review (who takes responsibility for each part?)
- Engineering Review (how will the project engineering happen?)
- Quality Review (how will project quality be managed?)
- Project Review (progress, budget, change management).

Contractual Structures - Example 2



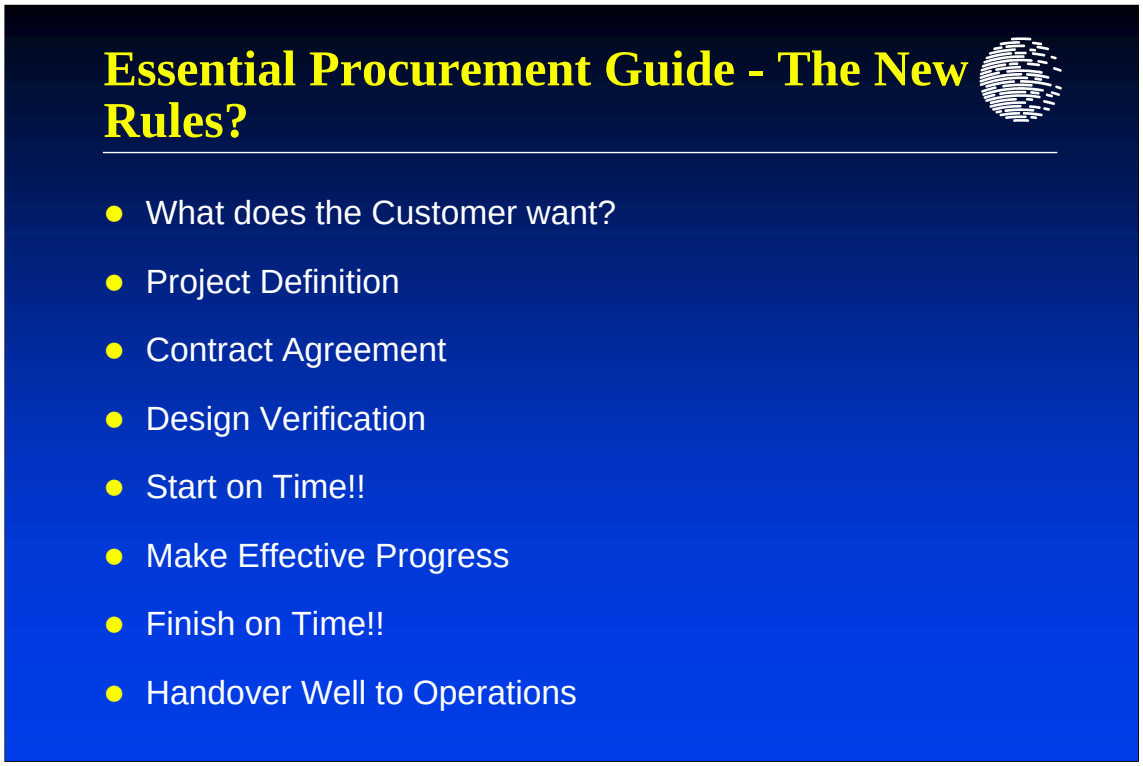
In the project structure, the system integrator may sit with the network supplier or the owner, but the job of pulling all of the parts together must sit with somebody.



In management terms, planning the commissioning phase is just as important as installation.

As the unrepeatered project is installed and commissioned, tying up the loose ends is a critical job for the system integrator, as project work almost certainly means that the people involved will quickly move onto other work.

Tying up loose ends is helped if the handover to operations begins at the start of a project, not the end. The same is true for maintenance.



So, what of the Essential procurement guide and the interesting corollary which I talked about in my abstract?

Note what the customer wants: Consider this question at the start of the project - what's the business case, whats the availability & technical perfromance? what are the local and regional issues?

Look at Project Definition: who is responsible for what? how will the contracts and subcontracts be executed?

Read and agree the Contracts: It's a good idea to do this ahead of the work being done! - But are all involved parties aware of the other people's scopes of work? Have the overlaps or drop-offs been ironed out? How will project changes be managed?

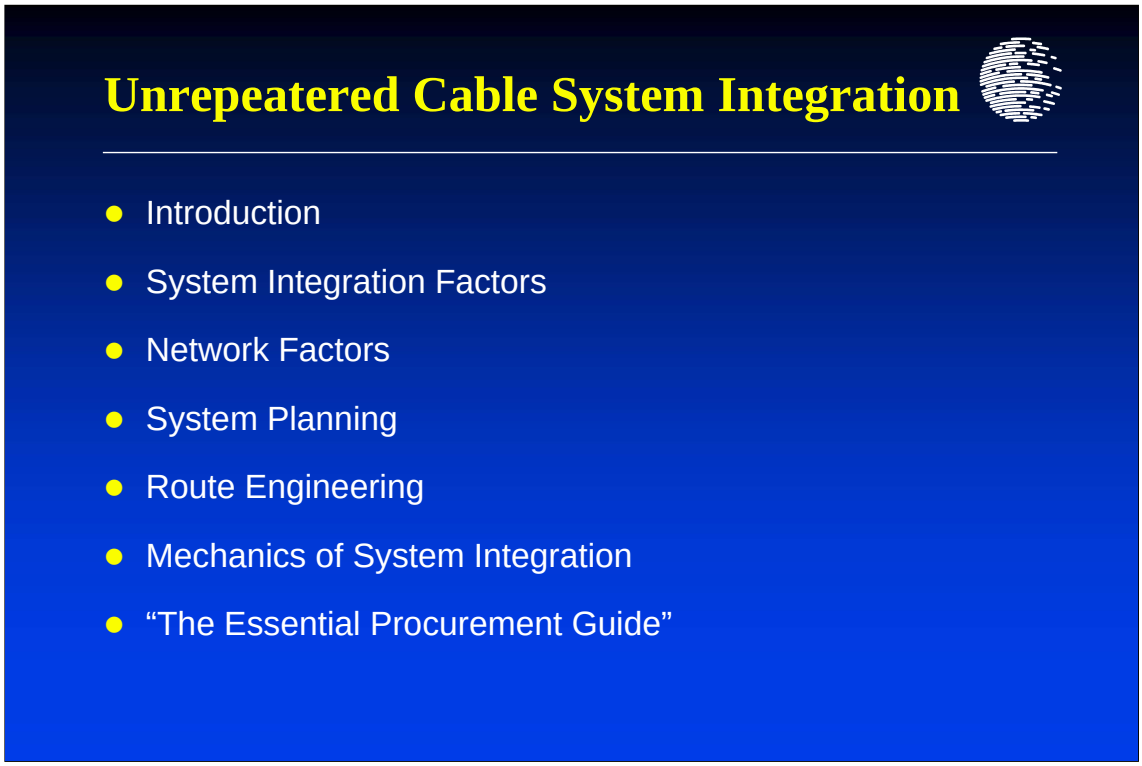
Hit Design Verification early on: It's important to ensure that in the same way that the contracts fit together, the network design will hang together into a coherent whole. This all has to be checked out even after the contracts have been worked out.

Activate the project and start work on time! A major frustration is when the work activities start late and the programmes compress unnecessarily. Manage the front end to secure the back end of the programme. Make sure both owners and supliers do the same.

Listen to each other - Make Progress Effectively: Both suppliers, and owners have to demonstrate that they can manage any changes caused by factors both outside and within their control.

Finish on time! Close the project in good taste! This can save a lot of money as well as making the project sponsors pleased. As well as setting achievable targets at the start, a good way of achieving this is to review the programme throughout to look for ways of advancing intermediate activities.

Don't leave the project smelling badly! - Handover efficiently to operations: Training and operational handover need to be considered as an integral part of the implementation



In conclusion...

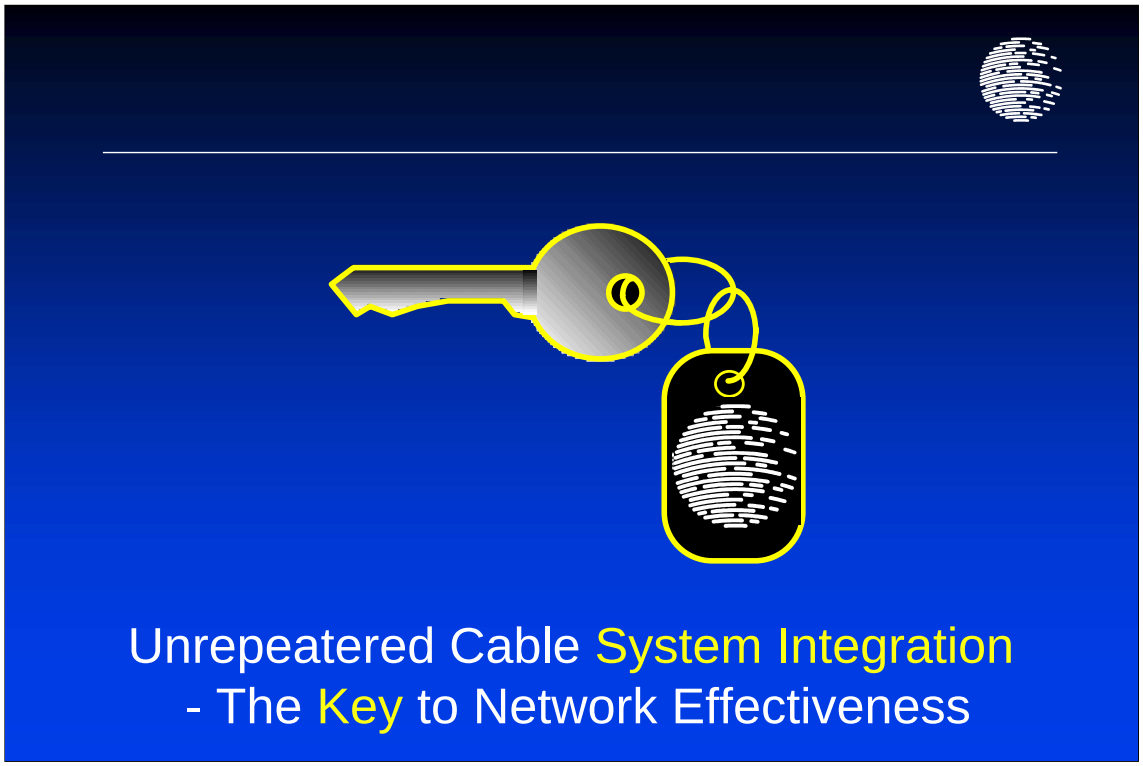
Today, we've studied unrepeatered network procurement and seen the benefits an independent systm integrator can bring. We've can marvel at the management and system innovations which are coming to market. We've brought systems to life and we've integrated them to completion!

We've observed system integration from the view of the network supplier and the network operator. We've observed network, technology and implementation factors.

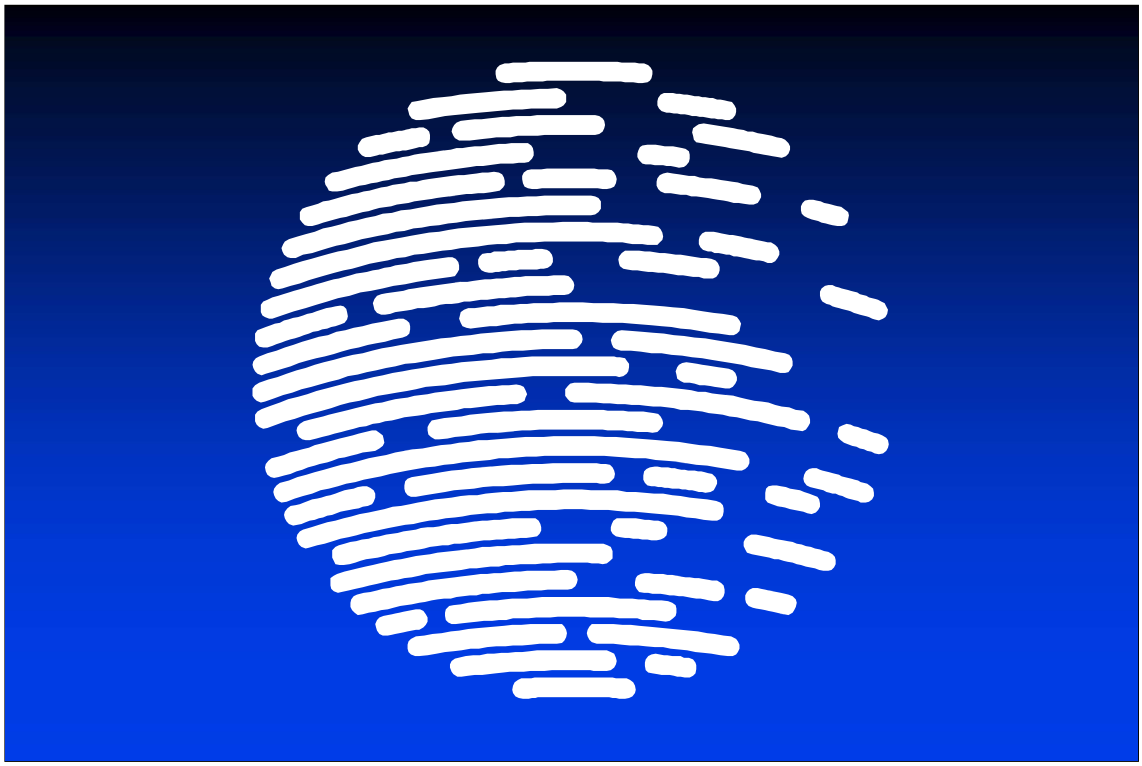
We've even spent a few moments looking at the new procurement rules which are emerging as best practice. We've seen that System integration is like the magic dust we want to spread over our projects!

But what of the interesting corollary I offered in my abstract to this paper?

Well - each project is unique, each network is special, and by now you may have guessed that in the world of unrepeatered networks, the interesting corollary to my theory is that **THERE ARE NO RULES!**



But remember that high technology car I showed at the start of this discussion - remember the spider's web of communication systems evolving around the worlds - Successful unrepeatered system integration truly is the **KEY** to **Network Effectiveness** (pause)**.**



That concludes my formal presentation, but I would be happy to take any questions or see you on the Cable and Wireless Network Services Stand immediately after this session.