Good morning everyone, welcome to this session
on data visualization.

We are lucky to have Annad Srinivasan with
us today, joining in from Bangalore.

Anand is an IITM alumnus B. Tech 1995 is that
correct Anand, yes and he has been a very

amazing data scientist throughout his 26,
27 year old career has worked with multiple

industries Airline industries, Saber technologies,
Dell.

He was with the senior management at Go Air
and now he is about to start a new venture,

a new airline which is going to be launched
very soon.

I can say that formally right Anand, yes you
can say that formally Rahul, perfect.

So, very glad that recently Anand was listed
as one of the top 10 data scientists in India.

So, very lucky to have you Anand on joining
us today for the session, my pleasure Rahul

it is always good to touch base with you and
happy to help in any way I can.

So, today's session is going to be on how
you see data that is going to be the primary

purpose.

How do you represent data and most of the
ideas are essentially Anand's idea that we

are going to discuss and therefore we have
Anand in the session today.

So, let us start.

So, first of all, why do you think we need
to emphasize on visualization of data?

So, you know there is a cliche right I mean
a picture being worth a thousand words fundamentally

■
that still holds true.■
■
End of the day when you look at analytics■
as a whole the fundamental purpose is you■
■
know people talk about data science etcetera.■
■
The only reason that field exists is to help■
businesses make better decisions, correct.■
■
If you count that then I mean that you question■
the very we need for the analytics function■
■
as a whole right.■
■
So, I have always been an exponent of saying■
look, it does not matter what kind of decisions■
■
are based on whatever analysis.■
■
Part of that is to say why we might build■
all kinds of sophisticated models you have■
■
to understand that decision makers you have■
to be able to present them that result of■
■
that analysis not necessarily the process■
but the result of that analysis in a very■
■
precise concise and consumable format which■
will go back and say hey if I do this this■
■
will this is likely to happen is this a good■
decision or a bad decision, correct.■
■
I think so, to me that is the crux of the■
problem right I mean let us face it in the■
■
forest and nobody heard it.■
■
So, you might have the greatest analysis but■
if good decisions are not being made based■
■
on that analysis then really what is the point■
of doing that analysis.■
■
So, I think that is where the visual ability■
to communicate and communicate visually to■
■
decision makers is a very, very critical part■

of analytics.■
■
In fact, that is my pet peeve if you want■
to call it that.■
■
It is like you know a lot of people that talk■
about analytics or you know people that teach■
■
analytics they do not emphasize this component■
enough.■
■
And people who have been endless will tell■
you how long the number of times come out■
■
to me after a long meeting with senior senior■
management and then come back and say oh we■
■
had this great model we had this great analysis■
but somewhere the whole discussion got derailed■
■
into something else and people did not really■
understand the core of what it is.■
■
And we ended up wasting time discussing some■
trivial aspects which were not core to the■
■
analysis that was presented all the time.■
■
And part of that is it is not that the management■
is sitting there saying look let us have chai■
■
samosa pakora and let us just white time away■
that they are there for a reason they want■
■
to understand the issue they want to understand■
the solutions.■
■
They want to make decisions but somewhere■
there the analyst has to take responsibility■
■
to communicate that effectively and I think■
that is where visualization comes in in a■
■
very, very critical way.■
■
So, I think I cannot emphasize the importance■
of visualization enough.■
■
So, in fact I am very happy Rahul that you■
are touching upon this as part of the course■
■

because I am not seeing this exercise because■
they want to quickly jump into statistical■
■
modeling recreation models and more importantly■
somewhere you know someone seems to how quickly■
■
can we get to AI and then I think emphasizing■
the fundamentals is so, critical lovely to■
■
see that, thank you.■
■
And not only for the corporate managers right,■
I mean I think psychologically also human■
■
beings are tuned to see pictures better than■
words right, yes absolutely absolutely right.■
■
In fact that is the thing right I mean this■
is well known right vision is the most powerful■
■
sense that we have there right.■
■
In fact I think there have been studies that■
talk about cognitive studies right 70% of■
■
the information we consume is visual right■
auditory sensory touch.■
■
So, I mean you know people can sit and debate■
the 70% 30% you know like I always say right■
■
85% of statistics are made up on the fly right.■
■
But that being said, I do not think so.■
■
I think it is beyond debate that vision happens■
to be the most powerful perception that we■
■
have.■
■
So, which is why visual communication is so■
important right and that is what we will talk■
■
about as we talk through some of these things,■
perfectly.■
■
And it doesn't really matter what kind of■
data you have, data can be numerical data■
■
can be continuous, it can be discrete and■
we have visualization tools right.■

■
We have visualization tools for each data■
type that I mean really there is no dearth■
■
of visualization techniques.■
■
So, interesting that your choice of words■
I mean I would emphasize the techniques more■
■
than the tools right.■
■
You know I think people once you understand■
the techniques you understand the fundamentals■
■
the tool is just a medium right.■
■
So, when you say visualization tool maybe■
perspective I am thinking of software tools■
■
that help you do visualization that is not■
the issue, correct.■
■
So, I would emphasize techniques more than■
tools because really what we want to teach■
■
people are the techniques.■
■
Then the tool just becomes a means of implementing■
that technique correct correct that is that■
■
is we wish to this that is what we wish to■
discuss in the session today I mean essentially■
■
what are the what are the core principles■
on which the visualization should be based■
■
irrespective of what data do you have that■
you want to represent.■
■
And you know what the other thing is.■
■
I think you know people need to understand■
these kinds of categorical numerical discrete■
■
continuous data.■
■
Because the very nature of the data right■
dictates how you represent them visually okay,■
■
correct.■
■

The number of times I have seen people show■
me you know trending data using categorical■
■
data, right.■
■
So, that is the whole point right you know■
if you are going to show me say a line chart■
■
which makes sense for you know time continuous■
trending kind of a data.■
■
But then you decide to draw a line chart on■
categorical data somewhere there you know■
■
when you say okay between this point and this■
point you have drawn a line connecting these■
■
two points which is exactly between these■
two, right.■
■
So, and you know and these kinds of things■
the amazing thing is you know when you when■
■
you actually talk about it you know everybody■
will smile and say yeah come on I mean like■
■
obviously is not that obvious part of the■
funny part depending the so on your point■
■
of view is the fact that it happens so frequently■
okay uh.■
■
So, I think it is just like you know part■
of it is tools that is the reason why I emphasize■
■
the difference between tools and techniques■
because what happens is you pull up the data■
■
you go to excel or something and then draw■
click and say create chat it just it just■
■
it is a it is a dumb tool right it just does■
not work.■
■
So, you know spending that little bit of time■
and hopefully the points we consider today■
■
when we discuss will get people to think for■
you know two seconds before creating a chart,■
■
right.■

■
And the two seconds will save you two hours■
of debate time when you are presenting your■
■
results precisely, yeah yeah yeah yeah yeah■
yeah.■
■
So, what do you think are the general benefits■
of visualizing our visual representation of■
■
the data?■
■
See benefits see the whole idea is communication■
right I mean there is only one reason why■
■
look if you think about it business has to■
improve.■
■
So, we do analysis etc to help the business■
improve and we need to communicate that to■
■
the stakeholders.■
■
So, the right decisions can be made very simply.■
■
Our objective as analysts is to communicate■
that idea.■
■
So, visualization is our language of; so I■
could almost call visualization the language■
■
of the analyst because let us face it you■
go sit in a boardroom they are not going to■
■
be interested in looking at your python code,■
yeah, correct.■
■
So, visualization is the language of analysts■
when they talk to the business stakeholder■
■
right.■
■
Now and by the way interestingly visualization■
is also the language by which the analyst■
■
understands the real world.■
■
Because the right visual representation can■
actually give you a very good view of what■
■
could be the core problem and then actually■

put you on the right path to solving the problem,■
■
yeah.■
■
If you do not have a good visual representation■
the problem itself may not necessarily be■
■
evident.■
■
So, when you say it is visual the stuff you■
talk about cognitive processes here yes that■
■
is that that is what the communication is■
visual representation visual communication.■
■
And obviously communication is to make the■
cognitive process easier.■
■
So, part of what we do visualization is to■
say look, the other person has to understand■
■
the concept and we have to make it easier■
for them to understand the concept, not harder■
■
right.■
■
There are times when the visual representation■
itself is.■
■
So complicated that you know people spend■
more time understanding the visual than what■
■
it is trying to communicate, yeah yeah yeah.■
■
So, I call that the equivalent of going to■
a foreign country and saying you know where■
■
the washroom is and the person gives you an■
answer, right.■
■
You spend more time trying to understand what■
the person was saying rather than where the■
■
washroom is, yeah.■
■
It might be just easier for the person to■
point, yeah yeah yeah.■
■
So, you know, having the wrong visualization■
is the equivalent of getting a very simple■
■

answer in a completely spend foreign language.■
■
If you take more time understanding what the■
person will say you know and rather than saying■
■
okay look I asked you for the washroom you■
pointed me there problem solved this is thank■
■
you, correct correct correct correct.■
■
And I mean I have experienced this also I■
mean.■
■
So, many times we take up a constraint assignment■
and at the end of the assignment you are supposed■
■
to make a presentation to the senior management.■
■
And uh, gently the person comes to you before■
the meeting and says boss do not present your■
■
math and do not present your code.■
■
Tell us what it means to us, right?"■
■
So, unless we speak the language that people■
understand.■
■
So that they can make better decisions about■
our model and our code is useless, absolutely■
■
right.■
■
And you know and you know see someone's right■
I mean which is kind of straying away from■
■
the core concept of what we are talking about■
here.■
■
I think as engineers right we also fall into■
the trap of confusing effort for importance■
■
right yes.■
■
So, you know you might have spent 50% of your■
time right cleaning up the data and lining■
■
up the data correctly and maybe only 30% actually■
building the model or you know or say let■
■
us say 60, 70-30 70% and you know typical■

70 or you will spend you know just cleaning■
■
up the data understanding this.■
■
That does not mean you know that your process■
of cleaning up the data has to consume 70%■
■
of your time; the time of your final presentation,■
yeah right.■
■
So, so.■
■
so we do fall into the trap of mistaking effort■
for importance, right.■
■
So, it does happen.■
■
So, that is part of the visualization is to■
say look but I think that is slightly outside■
■
the scope of what we are trying to discuss■
here but you know also be cognizant of that.■
■
So, I think when we talk about this we will■
talk about you know what is the purpose of■
■
this presentation.■
■
So, maybe some of those things will be touched■
upon as we go through, correct, correct.■
■
So, essentially by visualization we mean visually■
highlighting a few things for example through■
■
the form or through color or through spatial■
representations right, yeah.■
■
So, see when you try to build a visual representation■
right and these are all I mean if you really■
■
think about it all charts that you do use■
one of these techniques to and these are the■
■
things that the human eye spots very easily■
correct.■
■
So, for instance right I mean if you look■
at it we are trying very easily to kind of■
■
get a sense of identifying the shortest bar■
in those four lines right.■

■
I do not have to tell you that look mark 2o■
is shorter right.■
■
We are I just by looking at it I know correct■
the amazing thing is we are also very good■
■
at very quickly evaluating by how much it■
is shorter I mean somebody will look at this■
■
and say I would say it is about 15 shorter■
okay it is I mean you it may be 15 18 14.25■
■
but bottom line is we without saying anything■
I look at it I get a very good idea, righ.■
■
Similarly the width right I mean you know■
when you highlight it you know when you use■
■
bold text stresses of normal text.■
■
Again we pick up on that very, very quickly■
right of course orientation size shape you■
■
know and obviously using enclosure to highlight■
which is you know when you draw a person.■
■
So, these are all attributes of visual perception■
and the whole idea is when you do.■
■
When you communicate you have to think about■
which of these can I use to draw the user's■
■
attention to the important part.■
■
How do you get them to focus on what is important■
and how do you get them to not focus on what■
■
is not important, correct uh.■
■
So, like they say right, what you say is as■
important as what you do not show or what■
■
you show is as important as what you do not■
show.■
■
You know I might have made a crack about you■
know beachwear but maybe not appropriate for■
■
the current audience.■
■

So, we leave that as it is, yeah okay.■
■
So, okay now let us get down to the core of■
what we are trying to say right.■
■
You have often spoken about the four important■
kinds of umbrella principles of visualization,■
■
Can you elaborate on that right.■
■
So, I mean something that I mean you know■
I honestly speaking unfortunately I would■
■
like to know if I could I would go back and■
say that did I get this idea from uh.■
■
So, at the risk of saying you know it was■
pleasing I was inspired right at some point■
■
I might have seen this somewhere but I kind■
of it resonated.■
■
So, I kind of made it a cornerstone of a lot■
of times when I talk to people in terms of■
■
this.■
■
So, if there is somebody out there who actually■
came up with these things you know, consider■
■
the credit date granted, right right.■
■
So, the four things I always talk about is■
when you present a chart when you build this■
■
one.■
■
These are four things that you have to absolutely■
follow and in fact write it down and go through■
■
a checklist.■
■
First is to know the purpose.■
■
What is the purpose of putting this visual■
representation together, right?■
■
It has to have a purpose it is and the purpose■
cannot be you know let me demonstrate my mastery■
■
of the charting tool, okay.■

■
So, the purpose is why does this graph have■
to be here?■
■
Why does this chart have to be here?■
■
Why does this representation have to be here?■
■
I want to use the word graph chart and visual■
representation interchangeably but you know■
■
sometimes in cases there could be different.■
■
Once you have a purpose correct that purpose■
will automatically determine what form of■
■
representation it will do, correct.■
■
Second, I always ensure the integrity of what■
you represent, right?■
■
And you know typically you will have errors■
of omission and commission when you are presenting■
■
data, right.■
■
To me that is a non-negotiable right integrity■
of the data because even if it is by omission■
■
or commission.■
■
Even if there is a small error in the data■
correct it will and that could be in the most■
■
trivial you know sidebar after this one but■
it will derail the entire analysis and essentially■
■
you know even if it was oh you know it is■
actually something I made a typo and I put■
■
it into this presentation, correct.■
■
Once it gets caught the integrity of the entire■
presentation will be questioned.■
■
So, integrity is absolutely critical and it■
is non-negotiable.■
■
correct and you know I always talk about you■
know data inc and minimizing non-data which■
■

is the equivalent of saying you know what■
spend ink on the items that you want to show■
■
do not spend ink on items that you it is not■
which is not critical to the thought process.■
■
So, maybe just moving on will show your data■
and annotate yourself with the integrity of■
■
it as well, right.■
■
So, let us take this one by one uh.■
■
So, let us understand what we mean by purpose■
right.■
■
So, by purpose we mean the actual business■
problem that we are trying to solve, right.■
■
So, no, not really necessarily Rahul.■
■
So, because see if I build a chart or a visual■
right it is a one step in the larger question■
■
that I am trying to answer.■
■
So, which means that this is because let us■
face it right, the business problem I am trying■
■
to solve is not going to be solved by one■
visual representation, right yeah.■
■
I might be going through a slide and you know■
a series of slides, this one the purple.■
■
When I put a representative graphic together■
the purpose of that should say this is going■
■
to make my ability to communicate this more■
complicated concept of this one is that much■
■
easier it sets the stage in some cases or■
this might emphasizes this, correct, okay.■
■
Another way to do it is if you look at even■
this particular graphic that we are seeing■
■
on the screen, correct.■
■
Because I always talk about the umbrella principles,■
right.■

■
What do I mean by umbrella principles in English?■
■
It covers everything, correct, yeah.■
■
And if you look at that little handle that■
I have shown there, if I go back and say what■
■
the purpose of having that handle is, it emphasizes■
the concept of the umbrella principle, yeah■
■
correct.■
■
So, it is there for a reason, correct.■
■
So, which means literally everything that■
there has to be a reason.■
■
So, if you look at it and say why is this■
there, what is the purpose of having that■
■
particular graphic on the screen?■
■
You should have a clear purpose, right.■
■
Now the purpose again the reason I say a purpose■
is not necessarily the message what we are■
■
talking about how we communicate the message,■
right.■
■
The message could be communicated over a series■
of visual representations, okay and each of■
■
those will have a purpose that contributes■
towards communicating that message, okay okay■
■
okay, right.■
■
So, understood and in fact when people are■
starting off I always encourage you to whenever■
■
you put this together right what is the purpose?■
■
Does it serve a purpose?■
■
If it does not serve a purpose remove it.■
■
Sometimes and you know there is one thing■
to say it does not remove it sometimes certain■
■

visual objects will actually have a counter■
purpose, correct, yeah yeah.■
■
So, you have to be very careful and focus■
on what you want to say correctly.■
■
So, I always encourage you to know when you■
are putting thought through and say that what■
■
is the purpose of having this visual representation,■
this slide, this graphic whatever it may be,■
■
right.■
■
But just have that in fact I used to tell■
people to write it down, right saying what■
■
is the purpose right.■
■
So, nice, correct, correct . I understand■
the difference between the message that we■
■
want to convey and the purpose for which this■
visual tool is being used.■
■
I understand, exactly, exactly , exactly , right■
, okay.■
■
Second thing was integrity yeah and this I■
can see all all too often right.■
■
It is pretty immediate.■
■
So, for instance right I mean you know just■
to give an example you should not be presenting■
■
in a way to destroy right.■
■
So, if you look at the graphic on the right■
that shows you, let us say typically earnings■
■
per share is this one.■
■
Now here is the beauty of it right.■
■
When you look at the graph on the left on■
the graph on the right without paying attention■
■
the first thing that one would say is that■
oh my god the when I see the graph on the■
■

left it is.■
■
So, volatile, yeah right in reality it is■
not correct.■
■
I mean look if somebody pulls out a calculator■
and says okay 164, 220 what is the percentage■
■
but remember the thing is about how usually■
we see length and we are very quick to measure.■
■
So, when I look at the 1999 versus 2000 right■
on the left graph one would say we grew six■
■
x or five almost yeah yeah correct right that■
is that was not the reality right because■
■
what somebody has done is you can see the■
access has been cut off, correct, yeah.■
■
Now and in fact when I say this right somebody■
will come back and say no no I want to emphasize■
■
the variability, correct.■
■
Now and that is where I say it is being the■
integrity is lost because the reality is the■
■
variability is minuscule, correct yeah yeah.■
■
We are exaggerating on the left hand side■
yeah.■
■
So, by chopping it off; so, a lot of people■
say no I want to emphasize the difference■
■
or the variability I said in the grand scheme■
of things the variability is nothing.■
■
So, they will say I want to show that north■
is so much better than south or sales in east■
■
are so much bigger.■
■
But in reality the per capita might be you■
know off by you know 0.5% but by chopping■
■
it off I will make it up here it is off by■
you know 30 40%, correct.■
■
um This is you will be; I am amazed at how■

frequently this is used especially in media■
■
exactly.■
■
I was going to say that, yes, okay.■
■
And their equivalent of caviar temper is they■
will have a small little wiggly thing at the■
■
bottom to show that access has been cut, yeah■
yeah yeah.■
■
Right.■
■
And you know and when I see this graph that■
is the first thing I notice right the small■
■
wiggly squiggly line at the bottom yeah yeah.■
■
So, this is very common in media right and■
you know when you look at it then you and■
■
amazingly enough when you look at it from■
the lens of the integrity is being gone you■
■
actually will understand the bias of the storyteller■
in terms of what they are trying to say here,■
■
yeah yeah yeah that could become very evident,■
right.■
■
So, uh.■
■
So, so to me how do you eliminate as a storyteller■
as a media person I need to be making a statement■
■
of fact right by chopping it off you are not■
stating fact right.■
■
So, to me integrator integrity is so critical■
right I mean I mean and I chose the word the■
■
left the graph on the left is deceitful it■
is a very strong word and I chose it deliberately■
■
because I believe it is deceitful it is communicating■
our wrong picture, precisely, yeah.■
■
But the sad reality is exactly what you said■
you see every day in print media in the news■
■

media in the electronic media you see this■
every day yes and you know the most common■
■
technique used, right.■
■
So, again as um analytics analytics professionals■
correct and when we are presenting energy■
■
it is our responsibility to make sure these■
kinds of things do not happen, precisely yeah■
■
yeah yeah.■
■
Now moving on to the third thing about maximizing■
what we wish to highlight on the data inc,■
■
yeah.■
■
So, again, right , very simple.■
■
I am a big believer in simplicity, right?■
■
So, I have used this as an example.■
■
If you think about it right, all the gridlines■
and the yellow colors are all what I call■
■
non-data ink, correct.■
■
It does not communicate one mile of additional■
information for me.■
■
Whereas the title that I put there called■
totals by specialty is correct that actually■
■
communicates something to me, yes yes right.■
■
So, to me that is data inc it is communicating■
something to me correct the numbers are communicating■
■
something to me right.■
■
So, any amount of ink that you use to communicate■
something is useful right um anything else■
■
is styling.■
■
Now styling there are times when you have■
you know I you know it is not about oh there■
■
should be no styling understand this even■

the table that I have on the right there is■
■
some amount of styling that is being done,■
yeah.■
■
But even that styling is also very specific■
for a purpose again going back to purpose.■
■
So, if you go back and say what is the purpose■
of putting those cells in a yellow background,■
■
yeah there is nothing.■
■
Then so again it tells back to the same thing■
what is the purpose of that.■
■
So, if I go back and say what is the purpose■
of the title it has a very clear purpose it■
■
tells me what this means is what uh.■
■
So, again going back see and you know also■
if you look at it that is the difference between■
■
purpose and message, yeah, correct correct■
correct.■
■
So, the purpose is it just tells me that it■
is caused by speciality.■
■
The message might be that PCP and PT dermatologists■
are the highest, yeah yeah correct correct■
■
correct.■
■
So, the difference between a purpose and devices.■
■
So, anything that you do any color ink that■
you use that does not serve a purpose and■
■
communicate information to the end user is■
non-data ink, right and again you cannot eliminate■
■
it.■
■
So, you want to one call the lines that we■
have the horizontal and the vertical lines■
■
to be non-data right.■
■
So, that is why I said; minimize your non-data■

ink and maximize your data ink and you cannot■
■
eliminate it correctly.■
■
And the last point about annotating the data■
is essentially to help the users is that correct■
■
yes.■
■
So, again right, very simple, just look at■
the two graphs.■
■
What the left graph does is it gives you an■
axis and then you know somebody has got to■
■
hold a finger or a ruler across this to measure■
and read off what those bars are, yeah yeah.■
■
It is simpler to get rid of the access tick■
marks but annotate the data.■
■
Now it is much easier just visually just looks■
so much easier to read, correct, correct.■
■
So, much easier on the right hand side, yes.■
■
So, uh.■
■
So, annotate the data right now and people■
will see this as the graphs get more and more■
■
crowded and you have more and more data points.■
■
Annotation tends to become a bit sticky because■
it starts looking very messy, right, yeah■
■
yeah.■
■
So, fair enough, fair enough right.■
■
So, again you go back and annotate critical■
points you do not have to annotate every single■
■
data point okay things like that.■
■
So, you know, let us say you have 300 points■
on the x-axis and then you know, can you imagine■
■
a graph which has 300 little labels like that?■
■
It just becomes noise.■

Right for annotation it is important but it is judicious and selective on the annotation, precisely I mean yeah.

Simply because it is listed as one of the important principles, do not blindly use it, it has been our consistent message, yes, correct okay.

So, these are four principles and my submission is that if you follow these principles right.

Let us put it this way you will not be wrong in what you're presenting, right, yeah.

So, I would say this as an actual put it and necessary but not sufficient condition for optimal representation of data, yeah, correct, right right yeah.

In words that I will appeal to the audience of this class right these principles are necessary but not sufficient, correct correct correct correct.

Now let us focus on the process of designing the visualization techniques and tools right.

So, you have a three-step process: first of all trying to understand the message, then choosing a particular form and then designing that particular tool right.

So, so again this here also when you say define the message what are you trying to communicate right and again there is a purpose what is the purpose of this thing.

So, if you are looking at it as a single visual component right or a sub element of a graph then you can think in terms of a purpose or it could be or what is the message I am trying

to communicate with this chart correct uh.■
■
So, there is a bit of a back and forth between■
a message and a purpose, the distinction I■
■
made but the concept is the same right um■
what is the message right.■
■
And how do I ensure that when the person reading■
sees the graph he or she gets the same message■
■
that I am trying to communicate, yes that■
is very important.■
■
That is the key right that yeah what is being■
transmitted has to be received it has to be■
■
what is received right no loss in translation.■
■
Yes no loss in translation checksum should■
be there yes uh.■
■
So, that is fun and that is the key right.■
■
So, if I am trying to say something to somebody■
because you are not always going to be standing■
■
around trying to gain an ability to explain■
that graph.■
■
Somebody is going to pull up that graph or■
chart or whatever it is without the benefit■
■
of you having standing next to them, yeah■
correct.■
■
Which means that it is your responsibility■
to ensure that anybody or random let us say■
■
somebody has printed that and you see that■
graph when you buy peanuts on the beach on■
■
the paper that is that when you open it up■
you should be able to understand what the■
■
graph is, exactly, yeah yeah yeah.■
■
So, that is important right, what am I trying■
to communicate?■
■
How do I make that message clear?■

■
And at a glance you cannot come back and say■
listen if you spend 25 minutes looking through■
■
the graph and looking at the axis and this■
and that and this and you will also get the■
■
same message, yeah.■
■
You should not have to use the magnifying■
glass to decipher the message exactly correctly.■
■
So, no fine print right yes.■
■
Then I always talk about sometimes the best■
way to communicate is just write a paragraph,■
■
yeah yeah.■
■
If that is the best way to get the message■
across please do so.■
■
There is nothing that says that you have to■
show it graphically, correct, yeah.■
■
Sometimes you know I use diagrams like a flow■
diagram or a you know workflow diagram and■
■
you know this is you know especially in factories■
you will always know how material flows and■
■
you know um or sometimes it would be a graph■
sometimes it could be a tabular display.■
■
So, you have to choose the form of the visual■
display that is best aligned to the message■
■
you are trying to communicate, yeah yeah.■
■
That linkage is important: you have a message■
and what is the visual representative form■
■
that unambiguously conveys the same message■
that I want to convey, yeah that is critical,■
■
correct.■
■
And then there is a set of design principles■
correct.■
■
And these design principles come into play■

to ensure that visual cognitive cognition■
■
is correct.■
■
Yes, do not confuse you and you know I will■
spend a lot of time on that as well because■
■
I think that is where people also go terribly■
wrong at times.■
■
Choosing the right form in my opinion is actually■
much easier because once you get a clear message■
■
the form almost suggests itself, yeah yeah■
yeah.■
■
But the design principle is what makes a difference.■
■
So, I am equal when I say that right I mean■
you know I am just trying to draw parallel■
■
to see what people might understand.■
■
I would go to the equivalent or you drive■
it through the offside because it is a nice■
■
half volley outside the half stump.■
■
The short that you play is natural; you do■
not try to hook that ball.■
■
You can drive it through half the side.■
■
Because it is a nice half volley through the■
half side so often marked once you get the■
■
message the form suggests itself naturally,■
correct, yes.■
■
Unless you are MS Dhoni you do not try to■
helicopter shot the ball over midwicket correctly■
■
if it is if the ball is outside the off stream■
you will hit it through the half side through■
■
the offside by and large it suggests itself,■
right uh.■
■
So, that is what we may say you know when■
you get the right message the form kind of■
■

suggests itself.■
■
But the design principles make a difference■
right and that is the difference between Rahul■
■
Marathe or Anand driving the ball through■
the covers and Virat Kohli driving the ball■
■
through the covers, yeah right yeah yeah and■
that is where the design principles come,■
■
right.■
■
People will pay money to see Virat Kohli do■
this and you know you and I will.■
■
I do not think people will watch it even if■
we pay money to do it.■
■
So, I think that is where the difference comes■
correct.■
■
So, we will just go through a few of those■
things exactly.■
■
So, let us focus on these three things a little■
bit more right, yeah okay.■
■
I think we have a few examples that we will■
talk about right precisely precisely, yes.■
■
This is okay this is where we can actually■
end this session and move on to the next session.■
■
So, let me start the second session, ■
welcoming back the audience to this ■
■
visualization session. In the last session, ■
we had focused on the three-step process of ■
■
having a message is important. Once we have the ■
message loud and clear the form of visualization ■
■
becomes important and how do you design that ■
form was what was discussed in the last session. ■
■
Let us take examples of these three parts of ■
the visualization process in this session.■
■
■
Starting with defining the message as we have ■

said message is the most important starting point ■
■
unless the message is not clear how are you going ■
to design the visualization for the data. ■
■
■
So, why do you think the message is important. ■
So, again right now what is the purpose? ■
■
you know we do not sit here and create graph ■
charts for fun. we do it for a reason, now ■
■
a simple example So, I and on the right what you ■
see is a tabular this one where we have shown the ■
■
number of people like various age ■
buckets and the number of aids cases. ■
■
■
So, now what is it that you want to show. Now ■
my display will this one if I look at this, ■
■
I can look at several things that messages that ■
I might want to communicate with the same data. ■
■
I might want to come back and say between ■
35 to 39 that is the single largest ■
■
age bucket that we have aids cases and you can ■
see that in the data or I might come back and say ■
■
you know what between 30 to 39 that represents ■
the two largest buckets that are quite a lot.■
■
■
No, but I might also want to come back and ■
say do you know what there are close to 7000 ■
■
cases of children under five years ■
now to me depending on my objective ■
■
that might be what I want to emphasize. Do you ■
realize that there are kids under five with no ■
■
fault of theirs and there are 7000 and if ■
you want to say take it up to 12 years old ■
■
there are 10000 children under the age ■
of 12 who are suffering from AIDS?■
■
■

And these are children who have contracted ■
AIDS for no fault of theirs. So, in some ways, ■
■
I might be looking to emphasize that in some cases ■
I might be embarrassing just a statistically that ■
■
this is the most at-risk group, in the 25 to 39 ■
range whatever it may be. So, depending on what ■
■
is message what do I want to communicate here, and ■
accordingly, you will construct the display. ■
■
■
So, now the message is once the message is ■
understood choosing a form becomes apparent.■
■
■
And so, for instance, if I were to look at ■
it the thing that I will show is the one on ■
■
the right side which is a very simple columnar ■
display because it tells you very clearly where ■
■
the peak is. The second thing is also the ■
point I emphasized about using a line graph ■
■
for categorical data it does it. So, now ■
the data is categorical your bug indeed. ■
■
■
So, it does not make sense to make a line ■
graph. So, here is what I want to show. So, ■
■
that is what I meant by saying once I get ■
the data and I communicate this then the ■
■
form dictionary form becomes very self-evident ■
because it is a combination of the message the ■
■
type of data and when you put those two ■
together it is very self-evident that ■
■
what type of display you want to choose.■
And then, of course, I have applied all the ■
■
principles that I spoke about but because we are ■
building up those principles, for instance, I ■
■
have not annotated the data here There are things ■
like that but this is done to illustrate the point ■
■

and in fact, there are a few other things that I ■
will talk about for instance even in this display ■
■
If you look at the age buckets, I am not ■
a big fan of those vertical spacing.■
■
■
I mean because what you expect me to do is ■
lie down every time, I have to read this graph ■
■
tilt back or tilt the laptop up and down and ■
in fact it makes it worse if it is on a mobile ■
■
device when I tilt it, it auto rotates. So, that ■
does not help me either. So, there are others ■
■
and that will come in to address those points ■
when we talk about the design elements. ■
■
So, there are some recommended best ■
practices when we choose a form. ■
■
■
So, one of the things again see look at ■
this, I have sales numbers for two years ■
■
Jan to December for two weeks. Now the message I ■
want.is that you know there does not seem to be ■
■
any kind of seasonality. That ■
is the message I want to show. ■
■
And the secondary message might be that the trend ■
is all wrong in 2004 the trend is not right.■
■
■
Now if I throw it in a tabular display like ■
this that message just does not come across, ■
■
I mean if I show the table, it is impossible to ■
show that you know maybe at some level a trend ■
■
might be visible but if my purpose message is sure ■
that there is no seasonality. The tabular display ■
■
does not show it to me it does not help. But ■
when I show it as a graphical display like that ■
■
the lack of seasonality shows up very ■
clearly that there is no seasoning.■
■

■
The trend is somewhat visible in the tabular ■
display correct but it takes some effort,2004 ■
■
trend is probably a little bit more evident ■
than the 2003 trend because if you look at ■
■
2004 if you can top to bottom you can see it is ■
monotonically reducing. 2003 is not that way. So, ■
■
it is kind of goes up goes down and then if ■
you look towards the end, it flattens out. ■
■
■
So, the trend is not very clearly evident in the ■
2003 trend, again if I want to show that there is ■
■
no seasonality very clearly the right display is ■
big. Even for trend-right is preferred because if ■
■
one goes and looks at how many seconds it took for ■
you to understand that 2004 there is a downward ■
■
trend 2003 was an upward trend by looking at the ■
right graph and looking at the left table.■
■
■
Then you will understand what ■
I mean by saying the form is ■
■
you know the whole idea is how do you communicate ■
that quickly without any loss in transmission. ■
■
But I mean are there some general rules about ■
when to use a table and when to use a chart ■
■
there are some general rules.■
There are correct so for instance ■
■
when you want to display a complete ■
data set now it may not be practical ■
■
but if you want to show this one. Where we are ■
just showing the data, we may not necessarily ■
■
be inferring something from that or I might see ■
especially if you are looking at the customer ■
■
service MPS course you might just want to show ■
the kind of complete data in a table, right.■
■

■
You might want to show if you want to highlight ■
a specific row if you want to show like all the ■
■
product categories and you just want to show them, ■
I want to factually tell you what is the sales of ■
■
every product category. I am not trying to tell ■
you that a is bigger than b or b is bigger than ■
■
c. I am just trying to factually communicate ■
that by stating these are my sales numbers.■
■
■
I am not trying to tell you that Tamil Nadu did ■
more sales in Karnataka which did more sales in ■
■
Maharashtra I am just trying to tell you that ■
Tamil Nadu hit 20 million in sales and Karnataka ■
■
24 million in sales tabular display or if ■
you wanted to say look focus here focus ■
■
there you can highlight a certain row again ■
emphasis. Now sometimes you will want to show ■
■
how the numbers are calculated. ■
So, you might say look the way it was calculated ■
■
was revenue cost margins. So, sometimes when ■
you show that it might be easier to show it than ■
■
a tabular display where you can see how it ■
is calculated. And it happens often right ■
■
you will just say revenues cost margins ■
or what you call wrong metrics right. ■
■
■
You know we will call it to drum matrix revenue ■
units and markets which helps this one chart ■
■
will come exactly like when you want to show ■
patterns, we want to show a change over time. ■
■
So, for some cause and effect occasionally ■
you have to be very careful about that ■
■
I only want to compare two things. Comparison is ■
probably the most common use case for charts.■
■

■
I mean essentially a pattern is ■
effectively a meta comparison, ■
■
I can compare two things when I show that same ■
comparison multiple objects show a pattern ■
■
or multiple, and when you show that over time it ■
shows it becomes a time series. So, at some level, ■
■
these are all kinds of specific instances of ■
the same concept. So, visual comparison. ■
■
■
So, data tables are used for two things one is ■
just factually communicating the numbers without ■
■
drawing inference. I want to show specific ■
items where I will show this and highlight one ■
■
correct and if you want to show ■
visibility into the calculations ■
■
okay you know what a b c this is ■
how the margins stack up etcetera. ■
■
So, that you can compare multiple ■
things together right, and sometimes ■
■
just if you have equal enough you have a wide ■
number of columns and a whole number of rows.■
■
■
A graphical chart display might become overly ■
complicated in which case the simplicity mandates ■
■
that you just show it as a table and that is ■
also important. So, for instance, if I have ■
■
20 let us say I have sales I have something ■
and I want to show by state but then I also ■
■
want to show unit sold revenue made margins ■
made percentage margin what is the profit ■
■
how many sales agents were there how many ■
outlets were there and if you want to ■
■
show 20 different metrics for those trying to ■
show that in one graph will be impossible.■
■

■
You are better off showing it as a tabular display ■
than going out and taking out individual metrics ■
■
and showing graphs to show some comparisons.■
So, there are some quick tips about when to ■
■
use a table and when to use a chart right ■
that is what we were talking about just now. ■
■
So, when you are as you are saying when ■
you have just highlighted one component. ■
■
So, if I have multiple things and I ■
just want to highlight one component ■
■
of the pie chart now I am going to put ■
a huge rider on pie charts right in ■
■
fact while I say this, I generally also say ■
friends do not let friends use pickups. ■
■
■
Pie charts are very difficult to interpret and ■
probably the most grossly misinterpreted types of ■
■
charts that you will see there. So, ■
okay the problem with pie charts is ■
■
seen when I want to show that one ■
is largely dominant over the others. ■
■
If you look at the blue light blue and dark blue, ■
can you tell me which is bigger and by how much? ■
■
Difficult little difficult yes, it is ■
exactly the reason why pie charts are;■
■
■
So perceptual right remember what I said about ■
we are very good at perceiving differences in ■
■
length and relative differences in length. ■
We are not very good at perceiving relative ■
■
differences in the area especially the shapes are ■
different if I draw a rectangle under the square ■
■
and I tell you which covers ■
are bigger and a circle and I ■
■

ask you to tell me which of these ■
covers a bigger surface area?■
■
■
Difficult very difficult and really with a ■
pie chart that is what you are asking people ■
■
to do you are asking them to compare two ■
different areas of slightly different shape ■
■
and trying to determine which is the higher ■
which has a higher area. The same pie chart ■
■
could be equivalently shown as a column chart. ■
And the message comes across very clearly. ■
■
■
So, the question is why ■
would you choose a pie chart ■
■
if the emphasis is to show the percentage ■
breakdown where it all adds up to a hundred ■
■
percent that I can you can make an argument ■
for saying pie chart. But even there ■
■
if you have two of them that are very comparable ■
right will you cannot make out the distinction ■
■
area-wise unless you annotate it.■
Exactly I was going to say annotation ■
■
might help there correct. So, that is why I said. ■
So, pie charts to me it is a chart of last resort ■
■
right. So, which is why I say right friends do ■
not let friends use my charts. So, that is a very ■
■
important right, and similarly, if you want to ■
show components of multiple items you know you use ■
■
a stacked column chart or something like that.■
Now if you look at actually an individual column ■
■
of the stack column chart that could be a pie ■
chart effectively, So, you could make a pie chart ■
■
and make it a simple column chart or a single ■
column of the stacked component. Again, ■
■
perceptually which is easier to understand, ■

yeah but here in a column chart also ■
■
comparing two orange regions and deciding which ■
one is bigger might end up becoming difficult. ■
■
■
So, and that is where you will also look at ■
your choice of what are the categories on the ■
■
x-axis and what are the categories that are on the ■
stacked columns correct also makes a difference. ■
■
So, and in fact, if you notice those guidelines ■
that I have drawn on those between the orange ■
■
that is precisely to address your point. ■
Because you can easily see remember when we ■
■
spoke about the components of perception where ■
we spoke about thickness length orientation.■
■
■
You would see the base is the orientation whether ■
it is getting thinner or thicker So, a simple ■
■
line that draws these will show you whether the ■
orange component is reducing in contribution, ■
■
So, here you will very clearly see from ■
the second column to the third column ■
■
orange has held its blue has increased ■
primarily at the expense of pink.■
■
■
Whereas that is very clear from ■
those lines that you have drawn ■
■
and between the first and the second one is ■
very clear that blue has gained a percentage ■
■
at the expense of orange. A very simple line ■
kind of addresses those things yeah that helps ■
■
small things. Now and you know look I mean instead ■
of not getting through individual this one.■
■
■
But remember when I spoke about once you ■
get the message the form is very evident ■
■

that is the whole point if your message ■
stresses this it is very evident. So, ■
■
if your message is stressing correlation right you ■
will do a scatter plot exactly. If your message is ■
■
talking about change over time you will do ■
a line chart you want to do an internet■
■
■
So that is what I meant by saying ■
you know when you get a half volume ■
■
outside the off stomp you are not ■
going to try and do a hook shot ■
■
true. So, to me just. So, this is just a quick ■
recorder no hard and fast rule but broadly ■
■
speaking that is how you think about it correct, ■
and here are some examples for that right. ■
■
■
So, for example, if you want to say ■
sales of A bigger than sales of B ■
■
so again this is one more thing where ■
people might show it as a pie chart, ■
■
that does not come across that ■
you know a exceeds C by almost 2x ■
■
yes whereas here it does come across yes once ■
again yeah principle that the height is easily ■
■
perceptible than the area. that is so critical So, ■
very simple I will go to the next one right.■
■
■
If my message is that there is no apparent ■
relationship between and there is no correlation ■
■
correct a simple scatter plot with a regression ■
line that tells you that you know effectively ■
■
there is no correlation. But a pie chart ■
does have its place right for example ■
■
if you want to show the contribution. ■
So, that is why I said but notice that I have ■
■

taken the trouble to annotate it very carefully ■
which is critical. Without annotation right ■
■
honestly speaking it will be able to tell between ■
C and B what is the relative strength you cannot ■
■
difficult. So, when using if you do have to use a ■
pie chart or if you do choose to use a pie chart ■
■
correct make sure that annotations are there.■
But also remember this right the message here ■
■
is that our competitor A has the competitor D ■
has the smallest share. That pie chart is okay. ■
■
If I want to do a comparison between A B C ■
and D and show their relative strengths pie ■
■
chart may not be appropriate but you may not ■
the message is that that guy is the smallest ■
■
no problem but if you want to come back ■
and say you know if you combine D and C ■
■
where they have the same market share ■
as B okay. This will fail miserably, ■
■
and the time series has always been classic. ■
So, over some time correct and just again very ■
■
clearly, I just want to show that look we have a ■
problem EPS has been steadily declaring you know ■
■
it is time for a new CEO that ■
is what this is saying correct ■
■
I mean you can say all that if you just say ■
look EPS has been declining the CEO's got to go ■
■
right you are a troublemaker. You ■
show this graph then everybody says ■
■
you know what you are not a troublemaker ■
you are a whistleblower.■
■
■
And the last one is essentially an example of ■
a box plot right where clearly those dots 214 ■
■
observation number 213 observation number shows ■
that those are outside the tail and probably, they ■

■
represent the outliers in the data exactly. So, ■
you can talk of I mean I cannot emphasize enough ■
■
the concept of this outliers right.■
Because as you enter the workforce right ■
■
the biggest thing you will see is that people ■
will pick up an outlier and make a whole case ■
■
as if that is a regular event. So, you know and ■
they will call it oh I have anecdotal information ■
■
I mean that is the buzzword right and this is ■
what they teach you at all the MBA schools, ■
■
anecdotal information right.■
Draw me a box plot and show me ■
■
where it sticks and if your anecdote sits within ■
the big yellow bar I will talk if it is sitting ■
■
in that thing, I do not need to talk to you about ■
that exactly correct. So, it is very critical I ■
■
mean just to show that hey you know what this is ■
what it is. So, because they will come back and ■
■
say I spoke to this one customer and this one ■
customer had this kind of feedback and hence we ■
■
should change our entire product line.■
Are you bonkers, ■
■
if that were the case right ■
because when I talk to my daughter, ■
■
I will have to rebuild the entire Akasa ■
model and introduce business class seating, a ■
■
very nice example is very nice because she ■
just looked at it and said oh no business ■
■
class of this place? So, you know and if I ■
take that one example without understanding ■
■
where it sits on the outlier chart then you know ■
I will have a whole fleet of business classes.■
■
■
Fortunately, that is not going to make too much ■

money in India probably, yes on that front Rahul ■
■
I think I have eliminated the probability we ■
are very clear that is not the way to go into ■
■
the Indian aviation market and the data clearly ■
shows that right. So, all right okay. So, we have ■
■
knocked down two out of the three components ■
of the process of designing the visualization ■
■
for the particular data type.■
First, we discussed the importance of messaging, ■
■
and then we spoke about various forms that ■
immediately come from the message right. ■
■
So, we still have to discuss designing the form ■
but let us do that in the next session. So, ■
■
let us end the session here having knocked ■
down 3 out of 2 out of the three components ■
■
of the design. Design of visualization process. ■
So, let us end the second session here.■
■
Welcome back folks this is the third session■
on visualization.■
■
We were speaking about the process of visualization■
and the two important components were first■
■
of all trying to understand what message do■
we want to convey.■
■
And once the message is clear what form of■
visualization should be used and Anand is■
■
very happy to give the example of the cricket■
short where if the ball is outside the stamp■
■
no chance of, we looking it on a deep square■
leg.■
■
So, let us come to the third component which■
is designing the form that we have selected■
■
in the second phase of the visualization part■
over to Anand.■
■
Why designing important?■

■
Well, designing is important because you have■
got a good message you got a good form correct■
■
and the design can really completely detail■
the community message that you are trying■
■
to communicate.■
■
Almost a personal favourite is using 3D representation■
right absolutely 0 value to the message and■
■
that is being communicated correctly somebody■
decided.■
■
So, in fact, it takes it away right because■
if you look at those the bars that you see■
■
of the 25 you know which is that the two dollars■
bars which are 30 to 34 and 35 to 39, right.■
■
It is much more difficult to tell whether■
there is a difference between those two when■
■
you use 3D effects.■
■
Because of the shadow, honestly speaking my■
submission is again going back to purpose.■
■
What purpose does that 3D representation do■
whatsoever?■
■
In this case, at least right it is a harmless■
I will for your cases where you can be co■
■
counterproductive.■
■
I do not know if you have an example of a■
3D pie chart I have it on the next slide.■
■
So, I and again three same things I 3D effects■
that look this is very still same as the data■
■
is you know the same as what we saw the previous■
chart.■
■
But then we have got this 3D pie chart.■
■
If you look at it right if you look at let■
me, see the numbers a little bit right.■
■

If you look at our company which has 34 and■
the competitor here with us, 26 on the right■
■
side can pie chart on the left side it looks■
like our company and competitors have the■
■
same share.■
■
All was no, yes but look at the chart on the■
right side.■
■
yes, correct and if I wanted to do this, I■
will switch it around and rotate this pie■
■
chart.■
■
So, that competitor D which is a yellow slice■
can appear to be the same size as us.■
■
So, 3D effects have zero purposes and in some■
cases are bad this to me goes into almost■
■
deceit.■
■
Because the left side pie chart without annotations■
essentially says that our company and competitor■
■
have the same share, yes.■
■
So, that is why 3D effects are very dangerous,■
and at least you know when I used to review■
■
presentations, I would stop people whenever■
is a came in with a 3D chart I know I do not■
■
know why I do not know what reason that is■
why they got the message.■
■
I mean they are using 3D because 3D charts■
are so common everywhere today.■
■
So, I have a simple movie I will not look■
at anybody who comes into a 3D chart and it■
■
took me a while to get the message across.■
■
And I had to use multiple tools to get the■
message across but the message was and I would■
■
say you know you should never be used.■
■

And if you ask me get this particular slide■
and stick it up on your wall because this■
■
will tell you exactly why you should not use■
3D effects.■
■
And the same thing goes for even the line■
charts right we put too many things often■
■
there.■
■
Now different perspective right again you■
are showing monthly this one moreover the■
■
same we have seen this example before.■
■
We are talking about on the left side multiple■
things here right.■
■
Look at the title let us start with the title,■
right?■
■
it just says your cumulative unit sales actual■
versus plan.■
■
That is a statement of fact right.■
■
But look at the second one where I put this■
right.■
■
Sales have exceeded plan by 30000 the message■
is very clear very clear on the left side■
■
I have to calculate and not only do I have■
to calculate I have to look at the horizontal■
■
the red line show me and this one is about■
hundred extra hundred more what is the difference.■
■
So, you know what is it that it will be 300■
and 177 correct.■
■
So, you know what I said you know we said■
up for value labels wherever possible and■
■
you can delete some labels to avoid clutter.■
■
So, if you notice I have not labelled every■
single data point yes, I have to open to label■
■
every alternate one, yes.■

■
Why, it reduces clutter, and also, and since■
I have allocated that I do not need those■
■
horizontal grid lines once you annotate it■
you do not need those correct.■
■
So, again just look at aesthetically simpler■
right it is much easier more distraction right.■
■
It is the equivalent of listening to Beethoven■
with you know background white noise with■
■
some guy doing construction work in your house.■
■
I must comment that your analogies are as■
visually appealing as, I mean as they can■
■
have no I mean that is the point-like how■
to get the point across how to get the message■
■
across.■
■
So, the chart is Beethoven here on those red■
lines are the construction noise.■
■
And it is like correct but I mean in general■
by designing phase of the visualization we■
■
are trying to say that well may make it easier■
to guys exactly.■
■
But I am also calling out to see if even the■
title the key message I want to say is that■
■
you know cumulative actual sales through July■
we are ahead of the plan by 30000 I mean so,■
■
very precise and it is got the message across■
I see this.■
■
So, somebody says fantastic us a good job■
online.■
■
I mean it says I mean you want to say things■
that you want to draw attention towards right■
■
otherwise you are just keeping it open for■
discussion.■
■
So, look for this one I am going to do right?■

■
you know doctor colour that is why the director■
we should do it when I was in the department■
■
and he was ahead of the department with chemical■
legendary.■
■
He had a very interesting self-way of saying■
things right he says look if I show you an■
■
apple and you tell me it is an orange you■
are confessing to two kinds you do not know■
■
an apple and you do not know an orange understand■
principles, right?■
■
So, if you want to get something of course■
do not distract on other things because by■
■
definition people will draw their attention■
will be drawn to that and they will focus■
■
on that.■
■
So, you have to be very precise about what■
you what do you have to show.■
■
So, you know if you draw a different real■
accuracy and position when you visualize you■
■
have to be both accurate and precise.■
■
So, that completes our three-part process■
of designing visualization tools understanding■
■
the message conveying that message through■
a particular tool, and then designing that■
■
tool carefully right.■
■
I have a curiosity question for Anand.■
■
So, essentially all these charts and tables■
and these numbers get into what is called■
■
as data dashboards.■
■
So, what are our data dashboard?■
■
Dashboard right I mean and this is something■
that is there in every single I mean everybody■

■
wants to talk about dashboard.■
■
In fact, I remember seeing I think was it■
a department strip or something like that■
■
right when you had a serial executive saying■
you know and given that is coming up on Christmas■
■
gift right.■
■
So, an executive is writing a letter to Santa■
saying dear Santa all I want for this Christmas■
■
is a nice dashboard due from finance already■
has one.■
■
So, look I the whole idea of a dashboard is■
hey how do you this photo of individual graphs■
■
individual display self.■
■
A dashboard in my mind the system ah a collection■
of related displays with some purpose right.■
■
And you know no problem I think this was this■
I love this because it was created by, I think■
■
Steven Fue was considered to be, you know■
extremely good researcher and a well-known■
■
authority on dashboard design right.■
■
Dashboard definition is you know it is a visual■
display and very nicely where every word is■
■
important here.■
■
So, a visual display of the most important■
information is needed to achieve one or more■
■
objectives.■
■
Consolidated to a single screen, so it can■
be monitored and understood at a glance, every■
■
word here becomes critical.■
■
At least the ones where I reduce the font■
those you can encode it is a visual display■
■

end of the day correct what does it mean by■
visual displays that I see it and I comprehend■
■
correctly.■
■
Why do I say it is a visual display?■
■
Very often more often than not you will hear■
this thing called the interactive dashboard■
■
where you will see a dashboard and then people■
will say you can click here and we can show■
■
this and you can show that.■
■
No, I mean it is supposed to be visual right■
you do not necessarily have to make it interactive.■
■
I think you only show the most important information■
that is needed to achieve a particular object.■
■
I need the CEO to understand where we stand■
from a revenue perspective or a business performance■
■
perspective.■
■
It has to be on a single screen correct do■
not want to scroll up and down.■
■
And very easily more understood I look at■
it I know what happened the in fact very name■
■
dashboard was borrowed from the car automobile■
dashboard.■
■
I already said when you design a dashboard■
you think of the car dashboard.■
■
Can you imagine if you are driving a car and■
the dashboard requires you to reach in and■
■
push a button to look at the fuel consumption,■
push another button to understand what your■
■
speed is?■
■
I mean that speed display tells you that you■
know you are 32% over the other speed limit■
■
and that you know 78% of the and below your■
speed is that all relevant.■

■
And also, something that says that 14% of■
people in the age group 18 to 22 like this■
■
student on Facebook is that relevant.■
■
What I need to know is how fast am I driving■
it right.■
■
So, again it only shows me how fast am I driving.■
■
It does not show me anything for me anything■
which is not needed correct.■
■
I do not have to do anything to get that information■
I can look at it at the answer I can look■
■
at it at the corner of my eye and I will get■
the information.■
■
And it is all there on one screen.■
■
So, to me and somebody defines a dashboard■
this principle has to be critical.■
■
If you have to do all of these activities■
and you are throwing all this stuff onto a■
■
dashboard and then you are going to crash■
the car.■
■
The same way you put that on a business dashboard■
is useless and my personal favourite can be■
■
a real-time dashboard.■
■
A real-time cannot be a dashboard is meant■
where you look at it you glance at it you■
■
get information and then you go do what you■
have to do.■
■
A real-time is something that you are monitoring.■
■
If there is a reason to monitor something■
real-time, we should not be a dashboard it■
■
should be an entity.■
■
So, so these are all important things to consider■
when you design a dashboard.■

■
To me, I just absolutely love this definition■
right because it hits every single aspect■
■
of what a dashboard should be and what it■
should not be right.■
■
It should be at the number of times I have■
seen dashboard design with a tabular display■
■
where you have to scroll.■
■
I mean scroll some tell me this whole idea■
of the dashboard is so that you know I can■
■
put multiple matters on display at the same■
time.■
■
So, that I can say this is going down understood.■
■
Now if you put tabs then by definition, they■
are not on the same page yes if you have to■
■
scroll by the deficient amount on the same■
page and then what was the intent of food?■
■
So, and this is how one trap people fall into■
when designing dashboards right essentially■
■
is this.■
■
You will design a dashboard and it starts■
off with a nice simple concept like this.■
■
Then somebody will come back and say hey why■
do not we draw our social media data on top■
■
of that?■
■
why do not we draw our HR headcount data top■
on that, why do not we draw that also right■
■
then they need to get called an executive■
dashboard and you know what they feel proud■
■
of it for the fact that every carrier is this■
plan on one dashboard.■
■
It does not make sense at all correct.■
■
So, the director of IIT, Madras wants to see■

the dashboard.■
■
He wants to see how many students are enrolled■
how many faculty are there how many support■
■
staff what is your cost running operating■
cost incidents etcetera.■
■
He does not need to know what the GPA of the■
distribution of GPA of students was and you■
■
know how many students ah you know were absent■
for a particular class.■
■
He just needs to know all that.■
■
So, you have to think about those things and■
not try to overturn them with information.■
■
And then so they can do that correct.■
■
So, are you suggesting that before we design■
a dashboard there has to be some kind of a■
■
Pareto analysis saying figure out what is■
most?■
■
Actually, yes, I know it is not a question■
of Pareto analysis right because you know■
■
the problem with Pareto is earlier than you■
know it is a question of arbitrarily where■
■
it draws a line.■
■
You have to go back and say what is the purpose■
of this dashboard yes and what do you need■
■
to put there that helps the user of the dashboard■
achieve that precisely yes nothing else.■
■
It is not a Pareto.■
■
So, let us say the purpose of the dashboard■
is I just want to look at one metric and one■
■
metric only then only that does not show anything■
else.■
■
So, what would be the basic design principle■
of a dashboard?■

■
So, which means I do not know it is very similar■
to the same thing right the dashboard I mean■
■
even while I have a picture here even this■
is a very cluttered dashboard in my opinion.■
■
But it helps highlight the point.■
■
So, what we will say is that you will show■
the big picture.■
■
So, there are a glad you will see certain■
critical things and you know there is some■
■
color-coded red yellow green whatever you■
want to have that to draw attention.■
■
You know use colours you can zoom in on specific■
correct and then from there, you will provide■
■
a link to say here you know if you want to■
see more details you click here and you will■
■
it will take elsewhere to look at the other■
details.■
■
So, do not cramp other details into the dashboard.■
■
That should be simple.■
■
So, which means I see it I should see the■
big picture, this one gets a sense of the■
■
metrics in some nice suitable display.■
■
If you want to sort of revenue you may want■
to just show only the revenue or sometimes■
■
you will say look let me show you the trend■
of the revenue as well I think because the■
■
trend is also important.■
■
No problem but I can zoom in I can expand■
it and then I can click to get into supporting■
■
detail.■
■
Now, why is this happening?■
■

Why is that happening?■
■
And many other dashboards support that.■
■
Now that is in this case it might be a data■
warehouse monitoring dashboard.■
■
So, you can click that I say I see something■
wrong with the data warehouse system I will■
■
click that I go to the data warehouse dashboard■
correct.■
■
I see something wrong with the you know website■
I will go up and look at the website having■
■
the dashboard.■
■
So, yes there are long as big questions asked?■
■
Whenever somebody looks at a dashboard question■
should be raised correct one is what happens.■
■
But the solution to those answering those■
questions is completely separate dashboard■
■
only those questions I have heard people say■
that right when they say I understand that■
■
a glance or you should answer all the potential■
questions that have been covered?■
■
No, it should not.■
■
You should have additional information additional■
link additional accessible information that■
■
answers those questions but that is separate■
if you called that separately.■
■
You are trying to cram all that into the dashboard■
essentially you get you would mess all over■
■
the place like no you cannot drive the car■
you are only you are spending all your time■
■
reading the dashboard.■
■
That is what happens.■
■
So, that was the basic understanding but essentially■

our dashboards are you suggesting that there■
■
should be a separate dashboard for finance■
and there should be a separate dashboard for■
■
marketing but you are saying we are not saying■
that at all we are saying find out the purpose■
■
design in dashboard correct.■
■
So, typically yes for instance since you brought■
a finance marketing, that is a CEO dashboard■
■
that we come up with which will give some■
key metrics.■
■
Now there might be one or two critical metrics■
or that will show over things that will show■
■
up for representing finance and marketing.■
■
The details so far as I might want to say■
how much do I spend on marketing this month.■
■
The CEO dashboard I might not say how much■
was spent in Tamil Nadu versus Karnataka versus■
■
Kerala it is a separate market and if you■
say look looks like your spend of monthly■
■
spend this increase in your marketing why■
is that happening?■
■
You may have a separate dashboard look over■
the last few months we will increase a lot■
■
of spending in Kerala in South India which■
is why it is increasing.■
■
We have launched a new product and that is■
why we are spending more you know one of the■
■
things I should also emphasize video talking■
about marketing and this one and more correct.■
■
So, purpose and more or less one more thing■
I should emphasize talking about marketing■
■
and this one.■
■
When you design especially when you use colours■

correct accessibility becomes a big issue.■
■
Why so, for instance typically it is very■
common to use red, green, and yellow to highlight■
■
metrics that are good, bad, or need monitoring■
correctly.■
■
What happens if the person reading the dashboard■
happens, we can?■
■
So, then your red-yellow-green and if they■
have red-green colour blindness you lost the■
■
fundamental premise of why you are highlighting■
it red in green.■
■
So, there has to be designed for accessibility■
and red, yellow, green is universally accepted■
■
for good balance right.■
■
So, but then you have to have the ability■
to be able to customize it or at least end-user■
■
to come back and say look I have a certain■
visual impairment and it should switch over■
■
to 3 Different colours that are easily distinguishable■
but at the same time even for somebody who■
■
I colour blind.■
■
And in fact, when we got a lot of websites,■
they give you colour palettes that ah while■
■
they may not appear to be the same colours■
as you see it to a colourblind person they■
■
will appear they are guaranteed to appear■
as distinct colours so for different types■
■
of colour blindness.■
■
So, sometimes you know choosing the palette■
is also important right.■
■
And then I saw him.■
■
So, when I saw this red that is the first■
thing that struck me you know what if the■

person here, I am looking at it when colour
blind they will not know to understand between
which system is red and which system is green.
And you know as fundamental and communication
error that could be right correct.
So, you are right.
So, to the point right that you have to have
these kinds of high level and then break down
dashboards and then you know further breakdowns
and things like that.
And you can always have them on link interlink
where if a question comes up you can always
pull up the other dashboard and then dig.
But do not try to bring everything into the
same dashboard, correct.
Thank you Annad thank you for your insights
that does help in understanding why visualization
is important and once you have understood
the purpose how to go about doing it?
So, thanks a lot, and hopefully this session
is helpful.
So, thank you, now always a pleasure for her
anytime happy to help thank you.
So, let us end the session here.