

JEITA LPB相互設計セミナー

## 相互設計の課題とソリューション

～なぜ我々はLPBを始めたのか？～

2012/3/14

JEITA LPB相互設計ワーキンググループ

- ***Why we need LPB format?***
- ***Working with LPB format.***

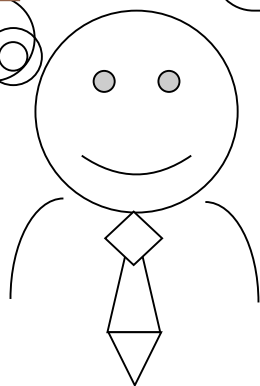
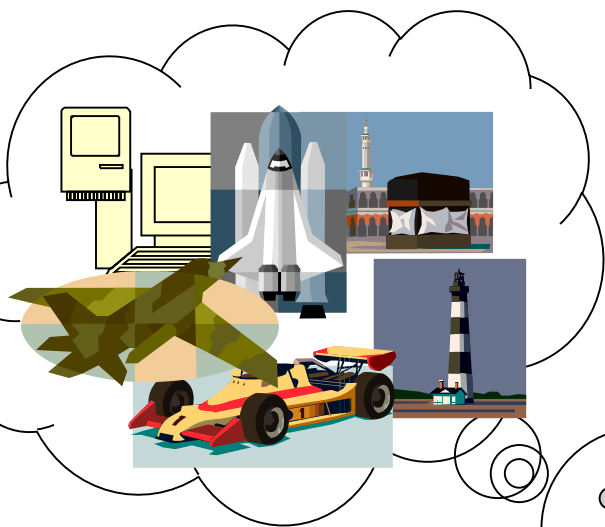


*We need a something for  
the communication.*

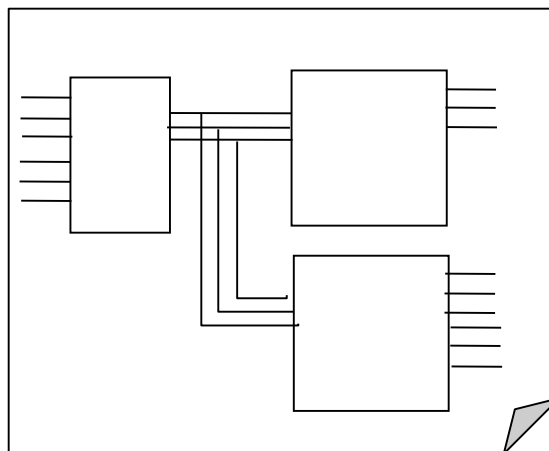


*We need something for the communication.*

## System designer



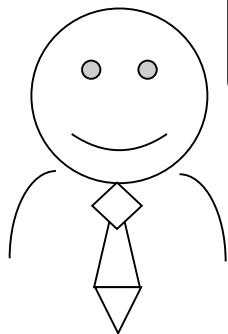
**I need a new LSI  
for my product**



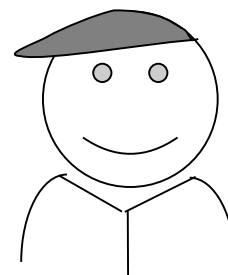
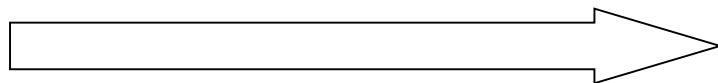
*We need something for the communication.*

**System designer**

**LSI designer**



**The architect of  
this LSI is .....**



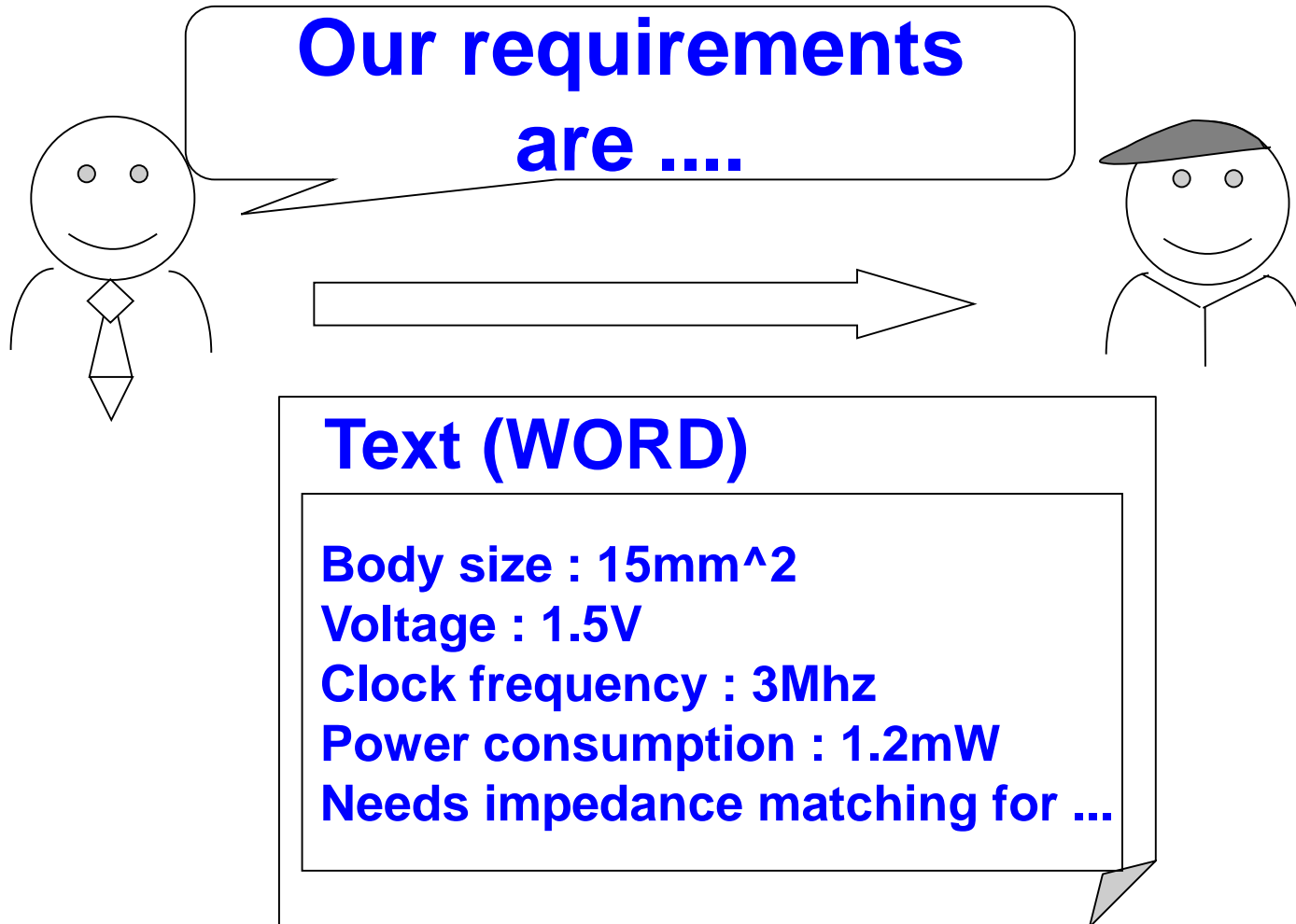
**Picture(Visio)**



*We need something for the communication.*

**System designer**

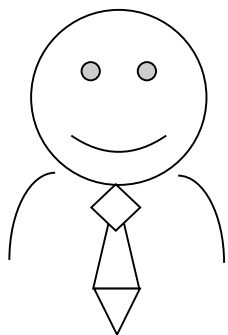
**LSI designer**



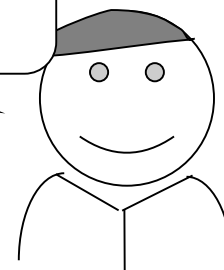
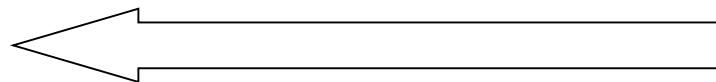
*We need something for the communication.*

**System designer**

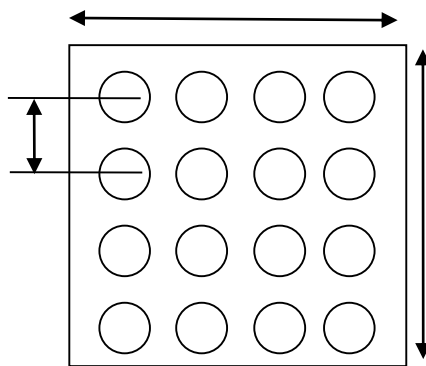
**LSI designer**



**How is this package?**



**Picture (Power Point)**

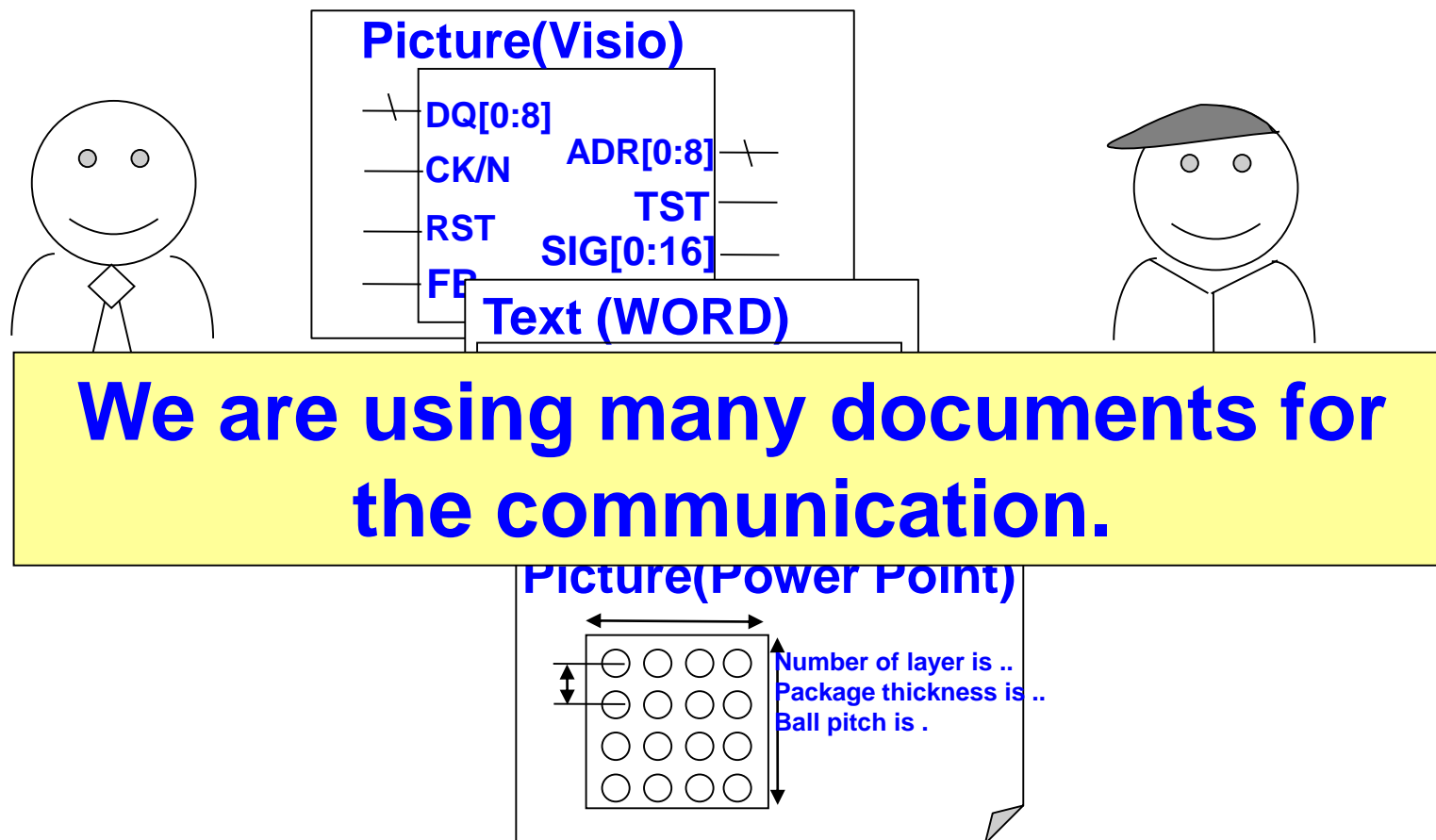


**Number of layer is ..  
Package thickness is ..  
Ball pitch is .**

*We need something for the communication.*

**System designer**

**LSI designer**

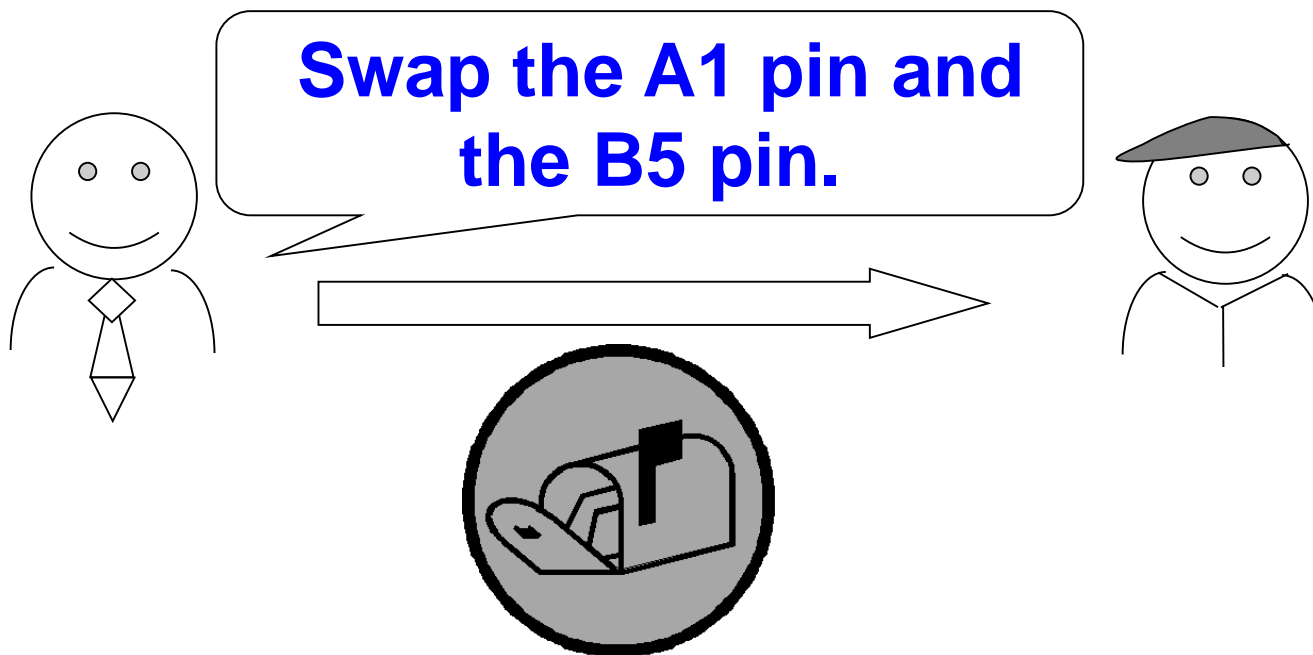




*We need something for the communication.*

**System designer**

**LSI designer**

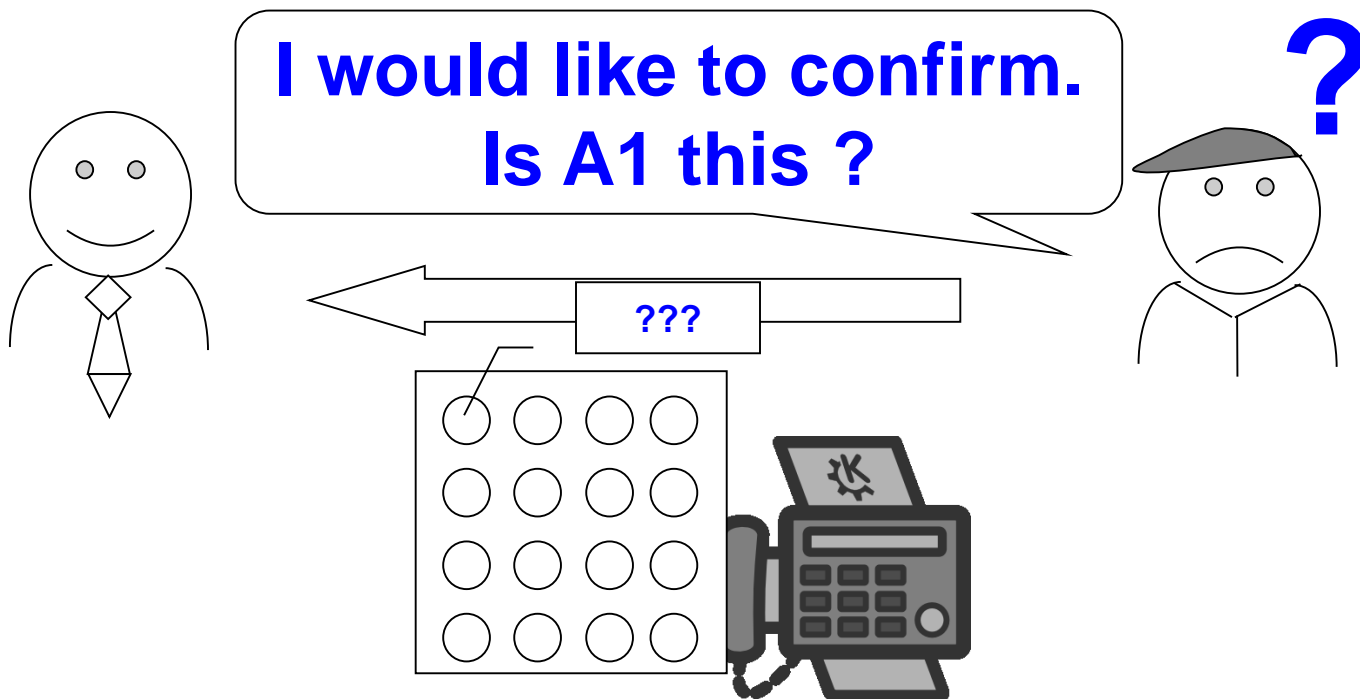


**E-mail without documents  
maintenance.**

*We need something for the communication.*

**System designer**

**LSI designer**

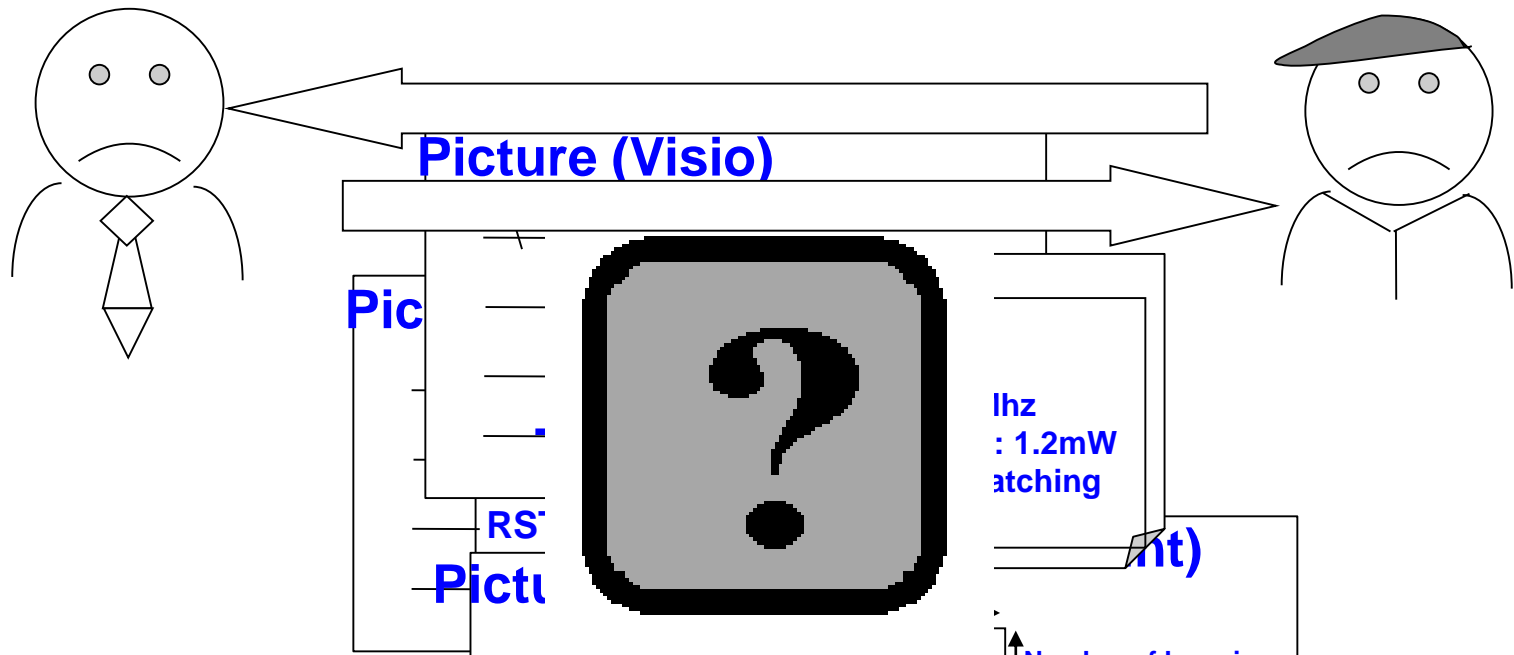


**FAX without documents  
maintenance.**

*We need something for the communication.*

**System designer**

**LSI designer**



**We spend many times for  
the communication.**

*We need something for the communication.*

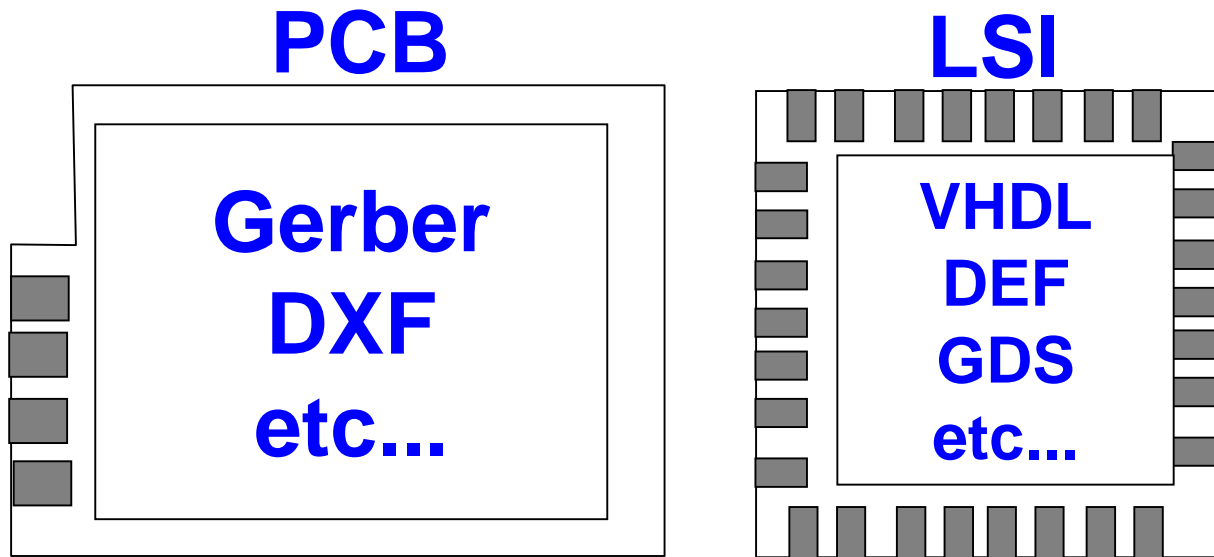
**System designer**

**LSI designer**



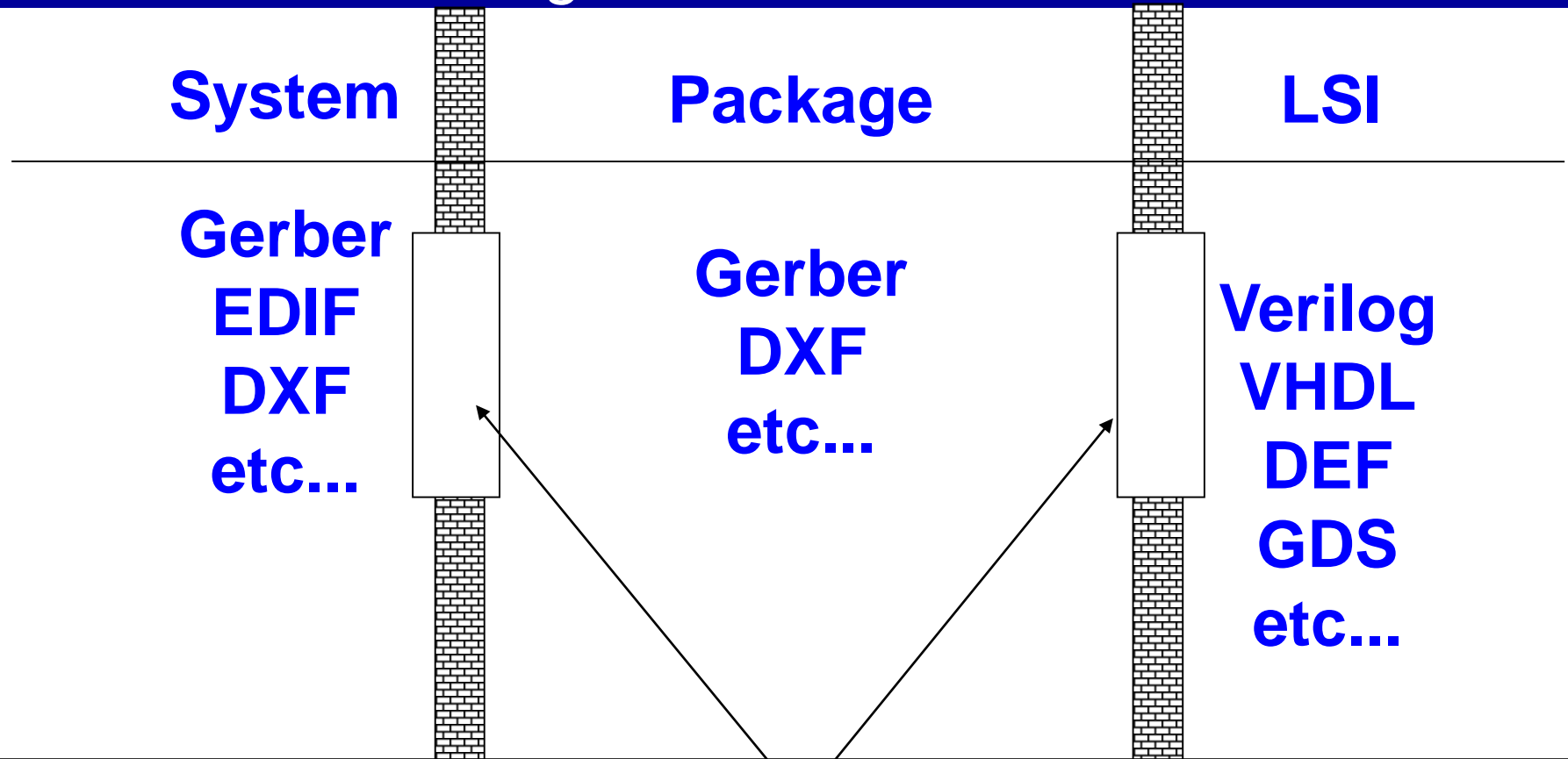
**"We have to communicate  
with one document"**

*We need something for the communication.*



All formats are used to define the  
inside of object.

*We need something for the communication.*

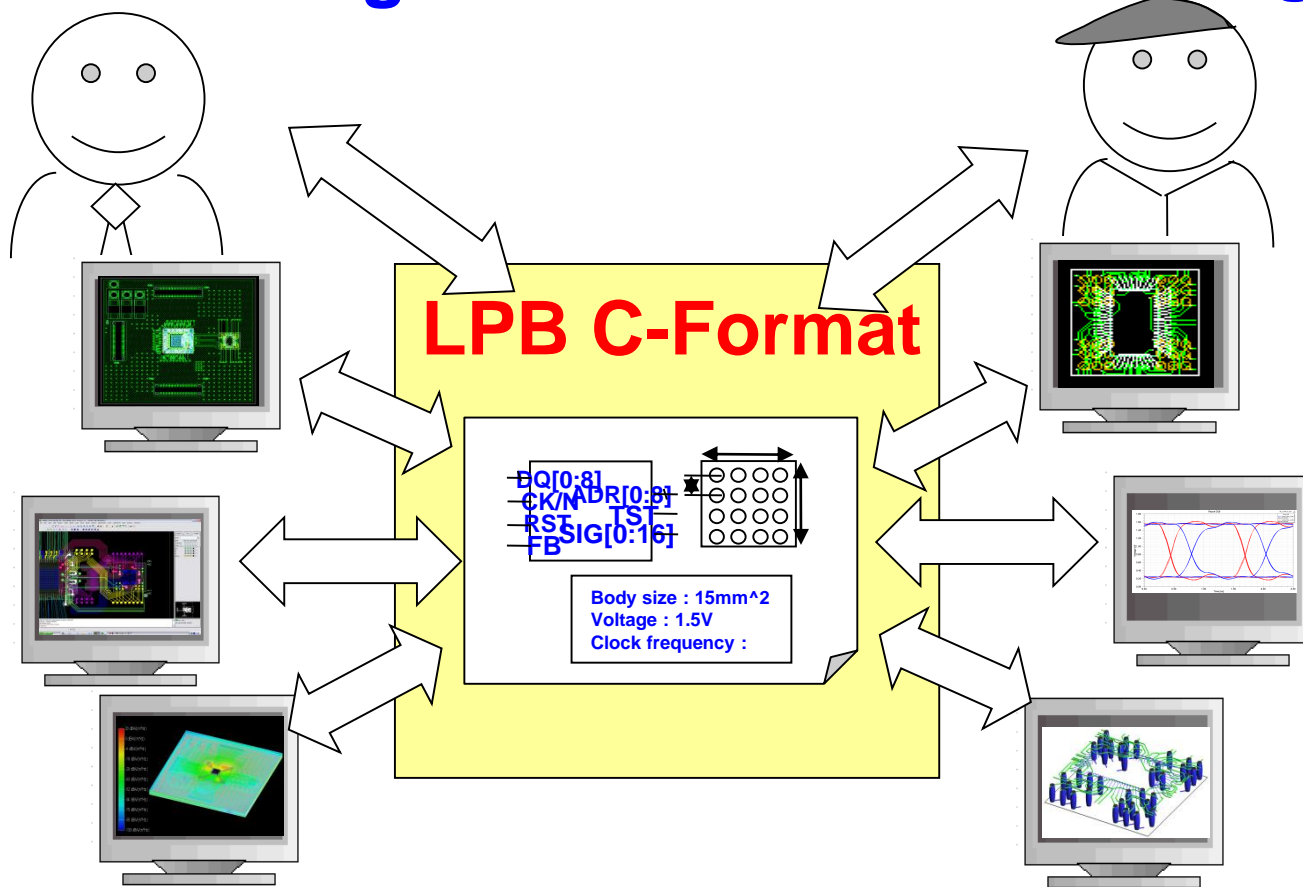


**The *something* is LPB C-Format.  
We call the boundary as a *socket*.**

*We need something for the communication.*

**System designer**

**LSI designer**



**LPB C-Format**

***C is component or communication***

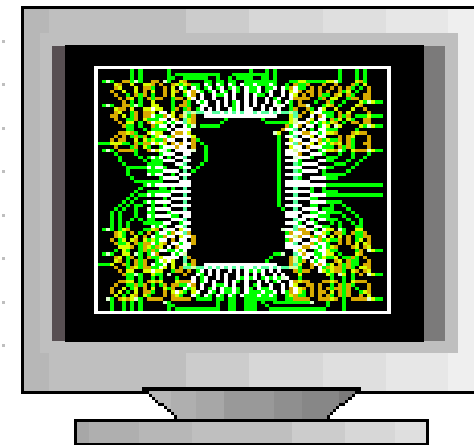
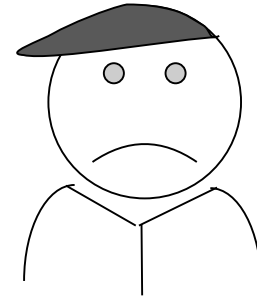
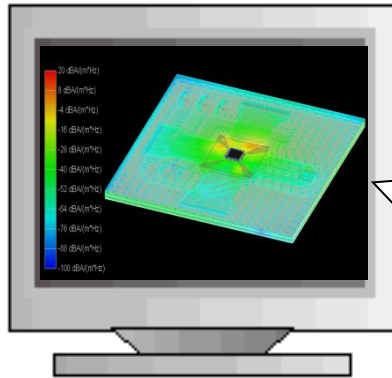
*We need a something  
between EDA tools.*



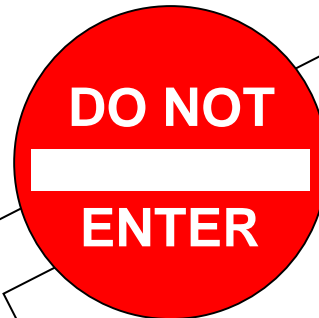
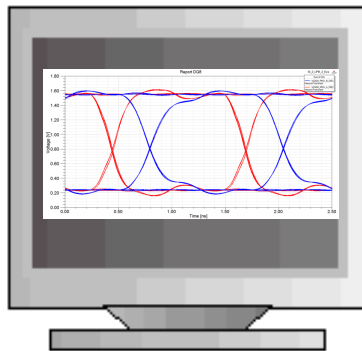


# We need something between EDA tools.

## Modeling

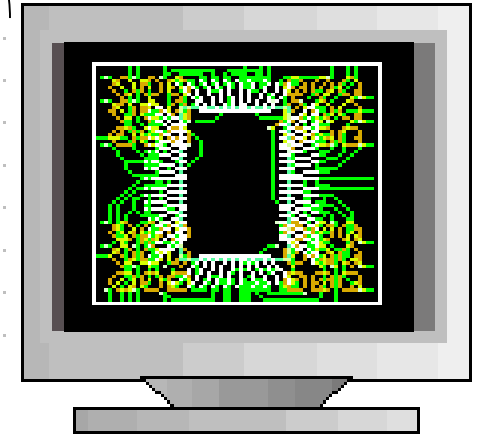
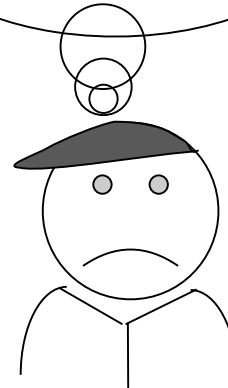
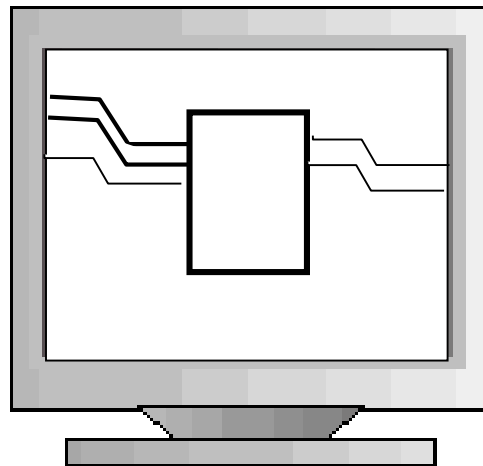
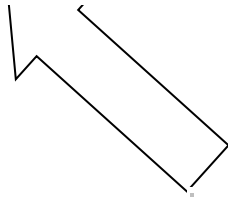
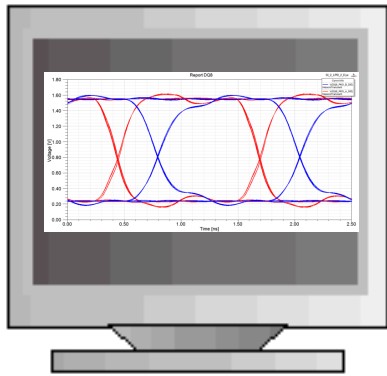


**CAD  
Artwork**



We need something between

**Why we need to  
redraw it for  
modeling ?**

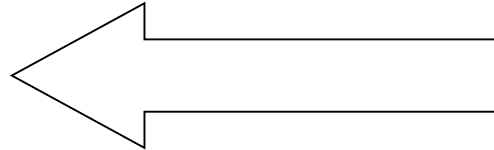
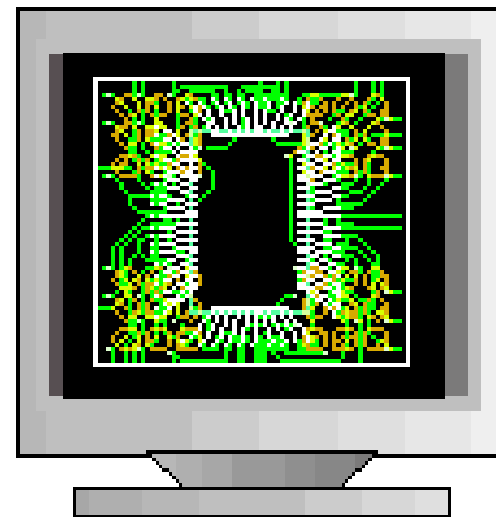
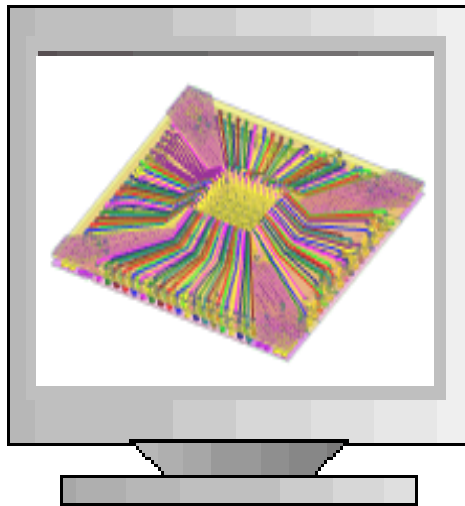


# We need something between EDA tools.

**Why is the  
unnecessary  
layer contained?**

**CAD  
Artwork**

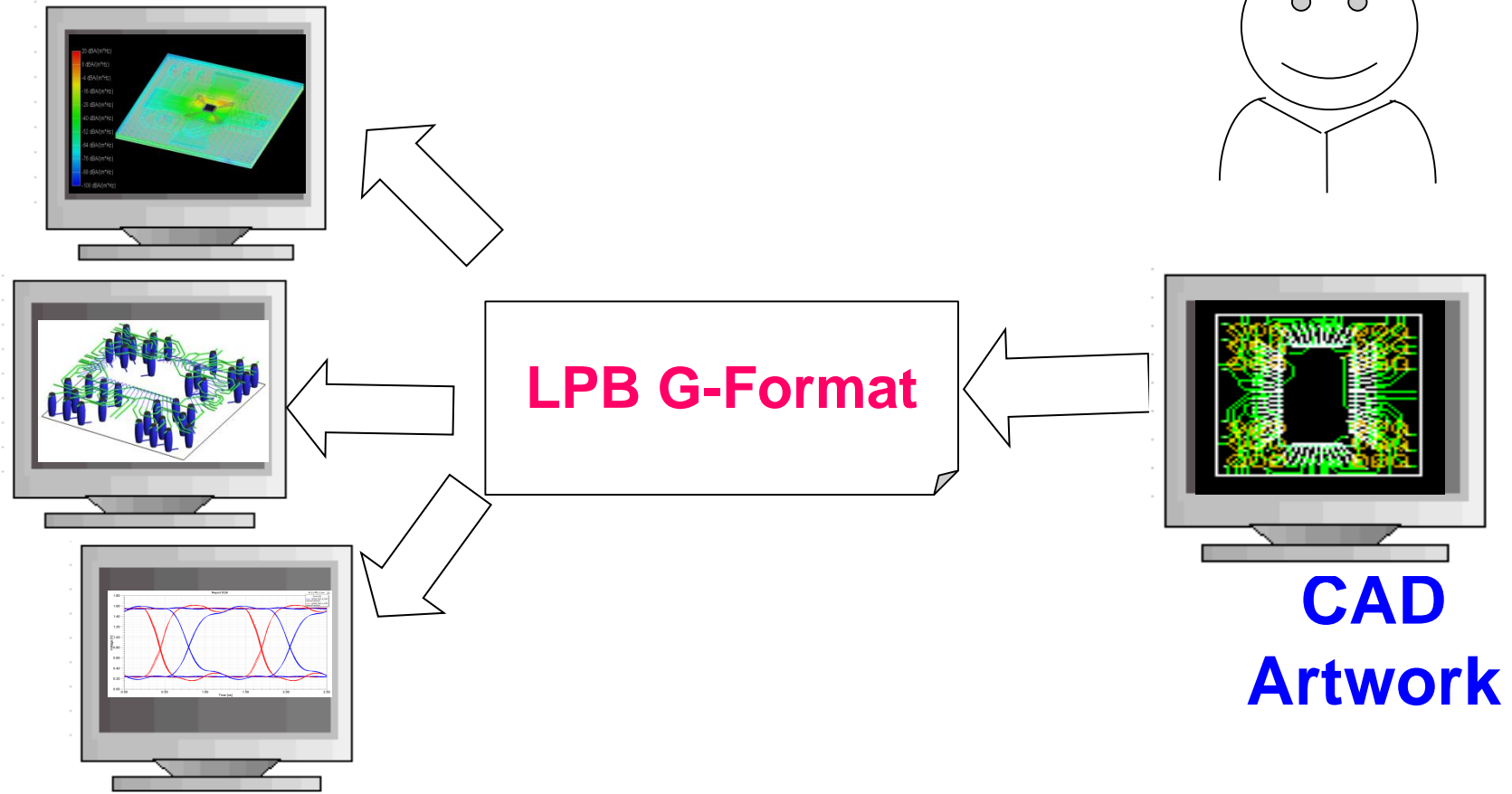
**Modeling**



CompA				
CompB				
DrillHole				
Boundary				
L1				
D1				
L2				
D2				
L3				
D3				
L4				
Hole2				

# We need something between EDA tools.

## Modeling



# LPB G-Format

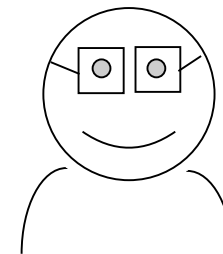
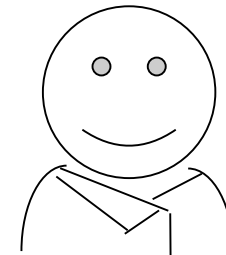
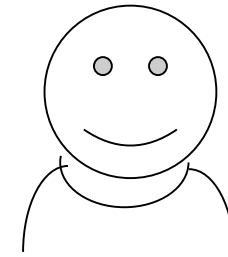
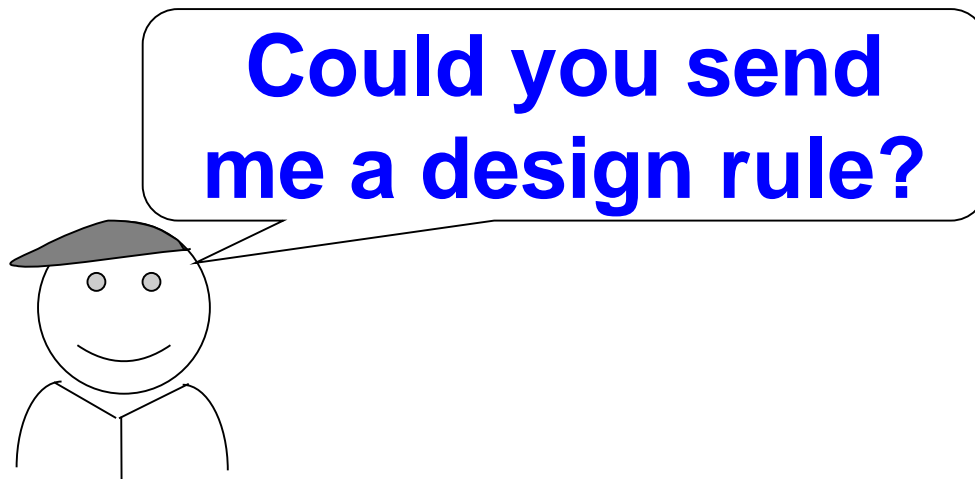
*G is geometry*

*We need a something  
for the reference.*



# We need something for the reference.

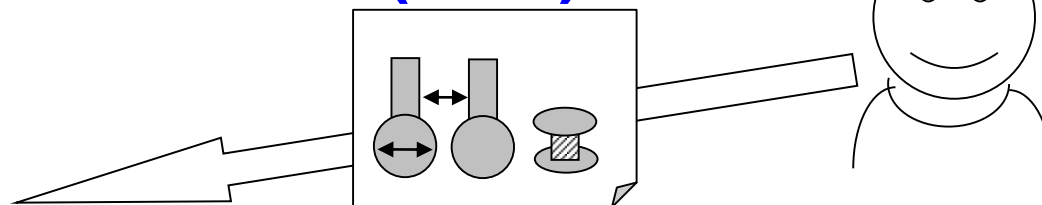
## Package vendor



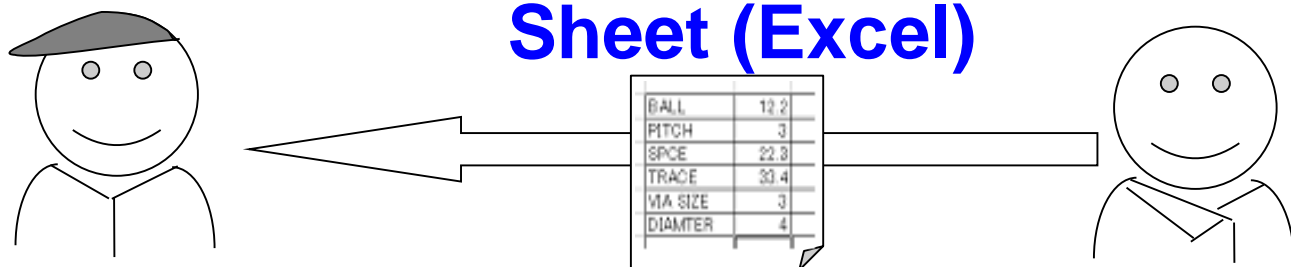
# We need something for the reference.

## Package vendor

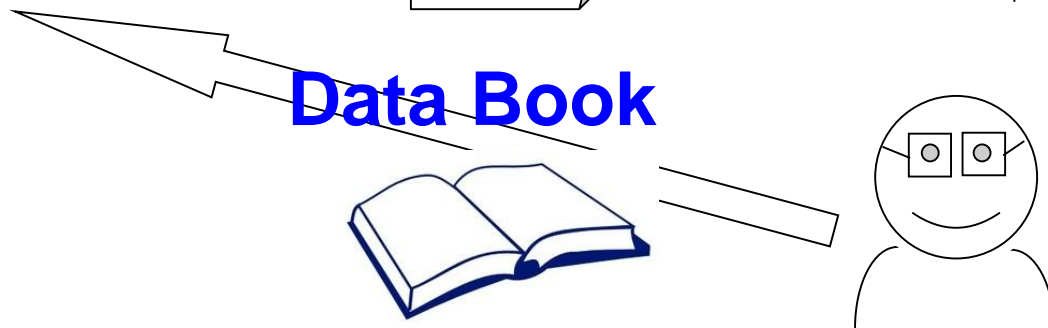
### Picture (PDF)



### Sheet (Excel)

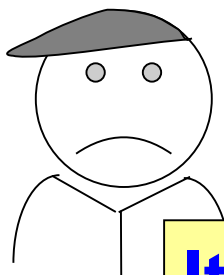


### Data Book

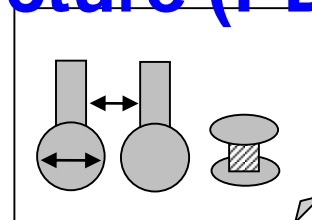


# We need something for the reference.

**Which one is the best for my project?**



**Picture (PDF)**



**Sheet (Excel)**

BALL	12.2
PITCH	3
SPACE	22.8
TRACE	33.4
VIA SIZE	3
DIAMTER	4

**Data Book**

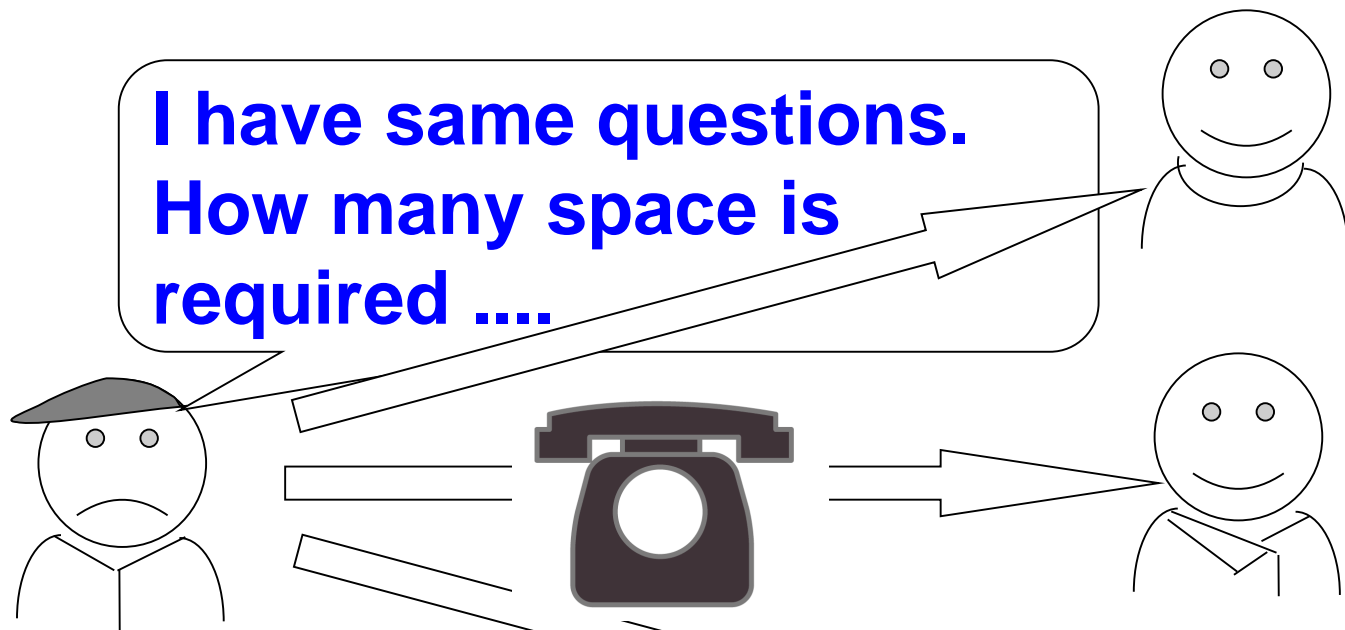


**It is difficult to compare them because the rules are defined by different form.**



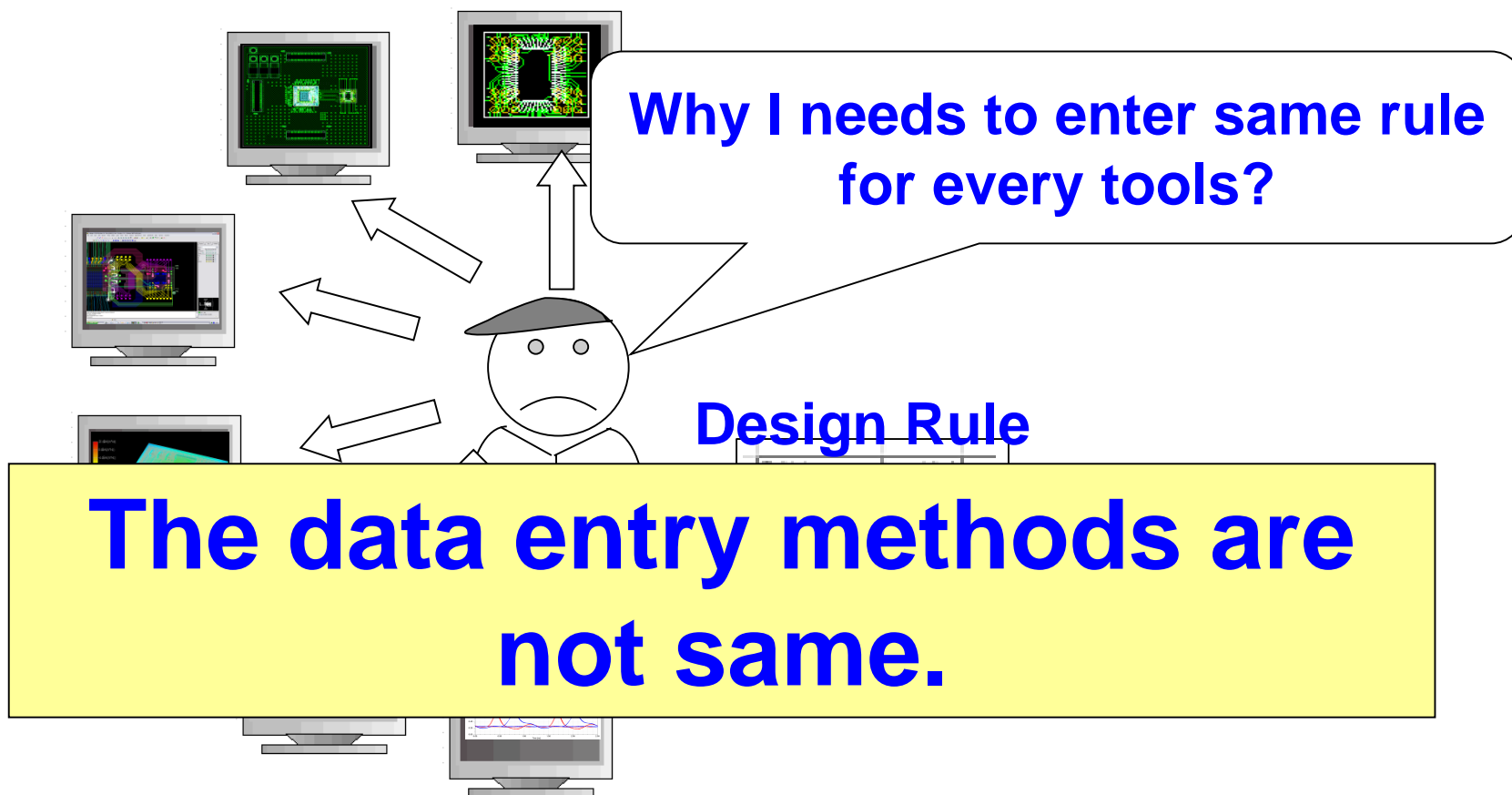
**We need something for the reference.**

**Package vendor**

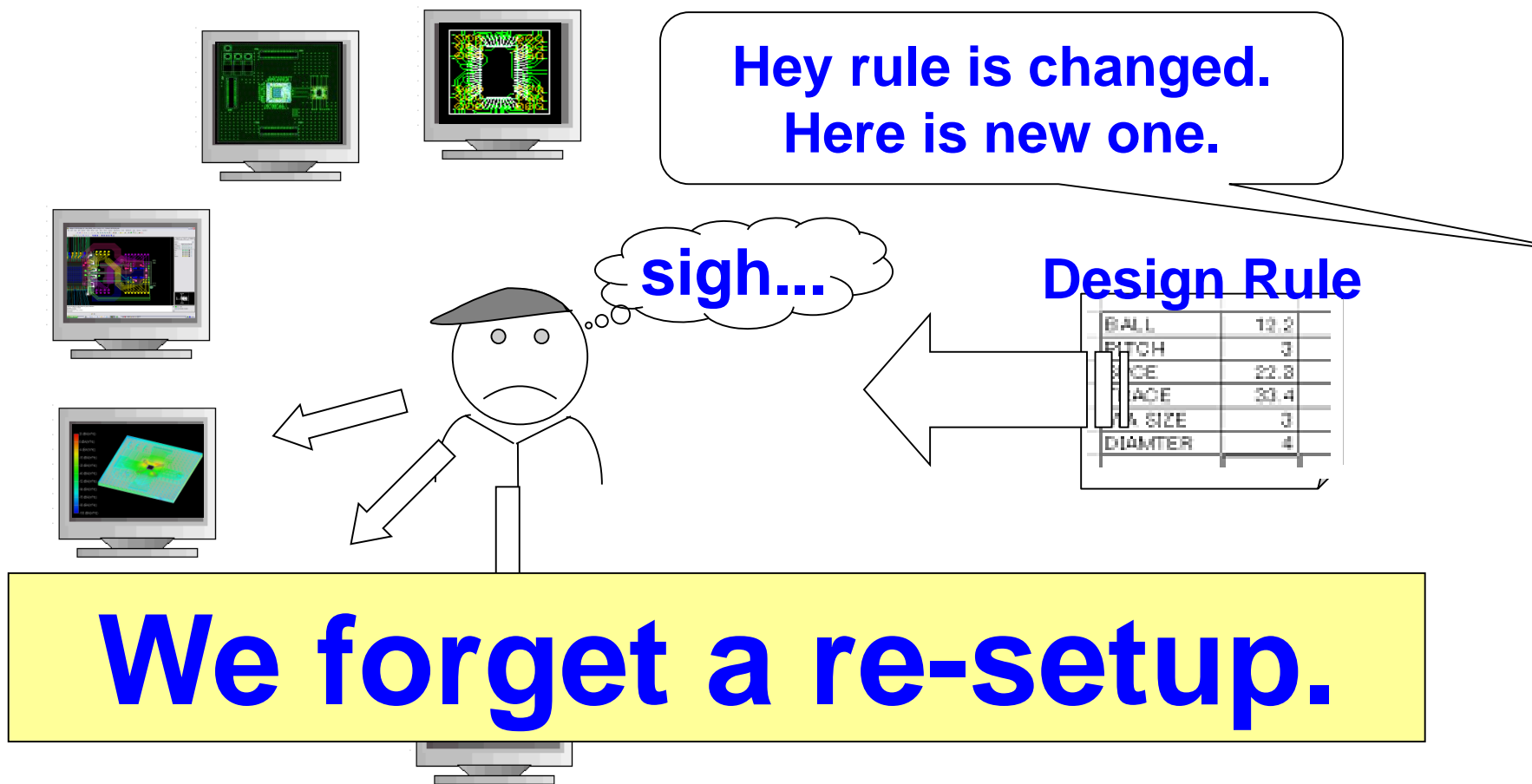


**We have to spend long time to understand the design rule.**

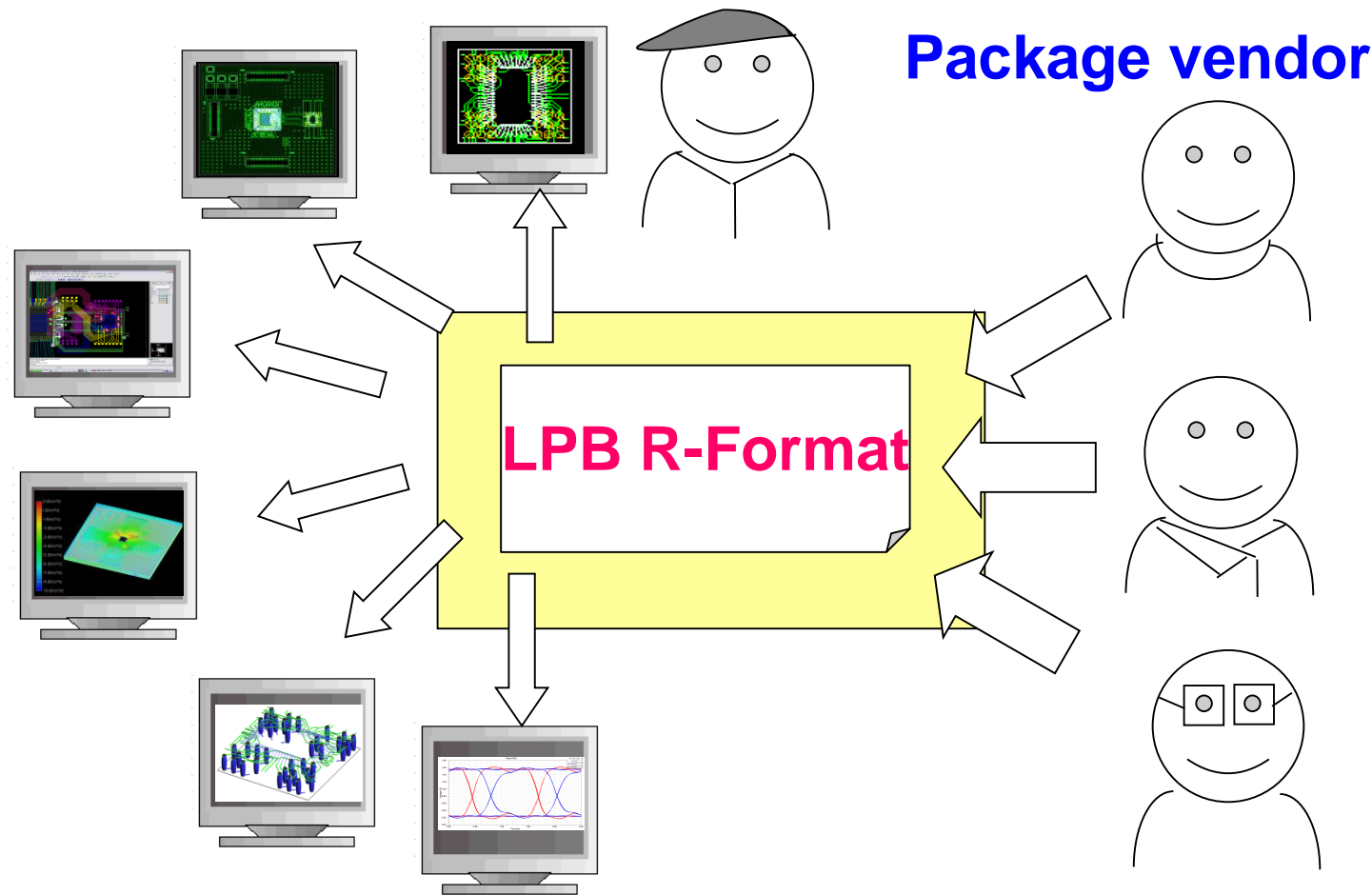
We need something for the reference.



# We need something for the reference.



We need something for the reference.



**LPB R-Format**  
*R is rule*

## N-Format

*N is netlist.*

## M-Format

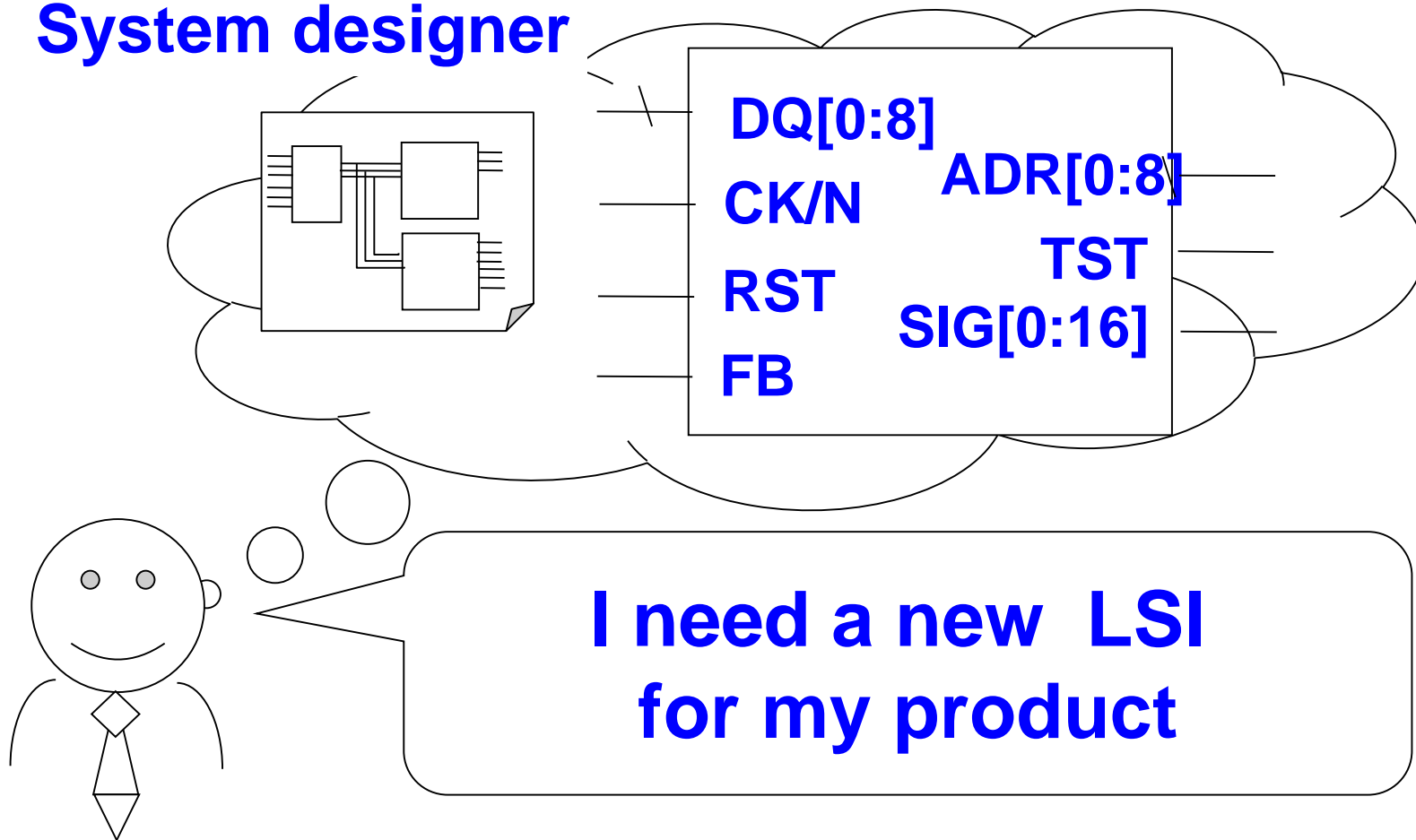
*M is management.*



# ***Working with LPB Format.***

# Working with LPB Format.

**System designer**

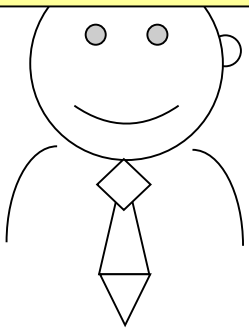


# Working with LPB Format.

**System designer**

**DQ[0:8]**

```
<module name="NEWLSI type="LIS">  
  <socket inst="IO">  
    <port name=DQ[0]/>  
    <port name=DQ[1]/>  
    :  
  </socket>  
</module>
```

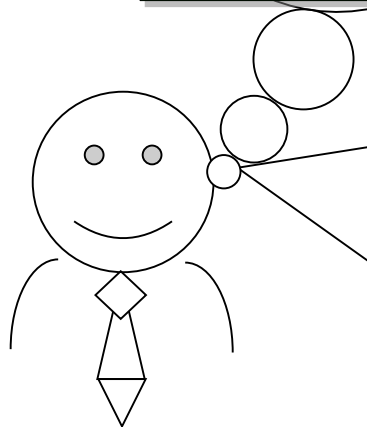
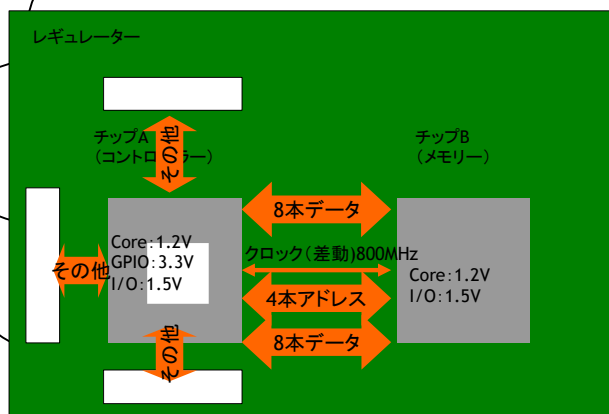


**I need a new LSI  
for my product**



# Working with LPB Format.

## System designer



**Hum.. According to this floorplan, the body size of new LSI should be ....**

# Working with LPB Format.

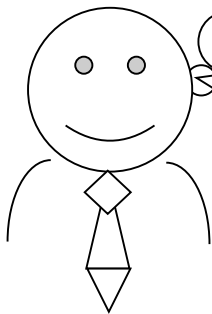
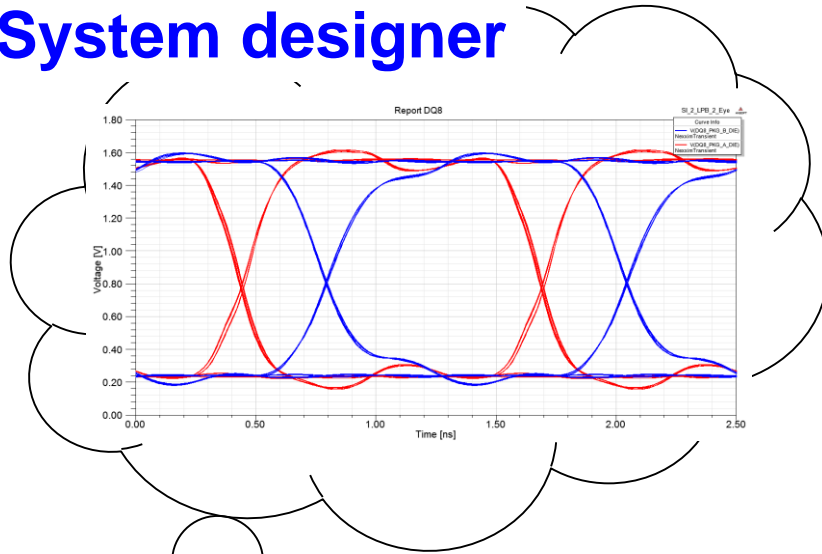
**System designer**

```
<shape>
  <rectangle id="BodySizeOfNEWLSI" width=".." height="..." />
</shape>
:
<module name="NEWLSI" type="PKG"
  shape_id="BodySizeOfNEWLSI">
  <socket inst="IO">
    <port name=DQ[0]/>
    <port name=DQ[1]/>
    :
  </socket>
</module>
```

**new LSI should be ....**

# Working with LPB Format.

**System designer**



**Hum.. according to pre-simulation, this line needs impedance matching...**

# Working with LPB Format.

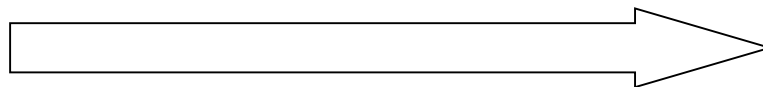
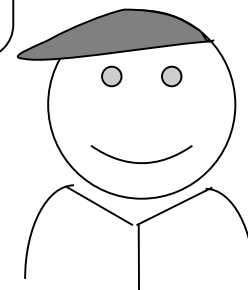
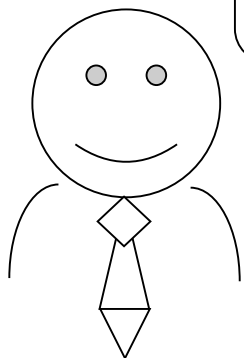
```
<shape>
  <rectangle id="BodySizeOfNEWLSI" width=".." height="..."/>
</shape>
:
<module name="NEWLSI" type="PKG"
  shape_id="BodySizeOfNEWLSI">
  <socket inst="IO">
    <port name=DQ[0]/>
    <port name=DQ[1]/>
    :
  </socket>
  <constraint>
    <impedance port_name="DQ[0]" type="single" typ="50"/>
    :
  </constraint>
</module>
```

# Working with LPB Format.

System designer

LSI designer

Here is the specification of new LSI.

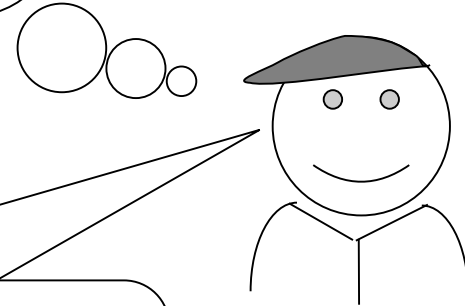
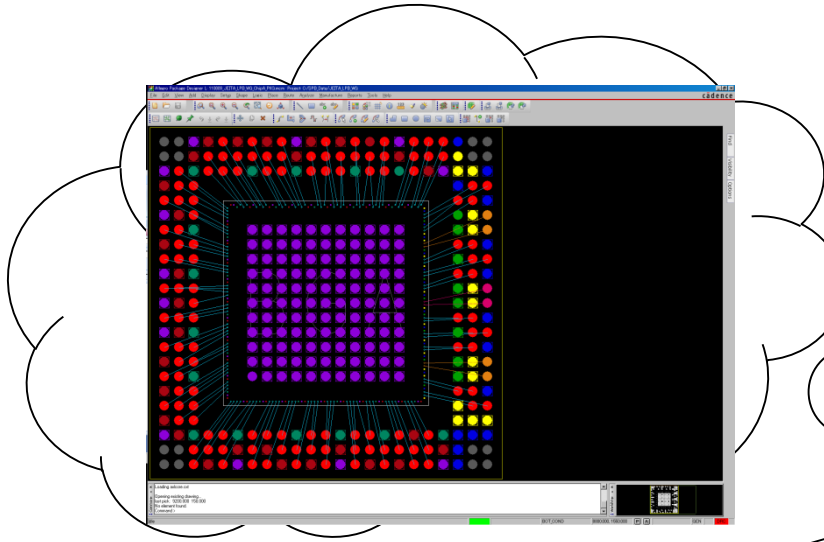


**LPB C-Format**

```
<module name="NEWLSI" type="PKG"
  shape_id="BodySizeOfNEWLSI">
  <socket inst="IO">
    <port name=DQ[0]/>
    <port name=DQ[1]/>
    :
  </socket>
  <constraint>
    <impedance port_nae="DQ[0]" type="single" typ="50"/>
    :
  </constraint>
</module>
```

# Working with LPB Format.

**LSI designer**



**This package is the best for this project.**

V

```

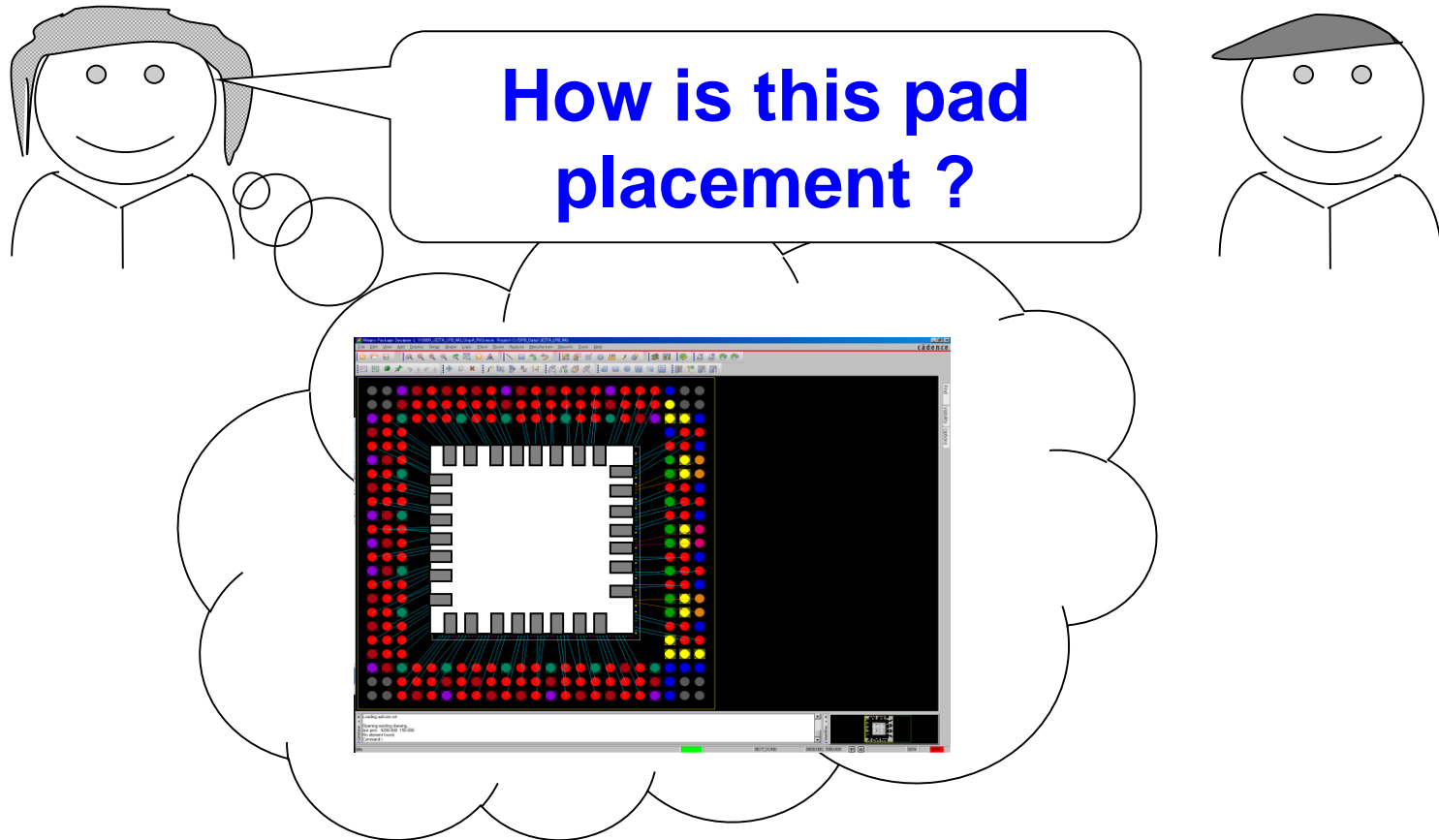
<circle id="BallSize" diameter= ... />
</shape>
<padstack_def>
  <padstack id="BallPad" type="BALL_PAD">
    <ref_shape shape_id="BallSize" layer="BOTTOM"/>
  </padstack>
</padstack_def>
:
<module name="NEWLSI" type="PKG" shape_id="BodySizeOfNEWLSI">
  <socket inst="IO">
    <default>
      <port_shape padstack_id="BallPad" />
    </default>
    <port name=DQ[0]/>
    <port name=DQ[1]/>
    :
    <port id="A1" x=".." y=".."/>
    <port id="A2" x=".." y=".."/>
    :
  </socket>
  <constraint>
    <impedance port_name="DQ[0]" type="single" typ="50"/>
    :
  </constraint>
</module>

```

# Working with LPB Format.

Chip Layout engineer

LSI designer





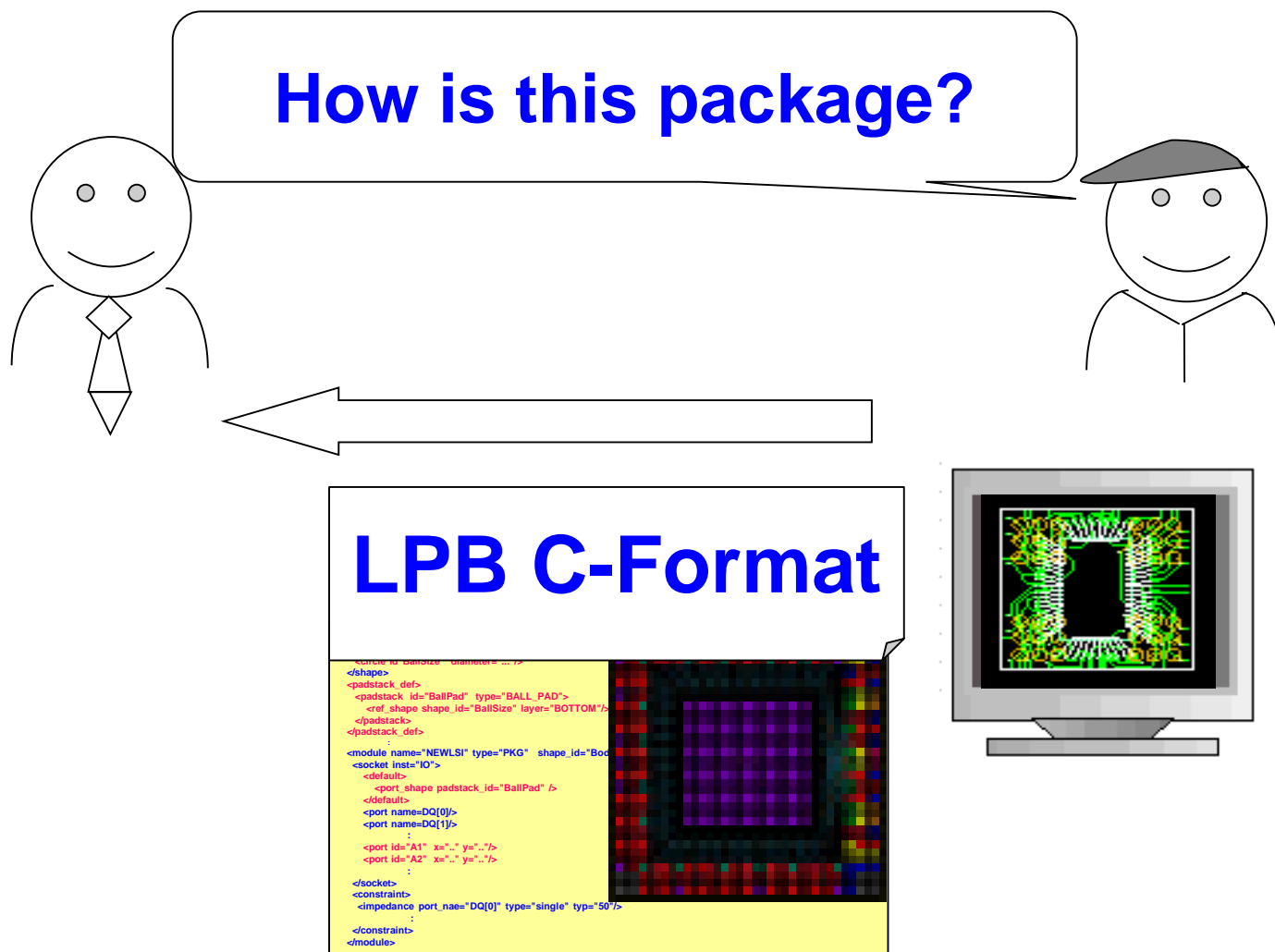
# Working with LPB Format.

```
<shape>
:
</shape>
<padstack_def>
:
</padstack_def>
:
<module name="NEWLSI type="LSI"
shape_id="DieSize">
  <socket inst="IO">
    <default>
      <port_shape padstack_id="Pad" />
    </default>
    <port id="P1" name="DQ_0" x=".." y=".." />
    <port id="P2" name="DQ_1" x=".." y=".." />
    :
  </socket>
</module>
```

ner

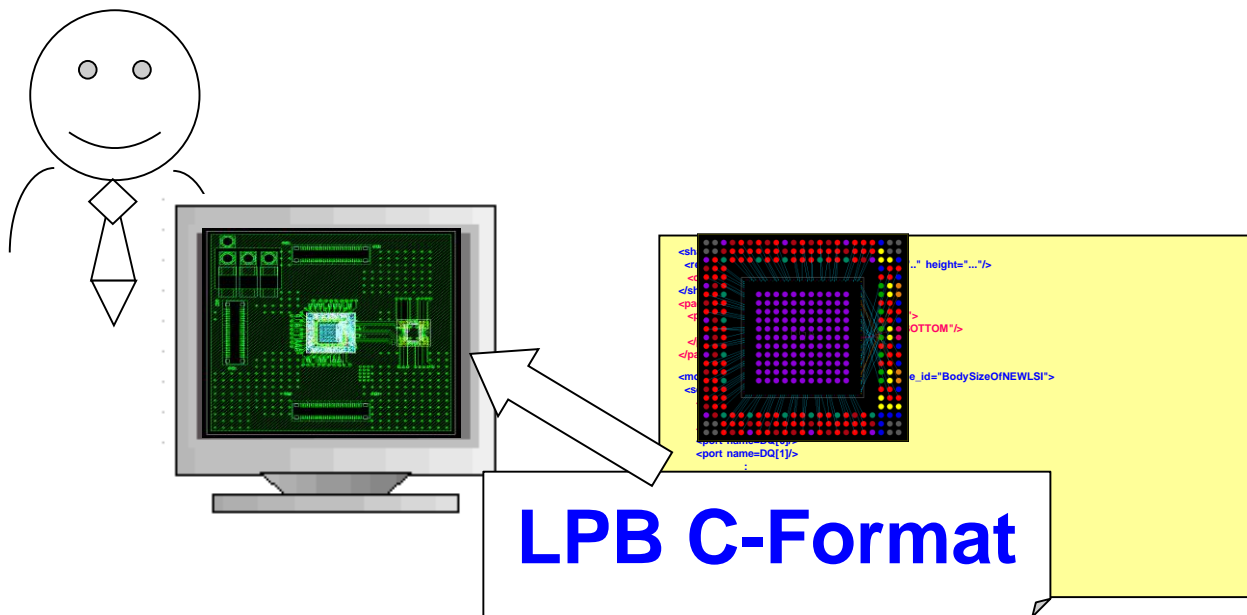
# Working with LPB Format.

## System designer



# Working with LPB Format.

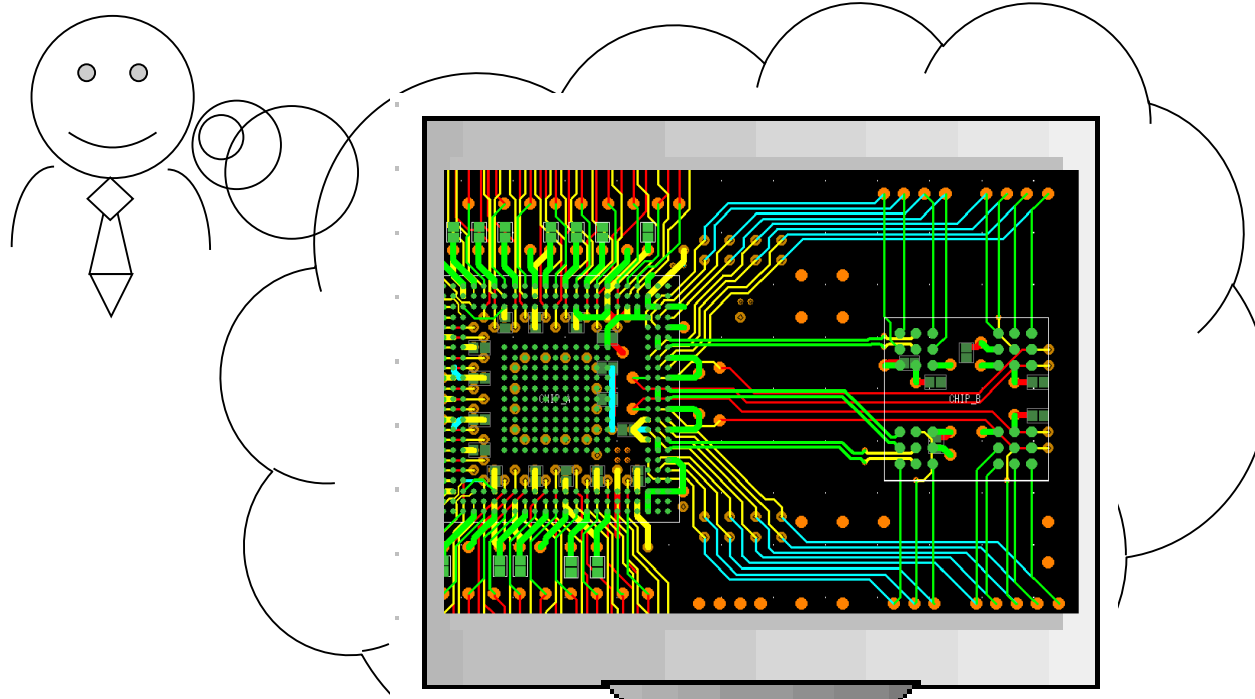
## System designer



**Re-build the package symbol using  
the C-Format.**

# Working with LPB Format.

**System designer**



**Consider the net assignment to  
package pin.**

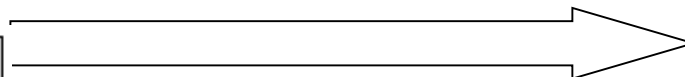
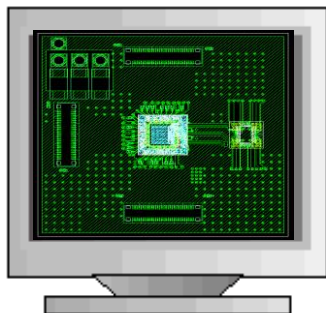
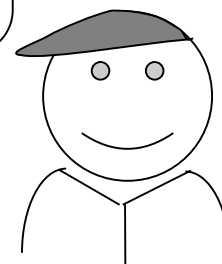
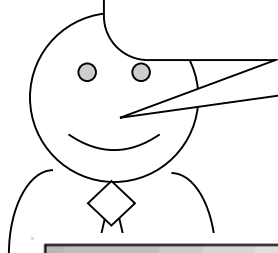


# Working with LPB Format.

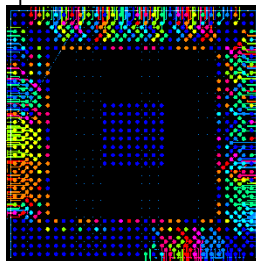
System designer

LSI designer

Could you design the package using this pin assignment ?



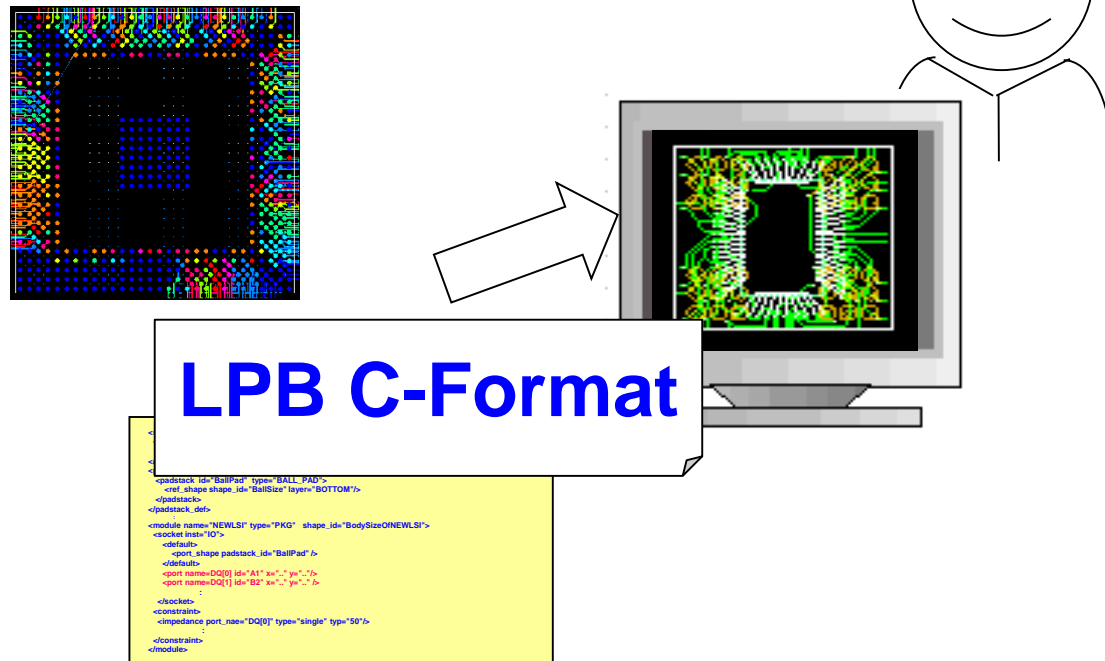
LPB C-Format



```
<!-- shapes -->
<rectangle id="BodySizeONEWSI" width="..." height="..." />
<circle id="BallSize" diameter="..." />
<!-- shapes -->
<!-- padstack_def -->
<padstack id="BallPad" type="BALL_PAD">
  <ref shape shape_id="BallSize" layer="BOTTOM"/>
</padstack_def>
<!-- module name -->
<module name="NEWSI" type="PKG" shape_id="BodySizeONEWSI">
  <socket insts="10">
    <default>
      <port_shape padstack_id="BallPad"/>
    </default>
    <port name=DQ[0] id="A1" x="..." y="..." />
    <port name=DQ[1] id="B2" x="..." y="..." />
  </socket>
  <constraints>
    <impedance port_name="DQ[0]" type="single" type="50"/>
  </constraints>
</module>
```

# Working with LPB Format.

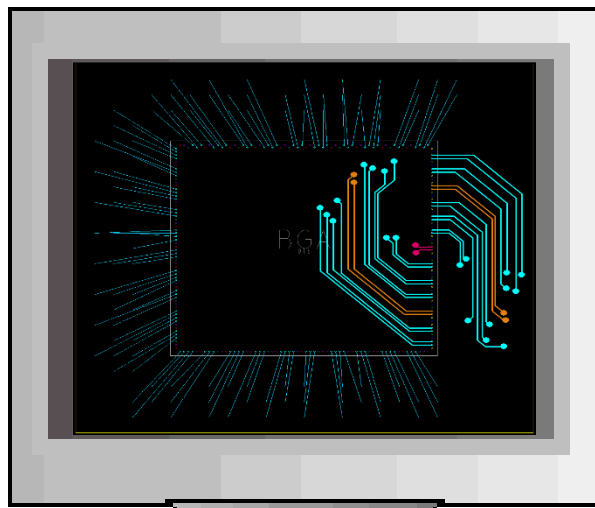
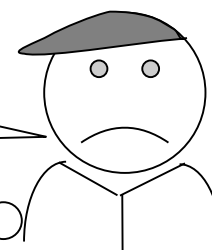
LSI designer



Read pin assignment from C-Format.

**LSI designer**

**It was troubled.  
Wiring is impossible.**



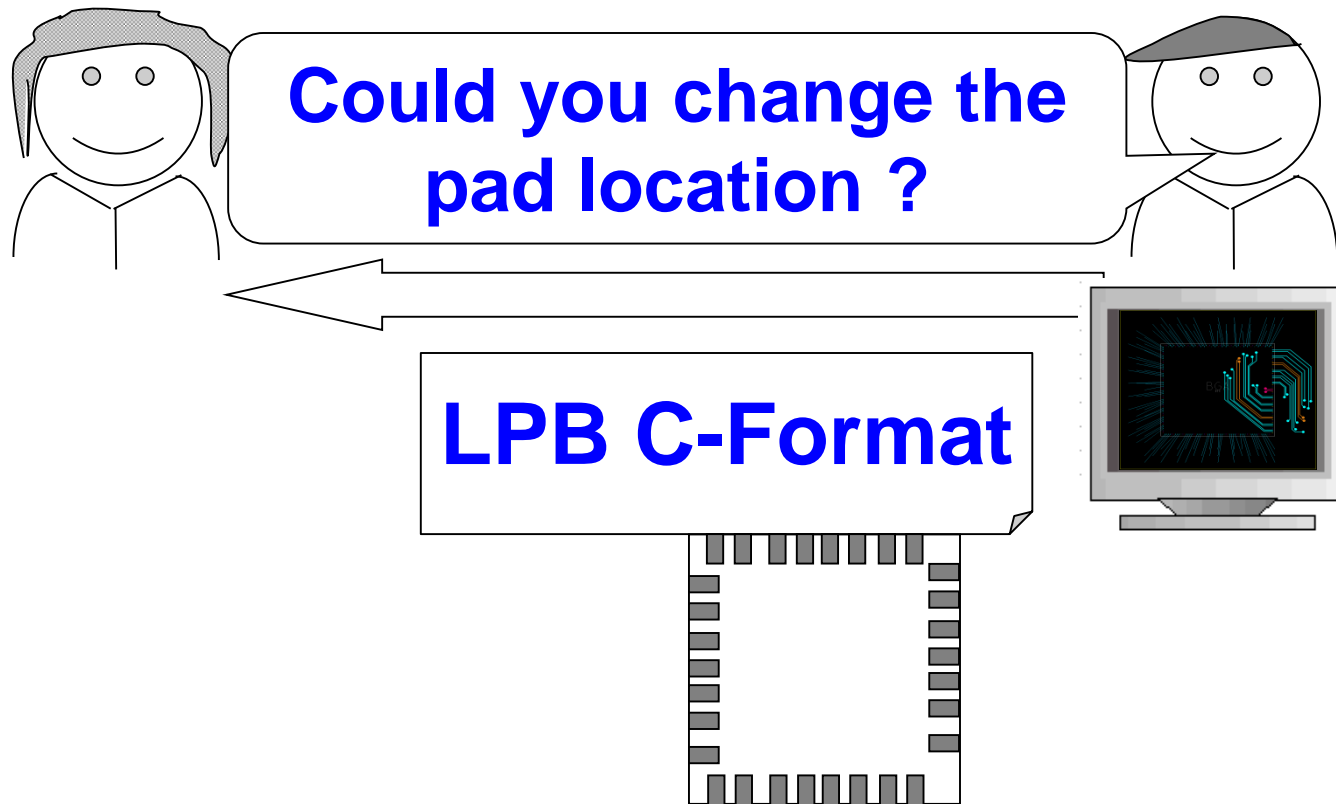
**Consider trace routing in the  
package.**



# Working with LPB Format.

**Chip Layout engineer**

**LSI designer**



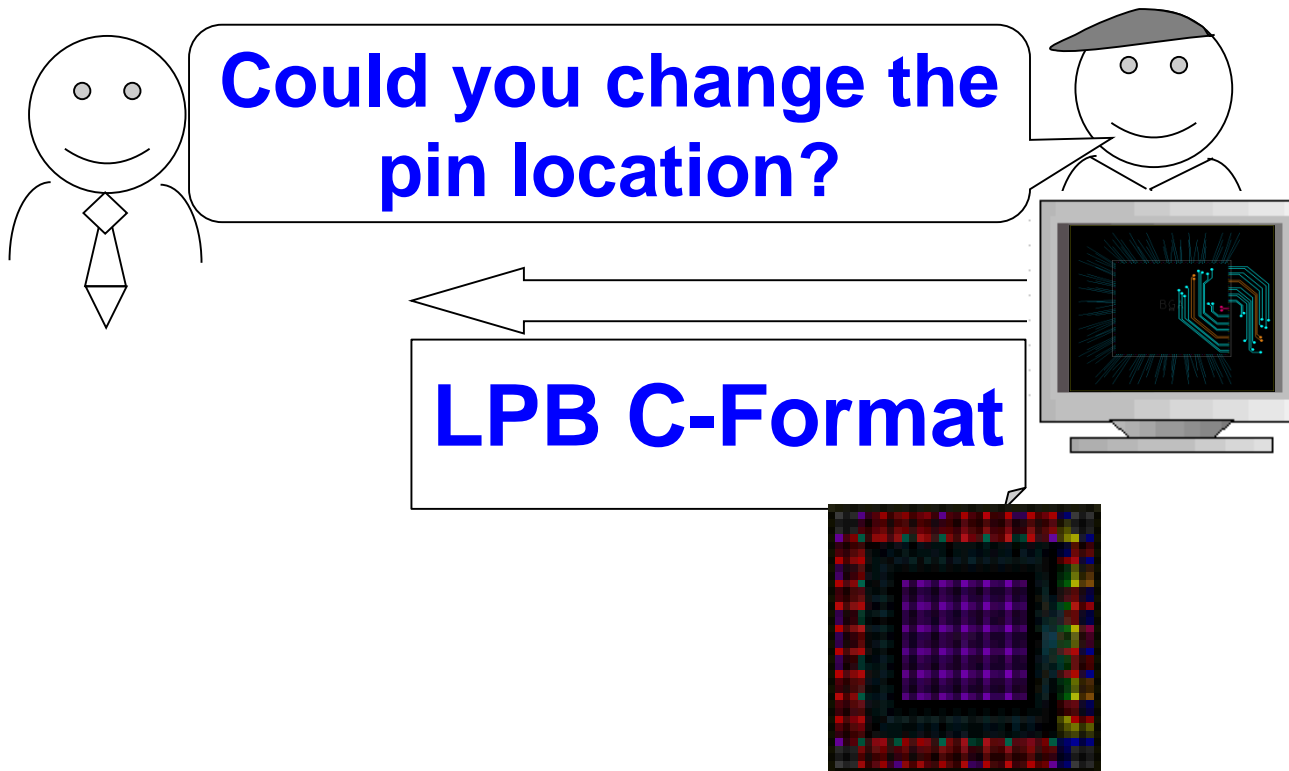
# Working with LPB Format.

```
<shape>
:
</shape>
<padstack_def>
:
</padstack_def>
:
<module name="NEWLSI type="LSI"
shape_id="DieSize">
  <socket inst="IO">
    <default>
      <port_shape padstack_id="Pad" />
    </default>
    <port id="P11" name="DQ_0" x=".." y=".." />
    <port id="P22" name="DQ_1" x=".." y=".." />
    :
  </socket>
</module>
```

# Working with LPB Format.

**System designer**

**LSI designer**



# Working with LPB Format.

System : Package designer

```
<module name="NEWLSI" type="PKG"
shape_id="BodySizeOfNEWLSI">
  <socket inst="IO">
    <default>
      <port_shape padstack_id="BallPad" />
    </default>
    <port name=DQ[0] id="D1" x=".." y=".." />
    <port name=DQ[1] id="A2" x=".." y=".." />
  :
</socket>
:
</module>
```

# Working with LPB Format.

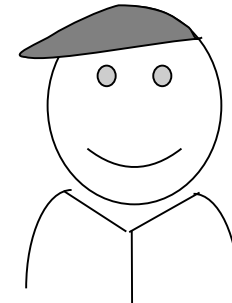
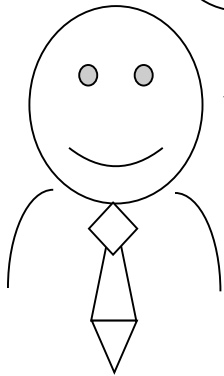


# Working with LPB Format.

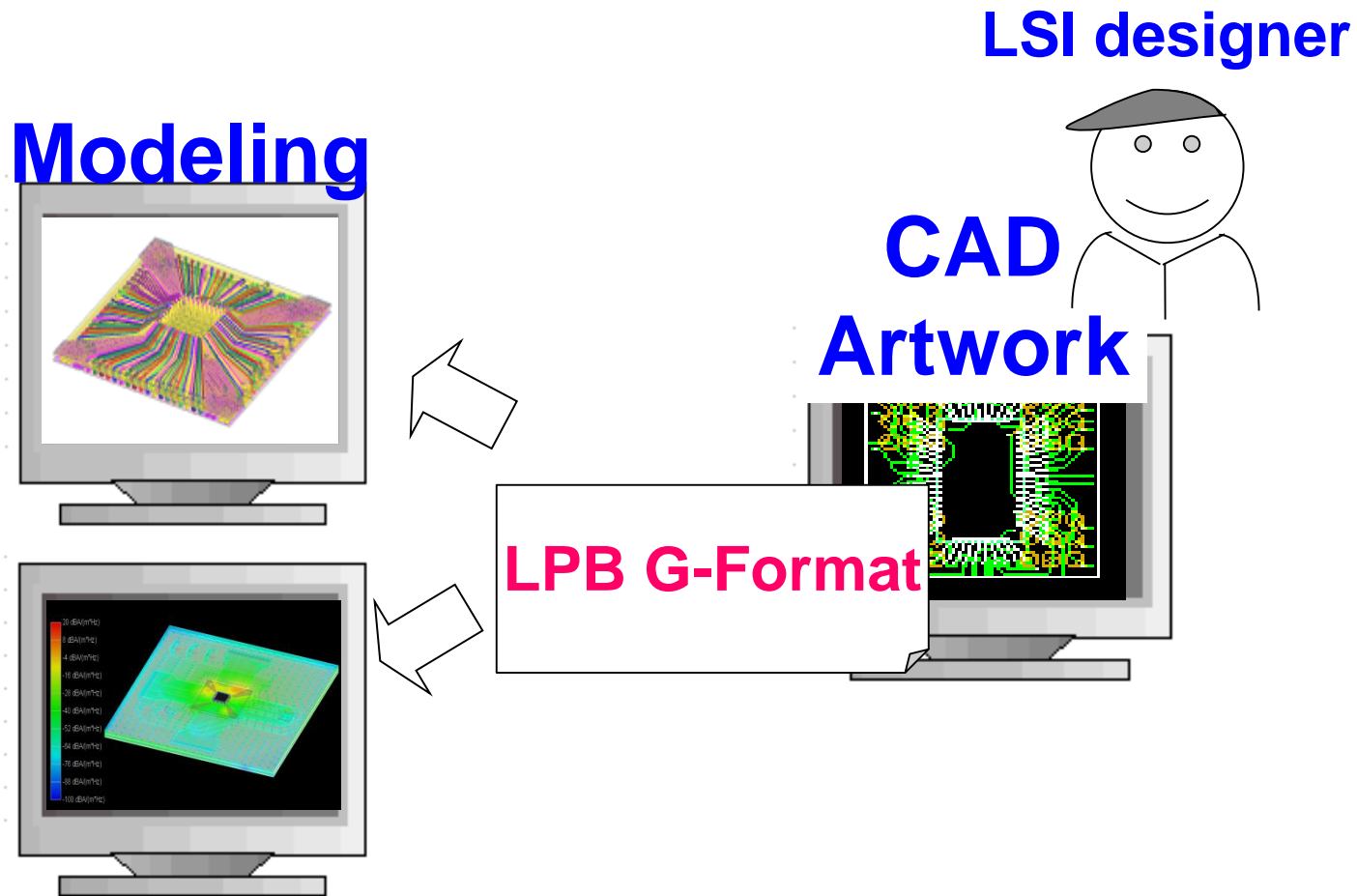
**System designer**

**LSI designer**

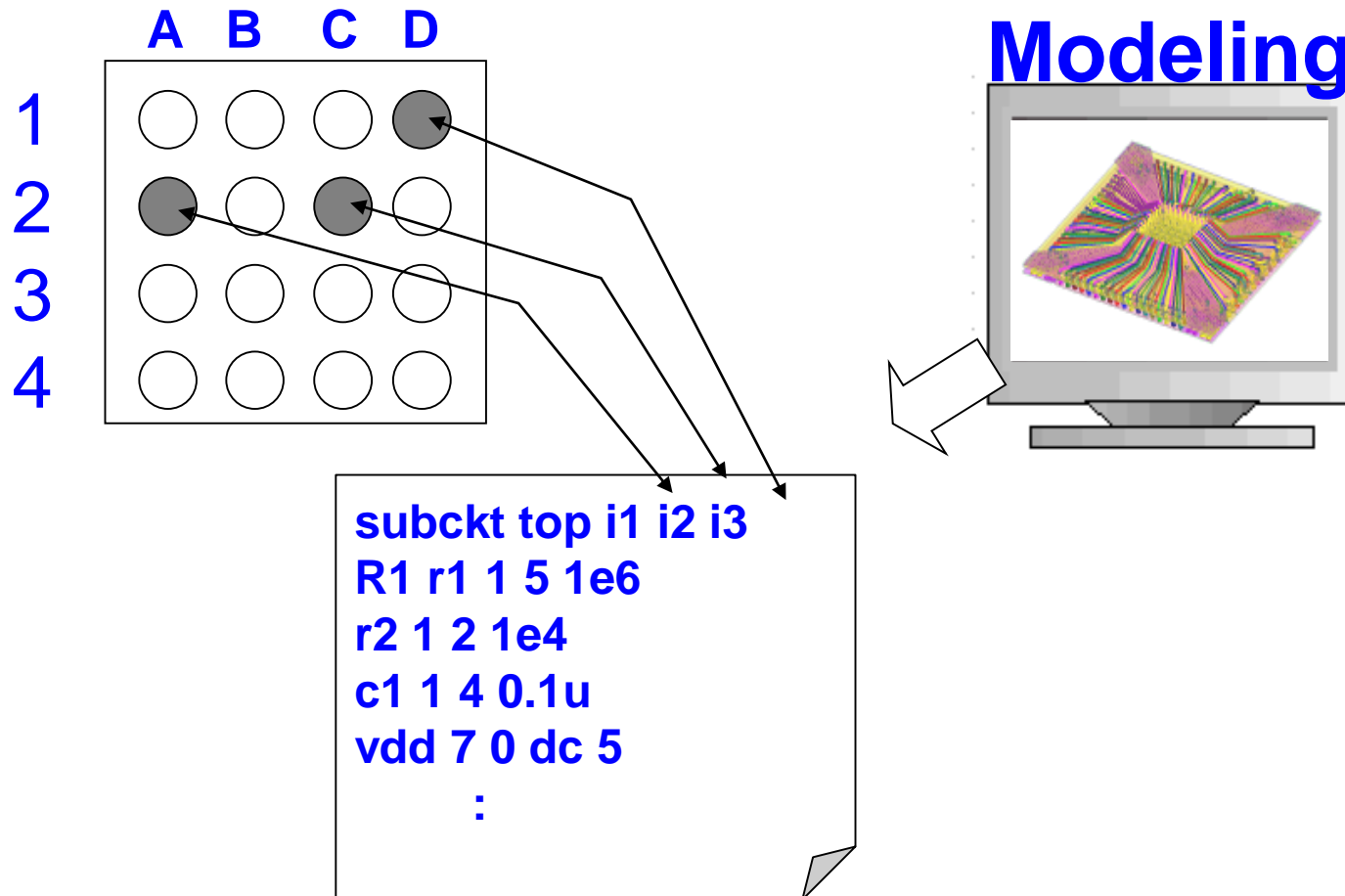
**Could you give  
me a package  
Model?**



# Working with LPB Format.



# Working with LPB Format.





```
<socket inst="IO">
```

```
  <default>
```

```
    <port_shape padstack_id="BallPad" />
```

```
  </default>
```

```
  <port name=DQ[0] id="D1" x=".." y=".." />
```

```
  <port name=DQ[1] id="A2" x=".." y=".." />
```

```
    :
```

```
</socket>
```

```
    :
```

```
</module>
```

```
<reference reffile="NEWLSI.sp" format="SPICE">
```

```
  <connect pirt_name="D1">
```

```
    <spice:ref_port subckt="top" portid="3"/>
```

```
  </connect>
```

```
  <connect pin_name="A2">
```

```
    <spice:ref_port subckt="top" portid="1"/>
```

```
  </connect>
```

```
    :
```

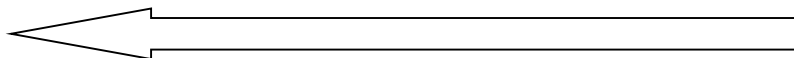
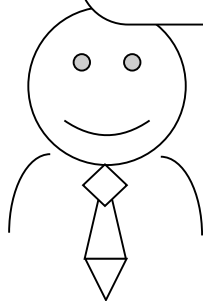
```
</reference>
```

# Working with LPB Format.

System designer

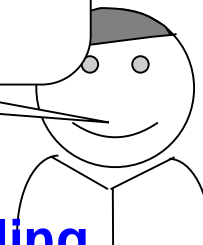
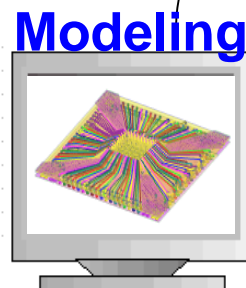
LSI designer

Here is a package model  
and C-Format.



**LPB C-Format**

```
subckt top i1 i2 i3
R1 r1 1 5 1e6
:
```



## ■ 課題

- 相互設計 : 異文化同士の交流
  - ・ コミュニケーションをもっとスムーズにしたい
- 異文化間交流には、定められたプロトコルが必要
  - ・ 意思の疎通を円滑に・・・
  - ・ 解析・モデリングツールを設計の道具に・・・

## ■ ソリューション

- コミュニケーションのためにフォーマットを統一  
*LPB M/N/C/G/R-Format*

**皆様のご協力を願います**

END