

# BEYOND GREEN DESIGN: Leveraging Non-industrial Bamboo SMEs' Potential for Holistic Sustainability through Design

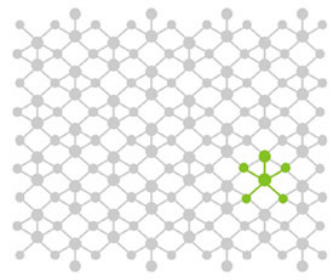


**REBECCA REUBENS**

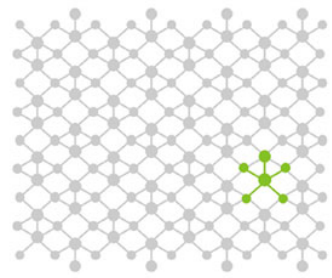
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World Bamboo Congress 10  
19<sup>th</sup> September 2015  
Ahmedabad



# What is 'sustainability' all about?

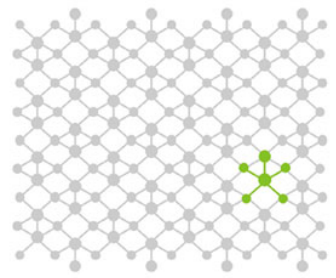


# industrialization



Goods on the quays of Masthugget waiting to be loaded. 1919. © Sjöfartsmuseet Akvariet





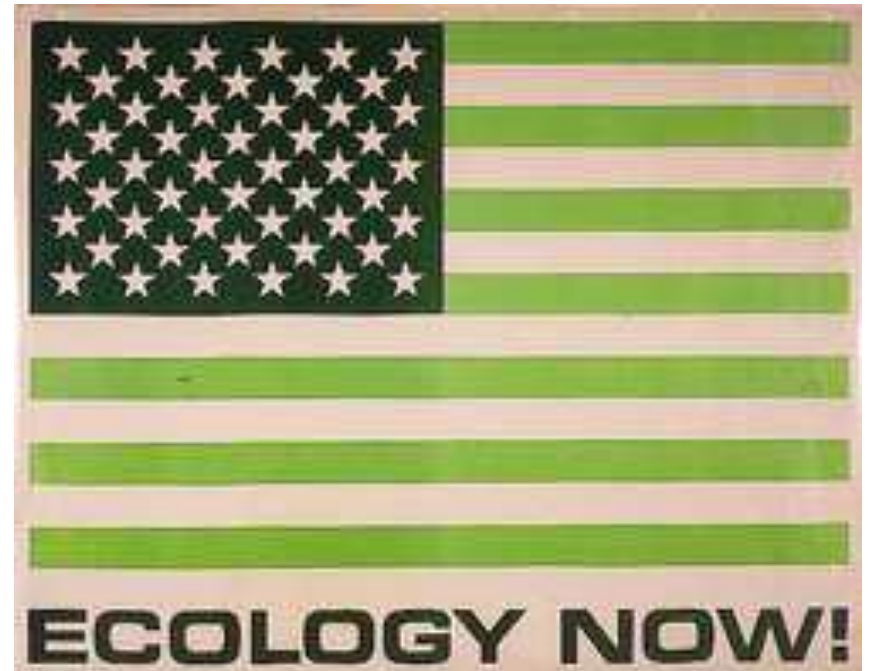
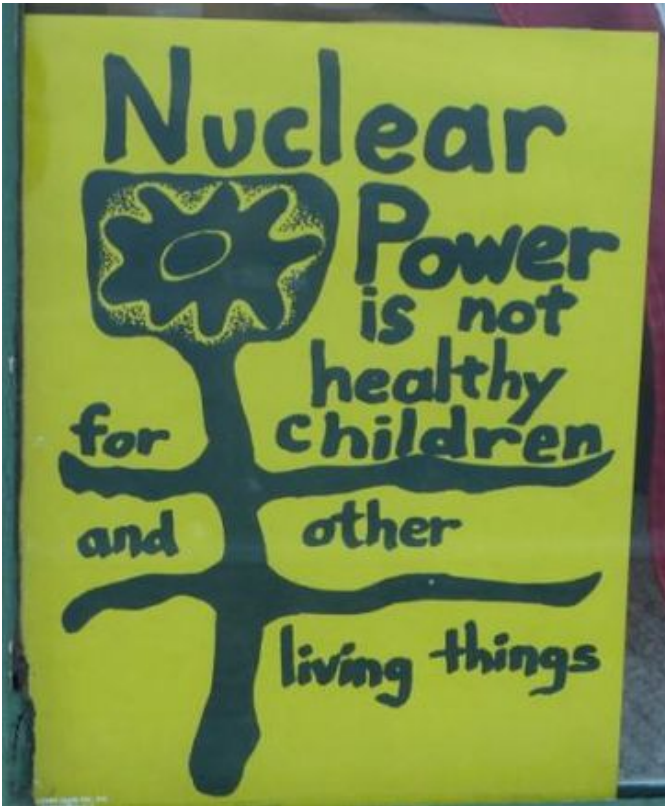
# Environmentalism v/s development







Despite environmental activism....





# Economy and development still important!!!





# Economic development + environmental protection

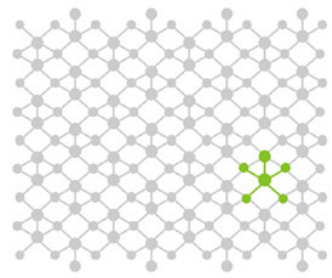


## Brundtland-Report «Our Common Future» 1987

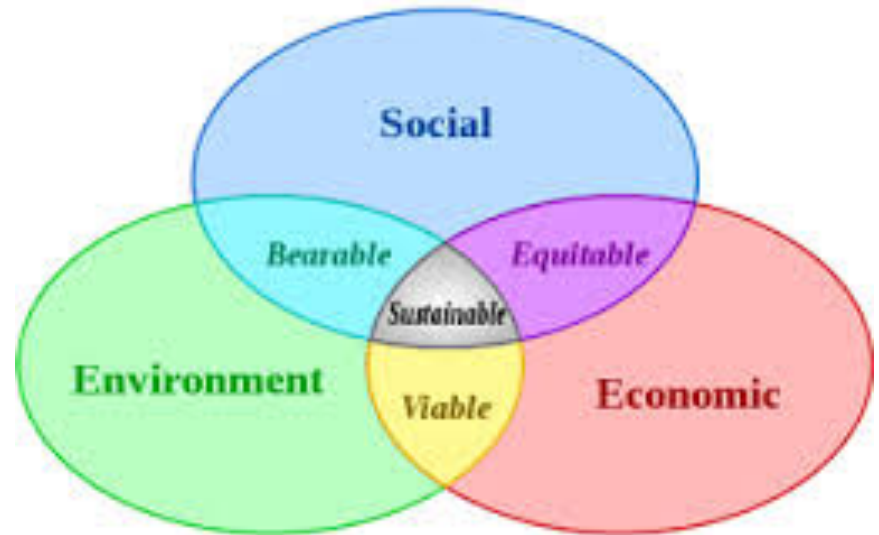
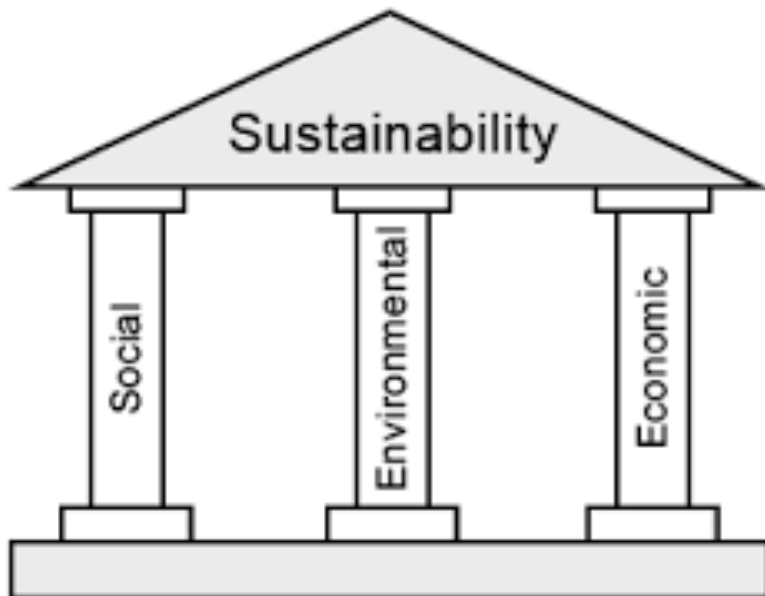
*“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*



World Commission on Environment and Development (WCED). 1987. *Our Common Future: Report of the World Commission on Environment and Development*. Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co-operation: Environment.

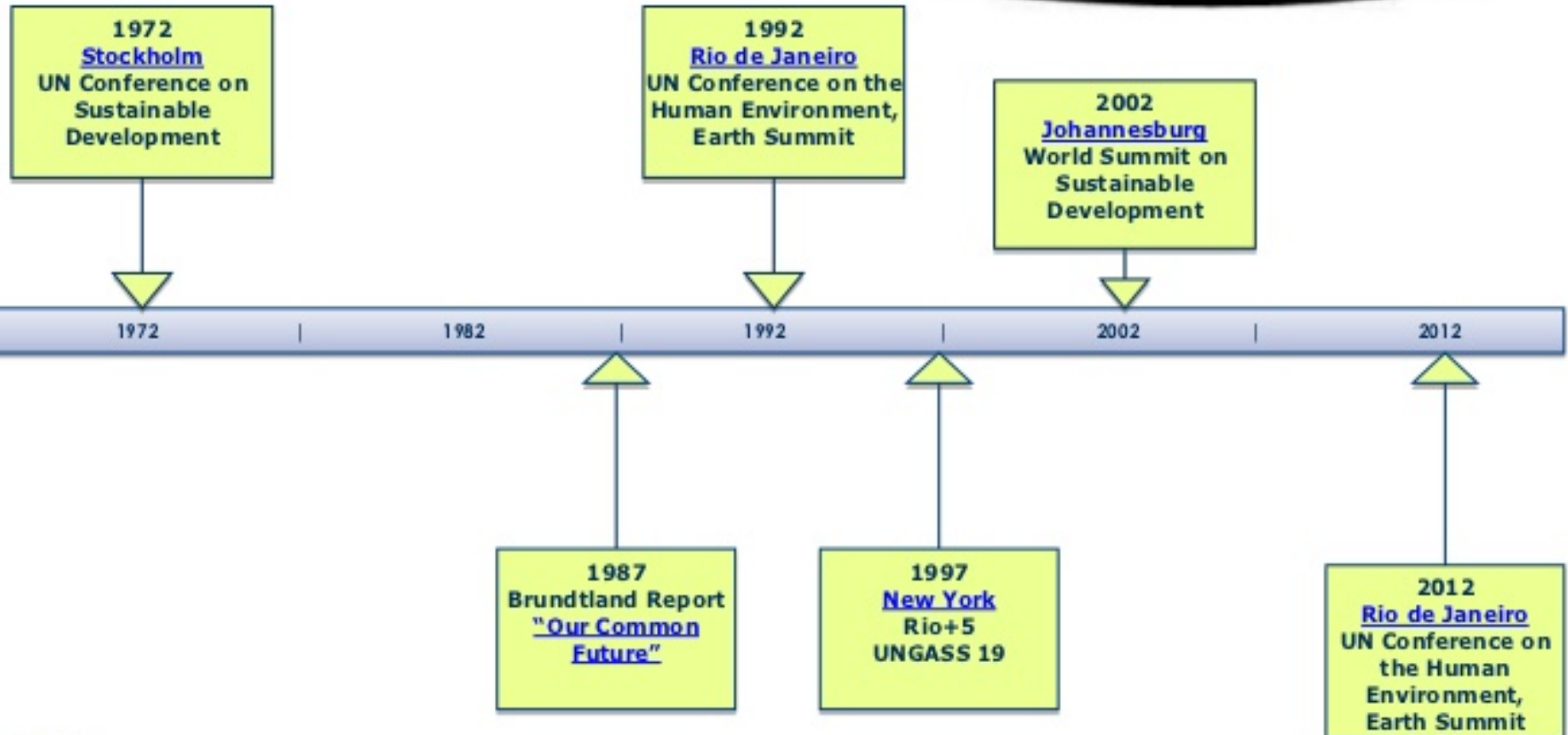


# Sustainable development



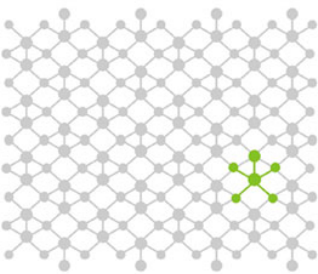


# The story so far.....









## GOVERNMENT BACKS FRACKING



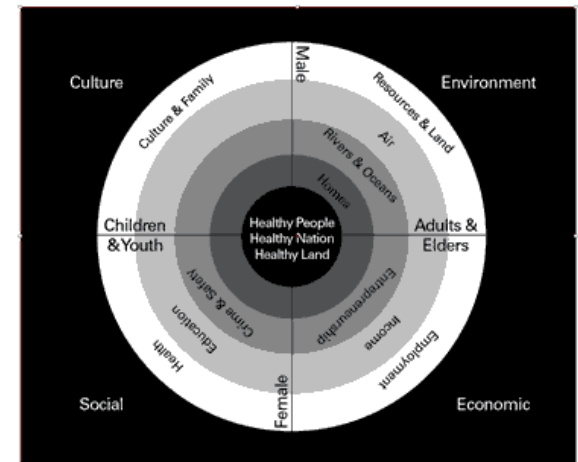
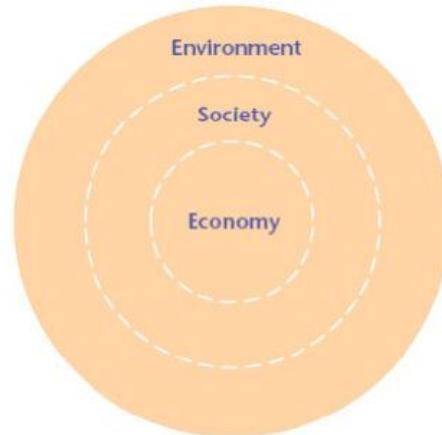
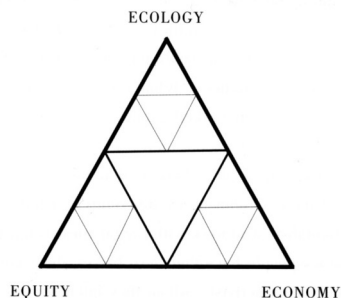
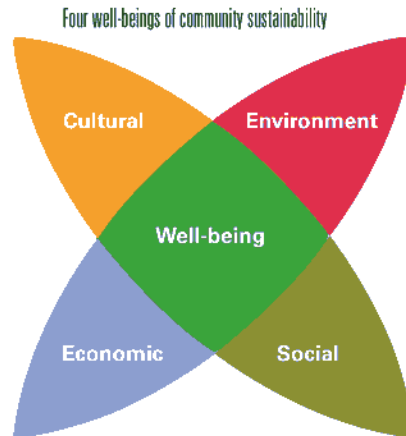
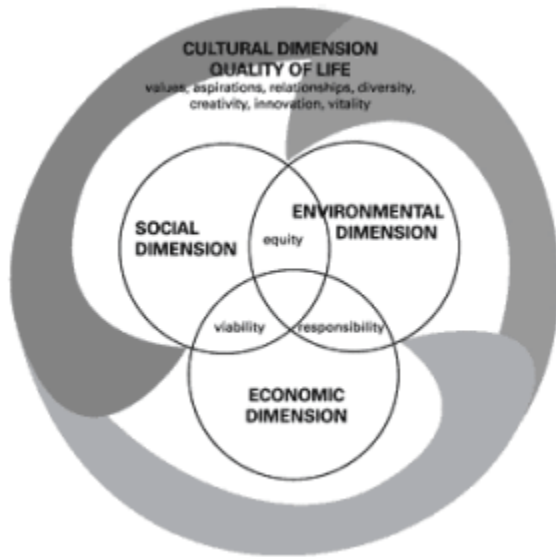
"WE MUST PUT AN END TO OUR FOSSIL FUEL DEPENDENCY...AS SOON AS WE HAVE EXPLOITED OUR ENTIRE SUPPLY"



## CODE GREEN iΘ!



# Innovation in sustainability becomes decentralized





# sustainability: an emerging megatrend

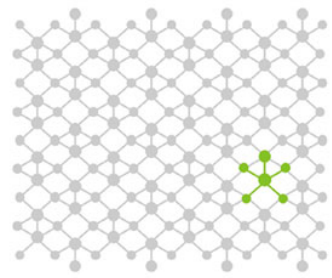


## Megatrend:

“ A fundamental shift in the competitive landscape that creates inescapable threats and game changing opportunities ... profoundly affects companies' competitiveness and even their survival”

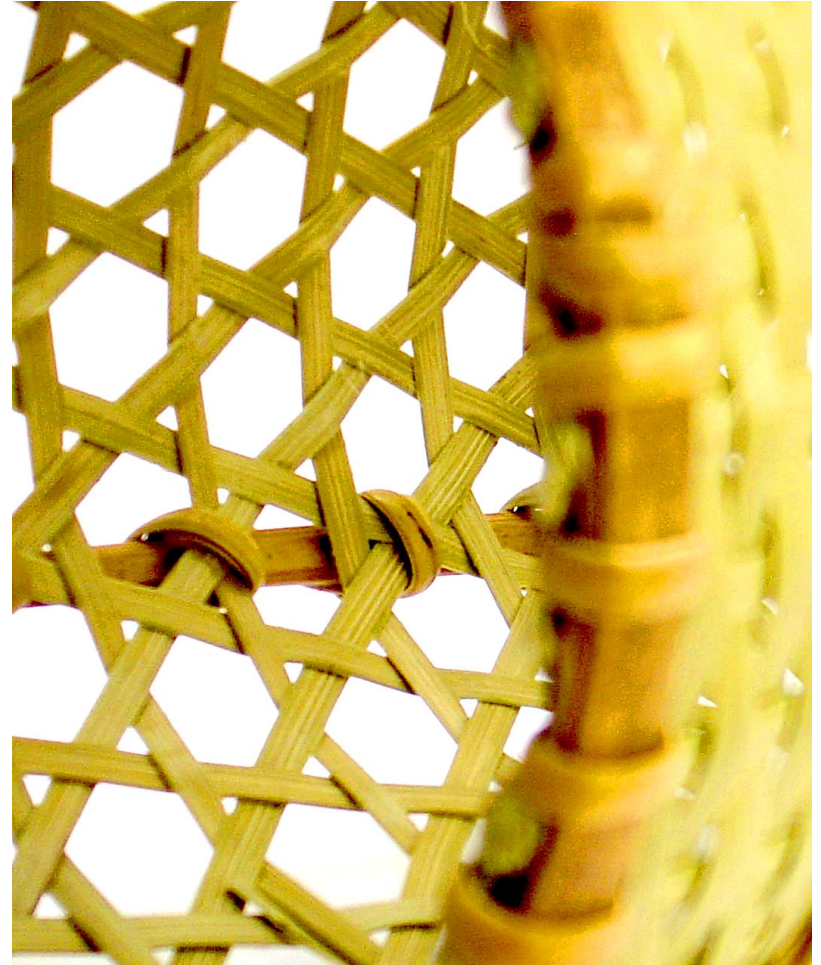
Harvard Business Review, May, 2010

- **Globalized workforces and supply chains** have created environmental pressures and liabilities
- **Intensified competition for natural resources**
- **‘Externalities’** such as CO2 and water are soon **becoming material** to investors
- **Consumers** seek sustainable products and services
- **Governments are interceding** with unprecedented levels of regulation
- **Explosion of innovation** in energy efficiency, renewable power, resource productivity, pollution control etc.

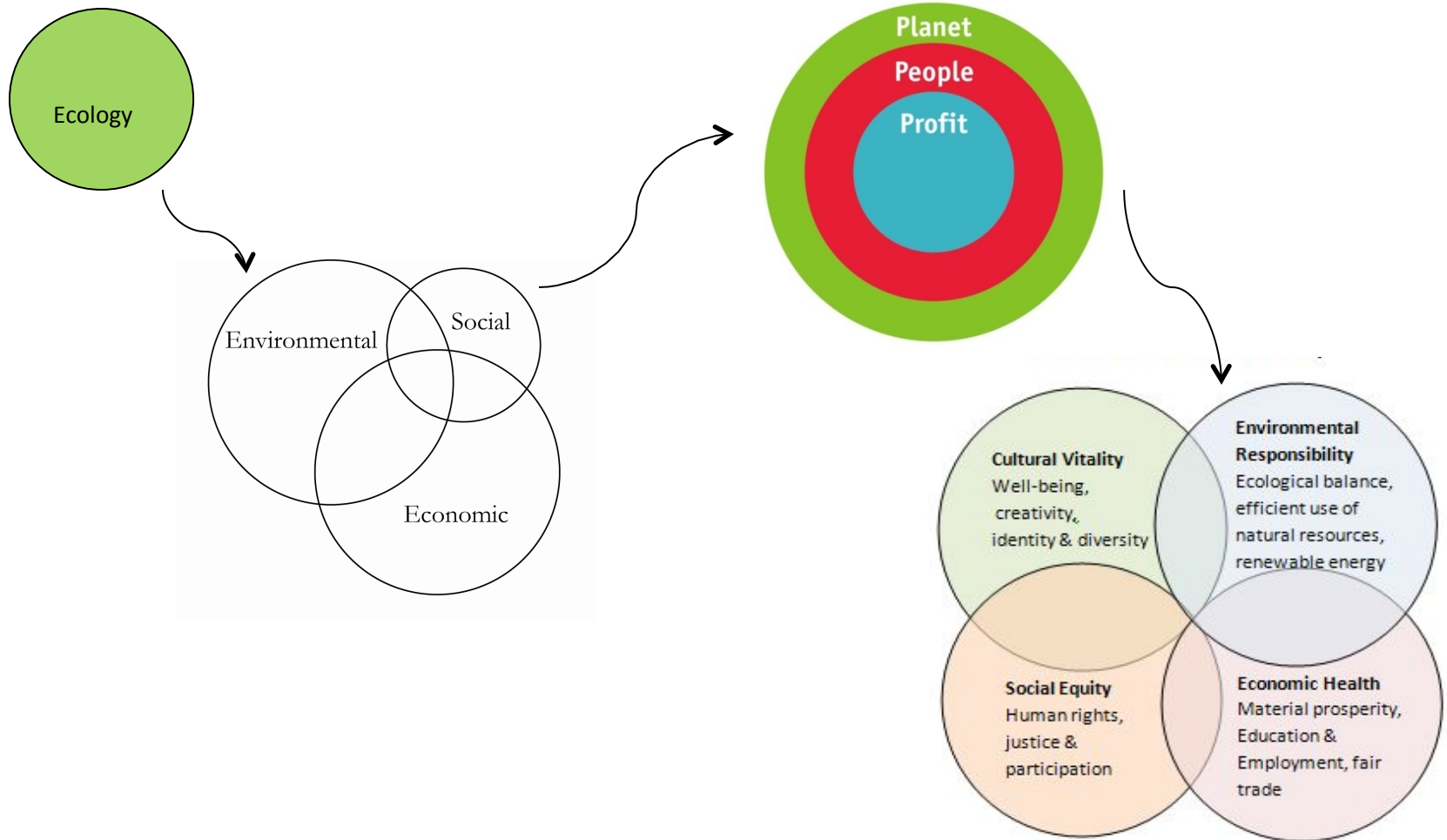


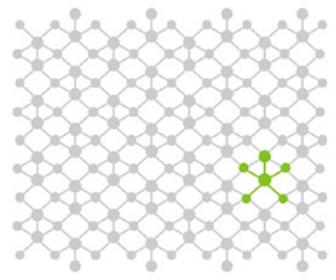
# who is onboard?

- **EVERYONE!** because Climate Change and the Energy Crisis are permanent
- **Consumers** because it's personal
- **Companies** from SMEs to large corporates because it is affecting the way they do business
- **Mainstream investors, banks and economists** are factoring sustainability related issues into rates and strategic and financial decisions
- **Politicians** are reacting
- **Governments** are cracking down regulatory frameworks like never before
- **Mainstream media** are covering and promoting sustainability

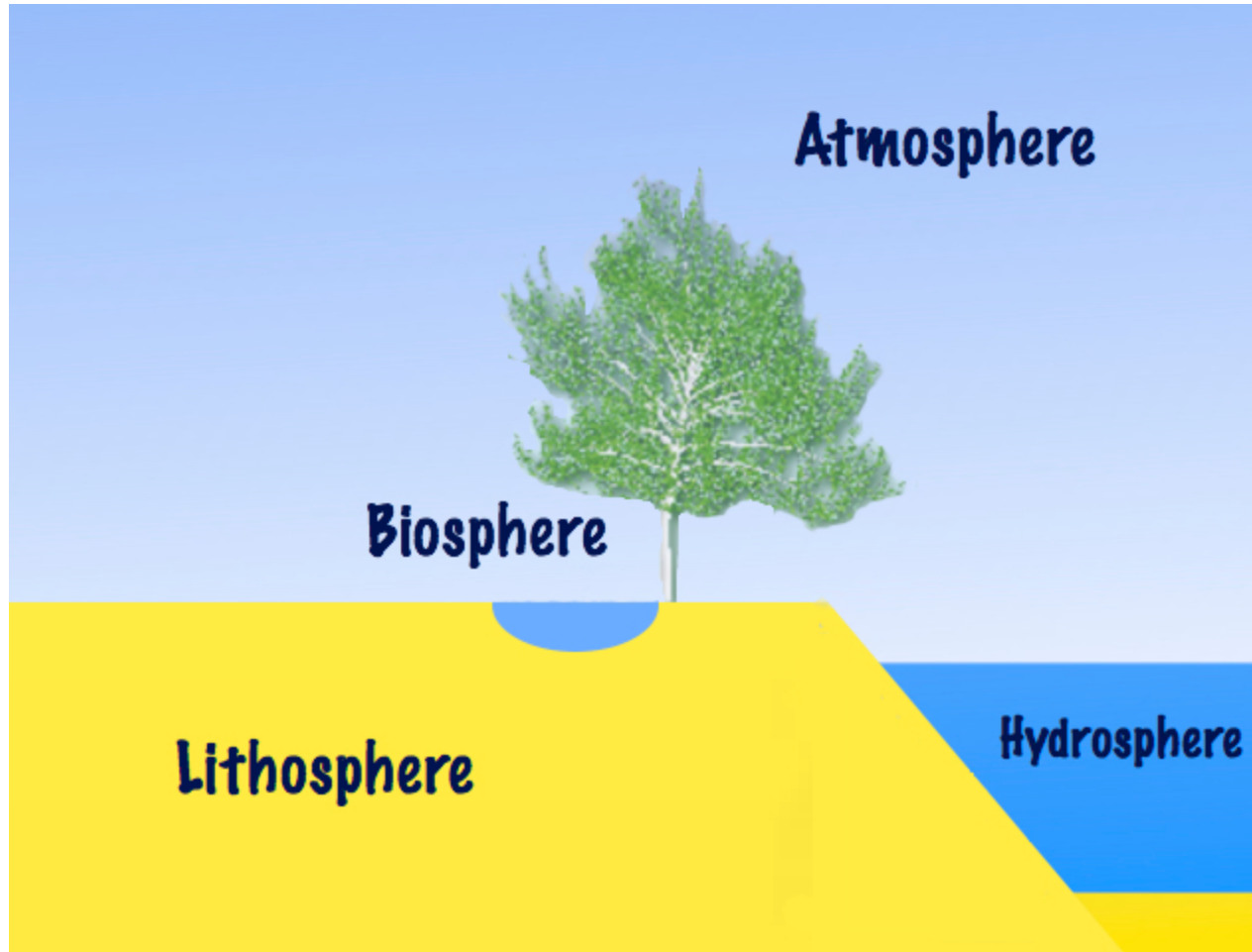


# expanding scope of 'sustainability'

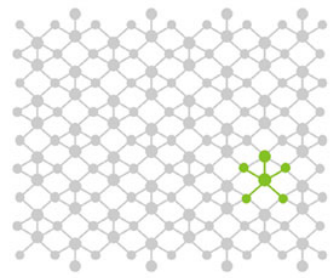




# Why renewable materials



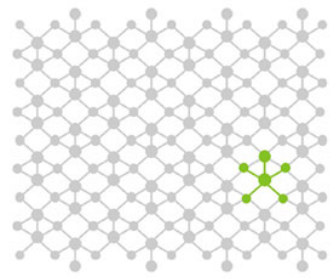




# bamboo: the poster child for renewable materials

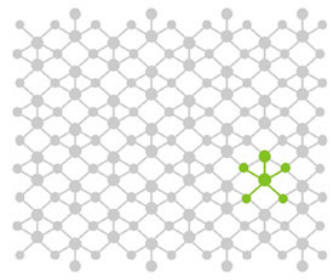
- Highly renewable
  - fastest growing species on the planet, and regenerates without replanting if harvested and managed properly.
- Does not cause deforestation
  - viable timber replacement material
- Mitigates water pollution
  - Its high nitrogen consumption makes it a good solution for wastewater treatment
- Prevents soil erosion
  - Due to its underground rhizome network
- Restores degraded lands
  - Bamboo forests produce 30% more oxygen and greater biomass than hardwood forests of the same size





# contemporary applications of bamboo

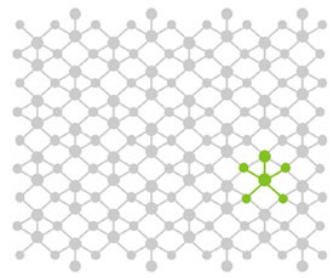




# laminated bamboo products





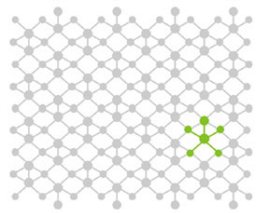


# potential to provide livelihoods for the economically poor communities

- Easy to process
  - Linear fibers
  - Does not require capital intensive infrastructure to process
- Available
  - Easily available in the natural environment
- Inclusive
  - Light, so can be processed by women
  - Part of cultural tradition of marginalized groups who have skills that can be built upon

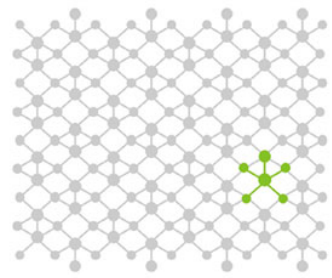






## The gap between sustainability markets and producers





what direction should design for sustainability with bamboo take?



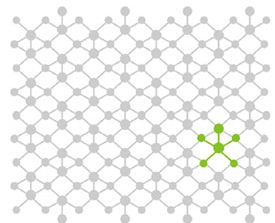
Industrial

Transplant the inherent unsustainabilities of industrialization?



Craft

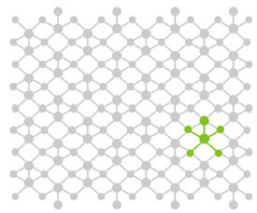
Transplant the inherent sustainability from craft PCS



# ‘Craftspeople’

- Extends to traditional artisans and craftspeople, in regions with a strong preindustrial production to consumption traditions
- Have been and still are employed in craft for their communities, trade, export
  - Skilled master craftsman
  - Wage worker
  - Local tradesperson
  - Part time agricultural worker
  - Landless artisan





# Value Chain



## Traditional value chain

Growing – harvesting – transporting- innovating - processing- marketing



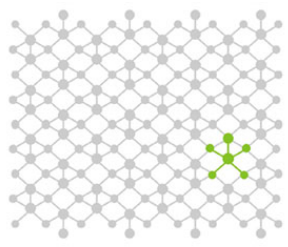
## Technology intensive/industrial value chain

Growing – harvesting – transporting- ~~innovating~~ – ~~processing~~ – ~~marketing~~

Craft leverages abundant material + productive labor force

Need for strategy to leverage craft holistically  
as a vehicle for holistic sustainability through creative and cultural economy

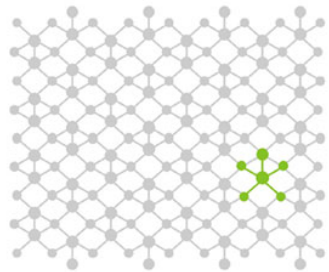




# Why innovation for developing countries?

We are a production hub now  
but for **how long without  
innovation?**

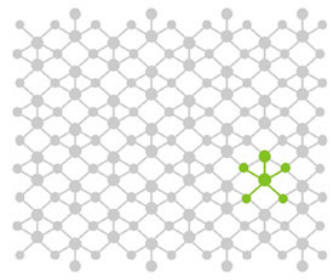
Raw materials.....**manufacturing.....innovation**



# Why sustainability design for developing countries

We have

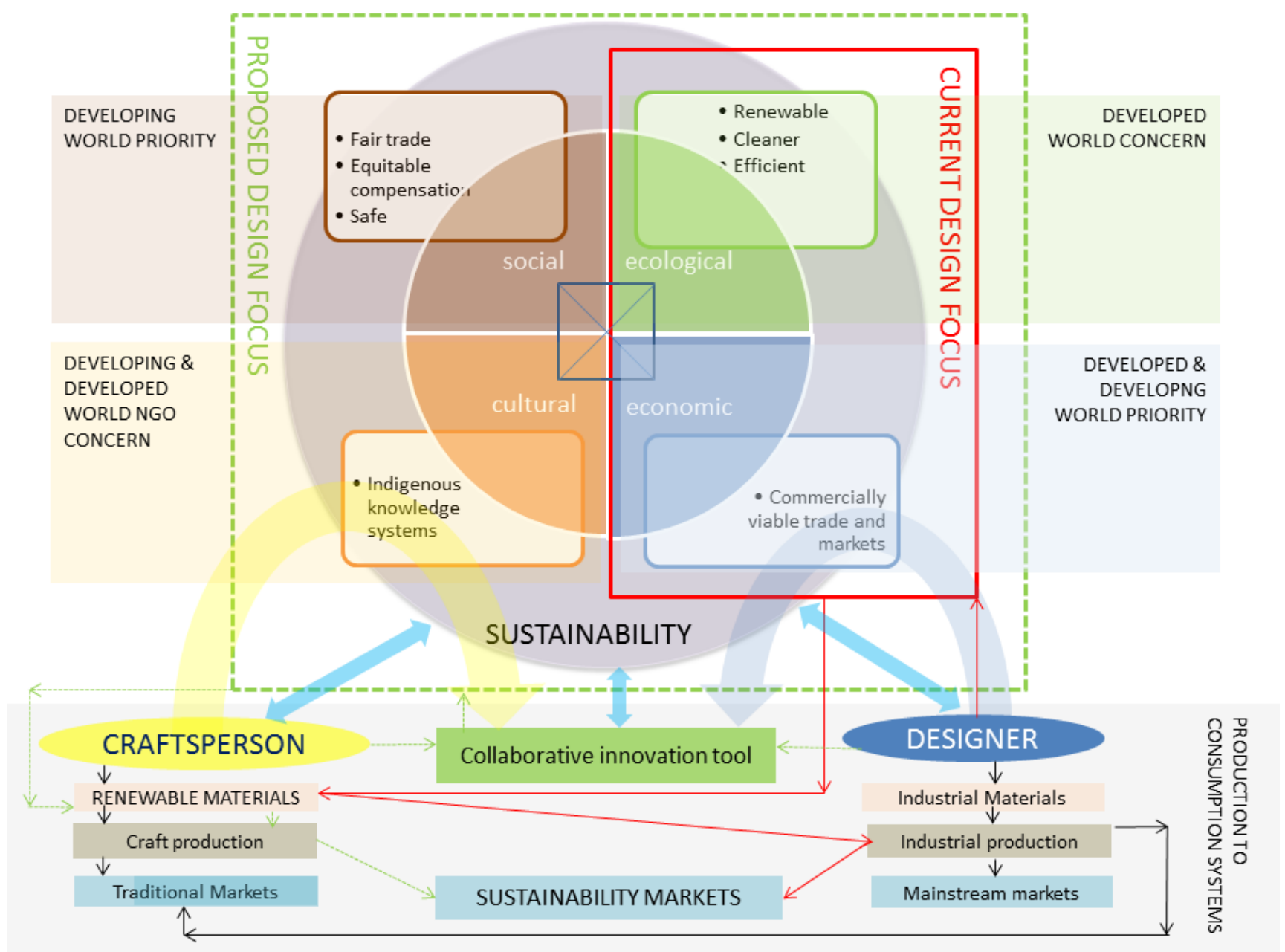
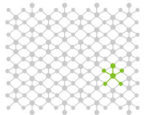
- renewable materials
- labor
- markets
- **innovation**



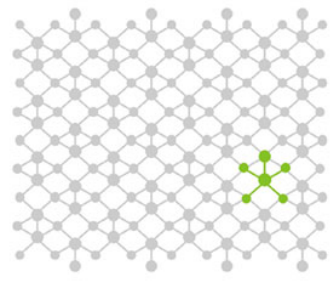
Difficult for designers to navigate

Sustainability is not within traditional design domain

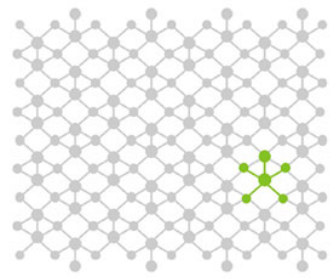
Craft is not within traditional design domain







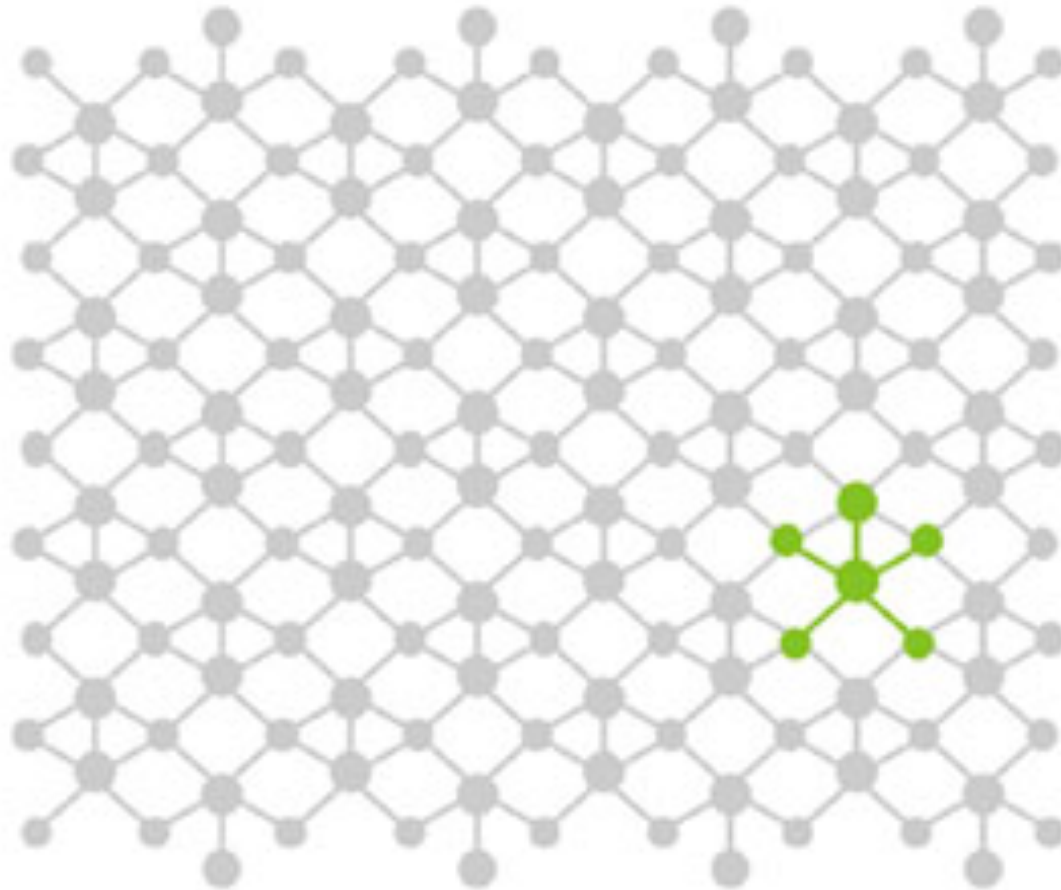
# How sustainable are current design efforts towards sustainability?



# Not very.....

1. Lack of knowledge about sustainability
2. Lack of holistic oversight on PCS
3. Failure to incorporate sustainability at a strategic level
4. Failure to include sustainability criteria in the design brief
5. Lack of a collaborative design process
6. Lack of tools
7. Failure to keep designers in loop till the end

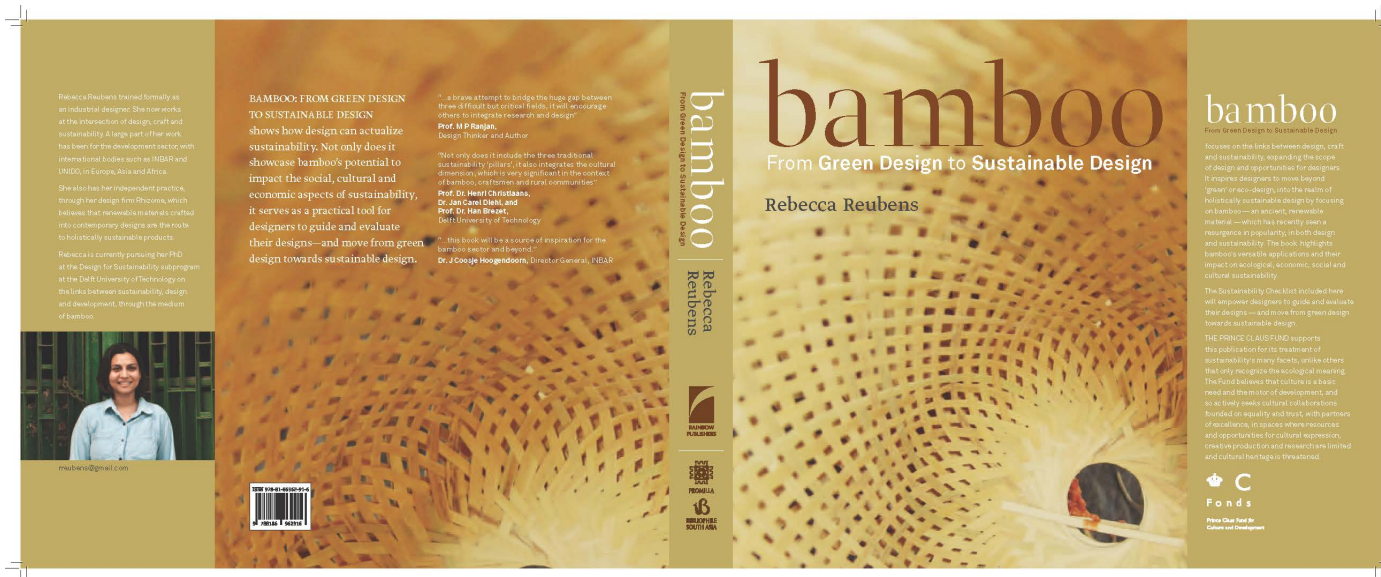
# The Rhizome Approach



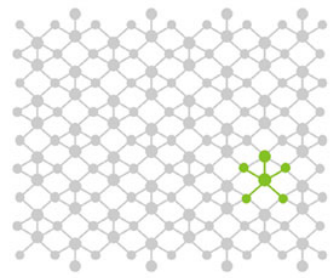
# STEP 1

## Lack of knowledge about sustainability

- Provide designers with information on sustainability
- Reading material
- presentations





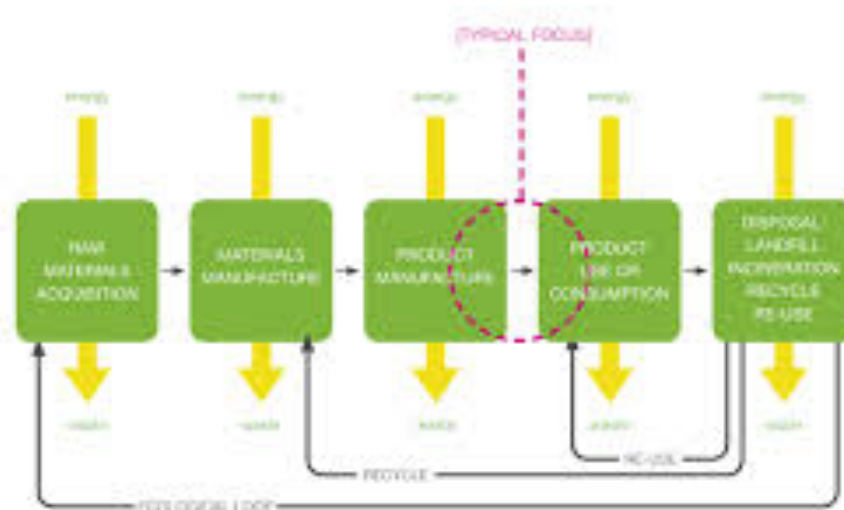


## STEP 2

### Lack of holistic oversight on PCS

- Experiential learning
- Vantage view-point
- Not just specialized 'design' responsibility

#### PRODUCT LIFE CYCLE



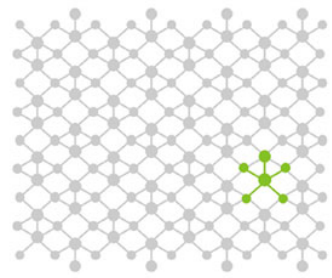


## STEP 3

### Failure to incorporate sustainability at a strategic level

- Including sustainability into the organizational blue print
- Countering myths such as ‘sustainability is more expensive’
- The rationale to go beyond compliance





## STEP 4

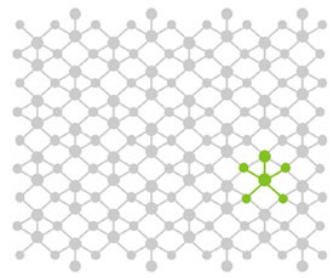
### Failure to include sustainability criteria in the design brief

- Sustainability is seen as an expensive add-on
- Not required by legislation
- How do you include it?
- What do you include?

#### HOLISTIC SUSTAINABILITY CHECKLIST

MATERIAL CONSIDERATIONS	Ecological	Social	Cultural	Economic
1 Renewable materials	*			
2 Minimally treated materials	*			*
3 Recyclable materials	*			*
4 Recycled materials	*			*
5 Local materials	*	*	*	*
6 Fairly traded materials		*		
7 Ecologically certified materials	*			
8 Non-toxic materials	*	*		
9 Less/no materials from intensive agriculture	*			
PRODUCTION CONSIDERATIONS	Ecological	Social	Cultural	Economic
10 Minimum materials	*			*
11 Minimum production steps	*			*
12 Renewable energy for production	*			*
13 Minimal energy for production	*			*
14 Low-emission-techniques	*	*		*
15 Proper management of production effluents and waste	*	*		*
16 Reduce/reuse production waste	*			*
17 Indigenous treatments and processes	*	*	*	*
18 Consulting indigenous communities on production issues that affect them		*	*	*
19 Safe and healthy work environment		*		*
20 Fair wages and benefits to producers		*		*
21 No child labour		*		*
22 No forced labour		*		*
23 Fair working hours		*		*
24 Freedom of association and collective bargaining		*		*
25 No discrimination		*	*	*
26 Local employment opportunities		*	*	*
DISTRIBUTION CONSIDERATIONS	Ecological	Social	Cultural	Economic
27 Minimum product volume and weight	*			*
28 Minimum and clean transport	*			*
29 Local PCS	*	*		*
30 Minimum packaging	*			*
31 Reusable packaging	*		*	*
32 Recyclable packaging	*			*
33 Packaging made from low-impact materials	*			*
CONSUMER USE CONSIDERATIONS	Ecological	Social	Cultural	Economic
34 Minimum/clean energy during usage	*		*	*
35 Minimum consumables	*			*
36 Safe to use		*		*
37 Customizable	*		*	*
38 Easily upgradable	*		*	*
39 Classic design	*		*	*
40 Minimum and local maintenance and repair	*	*	*	*
END-OF-LIFE HANDLING CONSIDERATIONS	Ecological	Social	Cultural	Economic
41 Reduced material complexity	*			*
42 Biodegradable	*			*
43 Easy to disassemble	*			*
44 Reusable	*		*	*
45 Recyclable	*		*	*
46 Promotes/uses local recycling systems	*	*	*	*





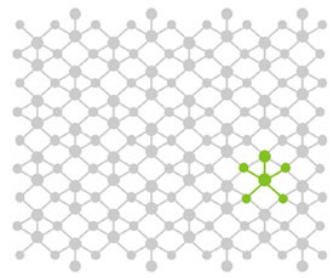
## STEP 5

### Lack of a collaborative design process

- Throwing over the wall
- Who is responsible for the final design?







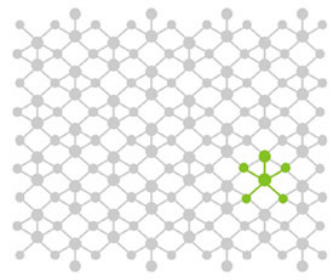
## STEP 6

### Lack of tools

- How do you design sustainably?
- How do you know to which extent you have succeeded?

Ecodesign-D4S-C2C-  
Natural Capitalism-  
LCA-SLCA-Meta  
Design- Design  
Activism

HOLISTIC SUSTAINABILITY CHECKLIST				
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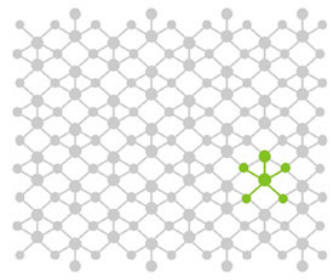


## STEP 7

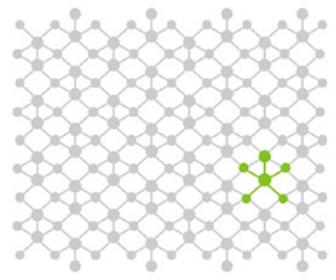
### Failure to keep design team in loop to the end

- Keep designers in loop till product actualization
- Designers to coordinate upstream and downstream implications





# Actualizing the Rhizome Approach



Space Making Craft Workshop, Ahmedabad

14 days

3 design institutions

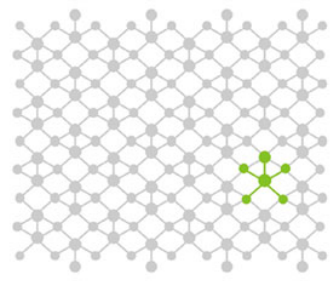
2 NGOs

24 designers

24 craftspeople

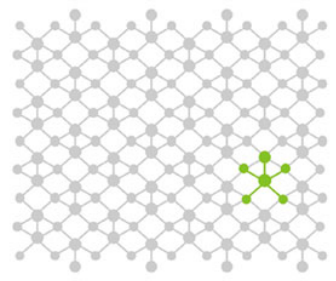
4 facilitators





# sharing the learning: with educators

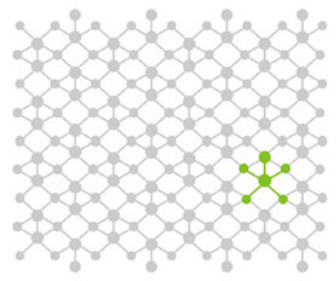




# sharing the learning: with collaborative innovators

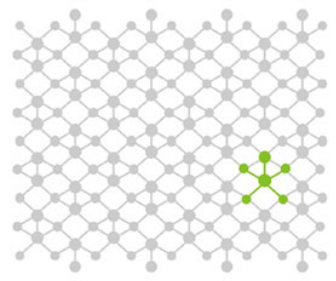




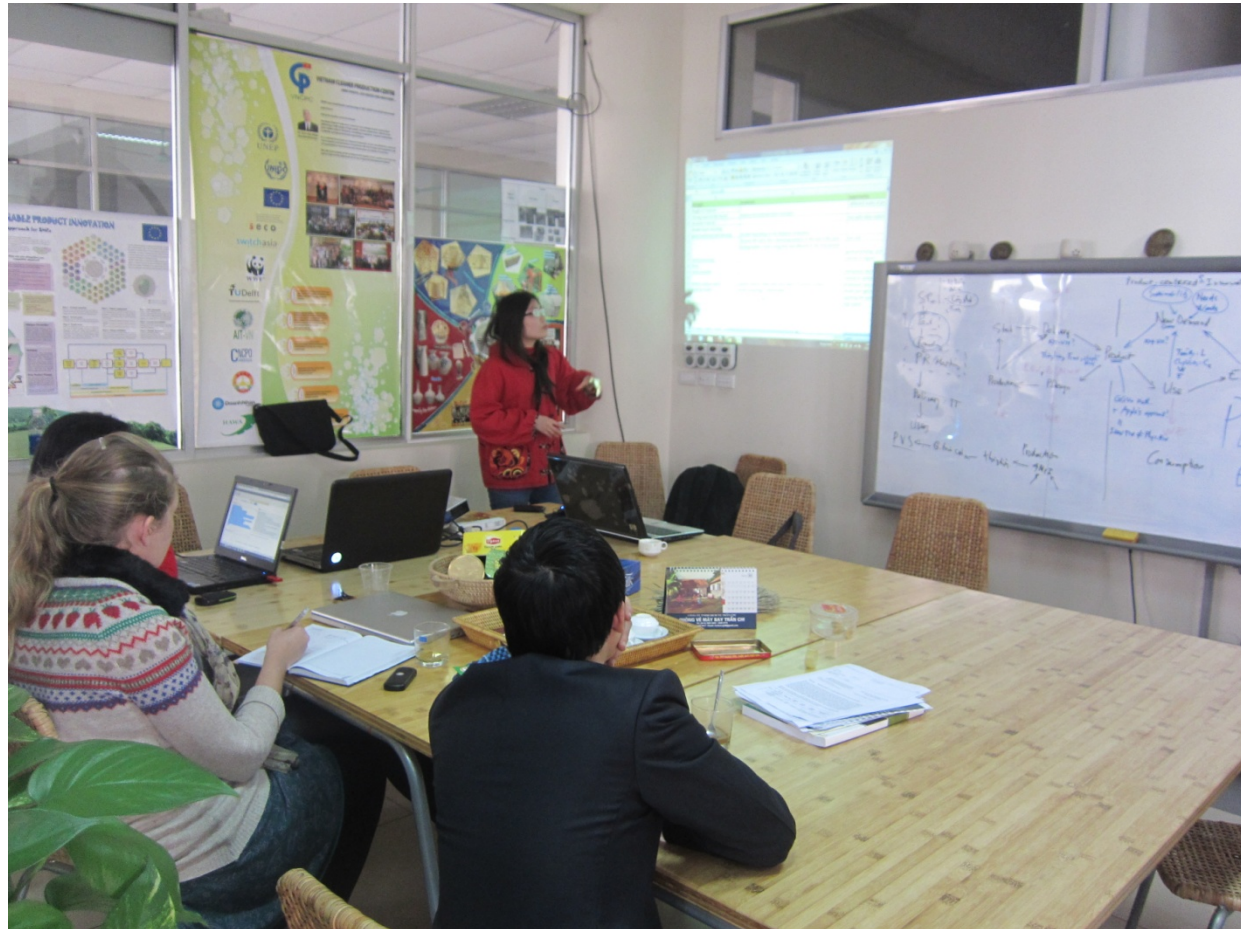


# sharing the learning: with design-craft teams

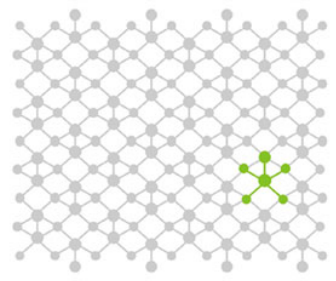




# sharing the learning: with technical institutions







# sharing the learning: with SMEs



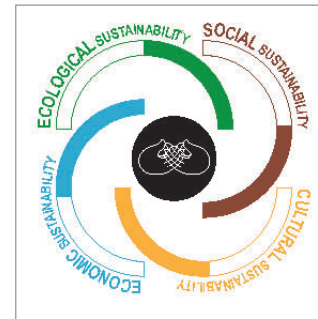
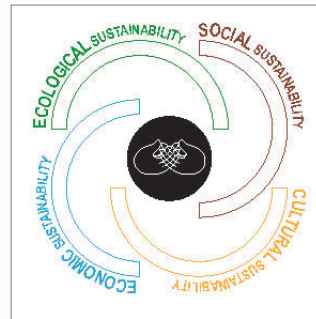
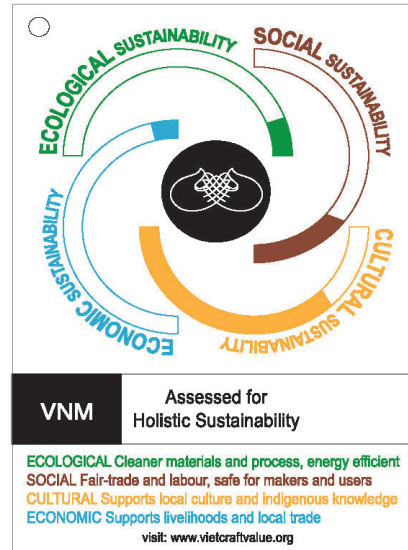
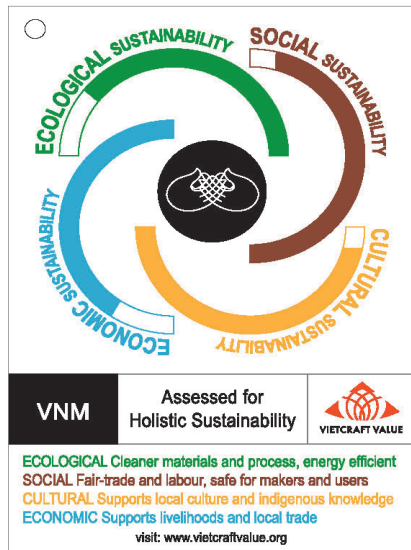


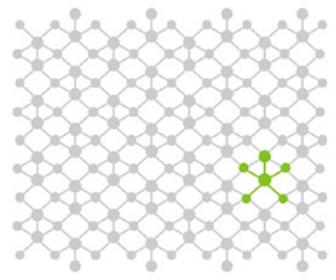
# sharing the learning: with entire PCSs



# Govt of Vietnam + UNIDO

assessing and  
branding  
sustainability  
in bamboo  
sector

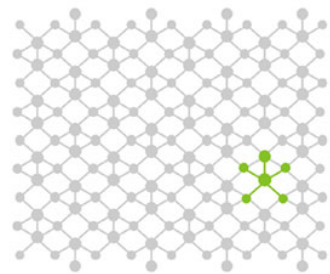




# 3 steps of labeling scheme

1. **Standard setting**, or identifying criteria to be met
2. **Certification**, or assessing to which level that standard is being met
3. **Labelling**, or communicating the results of the assessment, including the assessment criteria with or on the product





## HOLISTIC SUSTAINABILITY CHECKLIST

### MATERIAL CONSIDERATIONS

	Ecological	Social	Cultural	Economic
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2 Minimally treated materials	*			*
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### PRODUCTION CONSIDERATIONS

	Ecological	Social	Cultural	Economic
10 Minimum materials	*			*
11 Minimum production steps	*			*
12 Renewable energy for production	*			
13 Minimal energy for production	*			*
14 Low-emission-techniques	*	*		
15 Proper management of production effluents and waste	*	*		
16 Reduce/reuse production waste	*			*
17 Indigenous treatments and processes	*	*	*	*
18 Consulting indigenous communities on production issues that affect them		*	*	
19 Safe and healthy work environment		*		*
20 Fair wages and benefits to producers		*		*
21 No child labour		*		*
22 No forced labour		*		
23 Fair working hours		*		
24 Freedom of association and collective bargaining		*		
25 No discrimination		*	*	
26 Local employment opportunities		*	*	*

### DISTRIBUTION CONSIDERATIONS

	Ecological	Social	Cultural	Economic
27 Minimum product volume and weight	*			*
28 Minimum and clean transport	*			*
29 Local PCS	*	*		*
30 Minimum packaging	*			*
31 Reusable packaging	*		*	
32 Recyclable packaging	*			*
33 Packaging made from low-impact materials	*			

### CONSUMER USE CONSIDERATIONS

	Ecological	Social	Cultural	Economic
34 Minimum/clean energy during usage	*		*	*
35 Minimum consumables	*			*
36 Safe to use		*		
37 Customizable	*		*	*
38 Easily upgradable	*		*	
39 Classic design	*		*	
40 Minimum and local maintenance and repair	*	*	*	*

### END-OF-LIFE HANDLING CONSIDERATIONS

	Ecological	Social	Cultural	Economic
41 Reduced material complexity	*			
42 Biodegradable	*			
43 Easy to disassemble	*			*
44 Reusable	*		*	
45 Recyclable	*			*
46 Promotes/uses local recycling systems	*	*	*	*

# Standard setting

## MATERIAL CONSIDERATIONS

Traditional material-selection parameters include function, appearance, reliability, service life, environment, compatibility, production viability, and cost.<sup>7</sup> The Sustainability Checklist proposes the following supplementary parameters towards sustainability.

### 1» RENEWABLE MATERIALS

ECOLOGICAL SOCIAL CULTURAL ECONOMIC

Given that Earth has finite natural resources, renewable materials are growing increasingly important to ecological sustainability. While a lot of organic materials regenerate, the time frames required for their renewability differs.<sup>8</sup> Materials from the biosphere (that grow on the earth) such as bamboo or sea-grass are renewed more quickly than those from the lithosphere (under the surface of the earth) such as coal. Among these, some biosphere materials, such as bamboo, renew faster than other biosphere materials, such as wood. Materials that are more renewable should be used, and exhaustible materials should be substituted as far as possible.<sup>9</sup>

### 2» MINIMALLY TREATED MATERIALS

ECOLOGICAL SOCIAL CULTURAL ECONOMIC

Minimizing the treatments required to prepare raw materials reduces emissions and energy consumption, thereby impacting ecological sustainability. Minimizing treatments also positively impacts economic sustainability, as reducing the processes reduces the overall cost.

### 3» RECYCLABLE MATERIALS

ECOLOGICAL SOCIAL CULTURAL ECONOMIC

Recyclable materials positively impact ecological sustainability by reducing the burden of disposal, and inputting existing material into a fresh life cycle. Recyclable materials are valued economically as inputs into another material life cycle even after their original use and so also positively impact economic sustainability. To facilitate easy recyclability, the product should comprise of a single material as far as possible.<sup>10</sup> If this is not possible, materials with a similar end-of-life paths, such as biodegradable materials, should be used. Materials that are difficult to separate, including compound materials, laminates, fillers, fire retardants and fibre-glass reinforcements should be avoided.<sup>11</sup> Add-on elements like stickers, which complicate the recycling process, should also be avoided.<sup>12</sup>

### 4» RECYCLED MATERIALS

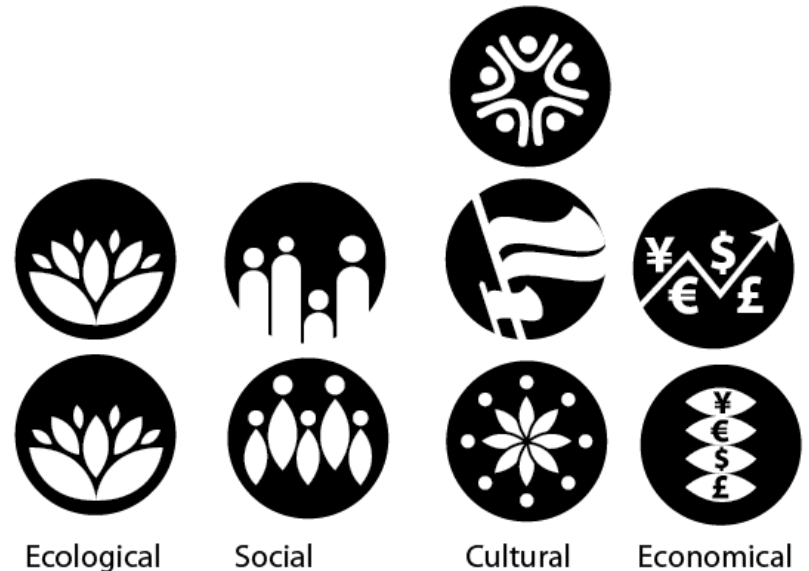
ECOLOGICAL SOCIAL CULTURAL ECONOMIC

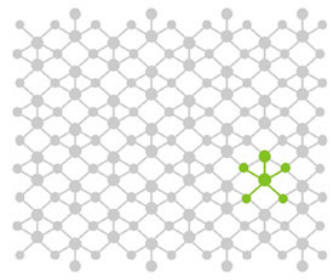
The use of recycled input materials positively impacts ecological sustainability since they reduce the need to harvest fresh materials for production. Wherever possible, virgin materials should be replaced by recycled materials, especially in functions that do not require high mechanical, hygienic or tolerance.<sup>13</sup>

### 5» LOCAL MATERIALS

ECOLOGICAL SOCIAL CULTURAL ECONOMIC

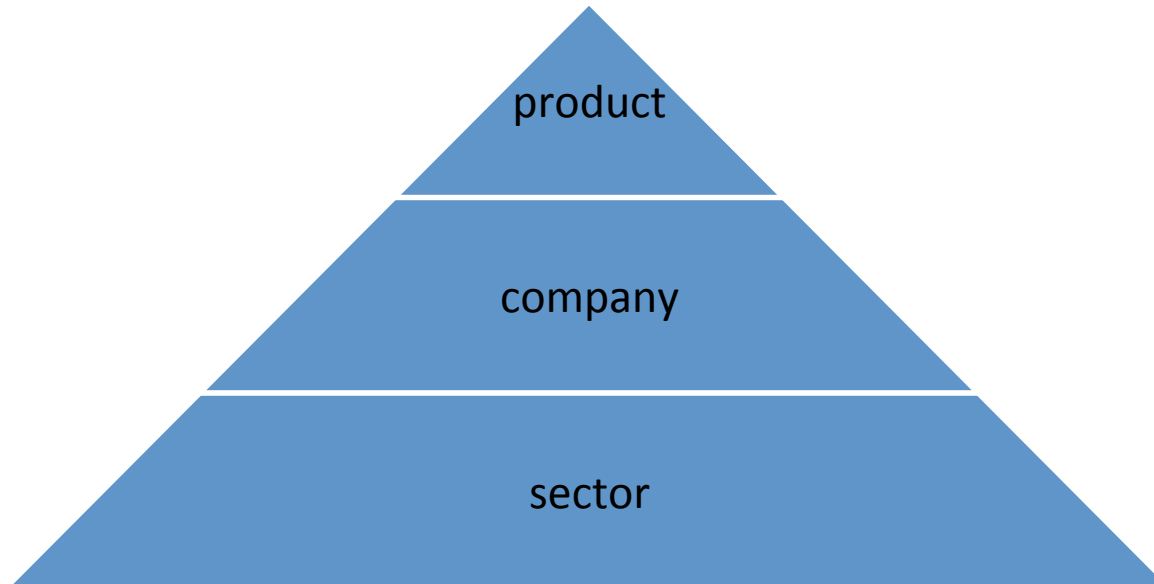
Using local input materials positively impacts the social, economic, cultural and ecological tenets of sustainability. Supplying local materials gives indigenous and local communities a source of livelihood (economic sustainability), and therefore the opportunity to sustain their social and cultural practices. Since environmental degradation caused by unsustainable practices such as over-extraction directly affects local communities, they tend to be more conscientious and, therefore, ecologically sustainable.

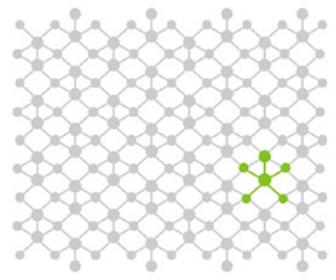




assessment

## What will be assessed?

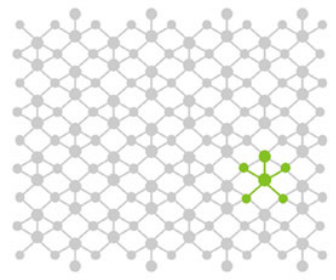




assessment

## Who will assess?

- 3 evaluators
- Preferably institutions
- Cross section – institutional subordinates, peers, superiors: 360 degrees

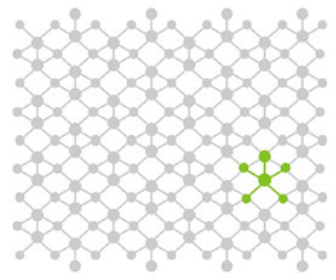


## assessment

### How to assess?

- 3 evaluators will grade 1,2 or 3 against each parameter of the holistic sustainability checklist
- Final score per parameter is the average of the 3 scores
- Score reflected in the parameter it affects
- 4 mini lists – ecological, social, cultural, economic
- Weightage is possible for each criteria

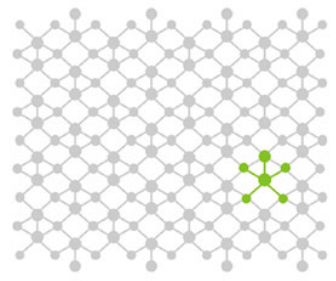




assessment

## Why scoring?

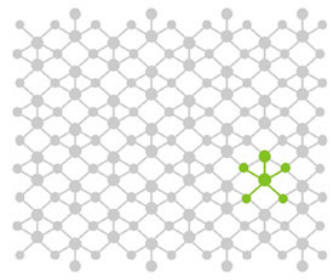
- Because even low scorers are reflected and not removed from the initiative
- Reflect trade offs between economic, social, ecological and cultural factors
- Low scores motivate to score better



assessment

## Benchmarks and stringency

- Against directive from implementation agency of possible benchmarks
- As stringent as possible
- Stringency levels to be tightened and reviewed annually or at regular intervals



assessment

## Minimum compliance criteria

- Non-negotiable criteria
- Decided by implementation agency based on statutory regulations and international norm
- ‘kick-out’ criteria

# Communication



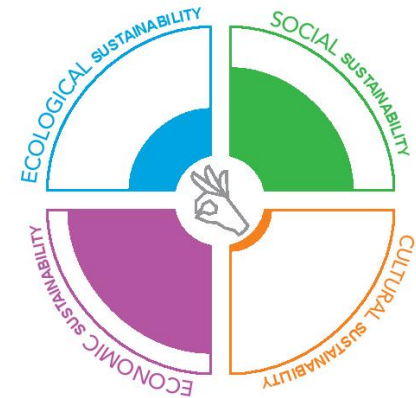
IND  
★ ★ ★  
Follows UNIDO holistic sustainability guidelines

ECOLOGICAL Cleaner materials and process, energy efficient  
SOCIAL Fair-trade and labour, safe for makers and users  
CULTURAL Supports local culture and indigenous knowledge  
ECONOMIC Supports livelihoods and local trade



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# Communication



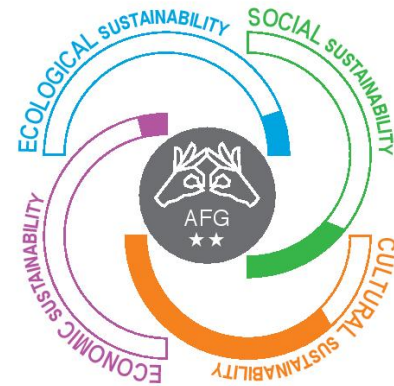
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Colour Variations:

Left: Different tones of the SAME colour. But because of gradation in colour it may convey different message of heirarchy.

Center: Single colour. Shows all sectors are on same level. Sustainability green; obvoius choice.

Right: Different sectors are colour coded, indicates individuality. Colours are in same tonal values.



# Communication



Follows UNIDO holistic Sustainability guidelines



Follows UNIDO holistic Sustainability guidelines



Follows UNIDO holistic Sustainability guidelines



Follows UNIDO holistic Sustainability guidelines

Different ways to show overall grade. Universally accepted measures like Tick Marks, Thumbs Up, Stars and another option of showing actual score. (Generated by computer)

# Communication



Follows UNIDO holistic Sustainability guidelines

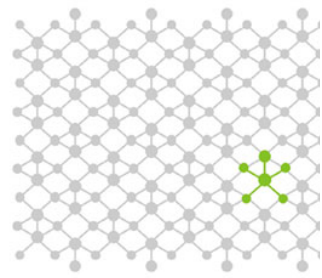


Follows UNIDO holistic **SUSTAINABILITY** guidelines

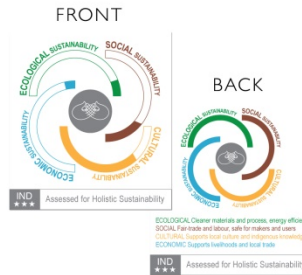
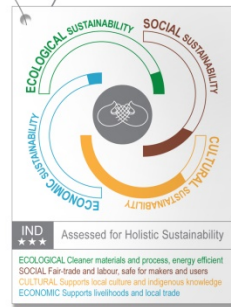


Follows UNIDO holistic Sustainability guidelines

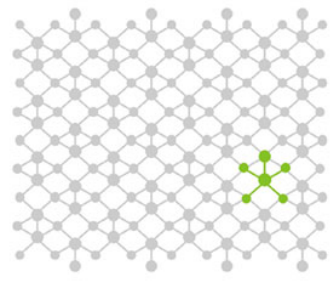
Different ways to incorporate word 'Sustainability'



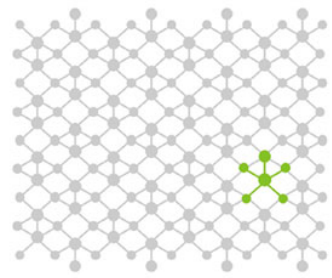
# Application







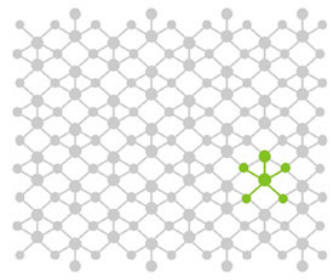
# The Rhizome Approach in practice through Rhizome's practice



# Gandhi Ashram Store

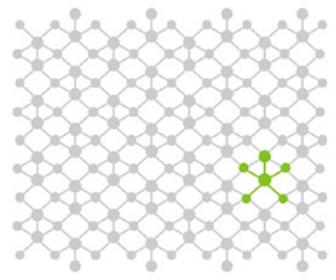


Gandhi Ashram  
Store  
Ahmedabad



# Phu Do



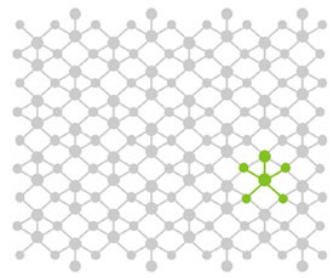


# Tripura Bamboo Mission

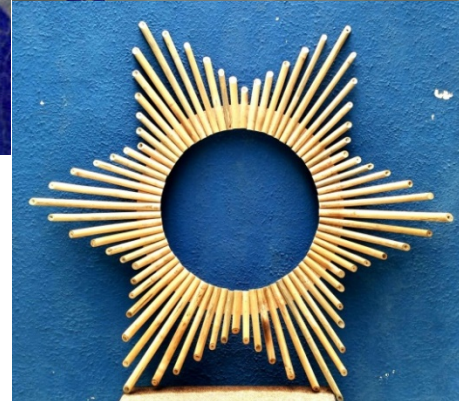


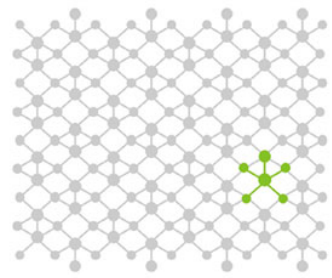
Design of spa products for TBM – flooded with market enquiries





# Rann Riders

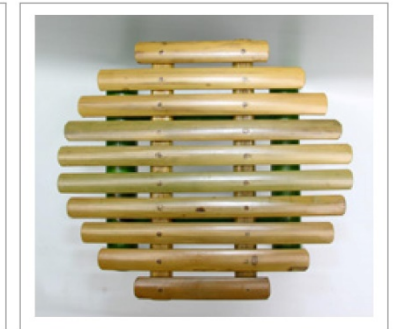
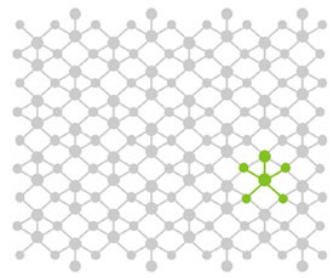




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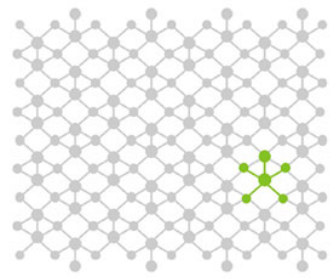


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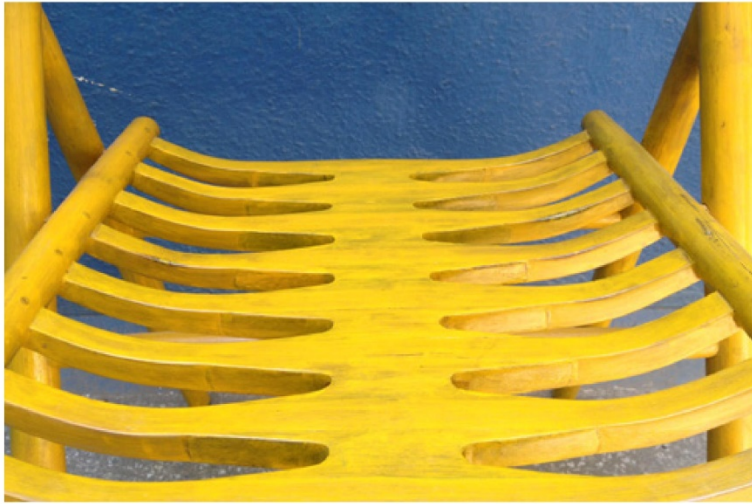
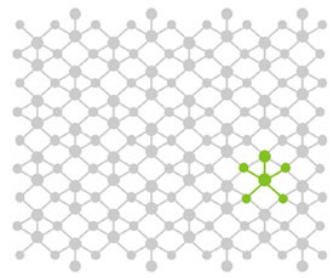
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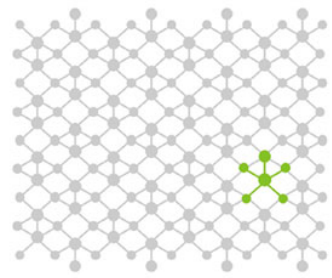


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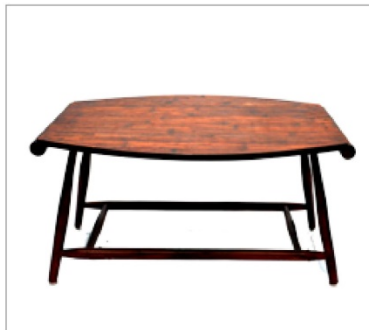
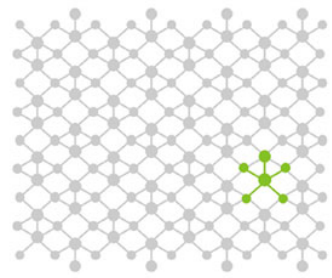
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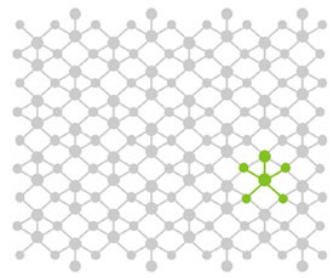
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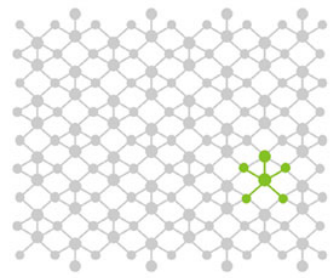
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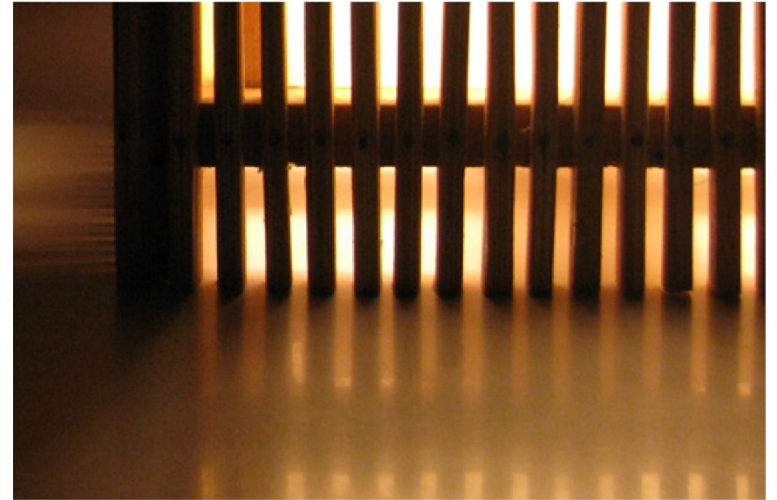
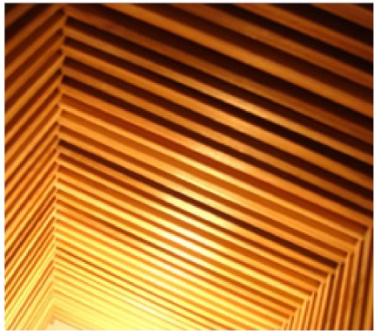
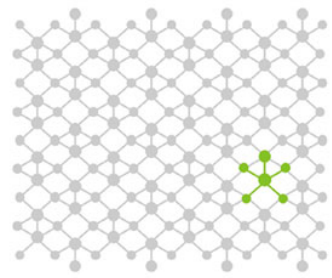


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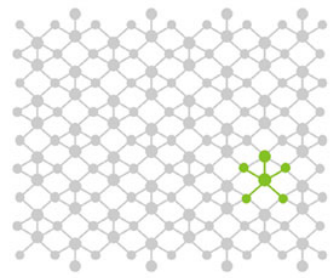
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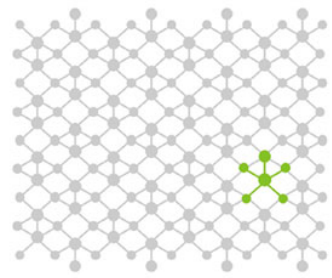


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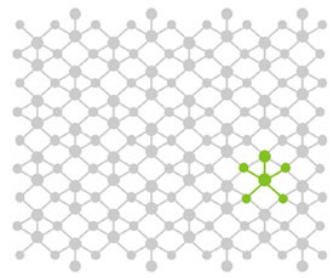
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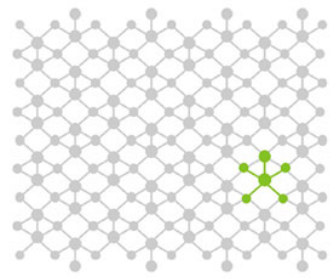


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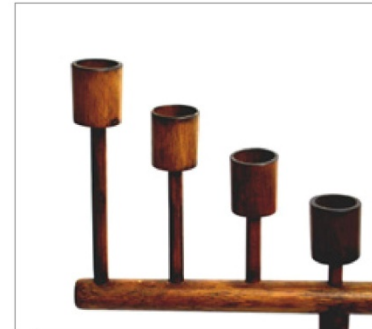
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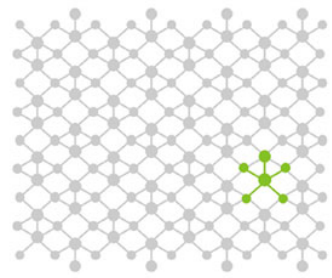
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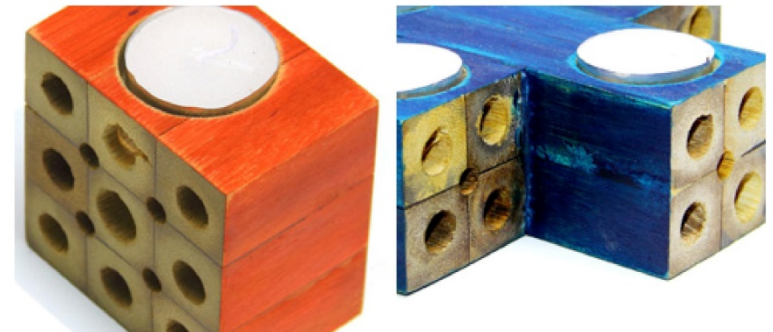
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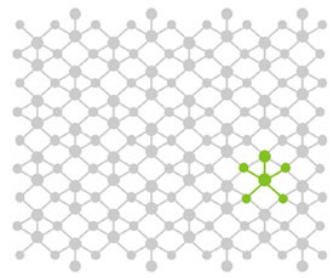
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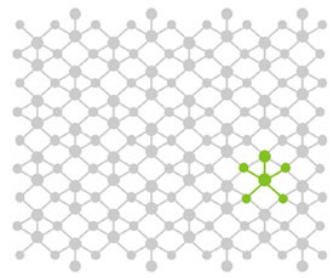
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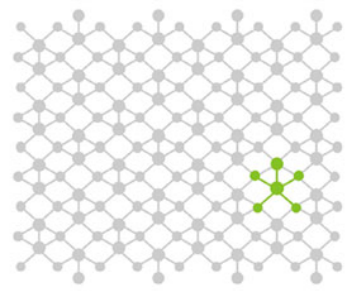


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