



## Long-term visions for cold climate standards & R&I

Ville Lehtomäki

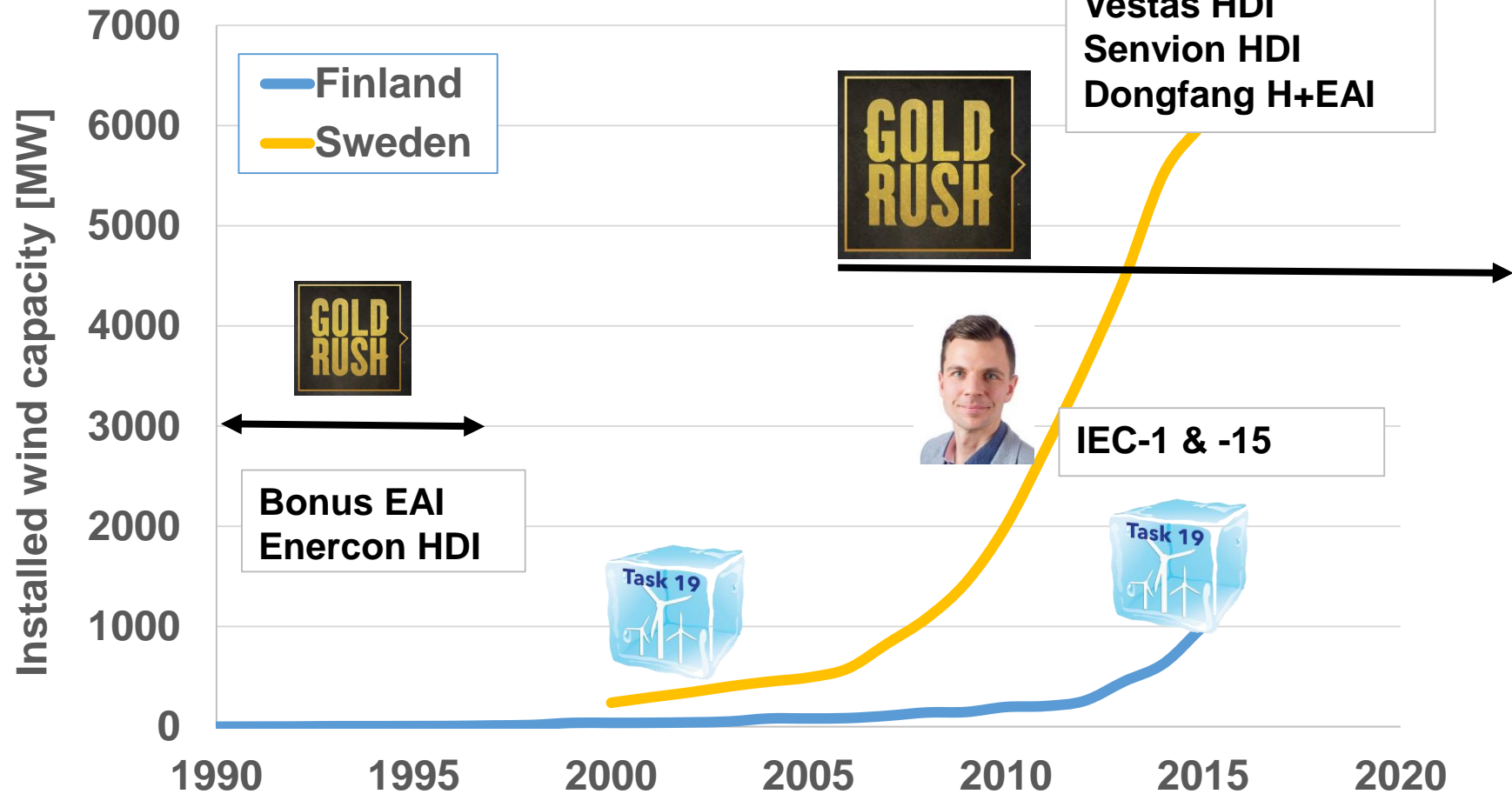
WinterWind conference, 7Feb2017, Skellefteå  
VTT Technical Research Centre of Finland Ltd

## I will try to answer the following questions:

1. What are the pre-requirements in order to make an international standard for cold climate?
2. What networks for cold climate exists, what are their roles?
3. What is the process from idea to standards?
4. How to fund international R&I projects for cold climate?



# History of CC wind deployment

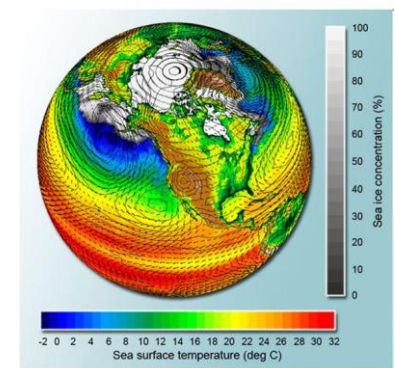
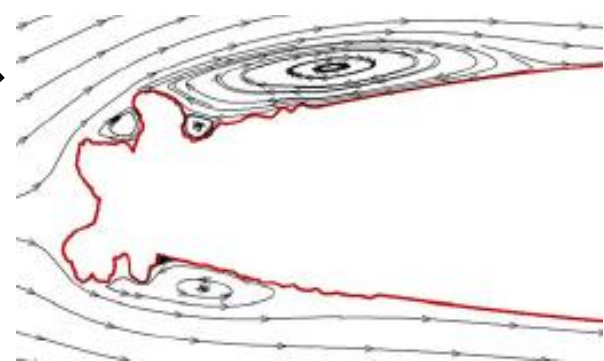
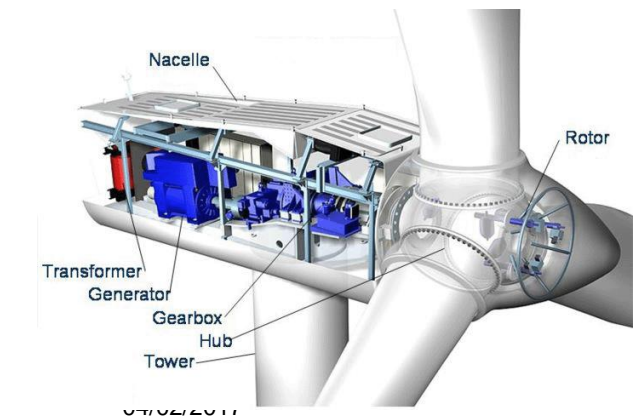
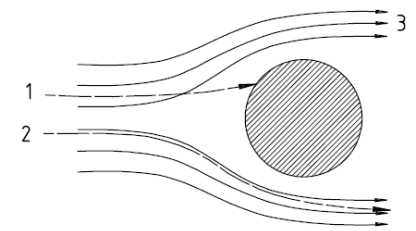
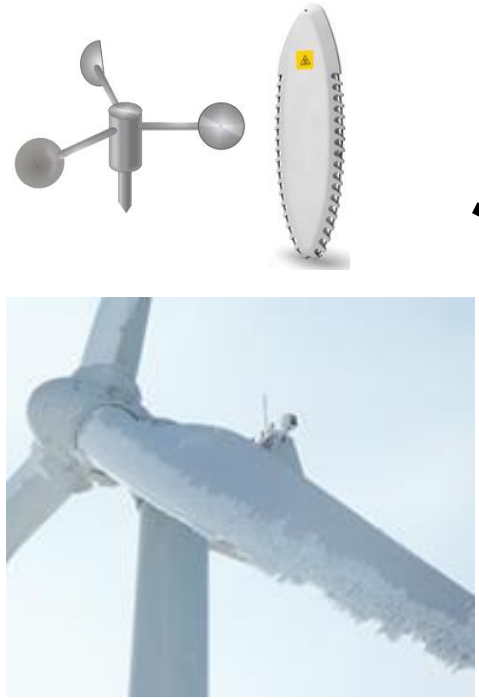




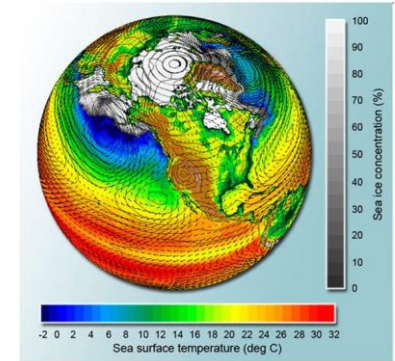
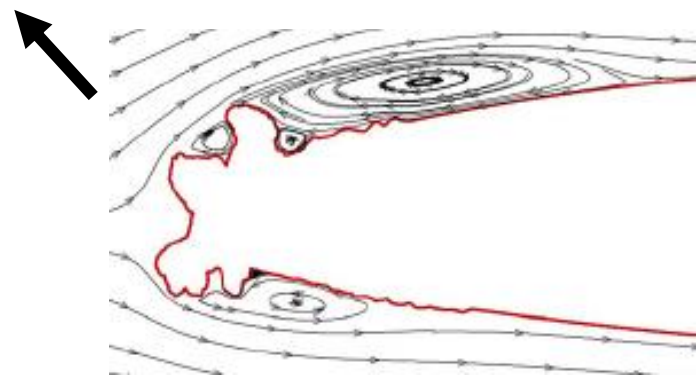
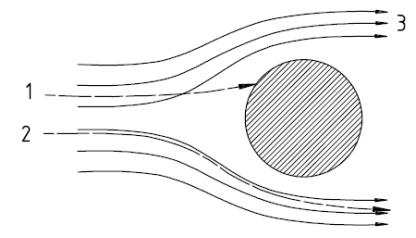
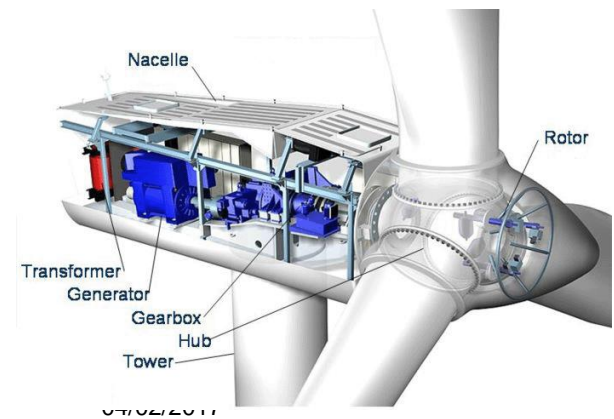
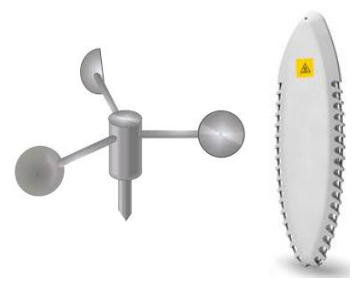
# My Passion

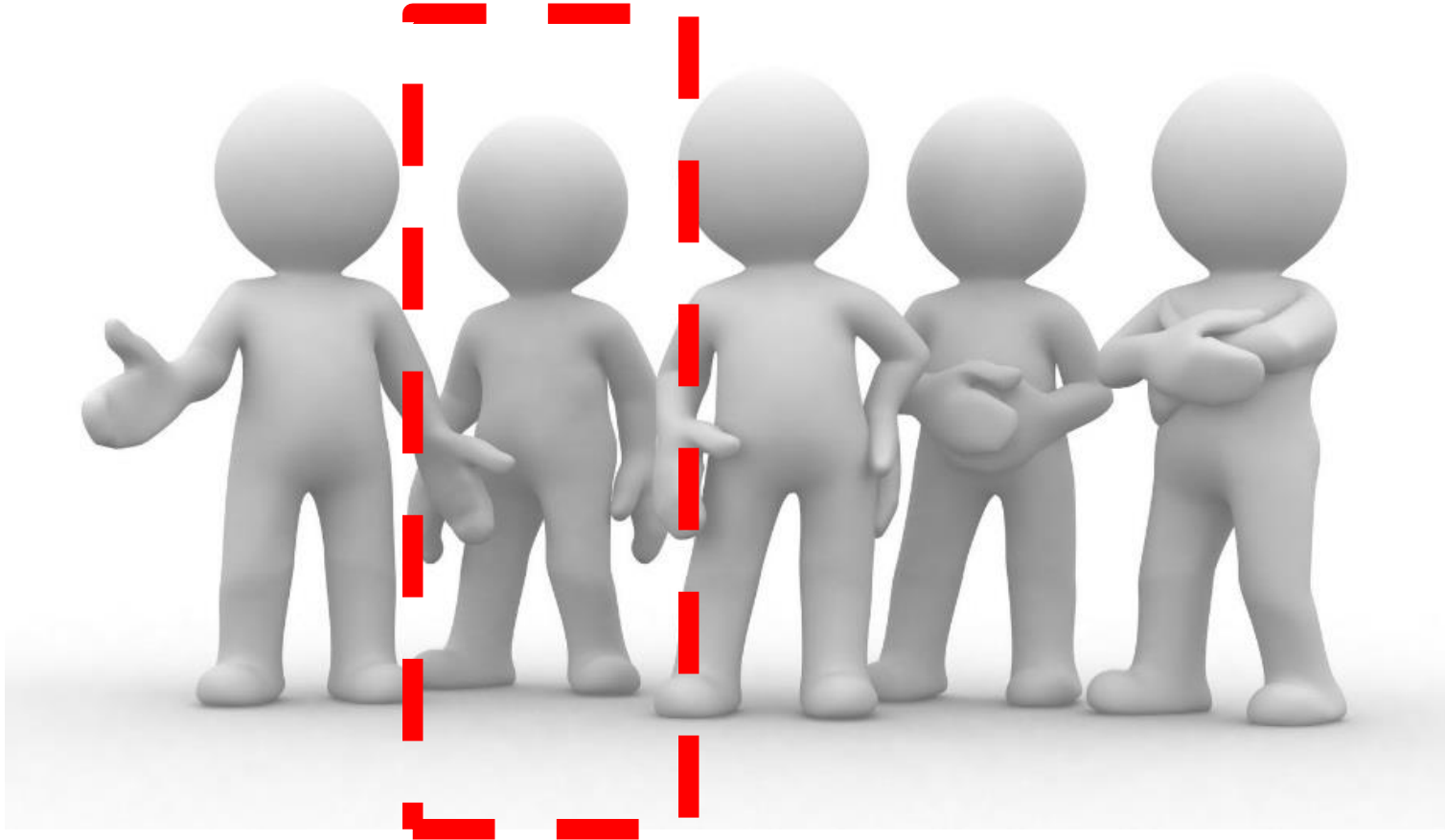


# Ville, why CC? Because it's so difficult!

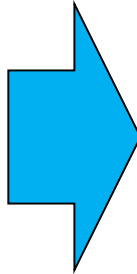
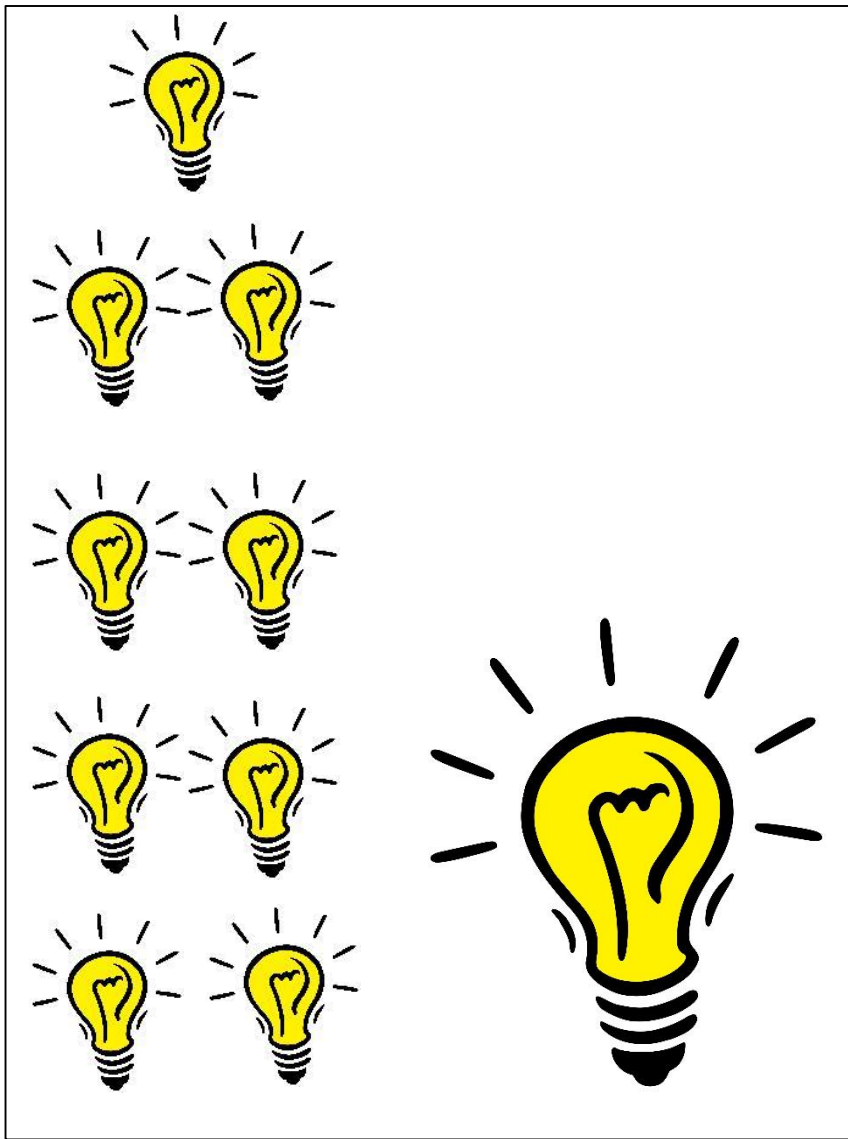




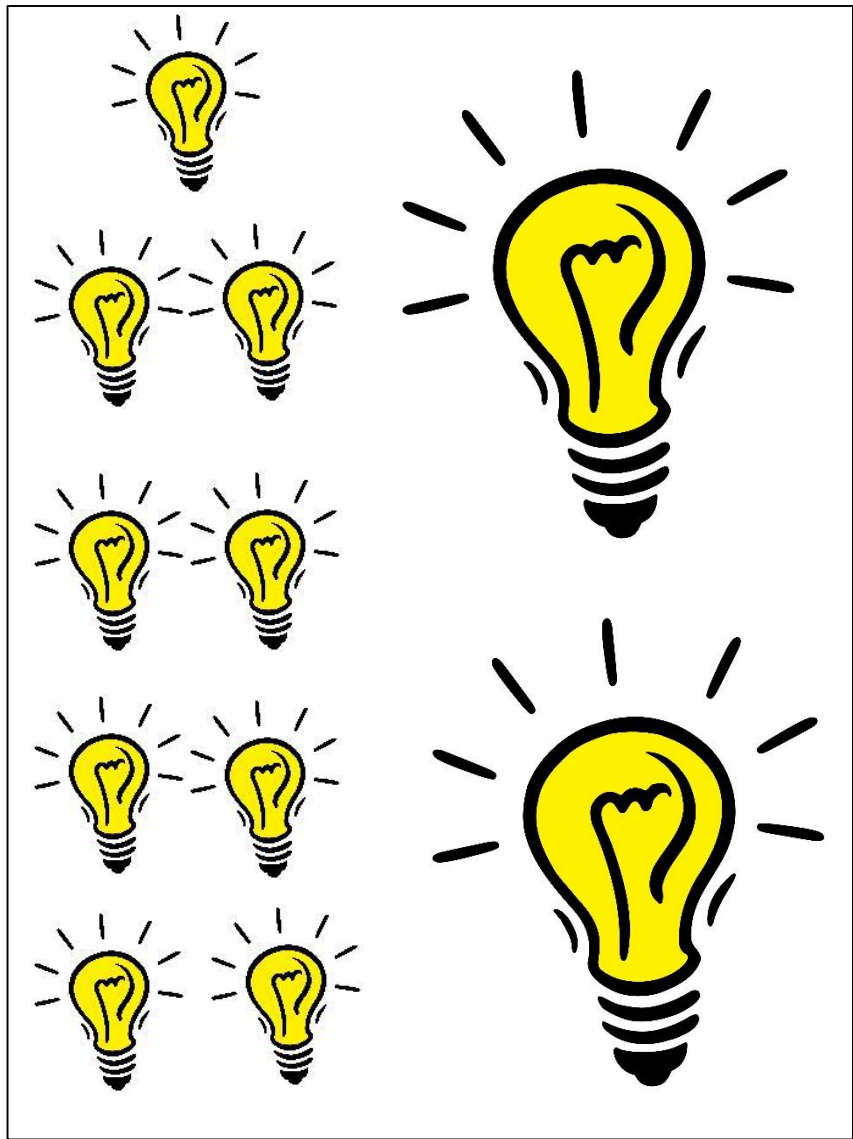




# TODAY

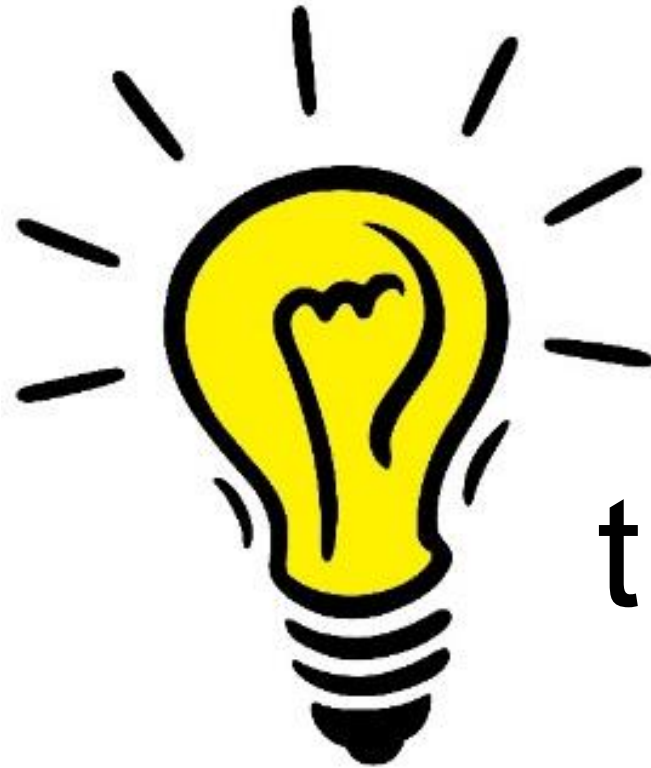


# TOMORROW



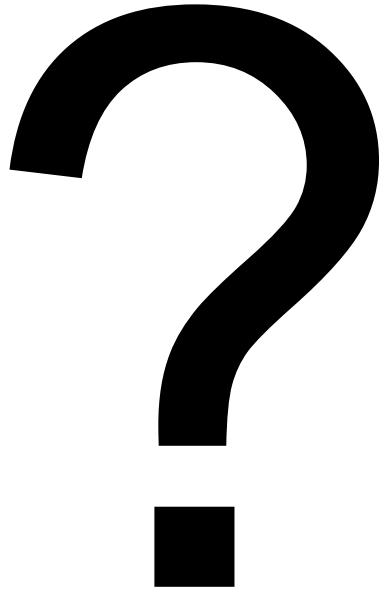


We need  
more



then





# Cold Climate Markets 2012-2017

Cumulative installed capacity by end of 2012 [MW]			Forecasted capacity 2013-17 [MW]		
Low temperature	Light icing: safety risk, some economic risk	Moderate to heavy icing: economic and safety risk	Low temperature	Light icing: safety risk, some economic risk	Moderate to heavy icing: economic and safety risk
18,945	41,079	11,478	20,025	22,083	8,003
Total 69,000 (*)			Total 45,000 – 50,000		

(\*) The total capacity is less than the sum of individual capacities because some of the sites have both low temperatures and icing conditions.

**30GW of new installations to icing conditions by 2017**

➤ Compare: new offshore 29GW by 2017!



# Cold Climate Markets 2015-2020

Cumulative installed capacity by end of 2015 [MW]		Forecasted capacity by end of 2020 [MW]	
Low temperature	Icing*	Low temperature	Icing*
40 500	86 500	62 500	123 000
<b>Total 127 000</b>		<b>Total 185 500</b>	



\*: IEA Ice Classification  $\geq 2$  meaning  $> 44\text{h/a}$  of meteorological (in-cloud) icing



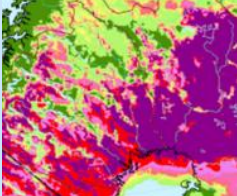
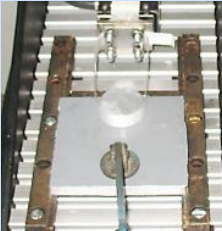
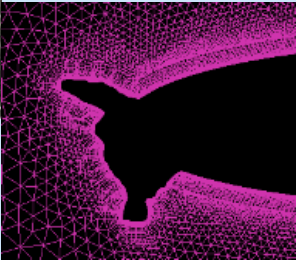
**+12GW/a -> 59GW of new installations to cold climates by 2020!**  
 ➤ Compare: new offshore +4GW/a -> 20GW by 2020

# Cold Climate Wind Energy





# Historical breakthroughs in CC wind energy R&I

Themes	Platforms	Deliverables
<b>PHYSICS, VOCABULARY</b>	 	<b>ISO 12494</b>   
<b>NETWORK</b>	<b>BOREAS -&gt; T19 - &gt; WinterWind</b>	<b>Tons on material!</b>
<b>TECH, METHOD, VALIDATION</b>	<b>EU WECO &amp; EU NEWICETOOLS, COST 727, Nordic</b>	<b>Blade heating, Ice throw methods, Site meas.</b>
<b>STANDARDS</b>	<b>T19</b>	<b>RP report, IEC-1</b>

# Challenges 2017 ->

Populism &  
Nationalism  
Post-truth era

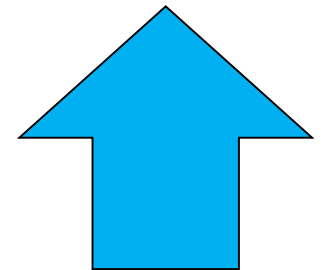
Missing  
Standards!



Horizon 2020  
Programme



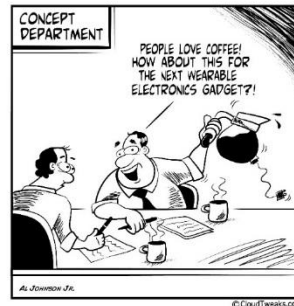
# How are standards made?



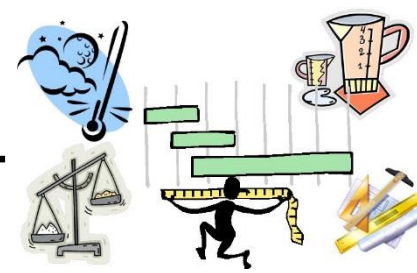
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Long-term R&D

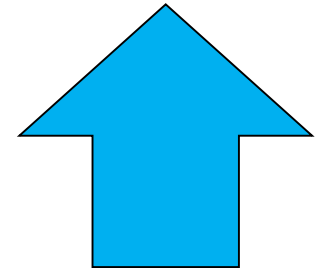
Applied research

Measurements, lab & field testing

Industry know-how



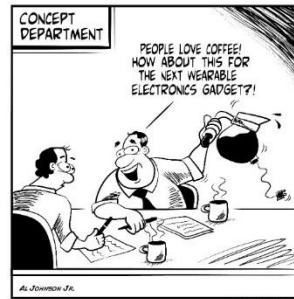
# Not enough: Standards need research results!!



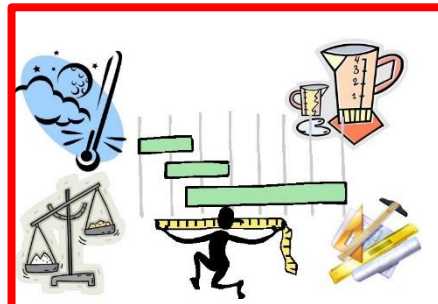
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Long-term  
R&D

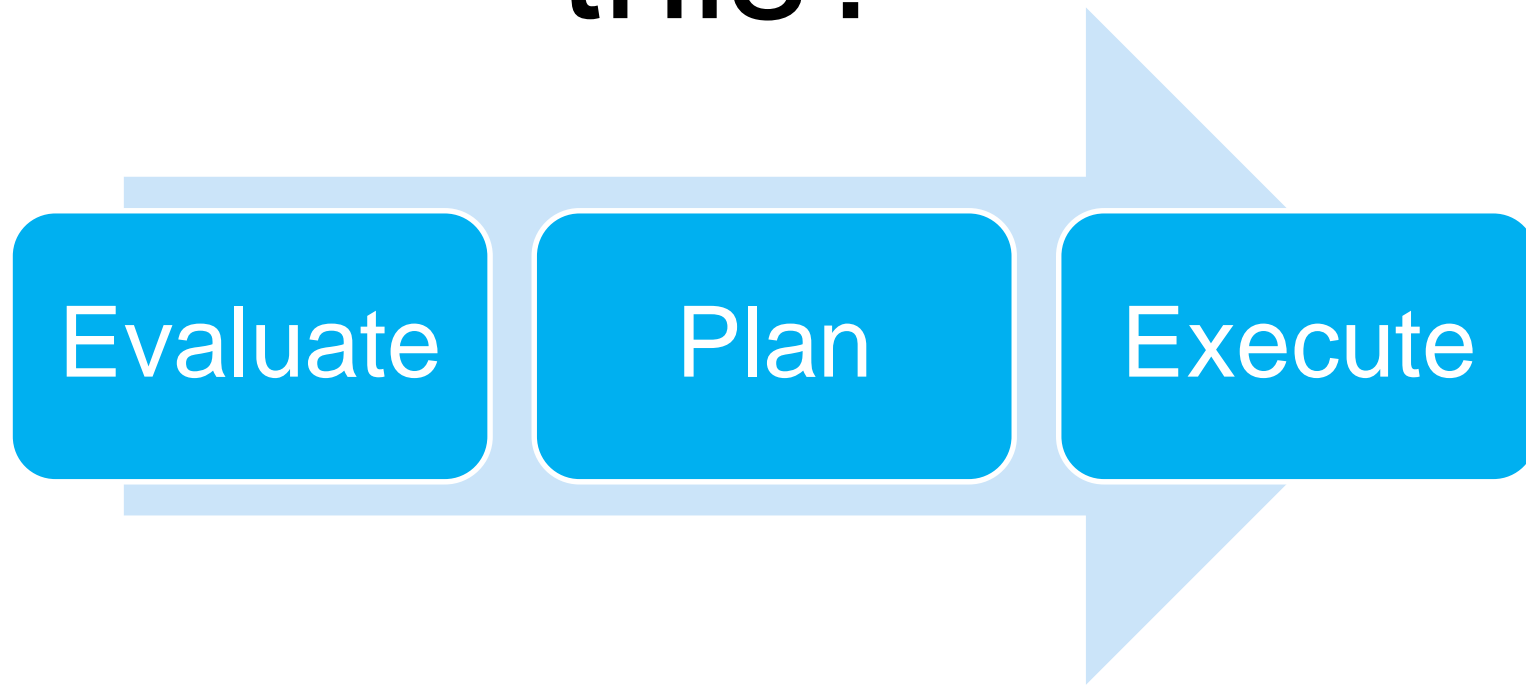
Applied  
research

Measurements,  
lab & field  
testing

Industry  
know-how

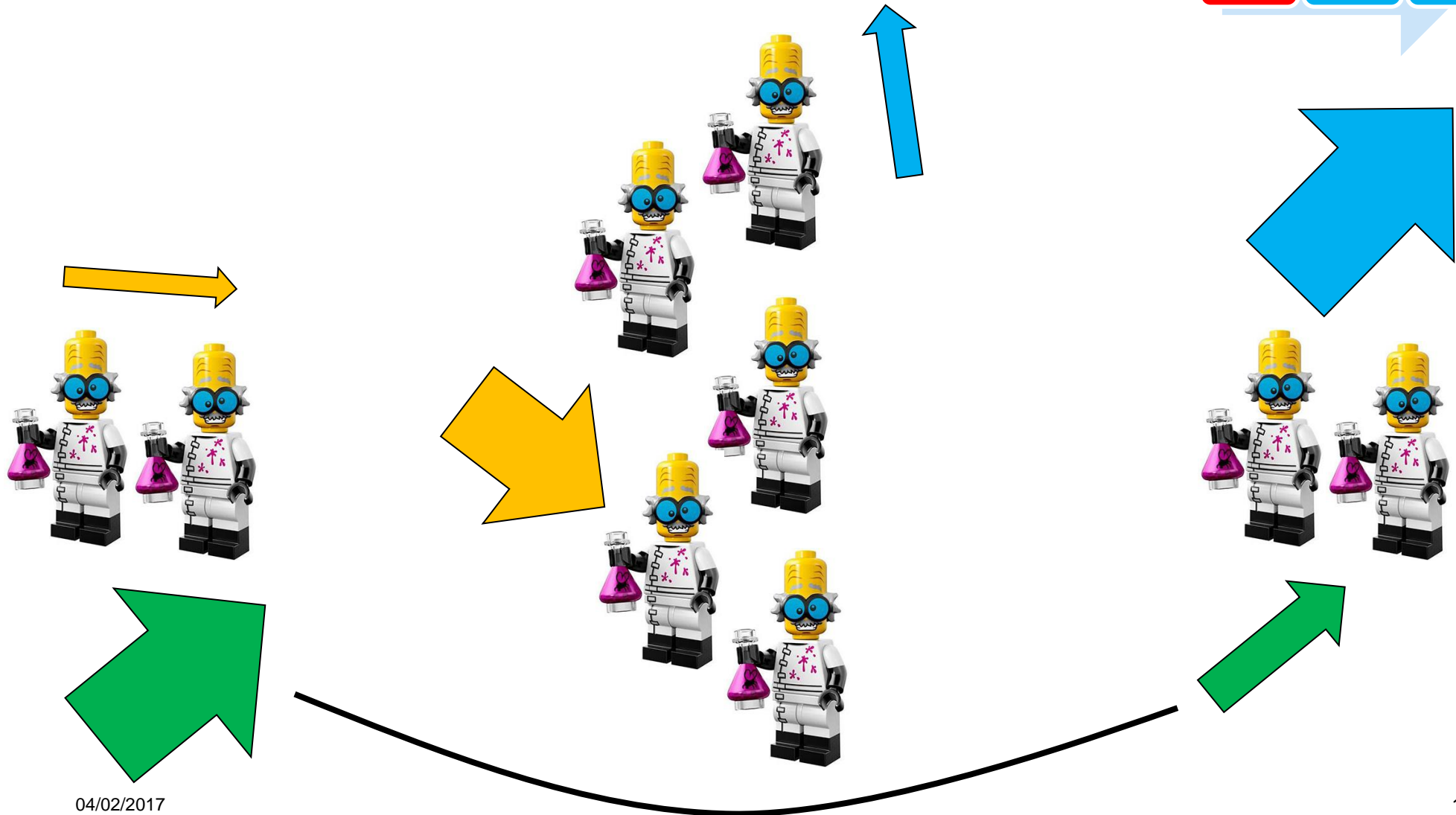


# How to fix this?

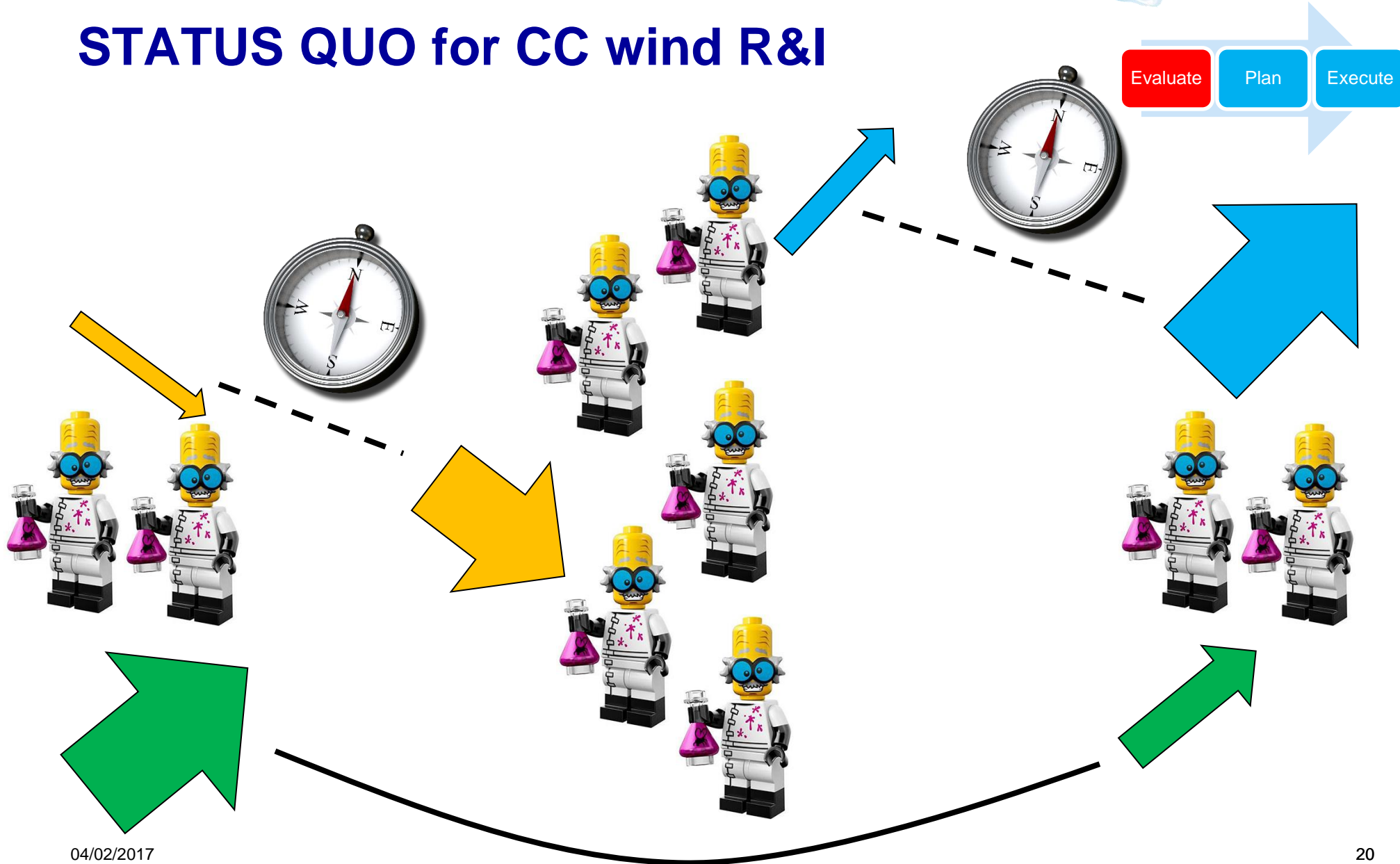




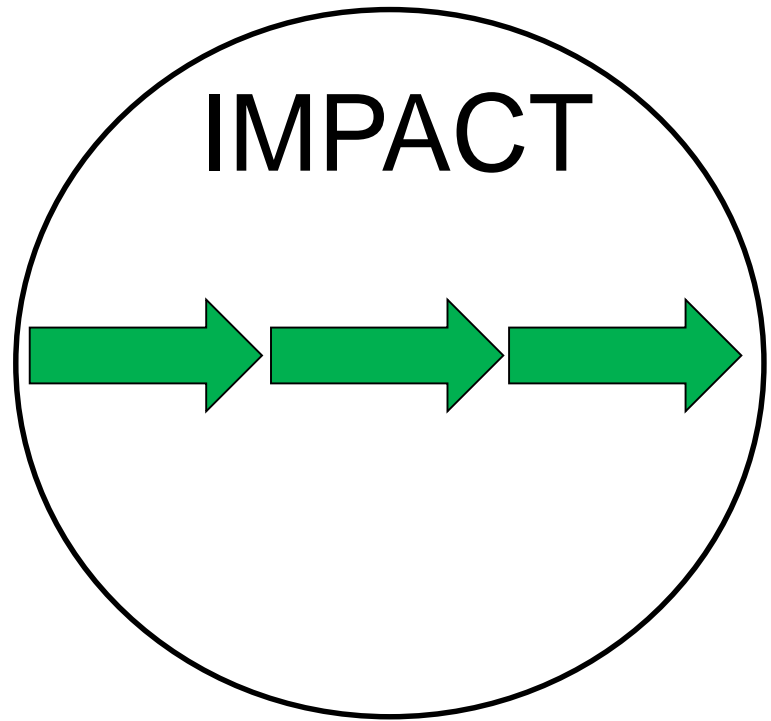
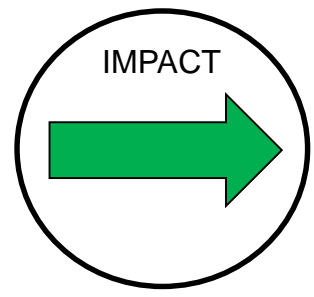
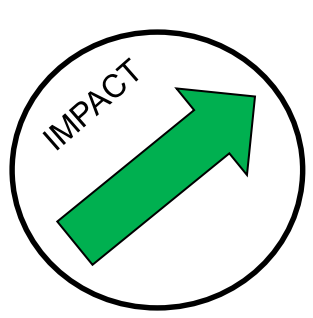
# STATUS QUO for CC wind R&I



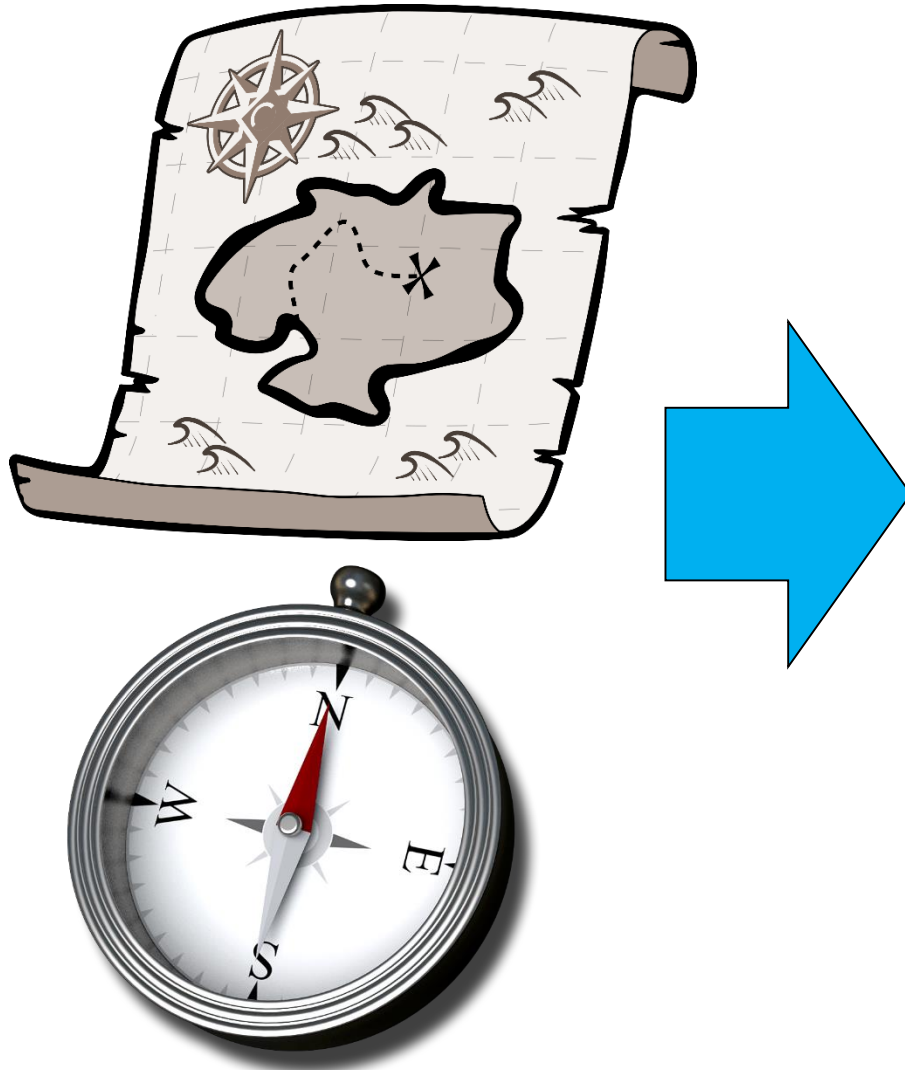
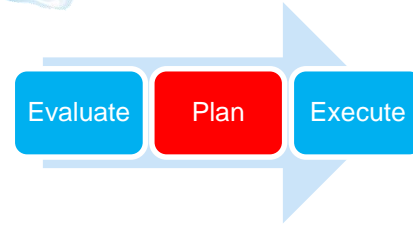
# STATUS QUO for CC wind R&I



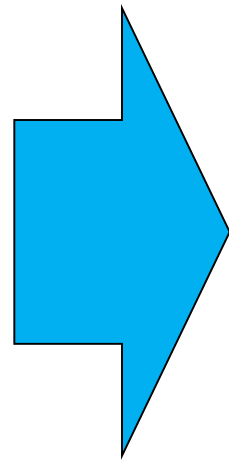
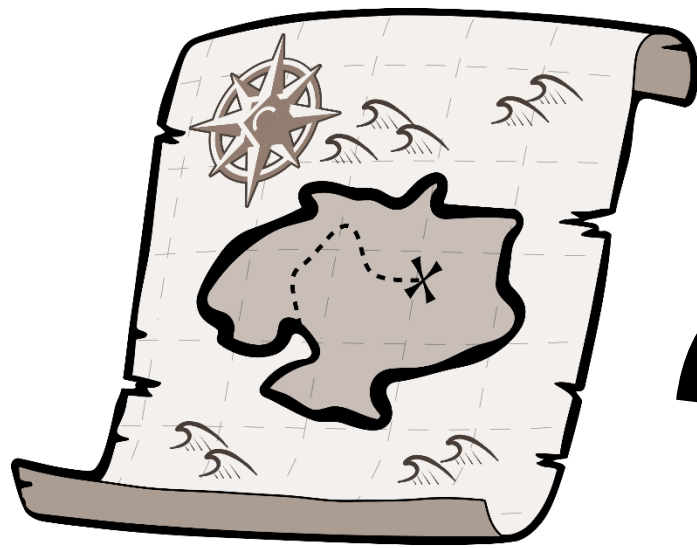
# Where are the big, SUPER international R&I projects for CC wind???



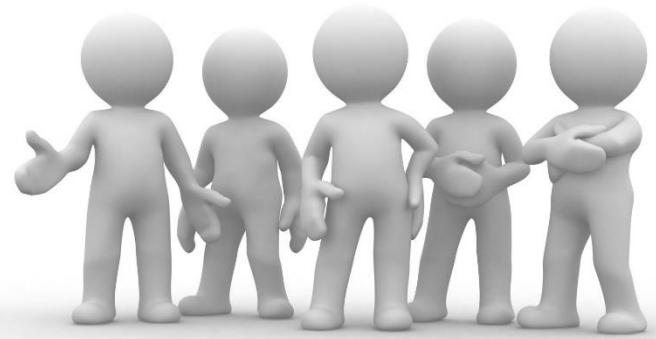
# What do we need?



1. New tech
2. New methods
3. Validation



# Networks



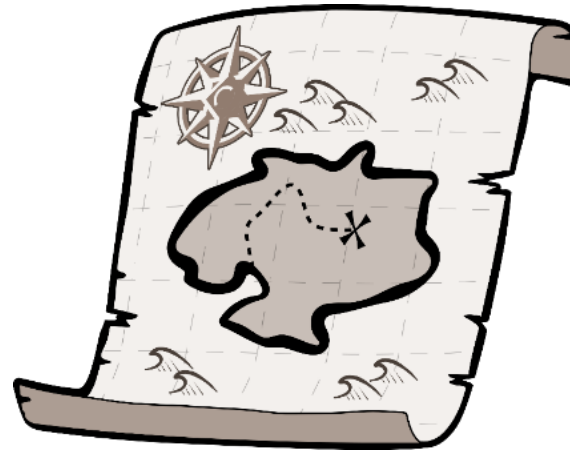
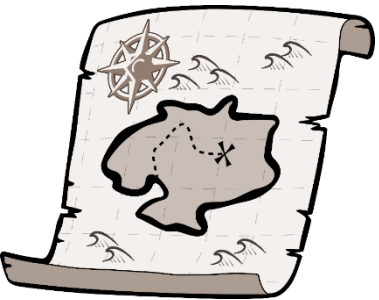




# Opportunity R&I networks



EUROPEAN TECHNOLOGY & INNOVATION  
PLATFORM ON WIND ENERGY



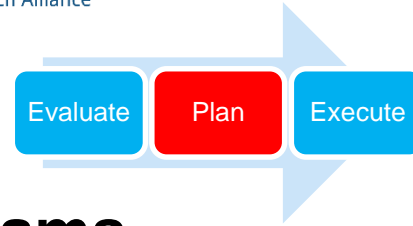
# EERA Joint Program WIND

## VISION

*Move from a voluntary network towards a “virtual research centre” running an Integrated Research Programme*

## MISSION

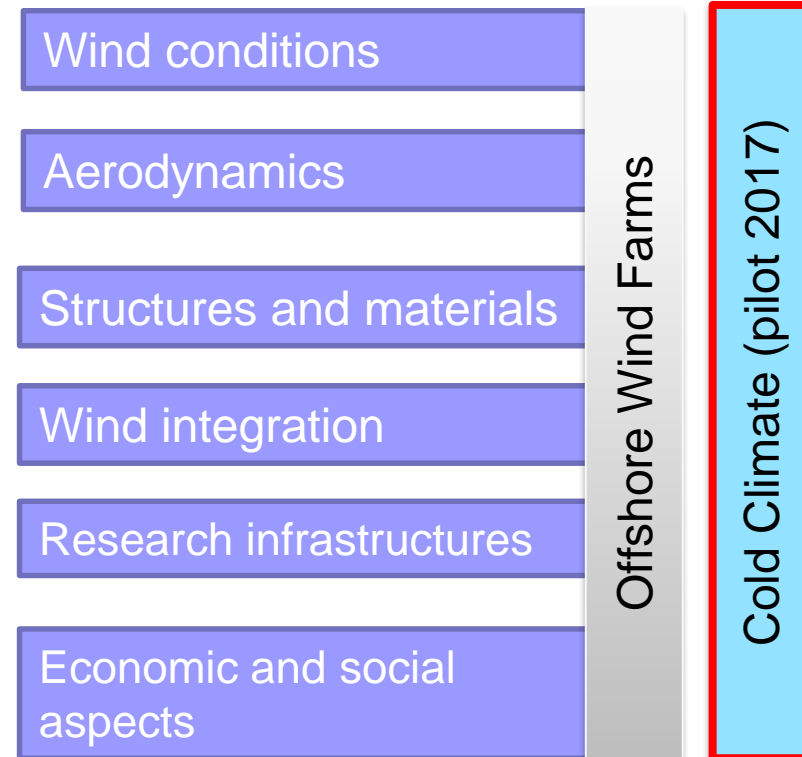
- Identify R&D priority settings*
- Coordinate research communities*



## Sub Programs

### Application areas

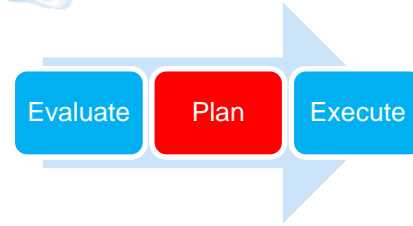
Enabling research areas





## Opportunity R&I networks

# EERA Cold Climate vs IEA WIND TASK 19



	EERA CC vs Task 19
<b>Similarities</b>	<ul style="list-style-type: none"><li>• Gather, exchange &amp; disseminate information</li></ul>
<b>Differences</b>	<ul style="list-style-type: none"><li>• T19: use existing research results -&gt; write Recommended Practices, international partners</li><li>• EERA: heavy European focus only, coordinate and <u>prioritize R&amp;D, perform research, long term horizon</u></li></ul>

# EERA Cold Climate Sub Program

## Long-term, pre-competitive R&I needs

### **Pre-construction production assessment in icing conditions**

Ice detector technology R&D

Development of next generation NWP models for icing

Development of site specific icing loss assessment methods

### **Cold climate wind turbine technologies**

Simulation of iced turbines

### **Laboratory and full scale field testing & measurements**

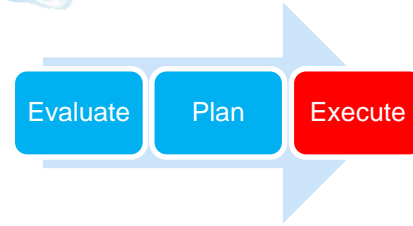
Component testing in icing wind tunnel and low temperature laboratories

Full scale turbine site testing

### **O&M in cold climate**

Icing forecasts with NWP models

Remote access O&M strategies, repairs and lifetime



# A proposal for solution



# Let's make our CC



# together!



+







+

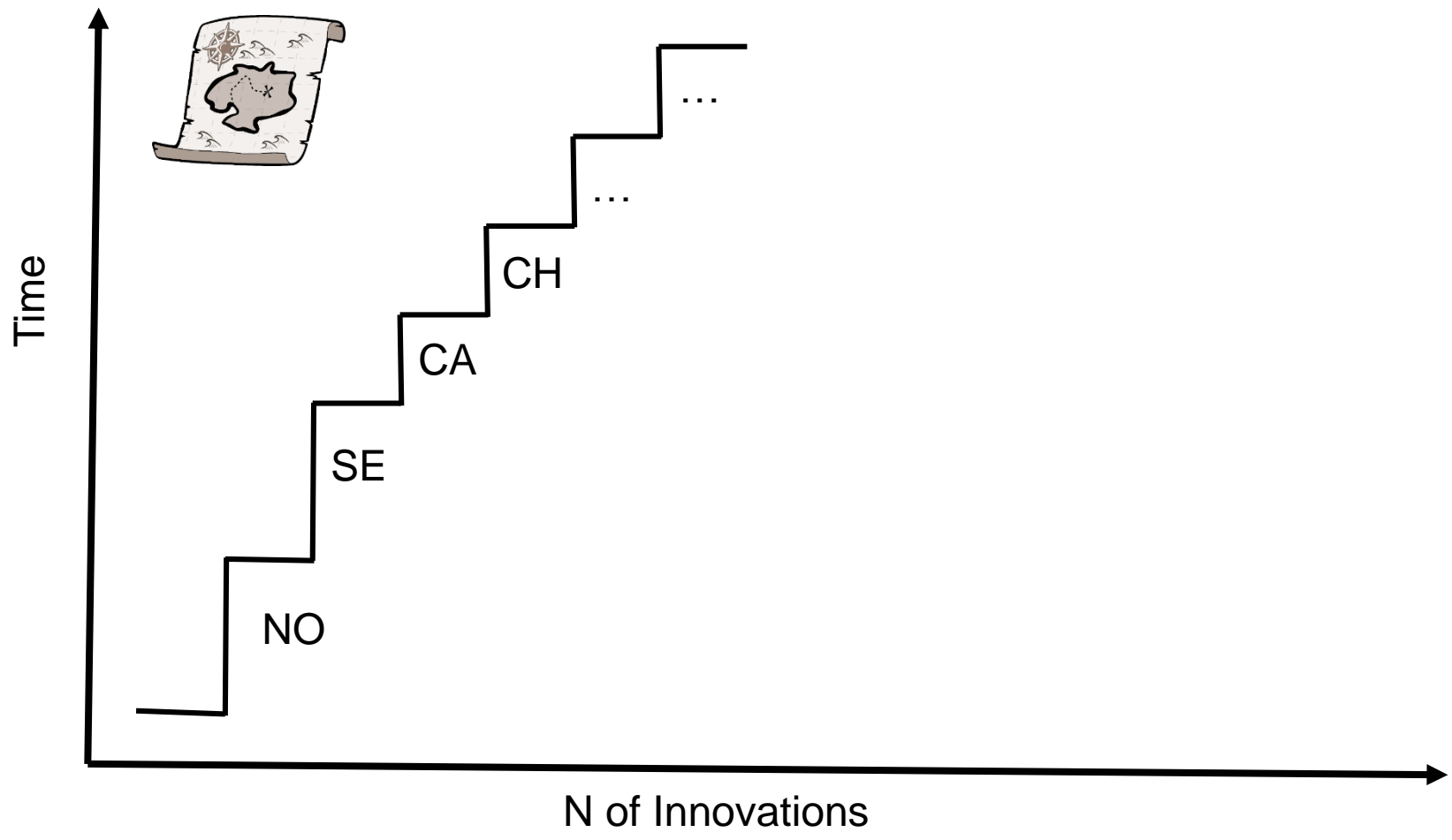




# Historical vs future breakthroughs in CC R&I

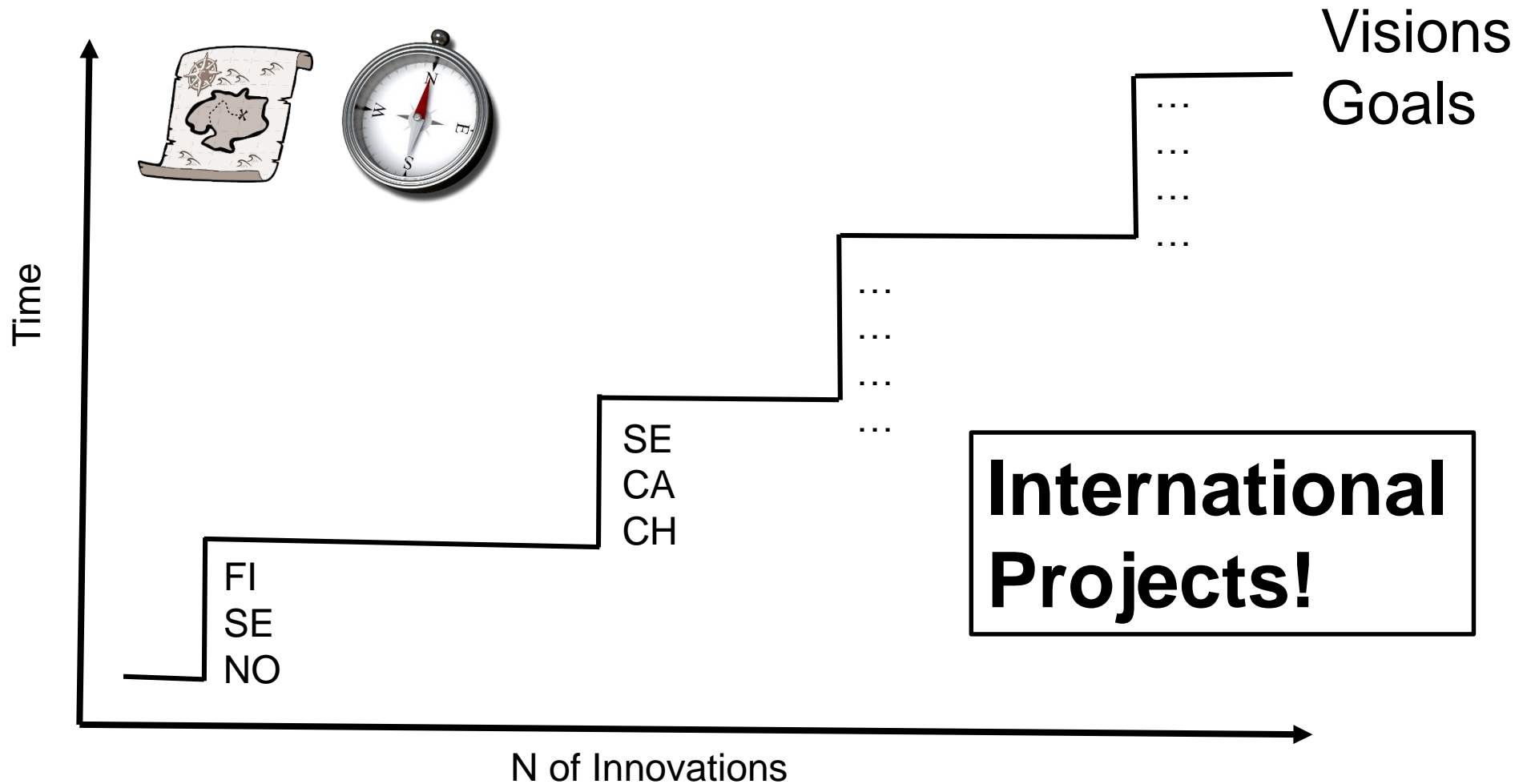
Themes	Historical success	Future success
<b>PHYSICS, VOCABULARY</b>	 	  <b>Vocabul.</b> <b>Ice</b> <b>ablation</b>
<b>NETWORK</b>	<b>BOREAS -&gt; T19 -&gt; WinterWind</b>	<b>BOREAS-&gt;T19-&gt; WinterWind-&gt; EERA</b>
<b>TECH, METHOD, VALIDATION</b>	<b>EU WECO &amp; EU NEWICETOOLS, COST 727, Nordic</b>	<b>BIG international projects</b>
<b>STANDARDS</b>	<b>T19</b>	<b>T19, others?</b>

# The walk to goals NOW



Visions  
Goals

# The walk to goals TOMORROW



## The funding

Joint  
industry  
projects



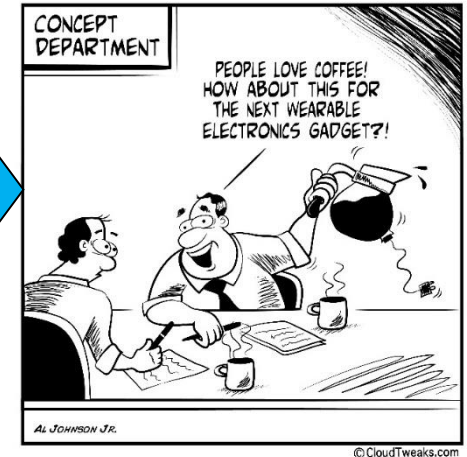
# The "magical" roadmap to standards



**KEEP CALM AND Standardize**  
 Vocabulary  
 Methods  
**STRATEGY**  
 Task 19



Long-term R&D

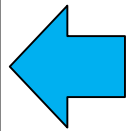


Applied research

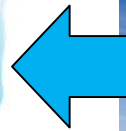


**IEC ISO**  
**KEEP CALM AND Standardize**

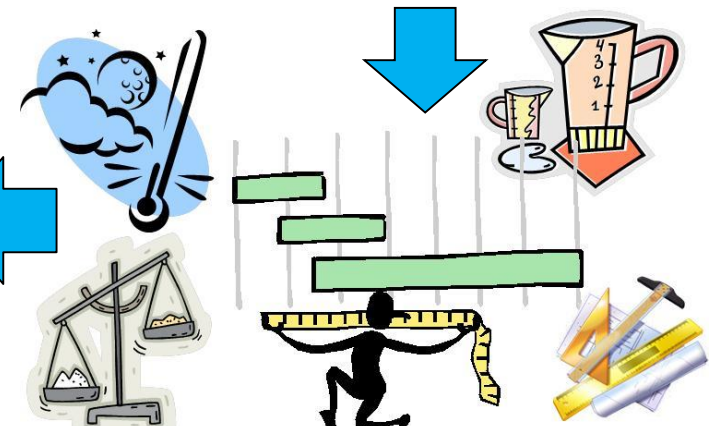
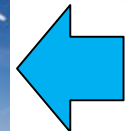
International standards



RP, AT reports



Industry know-how



Measurements, lab & field testing



## The questions:

1. What are the pre-requirements in order to make an international standard for cold climate?
2. What networks for cold climate exists, what are their roles?
3. What is the process from idea to standards?
4. How to fund international R&I projects for cold climate?

## The answers:

1. Strategic, pre-competitive long-term research via BIG projects to solve burning industry needs
2. Many: Task 19 (pre-standards) EERA (long-term research), WinterWind (info exchange)
3. The “magic” roadmap
4. Joint industry, EUREKA, COST, H2020

**Go out, tell our CC story!**

**Thank you!**



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