Third Mission What? Why? Who?



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# Layout of this presentation

#### What is TM?

➤ Short version

#### Historical background and perspective

Will try to convince you that it is not an accident, nor the produce of some politicians

≻ Know your time and place

Detailed discussion of the definitions

> What can be done, when, by whom?

Can be evaluated?

≻ How?

#### INFN...

≻ How do we support Third Mission activities?

### Universities and there mission(s)

The Humboldtian model was imagined for an elite university, based on

- Education (teaching)
- ➢ Research

It dates back to 1810 and exercised its impact well outside Germany

- There was no room for "market oriented" mission
- Its crisis started in the last decades of the XX century
- The emerging role of TM is strictly linked to a change in the role of HEI wrt this model



Wilhelm von Humboldt

# Why Third?

It is defined by "exclusion". In the academic world:

- First mission: teaching
- ➢ Second Missione: research

von Humboldt

- With many shades of colour and variations of form, and many notable exceptions, there has been a general tendency for universities and their academic staff, engaged as they are with what they perceive as the noble pursuits of education and research, to see themselves as somehow apart from the societies that host them; a very different posture from the intentions of their founders.»(\*)
- In recent years an effort with the aim that Research Organization and HigherEducation Institutions come back to be partners of the «host communities»
  - «Third Mission (3M) should not be seen as separate from the first two. The engament with society that is understood in the first two, finds other ways to express itself. Therefore 3M activities should be seen as part of the Mission of any Higher Education/Research Organization»\*

(\*) EU E3M Project: Green Paper on «Fostering and Measuring Third Mission in HEI 4



#### To whom do we transfer?

World «outside» academy:

- ≻ Firms
- Politicians
- Civil society groups
- ➤ The whole populations

Lifelong Learning Public Engagement

Initially «top-down» process, almost exclusively meant as TT

Great interest in aspects related to market

➢ Industry development, leadership, occupation, GDP(\*)

More funds for research

Over time, interest towards KT extended beyond marketdriven aspects, addressing the broader concept of

Develoment

➢ Social, cultural

Knowledge can address many problems...!

(\*) Gross Domestic Product, PIL

## From Turris Eburnea to Citizen Science

#### How did we go from *Turris Eburnea* to

#### Public Engagement?

- Curvy path, diffent roads
- Beware: different countries have different history
  - Take this as a suggestion/warning when looking at proposal/experiences
- Its is utterly important to set actions/choices in the correct historical perspective
  - The engagement of intellectuals and academics is intertwined with the culture of a given country
- Now let's see how and why we did this journey



# The old time

- Second half of the XIX century is the golden age of diffusion of science
- In UK Nature
- In Italy La Natura
- Back then, part of the

#### Humprey Davy (1800)



- Scientist's mission was to popularize her/his results
- Charles Darwin
- James Clerk Maxwell
- In Italy
- Lessona, Mantegazza

Where do we (scientists) come from? The Age of Extremes (The short Century)

WWI was the first "modern war" in which science had a strong impact on warfare. Just a few:

- Radiotransmission
- ≻ X-ray
- Planes
- High power explosives
- Poison gas
- ▶ ...

#### WWII marked by

- ➢ Radar
- ➤ pennicill
- Planes
- missiles
- Bomb

> ...

≻ ...

Cold War

In WWI strong links between academic world and military





Even if we do not know, *they* give us money because want something back

Technological and scientific development in XX century are strictly intertwined with the confilicts

WWI: a wide use of the most advanced technological tools:

From radio (just newborn), to portable X-Ray, from airplanes to poison gas (byproduct of the chemical industry), WWI is defined as the "first technological war"

In WWII a strict relation between science, technology and the military

> The very same end of WWII is marked by physics (A-bomb)

Cold War produced (among many other things) the race for the space (and for the Moon)

Sputnik, Yuri Gagarin, Neil Armstrong are part of the Cold War If you are thinking that this is disturbing, it's OK

However it is the plain truth

### Paradigm of the «endless frontier»

In July 1945 Vannevar Bush writes a fundamental report for President Roosevelt:

Science, the endless Frontier

It will set the relationship between science and society through the Cold War

Paradigm:

«give us funds and we will give you power and wealth»

In the '80-'90 of the '900, model crisis:

- ➤ Society asks for (an almost) direct "return"
- $\succ$  Push by the economic crisis of the '70
  - first legislation on patenting
    (Bayh-Doyle Act, USA, 1980)



Science, the endless frontier; a report to the President on a program for postwar scientific research

Affordable & High Quality Paperback Book Edition

United States. Office of Scientific Research and Development

#### Vision of science...



Science, The Endless Frontier (Vannevar Bush Report, 1945)-- the goose with the golden eggs

New Scientist, 99 (21 April 1983), 142

This has been the paradigm after WWII, until the end of the Cold War. Passing of this vision, is the basis of emerging new, and different requests to scientists, and to the HEI system at large 12

#### The end of Cold War

The fall of the Berlin Wall (another celebration for 2019) marked the beginning of the end of Cold War

The end of USSR (1991) was seen as the final end

In 1992 the Superconducting Super Collider started running in serious troubles. In 199e it was cancelled

► NASA budget kept falling (in % of the national budget)



### **Economics of Science**

Science, big or small, needs money, people, and time

- With money you can buy equipment but you need (skilled) people to advance in knowledge
- You need time for those same skilled people, to develop and test ideas. You can buy time with money (hiring more people). In any case you need to feed the skilled people.

Big science was born in Los Alamos

- > Manatthan Project was many things, even a sociological experiment
- Scientists discovered how to get infine amount of money
- Big science is not anymore limited to physics.

Another "big science" is space

- > NASA has the biggest budget for non-military
  - ➢ Is it really non-military? (dual use)

Genoma project is Big Science

The Human Brain Project is Big Science

# What happened?

Early '80's: in UK neoliberism recipes (Thatcherism) hit hard on research

≻ Funding cuts, brain drain, drop in enrollment...

The answer:

- Royal Society report (Bodmer Report), in 1985 set the paradigm of the Public Understanding of Science
  - > Lack of knowledge in the public creates lack of support
  - > The best investment is to educate the public on the value of research
    - $\succ$  If you can do it early on you will target the future leaders
- British scientists are the first one to cope with neo-liberism paradigms
  - This go global with the end of the Cold War: there is a strong request to science to "give something back"
    - There are many ways to "give something back", but you need to demonstrate the impact of your research on society

Knowlegde Transfer is born!

CERN KT office dates back to 1999

# What kind of KT?

Knowledge transfer can be related to «manifacture»

know-how/technology transfer

Technology Transfer

Traditionally through training of skilled workers (PhD etc)

Knowledge Transfer as «education», «(re)training» of people *already outside* the formal *education system*:

➤ Human capital

Lifelong Learning (LLL)

Transfer of the new frontier of knowledge and its application in society at large

Public engagement

> While often meant as "outreach" it has a much broader meaning

*Engagement* is rich of meanings in English

we will see that PE nowadays sets the paradigm for interaction with society

# **Technoloy Transfer**

#### Technological KT is of

Great interest in research community

Economic return for University (money back to research)

> Part of if back to internal actors? (Professors' right etc..)

> Positive image of research as an engine for economic development

 $\succ$  Becomes even more interesting in a phase of structural crisis

Great interest in the private sector

Opportunity to move from "incremental improvements" to «market driven» improvements (sometimes to disruptive innovation)

> Where do you find innovation required by the market?

• Inside Academia

> At he beginning only SME, later even for large/megalarge firms

- Disruptive innovation is developed by *outsider* 
  - ➤ Rethoric of the Silicon Valley "factory garage"
  - $\succ$  Storytelling with a core of truth

### How does TT take place?

Implicit know-how transfer

Skilled labour force

Protection and economic exploitation of intellectual property > Patenting > License, etc Business development/creation

Business development/create

- ➢ Spin-off, start-up...,
  - > Small enterprises forn out of a single idea
- ➢ Incubators

> Structure helping small enterprises to birth and grow

We are far from the goose with the golden eggs

> There is an implicit need to «return» in a direct way economic wealth to the host society

this kind of initiative is very often driven by regional needs/local governments/local economic and social fabric

#### Knowledge Transfer, II

#### Lifelong Learning, or the Human Capital

Changes in the labour market are driven by changes in an economy which is more and more "knowledge driven".

- The time of changes is much shorter than a worker's lifetime. There is the need to re-train more and more workers, especially in period of crisis.
- This problem set the need for continuous education in the political and social agenda. A few examples:
  - Mandatory continuous education for professionals (doctors, law pratictioners etc)
  - > Mandatory refresher courses for High School Teachers
  - European and national programs to help outplacing of workers in crisis zones
- Continental Europe in general (much more Italy) were late in this process due to lack of tradition/cultural approach

Push for acceleration

▶ ...

# What LifeLongLearning is

- We perform many activities
  - Refresher courses for High School teachers
  - Refresher courses, alone or in collaboration, for example, with the Medical Society (Medical Physics)
  - Courses with Opificio delle Pietre Dure for Cultural Heritage specialists
  - Re-training of skilled (and non) workers in crisis zones
- Recent examples:
  - *3DLab course* at LNGS (aimed to students, professionals and personnel from SME of Abruzzo)
  - AggiornaMenti (refresher for Middle High School teachers)
  - PID (Programma INFN per Docenti) and IdF (Incontri di Fisica)
    - Refresher for High School Teachers
  - Stages for outside personnel to learn new techniques (eg. CAD, 3D printing etc)
- Remember: Lifelong learning has (usually) a legal definition
  - $\succ$  It has to do with the qualification of the workforce
  - This definition can vary from situation to situation (EU funds...national/local funds etc.)

## Lifelong learning, what it is *not*

INFN does not have teaching in its mission, while it has higher education. We perform an internal yearly survey of LLL activities and several time we have to explain that:

- University Masters
- Graduate/post Graduate schools
- ≻ ...

These are teaching activities aimed to form/update *academic/research* personnel, therefore *higher education* 

➢ It is *not* lifelong learning

Higher Education like this course is important

You learn skills that will be useful to you and to society, still it is not considered as TM

Internal education is a Lifelong activity

➤ However it is aimed to *our* personnel

▶ It has no direct impact on outside world, therefore it is *not* LLL

### KT, III: *Public Engagement*

What is *Public Engagment?* The short answer is

> The «..interactions of experts with non-experts»

> It implies a two-way relationship, other than that very inclusive

In order to fully understand it, we need a step backward

In the early '80s, UK science was dealing with a crisis generated by Thachterism recipes/cuts:

lack of students, lack of money for research, people escaping from labs due to cuts. There was the chance for a decline

In 1985 Royal Society publiched the *Bodmer Report* in which outlined the strategy to be followed in order to (re)gain public support. It was based on two assumptions:

There is a *knowlegde gap* between scientists and public

> Public wants to be educated

# Public Understanding of Science

For about 20 years, PUS (a.k.a *deficit model*) became the paradigm of the relationship between science and society

- Top-down approach
- Lots of resources invested

This model implies a linear communication model

Simple yet limited in its effectivness



La concezione tradizionale della comunicazione pubblica della scienza

...this model was criticized since the start of the III millenium

- Limited results
  - Criticism of the measurement methodoloy
- $\succ$  Reflection on the role of science as one of the social actors
- Bottom-up activities that we now classify as "citizen science"
  - Post-Chernobyl reflections
  - Role of activists in AIDS studies

# Turning point: from PUS to PEST

2002: *Science* publish a short note "*from PUS to PEST*" (Public Engagement in Science and Technology) that announces the shift in paradigm:

- "... It is no longer enough for science communicators to "simply educate the public"...(Science minister D. Sainsbury)
  - Call into question, participation to "hot" debates
- Engage as committment, but also as participation
- ≻ It is a rich term in anglo-saxon world
  - Medieval charters of Cambridge and Oxford
  - Engaged Universities born in USA in the aftermath of Civil War (1861-1865)...
- Definition from National Coordinating Center for Public Engagement (NCCPE), www.publicengagement.ac.uk/
  - > PE is «interactions of experts with non-experts»
    - an organization supporting these activities in formal ways: Manifesto, material, courses etc.:

#### PEST and the Web revolution

PEST implies that researchers must be directly involved

Change of model, change of roles

#### Web 2.0 is another turning point

- Information appears available to the layman, just a click away
- Direct approach to sources
  1-0-1 (or "business to consumer")
- Public wants a direct contact with researchers, no intermediation
  - Some rockstar-like events must be seen in this perspective







### From Blog madness to RRI

Big success (behind us) of scientific blogs is an example

> Crowds for Higgs Boson and its discoverers, another

At the same time, at political level, science is called to provide support/information and (many times) as a substitutre

- Waiting for a study on the Xylella crisis, similar to what was done for the Sellalfield (UK) case.
  - ≻ Role of experts, role of science, role of public
- There is a growing understanding that "without scientific knowledge you are not a citizen, but remain a subject" (Lamberto Maffei, 2019)

Society (and we are part of it) looks for

Responsible Research and Innovation (RRI)

 $\triangleright$  Researchers are required to interact (both ways) with the other social actor

> Talk to the community (you are part of as citizen), to your neighborhood

➤ Case of DESY Hamburg and Fermilab

Beware: we are not talking of scientists only, this is a request to the whole research

#### You can "measure" what level of RRI (International Association for Public Participation, IAP2)

#### **INCREASING IMPACT ON THE DECISION**

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER		
To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.		
We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will work together with you to formulate solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.		

#### A long story in one slide..



#### Should we evaluate TM?

Generally speaking, anything that receive public money must be accountable

 $\succ$  In the US "the taxpayer \$"

Problem is: how do we decide that money was well spent?

- ≻ Can Third mission be measured?
- > What is interesting to measure?
- > Why do we want a measurement?
- Not everything that counts can be counted and Not everything that can be counted counts
- If you can't measure it, you can't improve it

#### Evaluation means interest

TM is integral part of what *society* (and Governments in first place) asks to «higher education» institutions

2008 crisis was a catalyst for a chage and for new requirements to HEI as EU decided to aim to a *knowledge economy* 

> TT and LLL are found in essentially all EU documents

Better scientific culture is considered fundamental in the building of the European Citinzenship

> Responsible research and innovation is a keyword in EU projects

> Very often you are required to present outreach programs of your research

RRI must be interpreted as an overall key

 $\succ$  That's the way it is meant in EU calls!

### TM evaluation

#### Evaluation of TM activities is a difficult task

- $\succ$  There are activities with economic aspects (e.g. TT)
  - $\succ$  Well, maybe economists know how to do it (!?)
- > There are activities related to human capital
  - Likely to be measurable
    - $\succ$  E.g. rate of placements after a retraining course
    - Overall rate of researchers involved
    - > Number of courses offered, number of hours
- There are activities that produce intangible values for society. To name a few
  - Local cultural activities, participation to policy-making, availability of highly skilled people for local enterprises
    - ➤ These are much more difficult to estimate, maybe count and describe
  - > A large number of outreach activities in this category

We can use proxies trying to capture the essence of..

#### Evaluation: can be done in many way

There is a wide literature (I will indicate you a classic from 2002), but beware:

- You can always find counterexamples of aspects which are not captured. This is strictly related to what you really want to understand: IMPACT of research on science and society
  - While the impact on science has "understood" proxies (citations, nobel prizes etc)

> The impact on society is more difficult to grasp

Problem is that research has a number of different paths, often serendipitous, to produce an impact

One of the (common) goal of many RPOs is to describe, in their narrative, the many different ways in which impact happens

### Research Excellence Framework

In UK, there is periodic evaluation, REF. Last time (2014), 20% of the score was allocated on the basis of research impact

- Universities were required to produce a certain number of "research impact" cases (3500 total) that were evaluated
- So far the largest ever attempt to measure impact
  - ➢ Based on narrative ("case studies")
  - ➤ A wide variety of areas and examples

#### A gold mine still to be explored

You can learn a lot by evaluating your activity
 (use of evaluation for steering)

Definition for the REF	'Impact' is any effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia.
Information provided	Each submission included:
in submissions	Impact case studies. These four-page documents described impacts that had occurred between January 2008 and July 2013. The submitting institution must have produced high quality research since 1993 that contributed to the impacts. Each submission included one case study, plus an additional case study for every 10 FTE staff.
	An impact template. This document explained how the submitted unit had enabled impact from its research during the period from 2008 to 2013, and its future strategy for impact.
Assessment criteria	Impact case studies were assessed in terms of the 'reach and significance' of the impacts.
	Impact templates were assessed in terms of how far the approach and strategy are conducive to achieving impacts.



https://is.gd/hefce\_dsreport2016

from Steven Hill (Hefce): Research impact and its assessment: lessons from the UK Research Excellence Framework,

presentazione a Open Evaluation Conference, Vienna, 24 November 2016

### The Italian VQR 2011-2014

Evaluation of economic and non-economic aspects of Third Mission, will concentrate on the latter:

- "Production of goods of public value"
  - Cultural heritage preservation and exploitation
  - ≻ Free clinical trials, bio-banks, etc.
- Lifelong learning

➢ Good quality but scarce committment of INFN personnel

#### Public Engagment activities

- ≻ Evaluation based on peer-review of activities (>3000)
- ➢ INFN scored reasonably well at central level, while showing that there is large room for improvements in its local units

> For example, in PE 0.7/1 for central activities (top level)

> 0.38/1 for local activities

### INFN answers to new challenges

#### What did we do?

- ➢ Inclusion of TM in our Charter
- Creation of a Tech Transfer Office
  - Set in Amministrazione Centrale
    - > Experts on licensing, patents, spin off etc.
- ➤ Creation of a National Committe for TT (CNTT)-2012
  - Biasini, Falciano (GE), Lanza, Masullo, Matacotta (UTT), Previtali (chair)
    - Network of local contacts
- Creation of a Coordination Commission for Third Mission (CC3M)
  - ➤ August 2016
    - ➢ Network of local contact July 2017
- Participation in TM networks (NetVal, APEnet...)
- Recognition of activity for promotion/hiring
  - New rules for exams

These are practicies usually found in EU recommendations

 $\succ$  We did it

#### INFN organization: Comitato di Coordinamento Terza Missione CC3M- (2016)- Chair G. Chiarelli

#### Francesca Scianitti

Uff. Comm



Giorgio Chiarelli



Vincenzo Barone

#### Franca Masciulli

Speranza Falciano INFN Executive Board







Ezio Previtali CNTT Chair

Maria Rosaria Ludovici from AC follows both Comm.Naz. Trasf.Tecnologico -CNTT- and CC3M





#### **Coordination with INFN**

#### Mebers if CC3M

- CNTT Chair
- Member of INFN Executive Board
- ➢ Una representative of Comm. Office

# Annual report to Executive Board Since late 2017:

- ➢ One TM contact in each Units
  - Feedback on local initiatives
  - Bottom-up proposal
  - Coordination
- First National meeting in Sep. 2017
  - ➢ Workshop on Hschools activities Novem.
  - ➢ National Meetings in 2018 and 2019

Call for proposal (budget 2019) in 2018

First attempt to centrally assign budget to CC3M initiatives

Bari		fabio gargano		
Bologna		stefano		
Cagliari		viviana fanti		
catania		angelo pagano		
Ferrara		susanna bertelli		
Firenze		adriana nannini		
Genova		andrea bersani		
Lecce		andrea ventura		
Milano S		gianluca alimonti		
Milano B		dario menasce		
Napoli		carla aramo		
		livia		
Padova		conti		
Pavia		alessia embriaco		
Perugia		elisa manoni		
Pisa		sandra le	eone	
Roma 1		giovanni	salmè	
Roma 2		pino di se	ciascio	
Roma 3		enrico be	ernieri	
		piergiorg	gio	
Torino		cerello		
Trento		christian	manea	
Trieste		massimo	casarsa	
Lab Naz Su	d	mario musumeci		
Lab Naz Gra	an sasso	roberta antolini		
Lab Nazi Fra	ascati	pasquale di nezza		
Lab nazion	ali Legnaro	andrea gozzelino		
CNAF		barbara	martelli	
GSSI		chiara ba	ndia	
		cecilia pa	asquinelli	

### What is the matter of interest?

CC3M deals with initiatives of large (national/regional) impact and/or multistructure. It has a budget to:

- Consolidate and coordinate ongoing activities
  - RadioLab, Masterclass, Scienza x Tutti (SxT), Art&Science in Italy
- > Launch new initiatives
  - Pint of Science (PoS)
  - > OCRA
  - Fermi Masterclasses
  - SalTo (National Book Fair in Turnin)
- Support to ongoing interesting activities
  - Documentaries
  - > Exhbitions

#### Some strategic goals:

- Introduce in all activities (self) evaluation mechanisms
  - Possibly performed by external partners
- > Differentiate and broaden our public (60K people "touched" every standard year)
  - > Joint initiatives with different partners
  - Explore new ways to engage people
  - Connect through different paths

#### Operation:

- ➢ Budget: 300KE since 2017
  - > Assigment based as a fraction of the total research budget



### **Best Practice**

#### University of Cambridge is the **3M European Champion**

- UoC Has an history of relations with the region and a special focus on the Cambrdigeshire county
  - «This seems to be an aspect related to the role played by the University within the social and economic life of the region, but also related to a peculiar AngloSaxon sense of community that perceives the efforts made by public institutions for Community engagement as an ordinary activity»
    - In Cambridge there is the freedom for individuals to come with proposals and freely pursue their 3M passions

#### This path to 3M is strongly linked to UoC history:

- In the medieval charter of several English universities (Oxford, Cambridge), the development of the county was part of the academic mission
- This example was inherited, for example, by the *Engaged Universities*, born in the aftermath of the US Civil War (1861-1865)
  - > Land in exchange for social-economic development through education

#### Summary

The traditional mission of Higher Education Institutions is now complemented by

> An active role as a social actor

> A request for accountability of use of resources and choices

Push for change is related to the request from society to improve quality of life

This definition covers much broader aspects than just economics, therefore nobody in research can (should) retract from this role

Not only the Ivory Tower has gone long ago

> Now citizens want empowerment

# Readings:

On the historical perspective, some useful readings:

- > Vannevar Bush: Science, the Endless Frontier, Washington, July 1945
- R.K.Merton *The Sociology of Science*, Chicago 1942, 1973
- Barbara Holland, Toward a Definition and Characterization of the Engaged Campus, Metropolitan Universities 2(3), 20-29

On Science and the Cold War there is a very large literature, this book has a wide coverage of different aspects:

N.Oreske e J.Krige: Science and Technology in the Globl Cold War, MIT Press, 2014

On the Third Mission, and the basis for measuring it:

- Science in Society: a Challenging Frontier www.esf.org
- M. Murphy: Assessing III Mission Activities, <u>http://arrow.dit.ie/engineduccon/2/</u>
- Green Paper: Fostering and Measuring III Mission in HEI www.e3mproject.eu/docs/
  Third Mission Indicator Definition, EU project within the «Leonardo Lifelong Learning Program»
- > Jordi Mollart-Gallas et al. *Measuring Third Stream Activities*, 2002 Sussex (Russel Report)
- > HEFCE, *Beacons for Public Engagement*, HEFCE 2006/49, webarchive.nationalarchives.gov.uk

An excellent example of "community empowerment":

https://www.fermilabcommunity.org/

The triangle of knowledge and the impact:

Marku Markula, The Knowledge Triangle Renewing the University Culture, in The Knowledge Triangle, Pia Lappaneine, Marku Markula eds, 2013

You can find some of them in:

- http://www.pi.infn.it/~giorgio/INFN/3M/
- TT\_INFN.pdf (same area) is a contribution by S.Falciano to a collective volume of «policy making» in which our V.P. describes the way INFN TT works.

## Does TM collide with CUDOS?

The founding paper on sociology of science is:

*The Sociology of Science: Theoretical and Empirical Investigations,* Chicago, 1942. In this R.K.Merton describes the set of values on which science is built:

- communism:all scientists should have common ownership of scientific goods (intellectual property), to promote collective collaboration; secrecy is the opposite of this norm
- universalism: scientific validity is independent of the sociopolitical status/personal attributes of its participants
- disinterestedness: scientific institutions act for the benefit of a common scientific enterprise, rather than for the personal gain of individuals within them
- organized scepticism: scientific claims should be exposed to <u>critical</u> <u>scrutiny</u> before being accepted: both in methodology and institutional codes of conduct

Somehow innatural for science define "property"

### Some INFN TM activities

#### After consolidating existing activities, in 2017:

- > Nominated one 3M reference person per structure
  - ➢ Guarantees better exchange of information
- Funded several initiatives
- Lifelong Learning:
  - ≻ Teachers:
    - Organize courses for I level (Middle) High School
    - ➢ Incontri di Fisica and Incontri di fisica moderna
      - LNF
    - ➢ PID for II level High School
  - > Students: we have activities for informal learning
    - Example: RadioLab
    - Example: Art&Science Across Italy

PROGRAMMA Workshop "L'INFN E SCUOLA"					
Firenze, GGI 13 novembre 201	7				
10:00 - 10:20	Introduzione. <i>Public Engagement</i> per la scuola all'INFN Giorgio Chiarelli				
10:20 - 10:50	Presentazione del progetto "Making Learning and Thinking Visible in Italian Secondary Schools" – Elisabetta Mughini - Responsabile Area per la Ricerca sull'Innovazione, INDIRE				
10:50 - 11:10	Domande e discussione				
11:10 - 11:40	Case Study 1. Informal learning. Arte e scienza con le scuole. Evoluzione del progetto sul territorio nazionale. Pierluigi Paolucci, INFN Napoli.				
11:40 - 12:00	Domande e discussione				
12:00 - 12:30	"Aggiorna-menti", training per i docenti torinesi. Andrea Beraudo, INFN Torino				
12:30 - 14:00	Pranzo				
14:00 - 14:30	Case Study 2: Informal learning. Radiolab. Possibili estensioni a livello nazionale - Josette Immè - INFN Catania				
14:30 - 14:50	Domande e discussione				
14:50 - 15:50	Tavola rotonda: <i>Primary schools</i> . Una rete INFN per la formazione primaria? Alessia Embriaco, Marialena Fedi, Luca Lista, Dario Menasce. Modera: Francesca Scianitti				
15:50 - 16:00	Coffee Break				
16:00 - 17:00	Tavola rotonda: <i>Aggiornamento docenti.</i> Esperienze a confronto e coordinamento. Con: Piergiorgio Cerello, Livia Conti, Andrea Gozzelino, Pierluigi Paolucci. Modera Giorgio Chiarelli				
17:00 - 17:30	Discussione e Conclusioni - Francesca Scianitti				

45

# Thanks everybody..









Giorgio Chiarelli

