

Public Engagement in science and Technology

Building a good story
Tricks and tips



FRANCESCA SCIANITTI - INFN Communications Office

Cogne – June 14th 2022

Talking about science | What we are talking about ...

A. Communicating science

1. Publics & Language
2. Formats
3. Stories

B. Building a good story

4. The structure
5. Some examples


C. Around your PE activity

6. Communication
7. Budget
8. Evaluation



COMMUNICATIONS vs. OUTREACH |

Not a simple matter of words

A large, dark blue double-headed arrow with a green outline, pointing both left and right. It is positioned horizontally in the upper left area of the slide.

Lectures, workshop, public
conferences, open labs,
contests

- **OUTREACH** implies an interaction between the sender and the recipient of the message, a commitment and a two-way communication between the researcher and the public

A large, green single-headed arrow pointing to the right. It is positioned horizontally in the lower left area of the slide.

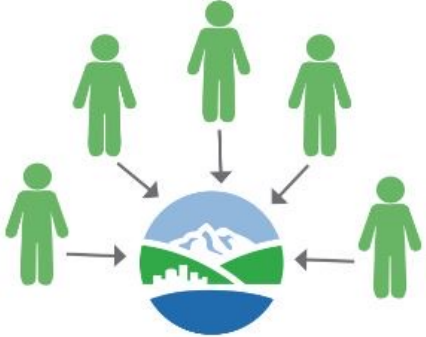
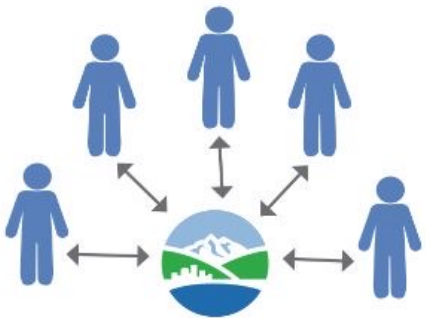
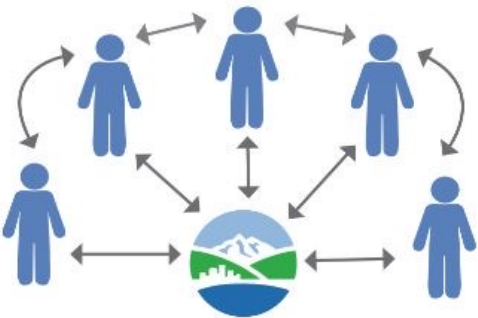
Press releases, news and articles on
newspapers and magazines, radio and
tv channels

- **COMMUNICATION**, on the other hand, has only one possible direction, from the sender to the recipient.

Credits: Apre, Agenzia per la Promozione della Ricerca Europea - www.apre.it

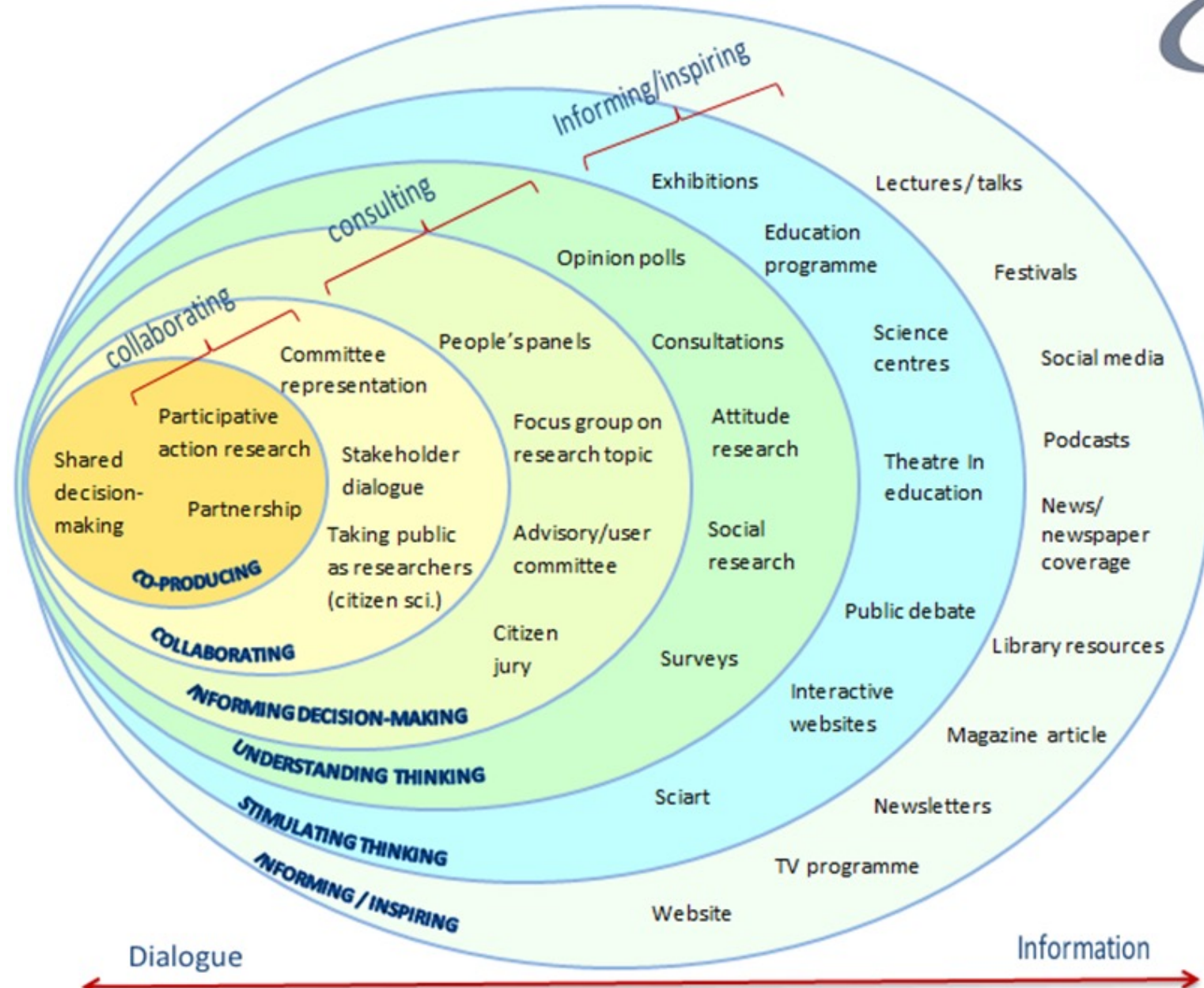
OUTREACH I Levels of engagement



 <p>The diagram for 'CONSULT' shows five green human figures arranged around a central globe icon. Each figure has a single-headed arrow pointing towards the globe, indicating a one-way flow of information from the public to the researchers.</p>	 <p>The diagram for 'INVOLVE' shows five blue human figures arranged around a central globe icon. Each figure has a double-headed arrow connecting it to the globe, indicating a two-way flow of information.</p>	 <p>The diagram for 'COLLABORATE' shows five blue human figures arranged around a central globe icon. Each figure has a double-headed arrow connecting it to the globe, and there are also curved double-headed arrows between the figures themselves, indicating a fully collaborative and interactive environment.</p>
CONSULT	INVOLVE	COLLABORATE
Researchers informing and inspiring the public about their research	To better inform researchers on the public's views and concerns about their research, and also an opportunity to hear fresh perspectives and insights	Whereby researchers and the public work together on particular projects or help define future research direction, policy or implementation of research outcomes
participation in festivals; talks and presentations; digital engagement	public debates; online consultations; panels and user-groups	citizen science; co-production of knowledge; Patient and Public Involvement.

FROM OUTREACH TO PUBLIC ENGAGEMENT I

*formats vs.
engagement's level*



MEETING SCIENCE | *what opportunities for the public?*



To meet **researchers**

To enter research **infrastructures**

To **know** about science **ideas and perspectives**

To **understand** science **ideas and perspectives**

To make part, as a citizen, of the **process of research**

To know about the relationship about **science and other cultures**

MEETING SCIENCE | *what opportunities for you and your research institution*



To strengthen the **institution public image** and a positive perception of research in general

To engage in science an **ever-growing audience**

To raise people's **knowledge on fundamental research ideas and goals**

To raise people's capability in **taking decisions about research strategies** and funds

To raise people's awareness about the **good fall of fundamental research on society**

Never forget to explain who you are, what the institution you work for is, and to underline its peculiarities and positives

Talking about science | *stories for various format*

- Seminar talk for the **public** in your laboratory
- Seminar talk to **students** in their school
- Outreach event hosted in **cultural venues or festivals**
- Outreach activity during **Open Labs** or the European Research Night
- Guided **visit to laboratories** and infrastructures

BUT ALSO

- Seminar **talk for your colleagues**
- Presentation of your activity to **institutional representatives or stakeholders**

STORIES | *why not a simple speech*

Human beings organize and manage their knowledge of the world following **two main ways of thinking**:

1_ The narrative thinking is the way people use to structure their own immediate experience.

2_ The logical-scientific thinking: is the way in which human beings aim to clarify their knowledge to remove ambiguities.

[Jerome Seymour Bruner, psychologist and education scientist]



They are both involved in the **process of meaning making**.

STORIES | *Why?*

Storytelling is based of four main stages:

- The willing to know
- The knowledge process
- The capability to make choices
- The capability to make or design any further step



→ Reorganize the experience → **Scientific Method**

Why stories about science?



Storytelling → advantages



Emotional link

Easy way to memorize Engagement

Science

Different levels of
complexity

Science going
off the
laboratory

Open to personal
interpretations

THE STORYTELLER KNOWS THE STORY

Who better than its protagonist can tell the story?



Authoritative



Directly involved



Doubts carrier





BUT...

The potential of the story
largely depends on its
AUDIENCE

→ **IDENTIFY YOUR TARGET**
to modulate your story

ADULTS I

Contact between researchers and other workers

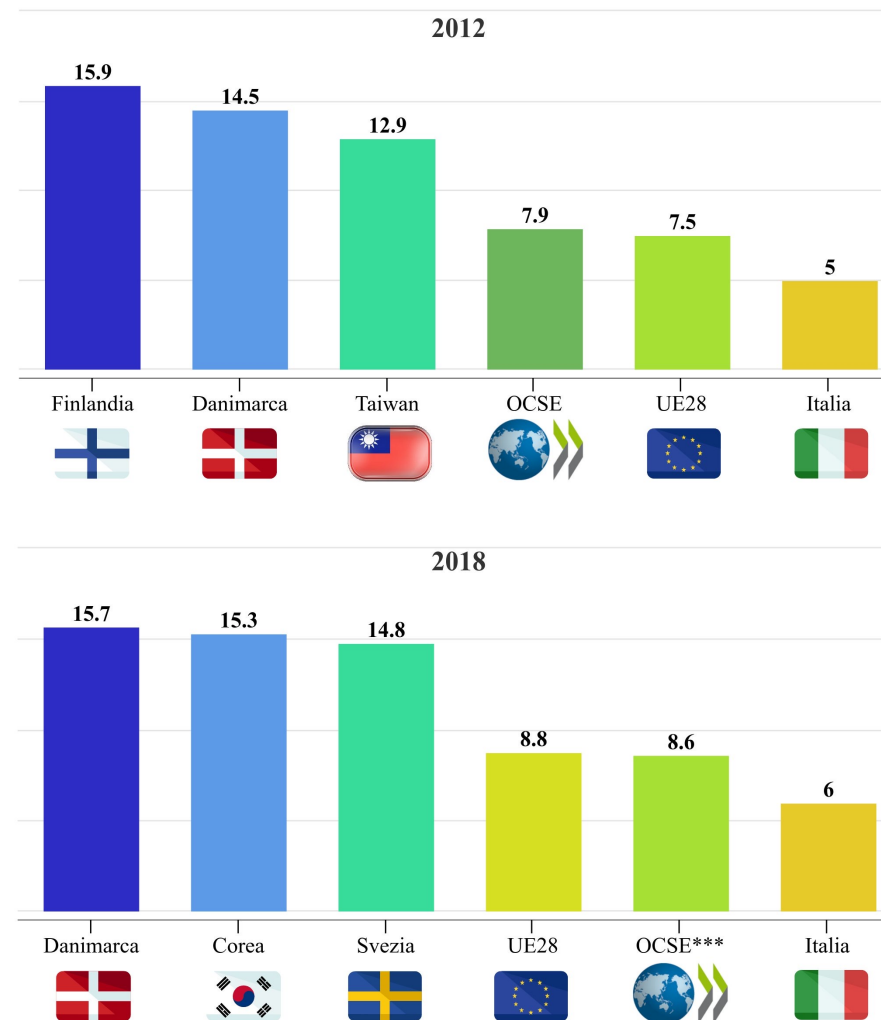
Percentage of researchers among employed nationally.

Italy is below the European average and far from the values of the countries of central and northern Europe which record the highest presence of researchers among the active population.

Observe ScienceInSociety, Annuario2021

Fonte: OECD 2020

Ricercatori impiegati in R&S per mille occupati



*Fonte: OECD database, Main Science and Technology Indicators, sito web ufficiale, settembre 2020. Dati riferiti al 2018 e al 2012 o all'ultimo anno disponibile: ***=2017*

THE LANGUAGE | *the style of the communication*



*First question:
Who I'm talking to?*

what are other
words for
unnecessary word?



expletive, filler, fill-in,
stopgap, meaningless phrase,
meaningless word,
redundant phrase



Any audience has a specific attitude to understand/to be engaged/to appreciate

- The use of words, technical terms, concepts has to be weighted on the target, as to the style (formal/informal)

Building a good story

Understandable, engaging and persuasive

Independently from the PE format you choose

ORGANIZING YOUR CONTENTS | How?

In a way that makes it...

- Comprehensible
- Fascinating
- Persuasive



STORIES | *the non-storyboard*

LOW PRIORITY



“At this point in the meeting we’ll open a discussion of whether or not we needed to have this meeting.”

STORIES | *the non-storyboard*

The non-storyboard is made of what is essential and interesting FOR YOU but not FOR OTHERS and not for your story

- Deep or unnecessary **details**
- Very **technical** aspects
- **Difficult** concepts
- **Autoreferential** details

... even if you find them fascinating:

(merits should come out from the story)

Stories | *the storyboard*



The storyboard is made of:

- **Structure**

the sequence is not improvised and include **narrative key elements**

- **Logic line**

one concept **logically** follows the other (a good rule is: “never anticipate”)

- **Time line**

The quantity and complexity of contents respect the **time window** at your disposal

ORGANIZING YOUR CONTENTS |

Ingredients to inform

- Your message
What are you communicating?



ORGANIZING YOUR CONTENTS | |

talking about your project

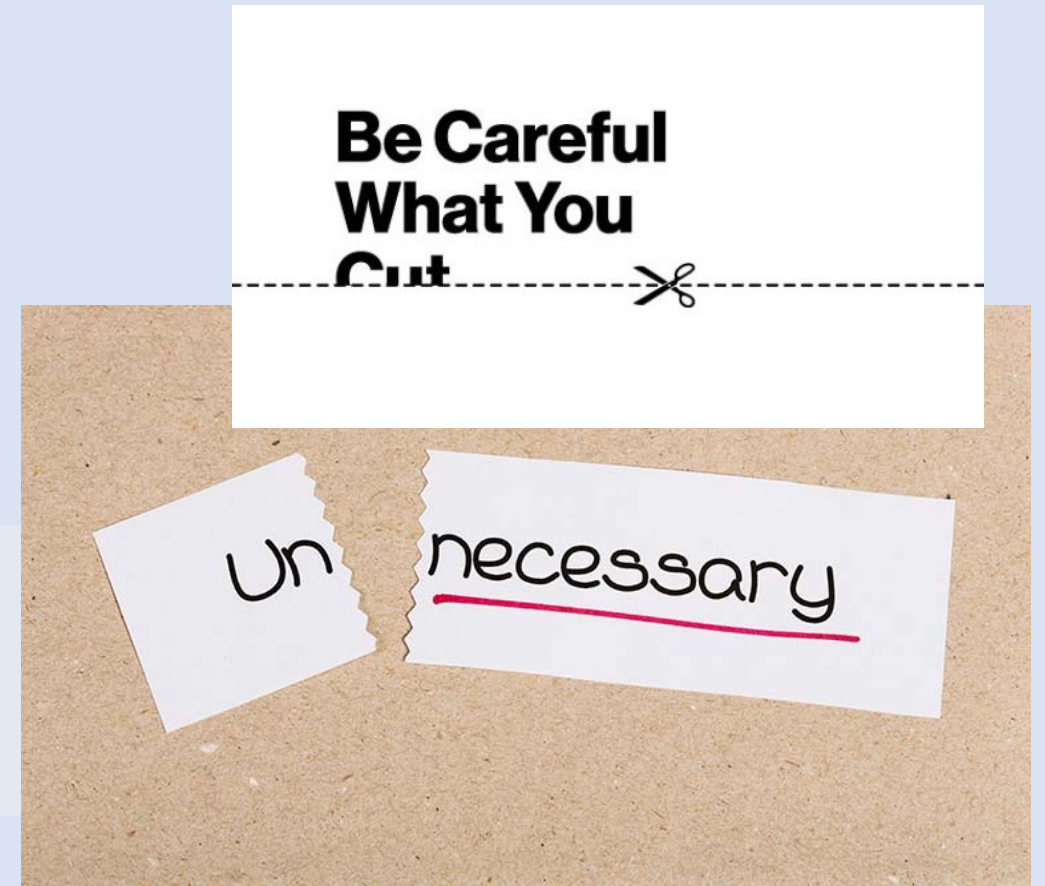


Your story is based on the five W's you have in mind ... thus you have in mind the story

- **Why** are you doing what you're doing
- **What** is the plan, the scheduled process
- **Where** will you conduct your research
- **When** do you expect to gather results
- **Who** is part of your team or sustains your project

Three elements have to be added to build a good story:

1. *The storyboard (a logical sequence)*
2. ***The non-storyboard (what would be illogical in the sequence)***
3. *The language (words to use or to not use)*



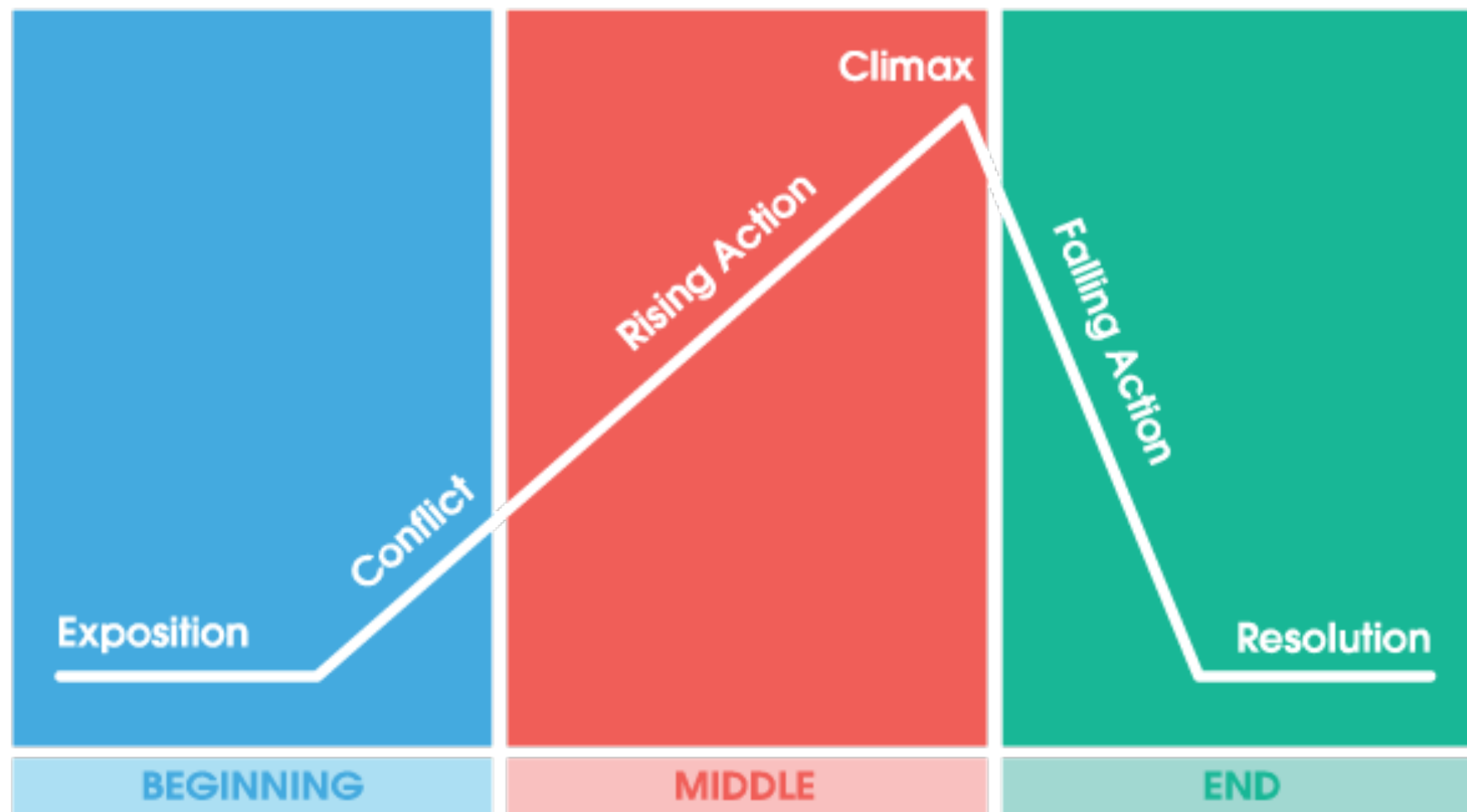
ORGANIZING YOUR CONTENTS |

Ingredients to build a story

- Protagonist
- Topic/question/problem
- Obstacles
- Trip/Process/Adventure
- Paradigm/frame change



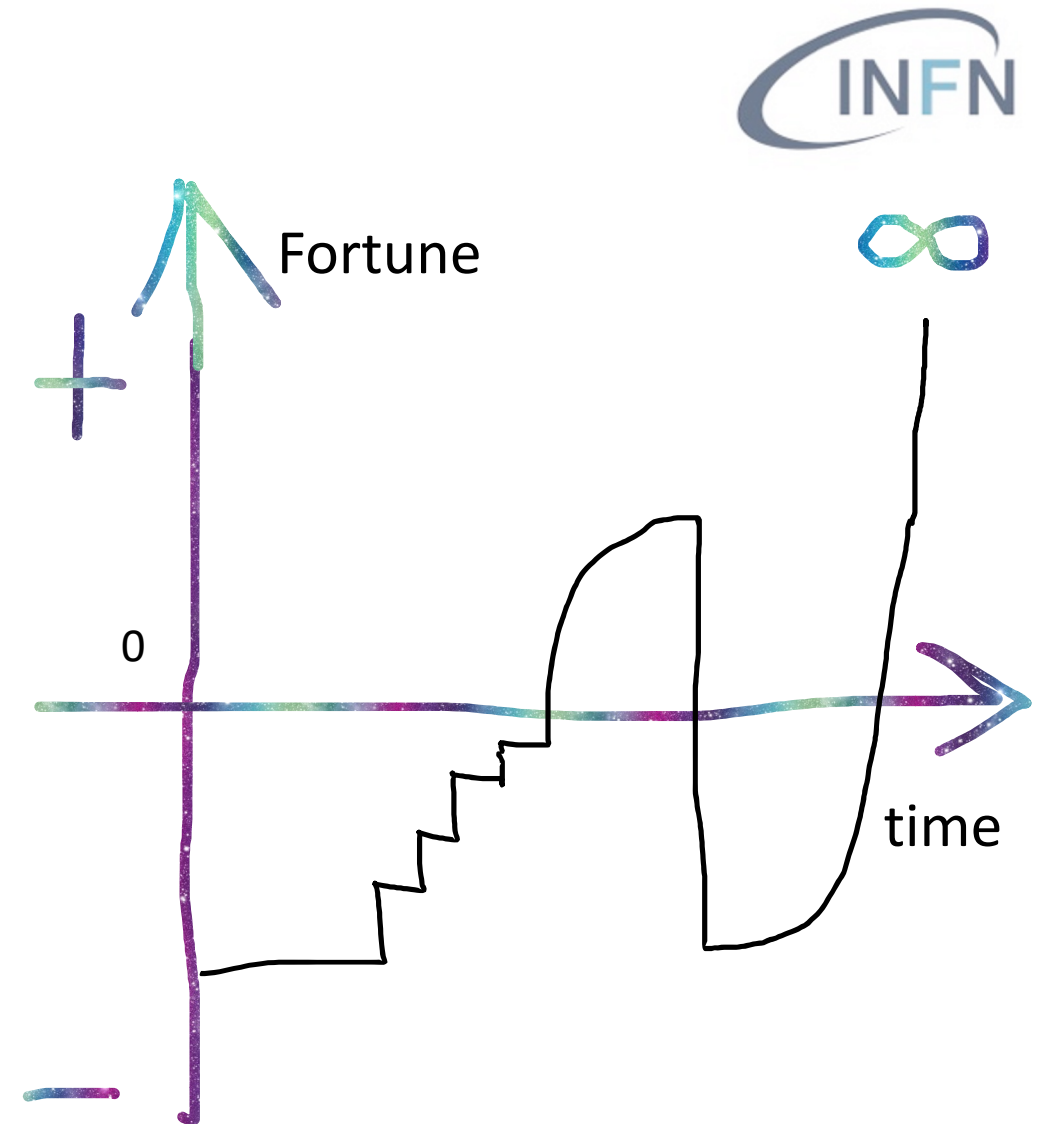
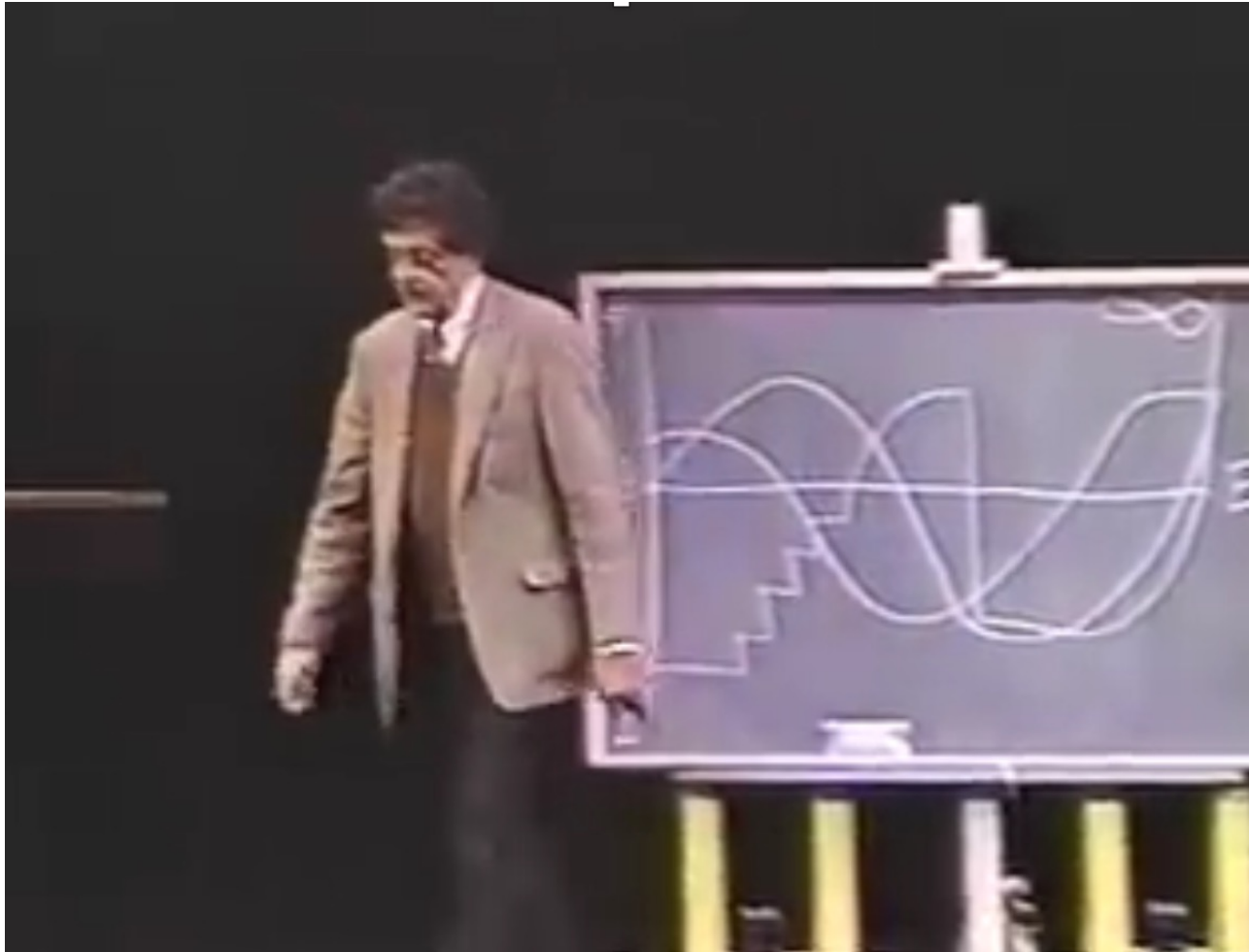
Structure of a story | ... three acts?



The narrative arc:

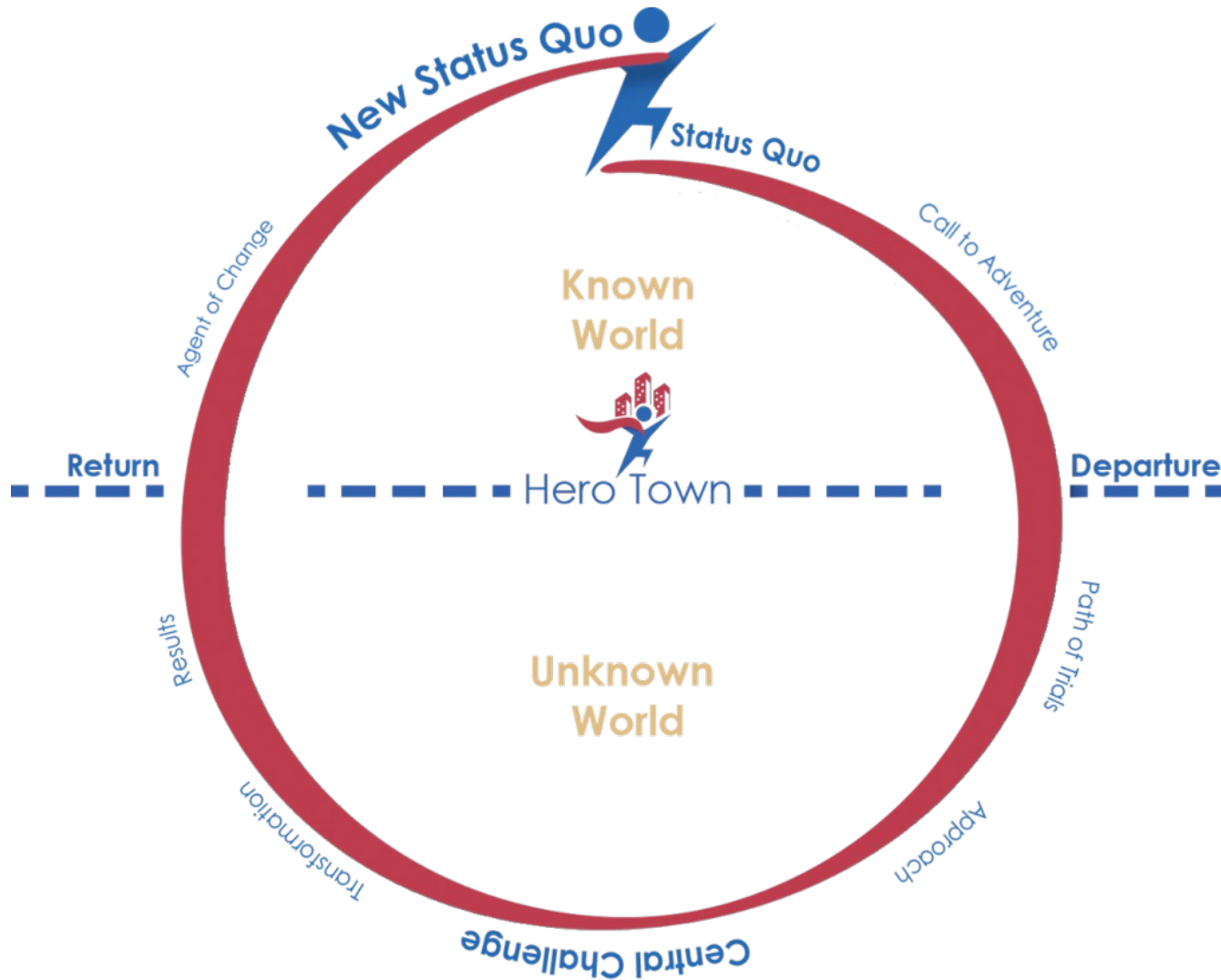
- Equilibrium
- Disruption
- New Equilibrium

A well known story| ... Cinderella



Kurt Vonnegut – The Shapes of Stories

Narrative structures | ... *the Hero Journey*



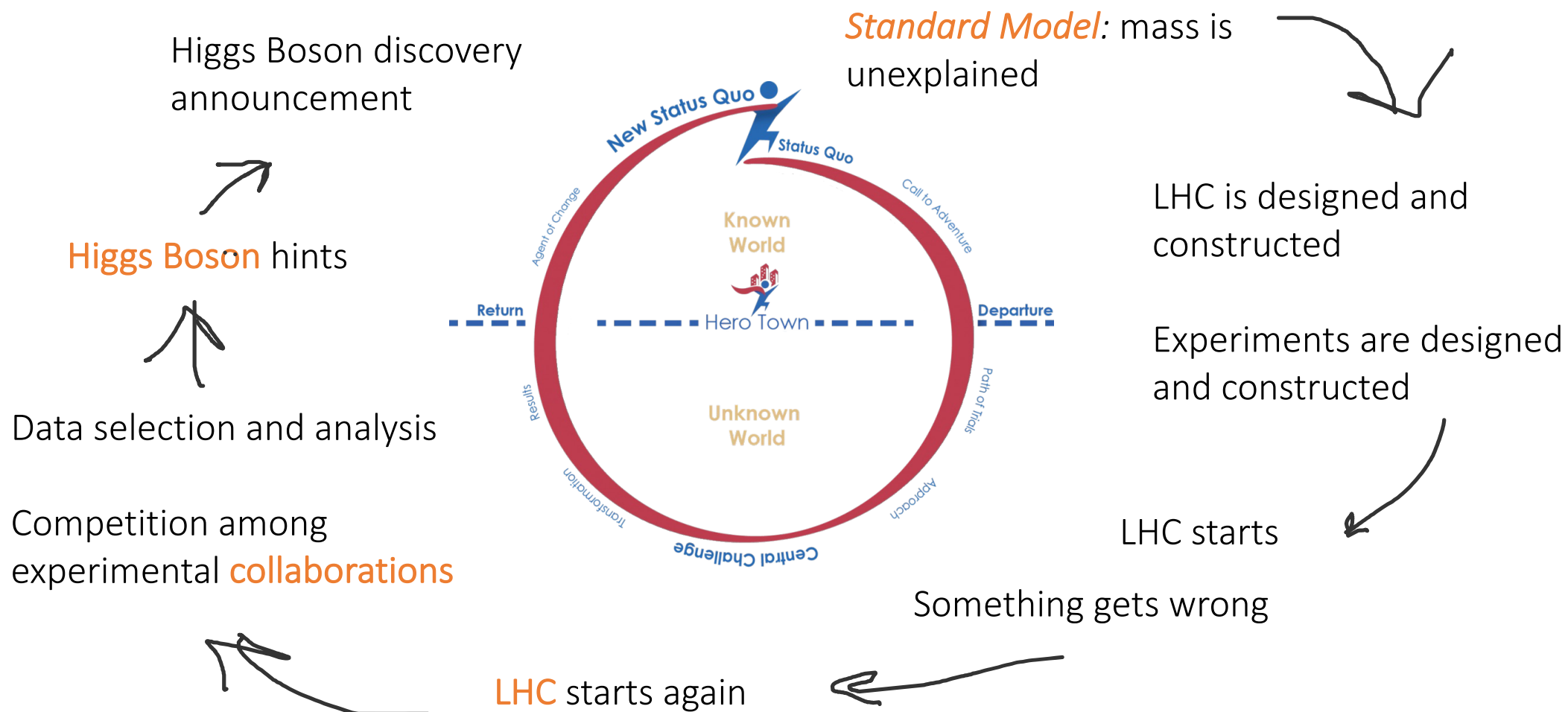
It involves:

- *A Hero (a person, a community, a team)*
- An initial scenario and a modified end scenario
- A "heroic" journey with overcoming obstacles
- The acquirement of new knowledge

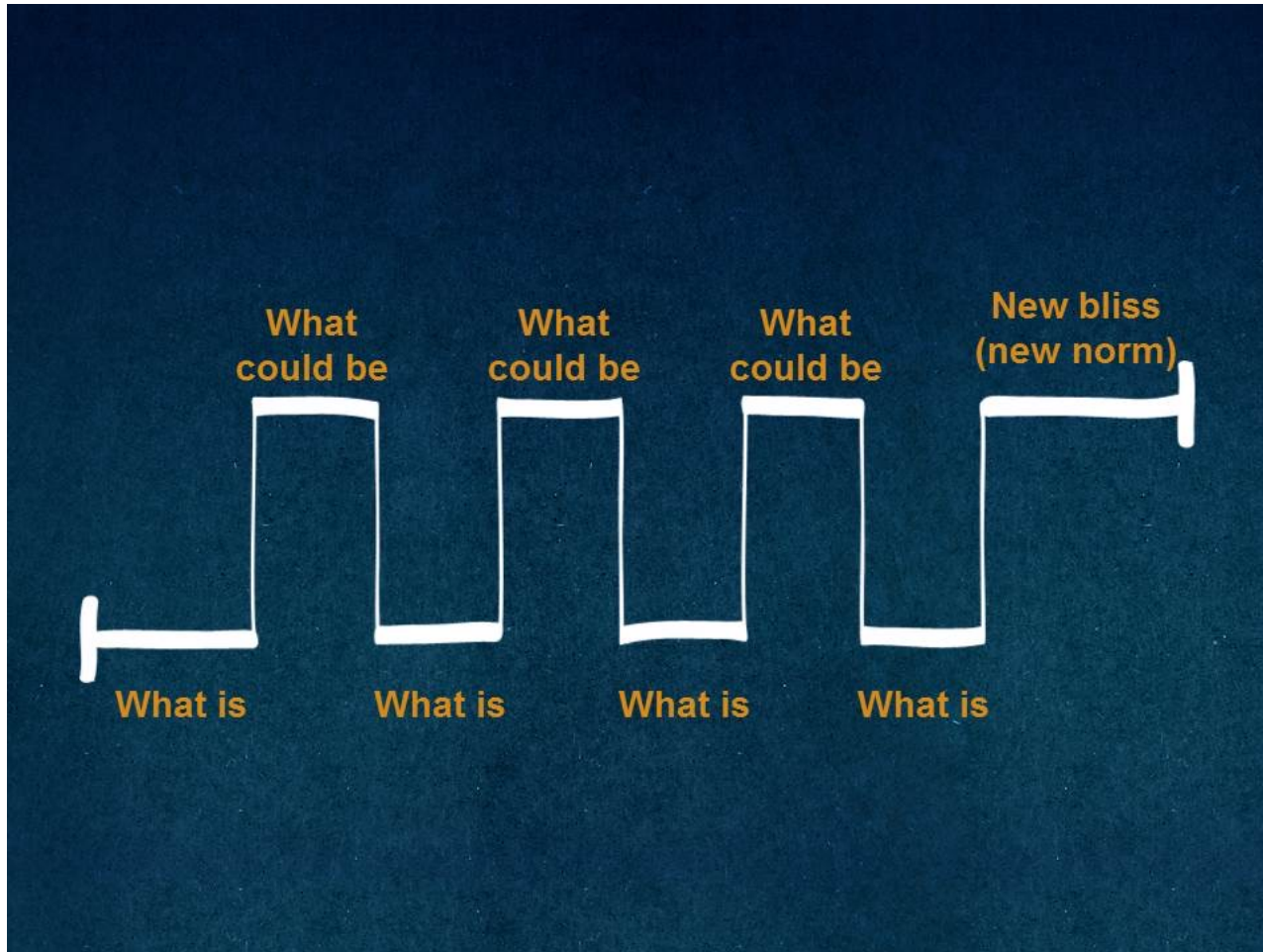
Useful to:

- Tell about a journey, an adventure, an experiment story
- Highlight the positives of exploring
- Describe a scenario change (new paradigm, someone's theory)

Narrative structures | *The LHC Adventure 1*



Narrative structures | ... *the sparklines*



Useful to:

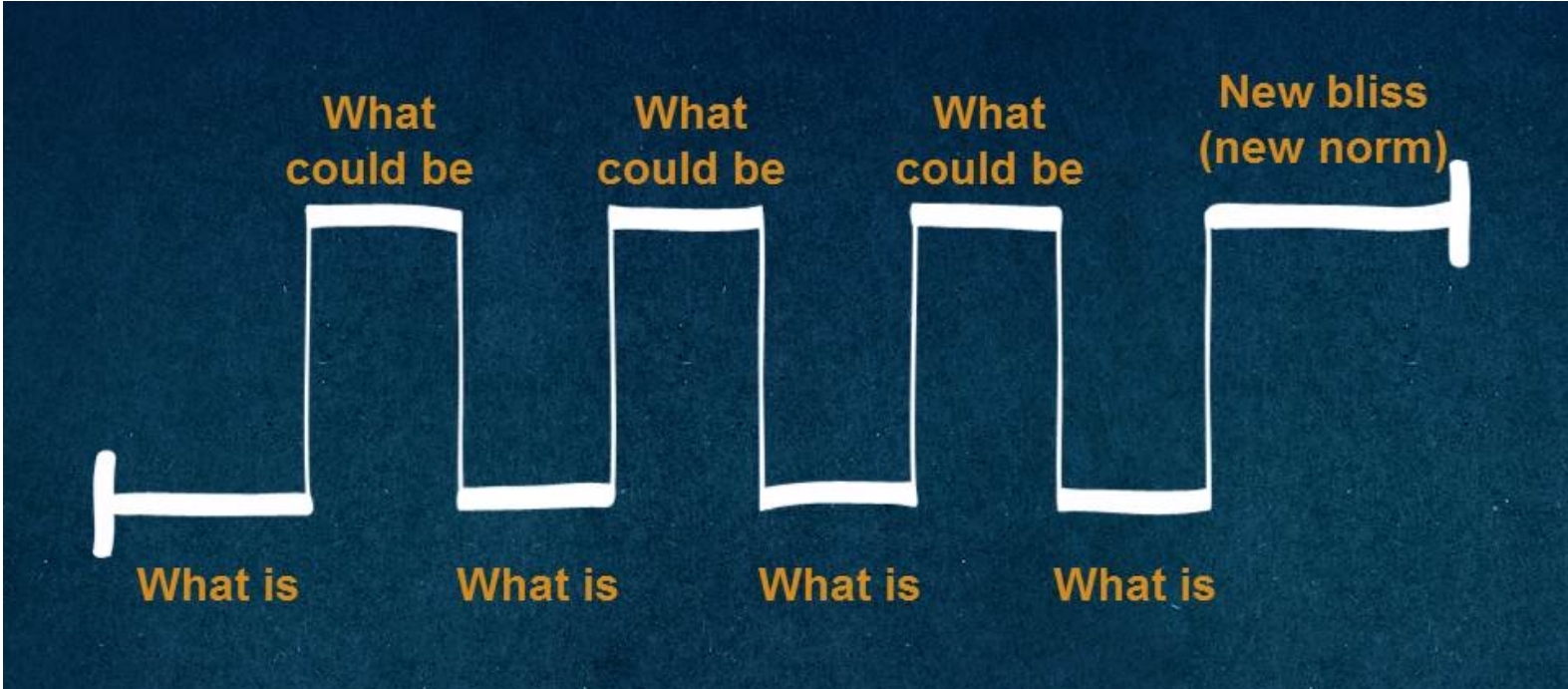
- Keeping the public's attention
- Generate wait and suspense
- Give rhythm without losing the thread of a sequence

Examples:

- Time Travels: Possibility vs. Impossibility
- What is dark matter: Hypotheses and evidence vs. experiments/Known vs. unknown
- LHC history: from initial strategies/expectations to path changes (rigid timeline).

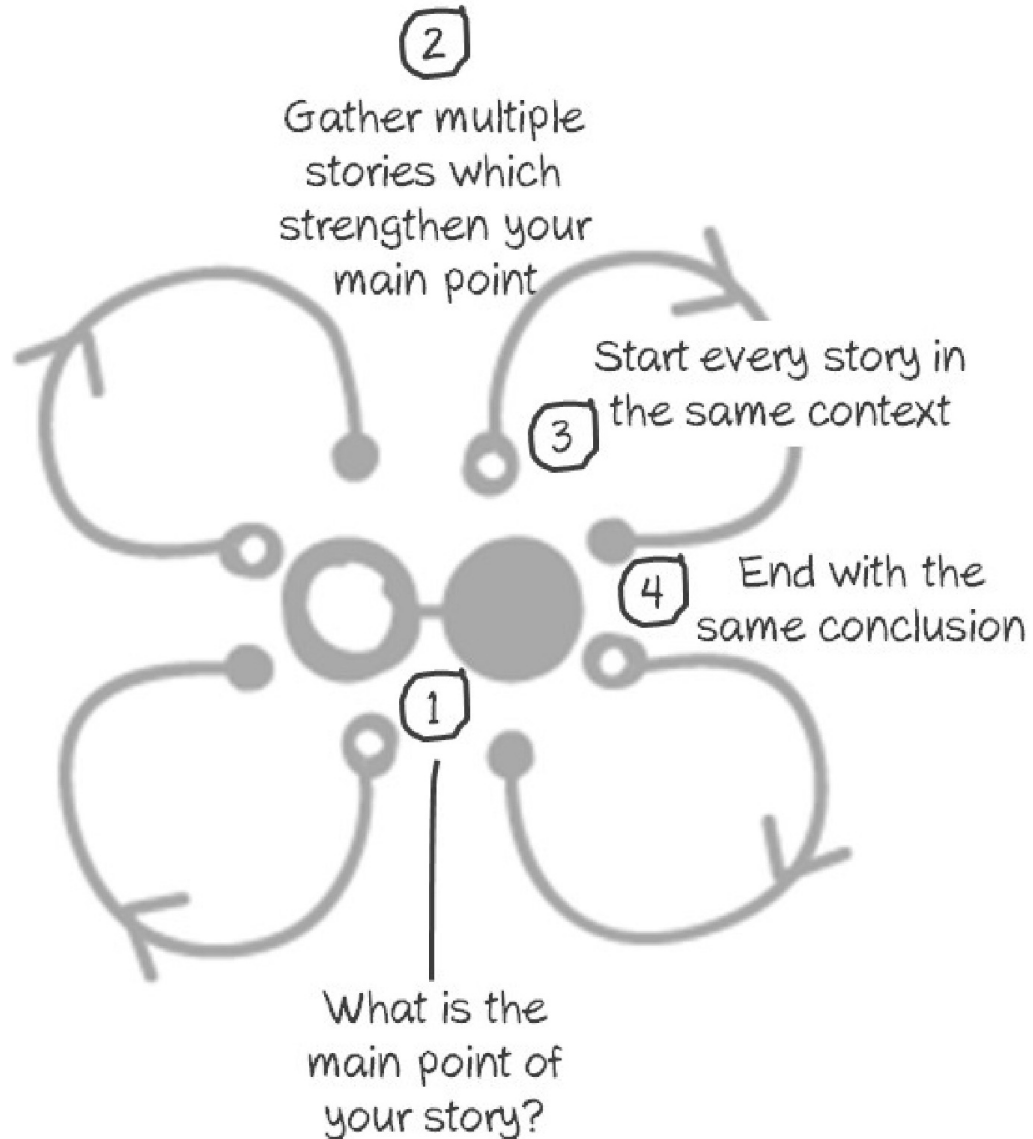
Narrative structures | *The LHC Adventure 2*

Standard Model: mass is unexplained *Theoretical model* Higgs Mechanism *Theoretical previsions* which energy to produce Higgs Bosons *Simulations* to design LHC and its experiments



LEP energy limits *LHC* proposal *Discussion* about LHC promises/ costs ands benefits *Decision* about LHC construction

Narrative structures | ... *the Petal structure*



Useful to:

- Describe connections between threads in a story or process
- Show how different scenarios relate to a single idea
- Allow multiple speakers to talk around a guiding theme

Examples:

- Innovation and research: physics and medicine/cultural heritage/computing/new materials
- Contemporary astronomy: different approaches. GW/neutrinos/gamma/optical
- Dark Universe: Dialogue between researcher from different fields

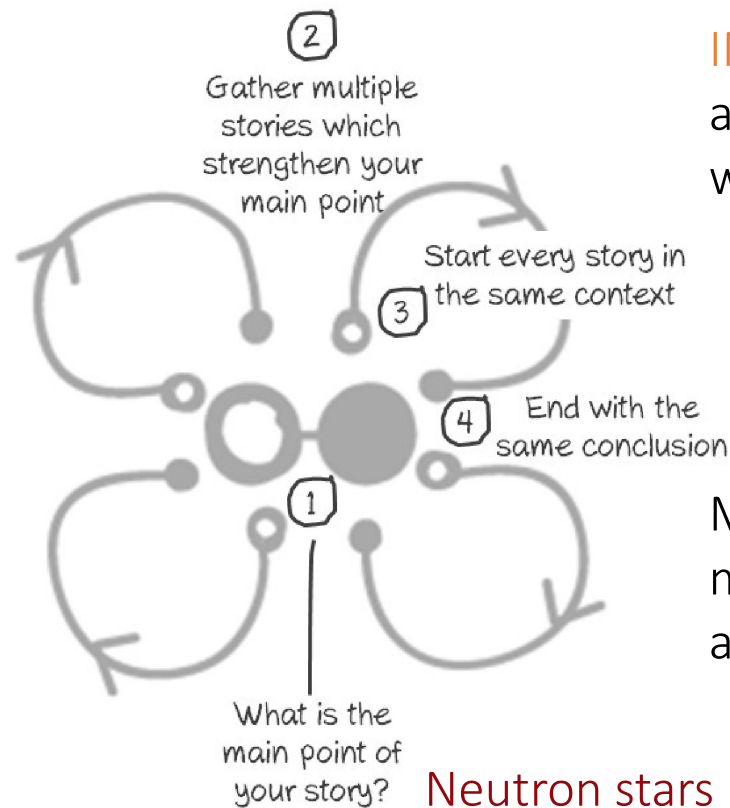
Narrative structures | ... *Neutron stars merger*



ASI Voice: Fermi
space telescope.
Gamma rays

INFN Voice: Virgo
and gravitational
waves

INAF Voice:
Terrestrial
optical
telescopes



Multi-
messenger
astronomy

Neutron stars
merger
August 2017



IN MEDIAS RES



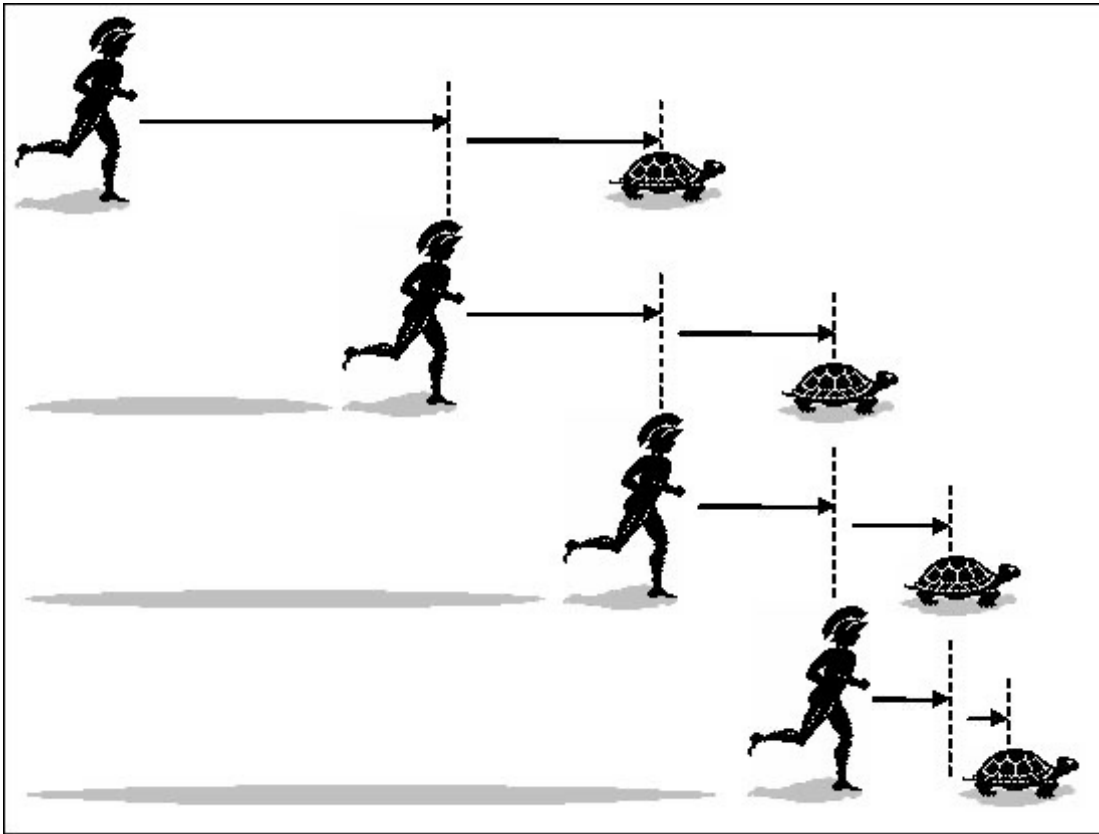
Examples:

- LHC is the coldest place in the universe
- Einstein is the unwitting inventor of the GPS
- The 2015 gravitational wave was emitted at a distance of more than a billion light years

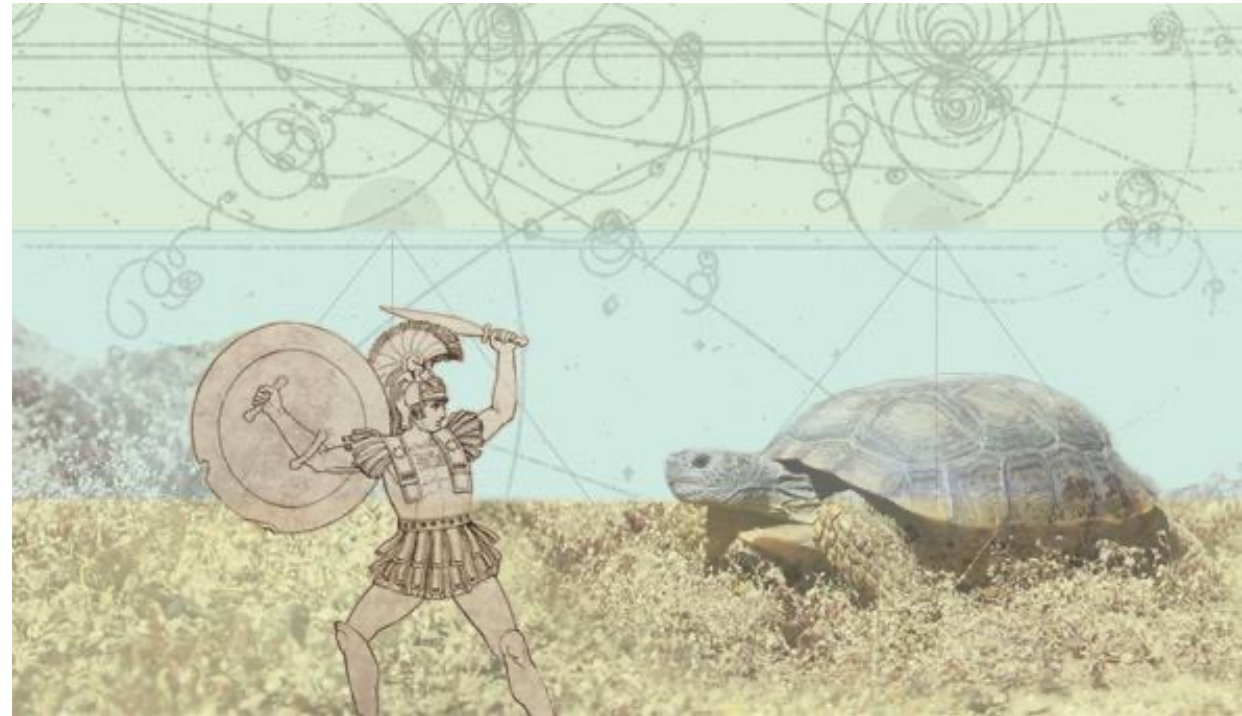
Useful when the story has a well-defined development to:

- Capturing attention from the first moment
- Keep the audience suspended while waiting for an explanation
- Focus on a crucial moment in your story

Narrative structures | ... *The paradox*



Zeno's paradox: Achilles and the tortoise



Narrative structures | ... while making institutional communication

Di arte e di scienza
L'Universo tra creatività e conoscenza

1 febbraio 2019
MILANO
Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci
Via S. Vittore 21

Ore 18.00
Partecipano: **Philippe Daverio**, **Fernando Ferrari**, **Lella Costa**, **Daniela Rossi**, **Florentino Galli**, **Marco Cattaneo**

22 SETTEMBRE 2012
CITTA' DELLA SCIENZA NAPOLI

LO SHOW DELL'UNIVERSO
fisica, bolle di sapone, giochi e Bosone di Higgs

INFN

Quella che non sa
matéria oscura, onde e bolle di sapone
la scienza in la spettacolo

15 FEBBRAIO 2014 ore 17.00
Teatro Manzoni
Corso Gramsci 127, Pistoia
Ingresso gratuito fino a esaurimento posti

INFN

Il gusto dell'Universo
Storia cosmica in tre portate
Uno show-sperimento a base di invenzioni culturali per parlare di fisica e di Universo

25 settembre ore 21.00
Espo Gata, Spazio Officin, Via Luca Bellarini Milano

INFN

Galileo turns 450
The Exploration of the Universe

October 9th - December 12th 2014
Embassy of Italy, Washington DC
Italian Research Institute, Georgetown University

6 GIUGNO, Bologna
Onde gravitazionali e bosone di Higgs:
dei protagonisti, il racconto di due grandi scoperte

21/05
Aula Magna di Santa Lucia
Via Castiglione 38, Bologna
INGRESSO LIBERO FINO A ESAURIMENTO POSTI

INFN

LO STRANO MONDO DI LHC

20 dicembre 2011
Museo Nazionale della Scienza e della Tecnologia
via San Vittore 21, Milano
10.30 - 13.30 Auditorium

INFN

Venerdì 5 aprile, ore 21.00
Boretto
via Roma 31

Spazio, materia e gravità nell'evoluzione dell'Universo
Racconto cosmico

INFN

Materia oscura, gioielleria e quadri di sabbia in jazz

23 gennaio ore 21.00
Auditorium Parco della Musica, Roma

Quella che non sa

INFN

18 Febbraio, ore 21.00

Einstein aveva ragione
Di che cosa parliamo quando parliamo di onde gravitazionali: il racconto di una scoperta

INFN

Venezia 2018 Quark Matter

The 27th International Conference on Ultrarelativistic Nucleus-Nucleus Collisions

14-19 May 2018
Palazzo del Cinema
Lido di Venezia, Italy

INFN

Napoli 11 novembre ore 17.00
Città della Scienza, Sala Newton
Via Coroglio, 57

LIGHTS AND WAVES RHAPSODY
racconto in musica a tre voci

INFN

Genova, Palazzo Ducale
Sala del Maggior Consiglio
3 novembre ore 21.00

Spade, denari e coppe: gli Assi della Big Science
Nel backstage delle scoperte da Nobel

INFN

SPACE, TIME, GRAVITY

Teatro della Tosse
Genova 31 ottobre ore 21.30

INFN

TAUP 2015

14th International Conference on Topics in Astroparticle and Underground Physics
7-11 SEPTEMBER 2015
Centro Congressi Unione Industriale, Torino (Italy)

INFN

la ricerca ha bisogno di giovani

30 marzo 2016 ore 18.00
Genova, Palazzo Ducale
Sala del Maggior Consiglio

INFN

Arte Scienza Società

11 dicembre
L'Aquila

Dialogo tra i saperi

INFN

the Jackal & the Presidents

13 MAGGIO ORE 21

Dialogo irriverente sull'universo e la vita extraterrestre

INFN

Conoscere l'Universo, esplorare il corpo umano
La fisica che cambia la medicina

domenica 14 maggio ore 18.00

INFN

Enrico Fermi
"the Pope of Physics"

October 2nd - December 2nd 2017
Embassy of Italy, Washington DC

INFN

PIANO TRIENNALE 2019/2021

12-13 ottobre 2018
AUDITORIUM MANZONI

INFN

Macchine per scoprire
dal Bosone di Higgs alla Nuova Fisica

Auditorium Parco della Musica
Sala Sinopoli, Roma
14 aprile ore 21

INFN

Quella che non sa
matéria oscura, bolle di sapone, quadri di sabbia

23 ottobre 2013 ore 21.00

Palazzo Ducale, Sala del Maggior Consiglio
Piazza Matteotti 9, Genova

INFN

3-4 Dicembre 2015
Catania

INFN

Area Congressi
Le Ciminiere
Viale Africa, Catania

INFN

Exhibitions and Conference Shows



Based on the
**intertwining of science
and arts**



Having **researchers** as
main voice and
discoveries,
infrastructures and
research projects as a
narrative line



Designed to be host at
**Festivals, in Theatres
and Museums**

KNOWING BY DOING I *making of science an experience*



COLLISIONI. **INFN**

Spazi culturali
all'Istituto Nazionale di Fisica Nucleare



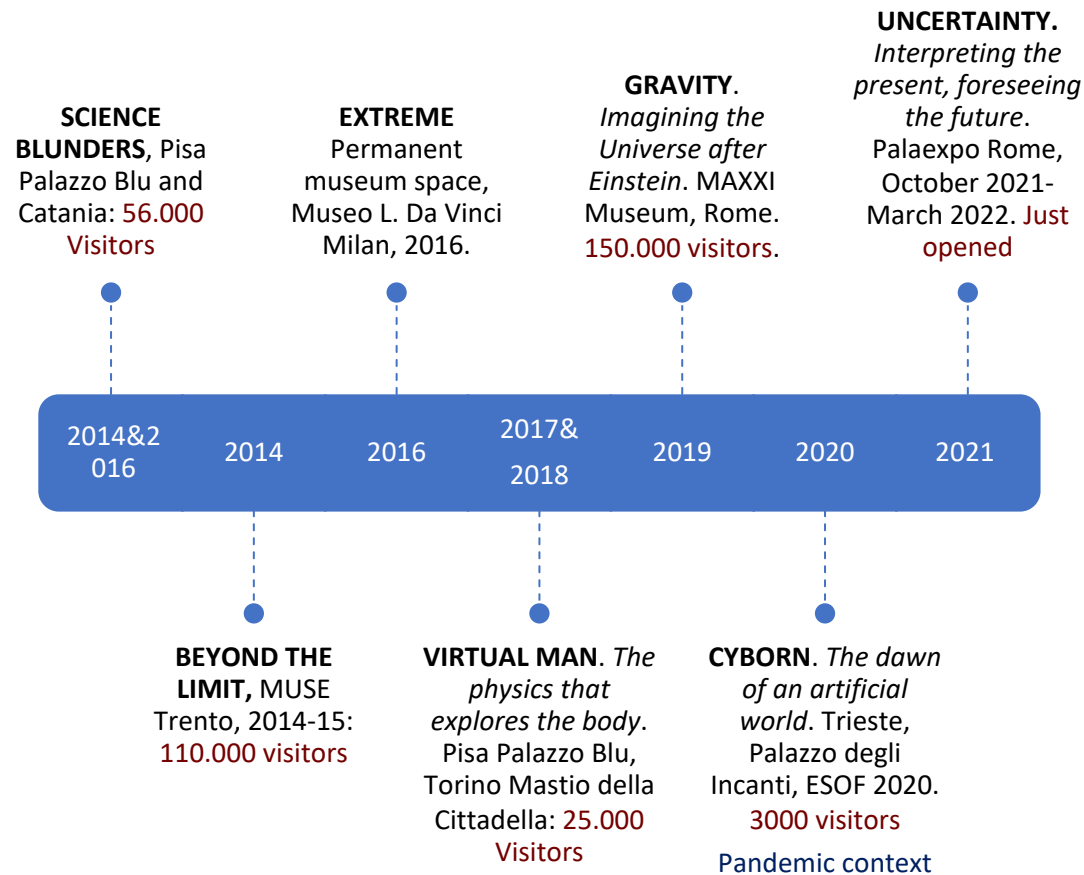
*Not everyone is willing to play
Not only children love to play*

*Not only adults want to understand
Not everyone wants to really
understand*

LISTENING
OBSERVATION
PARTECIPATION

Exhibitions

Immersive, interactive, multimedia



Conference Shows

POST-LHC STRATEGIES: FCC 2016

- FCC Week Public Event
- 1000 paying spectators
- Sponsorship by ASG Superconductors

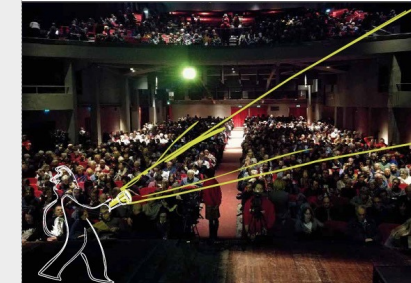


Di arte e di scienza L'Universo tra creatività e conoscenza



ART, SCIENCE AND CREATIVITY 2018

- Art&Science Across Italy
- 2 replicas (NA/MI)
- 1400 spectators
- Synergical with CC3M



A COSMIC TALE 2016-2019

- 7 replicas (Rome, Genoa, Turin, Bergamo, Correggio, Boretto, Baveno)
- 7500 spectators
- 4 stages produced by privates: theatres and foundations
- 4 broadcasts on Rai Scuola

FROM PHYSICS TO MEDICINE 2017

- 600 paying spectators
- Sponsorship by Assobiomedica



TALENTED WOMEN SCIENTISTS 2019

- 700 paying spectators
- Television conduction

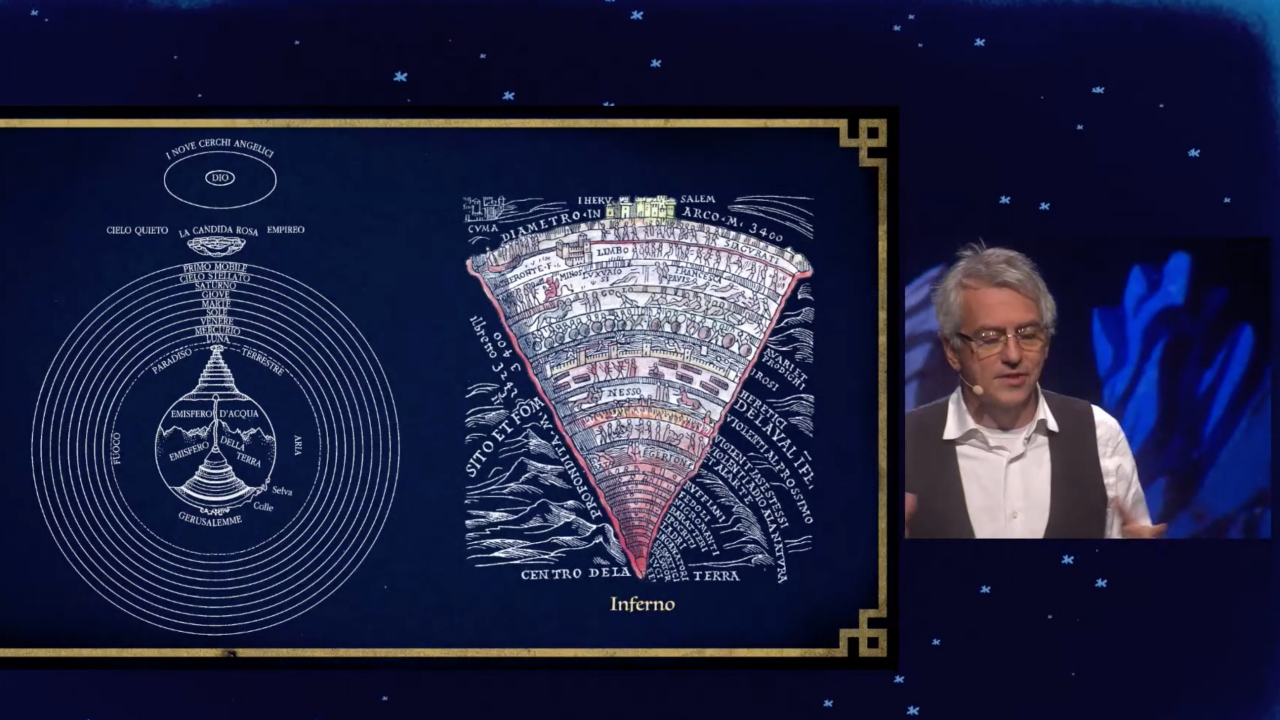
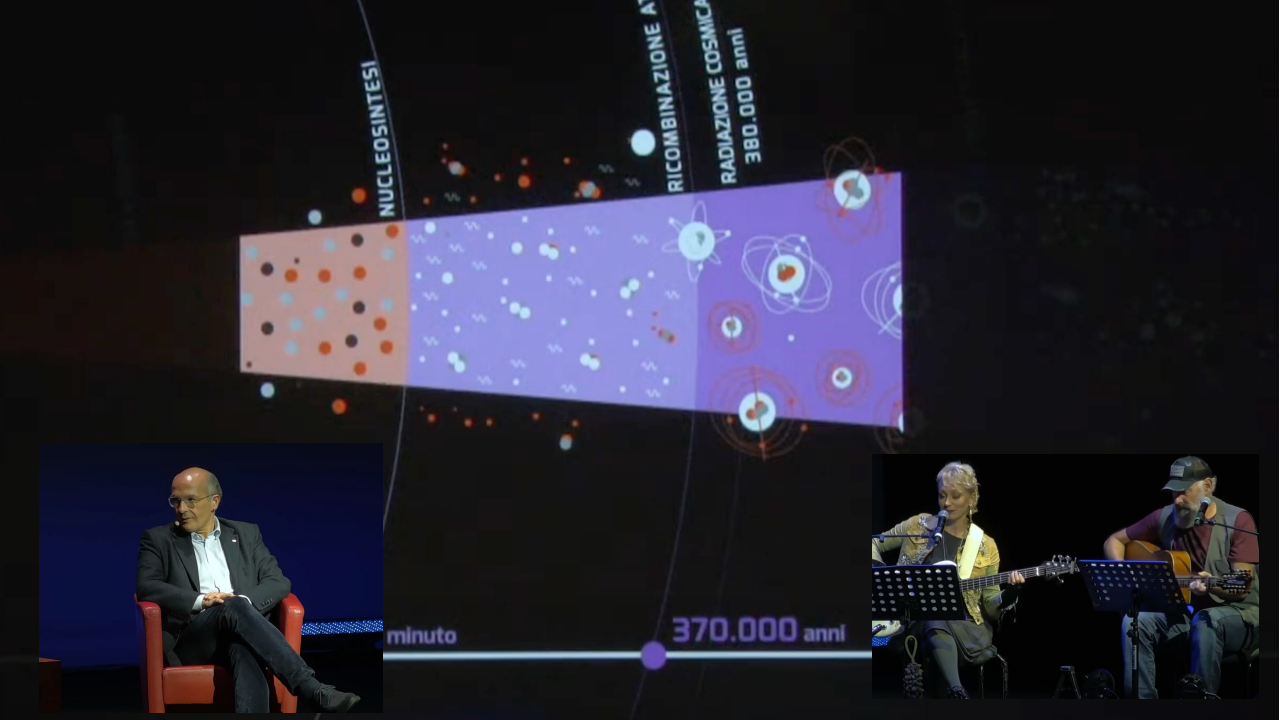
THE NEW MULTI-MESSENGER ASTRONOMY, IN MUSIC 2018

- Co-produced by INFN/ASI/INAF
- 3 replicas (RM/NA/GE)
- 3000 paying spectators



RARE EVENTS ("UNDERGROUND UNIVERSE") 2020

- Streaming from LNGS
- 1200 live streamers
- Pandemic context



Science, Art and Literature:
the scientist on stage

Why using narratives to talk about science - bibliography



1. Jones M.D., Crow D.A. (2017), *How can we use the 'science of stories' to produce persuasive scientific stories?*, Palmgrave Communications, 3:53, Nature
2. Shanahan E., Jones M.D., McBeth M.K., Radaelli C.M. (2017) *The Narrative Policy Framework*. In: Weible C, Sabatier P (eds) *Theories of the Policy Process*. 4th edn, Westview Press, p 173–213
3. Herman D. (2003) *Narrative theory and the cognitive sciences*: Stanford Univ Center for the Study.
4. Dahlstrom, Michael F. *Using narratives and storytelling to communicate science with non expert audiences*, *PNAS* vol 111 suppl. 4 September 16, 2014
[www.pnas.org/cgi/doi/10.1073/pnas.1320645111]
5. Irwin, A. *The Politics of Talk: Coming to Terms with the 'New' Scientific Governance*, *Social Studies of Science* 36(2): 299–320
6. Bruner, J. S. *Actual minds. Possible words*, Harvard University Press, Cambridge, 1986.
7. Bruner, J. (1992). *La ricerca del significato*. Bollati Boringhieri.
8. Bruner, J. (2004). *Narratives of science*. In *Reconsidering science learning*, (pp. 90-98). Routledge Farme

Around your PE activity

Communication, Budget, evaluation



THE TIME OF THE STORY|

- The time of the **premise** "Once upon a time"
- The duration of the **suspense** «Snow White ate the apple and ...»
- The **development of the story** "the prince departed, met the dragon, got lost in the forest, kissed Snow White..."
- The **moral of the story** "they lived happily ever after"

→ The attention time

THE TIME OF THE STORY | ... *The measure of time*

- Duration of speeches/answers
- Number of speakers
- Equilibrium among speakers
- Duration of videos or other narrative elements

A **text/time** unit: **800 types/minute** for someone speaking at the radio

> Improvisation > Dt



VISUAL COMMUNICATION |

the importance of a clear and direct communication

COVID-19 INFORMATION

PRACTICE PHYSICAL DISTANCING

Keep at least 2 metres (about the length of a hockey stick) between you and others. If you are too close to someone who coughs or sneezes, you risk breathing in tiny droplets that could contain the COVID-19 virus.

Help support a healthy relaunch by following public health measures, practicing physical distancing and good hygiene, and continuing to act responsibly.

STAY INFORMED

alberta.ca/covid19

Alberta



VISUAL COMMUNICATION | *A good example*



In ascolto delle onde gravitazionali

L'esistenza di onde, che, generate da grandi cataclismi cosmici, si propagano nel cosmo, e deformano la trama dello spazio-tempo, era stata prevista da Einstein già nel 1916. Ci è voluto però un secolo di innovazioni scientifiche e tecnologiche per arrivare alla loro scoperta, annunciata nel 2016 dai fisici della collaborazione scientifica degli interferometri statunitensi LIGO e dell'europeo VIRGO, installato in Italia, nei pressi di Pisa. Queste antenne gravitazionali sono oggi gli unici strumenti al mondo in grado di rivelare le onde gravitazionali. Sono costituiti da due bracci lunghi diversi chilometri, nei quali due fasci laser vengono riflessi migliaia di volte fino a che si sovrappongono a formare un'immagine di interferenza. Il passaggio di un'onda gravitazionale, allungando il percorso dei laser lungo un braccio e accorciandolo nell'altro senso modifica questa figura di interferenza. Nonostante siano prodotte da eventi cosmici violentissimi come le fusioni di buchi neri o di stelle, sulla Terra le onde gravitazionali producono variazioni di lunghezza impercettibili, più piccole delle dimensioni di un atomo. Grazie a tecnologie d'avanguardia per la fabbricazione degli specchi che riflettono i laser, la produzione dell'ultra vuoto e l'isolamento dalle vibrazioni dell'ambiente gli interferometri sono in grado di rilevare anche queste variazioni infinitesime.

Listening to the gravitational waves

The existence of waves generated by major cosmic cataclysms and propagating through the cosmos, warping the fabric of space-time, was predicted by Einstein as early as in 1916. However, it took a century of scientific and technological innovations to achieve their discovery, announced in 2016 by physicists using scientific collaboration of the United States interferometers, LIGO, with the European VIRGO detector, based in Italy, near Pisa. These gravitational antennae are the only instruments in the world today that can detect gravitational waves. They consist of two arms, several kilometres long, in which two laser beams are reflected thousands of times, until they overlap to form an interference image. The passage of a gravitational wave lengthens the path of the lasers along one arm and shortens the one along the other direction, altering the interference figure.

Even though they are the products of extremely violent cosmic events, such as fusions of black holes or of stars, gravitational waves produce imperceptible variations of length on Earth, less than the dimensions of an atom. With leading edge technology for manufacturing the mirrors that reflect the lasers, production of ultra high vacuum and isolation of environmental vibrations, interferometers are now also capable of detecting these infinitesimal variations.

Photo credit: EGO



VISUAL COMMUNICATION | *A bad example*



EXOPLANET HUNTING USING GRAVITATIONAL MICROLENSING

ASHNA SHARAN, SUPERVISOR: DR. NICHOLAS RATTENBURY, DEPARTMENT OF PHYSICS

INTRODUCTION

- Are there planets around other stars (exoplanets)? We may have gazed at the stars and wondered for centuries but it has only been around two decades since astronomers found convincing evidence for the existence of exoplanets. This is not surprising as exoplanets are too far, too dim and hidden in the glare from their host star. However, within the last twenty years, thousands of exoplanets have been discovered and confirmed.

- Microlensing allows us to detect exoplanets which are too far away (in another galaxy even!) or too small for other exoplanet detection techniques.

- Here, we model real microlensing events with the goal of finding and characterizing exoplanets. Additionally, we aim to refine and improve the modelling methodology in the process.

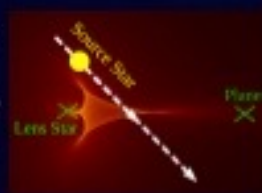
MICROLENSING

- Microlensing occurs when light from a distant source star is deflected by the gravity of a faint lens system passing in front of it.



- Multiple distorted images of the source star form, but are too small to be resolved by current telescopes. However, we can measure an apparent change in the brightness of the source star, the **magnification**, with respect to time. Graphing these data gives us a **microlensing light curve** which, in the case of a single-star lens, is bell-shaped. The presence of planet(s) is indicated by **short-duration blips** in the light curve.

- Here is the microlensing geometry (not to scale) depicted as a "magnification map". Each pixel on the map represents the source star magnification at a given location at a given time. The brighter the regions the higher the magnifications. The bright regions that form a roughly diamond shape are called the "caustics", with their boundaries being the brightest.



Think Tatooine in the Star Wars saga is strange, with its two suns? Then you will agree that reality is stranger than fiction, as exoplanets with **four suns** in the sky have been found [1]!

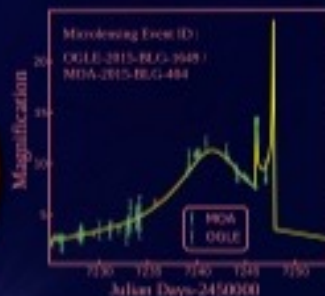
WHY CARE ABOUT EXOPLANETS?

To test and expand our current understanding of the formation of individual planets and solar systems.

To find a habitable planet, "Earth 2.0", which humans may one day inhabit!

To search for extraterrestrial life!

A LIKELY EXOPLANET!

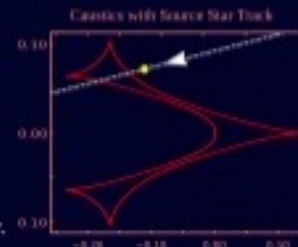


- Shown on the left is, thus far, our best model light curve that fits the observed data points for this particular microlensing event. The data was obtained from the observation groups, MOA [2] and OGLE [3], who monitor billions of stars in our Galactic Centre.

- The binary lens mass ratio for the microlensing event presented here is roughly 0.004, which strongly indicates a star-planet lens system. From this mass ratio our model very likely implies an exoplanet of 1.2 Jupiter masses, assuming the host star is a **red dwarf**, the most common type of star in our galaxy.

- This figure shows the boundaries of the caustics in red with the source star moving in the direction of the white arrow. We can see corresponding spikes in the light curve where the source star crosses the caustic boundaries.

- These caustics are important in the study of microlensing events since they act as the astronomer's visual guide to the lensing effect of the lens system on the light of the source star.



- We cannot claim an exoplanet discovery by merely presenting a best fitting model light curve indicative of a planetary deviation. We also need to demonstrate that there are no other models that will represent the features of the light curve equally well or better. If there are such models, we will need model selection techniques. In addition, more precise modelling and analysis will be required to confirm and better characterize the exoplanet.

ONGOING WORK

- Modelling code developed by Ling [4] was used to model the microlensing event shown above. Part of my ongoing research work is to develop this modelling code further so that it can also perform statistical model selection on alternative models that fit the data equally well.

- Meanwhile, the hunt for exoplanets continues!

REFERENCES:

- [1] Lewis C. Roberts et al., 2015, The Astronomical Journal, 149, 135
- [2] <http://www.phys.cornell.edu/~moa/> (Accessed: 20 August, 2015)
- [3] <http://ogle.astrouw.edu.pl/> (Accessed: 19 August, 2015)
- [4] Ling, G., 2003, PhD thesis, Massey University

COMMUNICATION | *The value of the title*



- ✦ EVOQUES through images, irony, ideas, literary quotes, puns
- ✦ TELLS what the event is about
- ✦ INVITE the public
- ✦ DEFINE the style

THE SUBTITLE (always useful whenever possible)

it reveals the content and the style

COMMUNICATION | *The event in a few lines*



CONFERENCE-SHOW

LIGHTS AND WAVES RHAPSODY. A THREE-VOICE MUSIC STORY

AN EVENT BY THE NATIONAL INSTITUTE OF NUCLEAR PHYSICS, THE ITALIAN SPACE AGENCY, WITH THE CONTRIBUTION OF THE NATIONAL INSTITUTE OF ASTROPHYSICS

(**SUBJECT**→) The story is that of the most extraordinary discovery in physics of the last 100 years: the first detection of gravitational waves emitted by the fusion of neutron stars, which took place in perfect synergy between very different instruments. A discovery that changed the image of our universe. (**STYLE** →) In a non-random alternation of words and music, the two-act narrative is entrusted to the protagonists of discovery: (**PROTAGONISTS** →) exceptional physicists who, thanks to different tools, technologies and knowledge, have rassembled the image (**CONTENUTS** →) of an extraordinary cosmic event, describing in detail its characteristics and opening the new era of multi-messaging astronomy. (**ARTISTS** →) The musical contribution to the narrative participates in the choral message. Alternating with the voice of scientists, the music of the jazz trio and the Open Orchestra, returns the image of the specific and at the same time synergistic contribution of three ways of investigating the universe: (**CONTENTS** →) that of fundamental physics, with gravitational wave detectors, astrophysics, electromagnetic signal detectors from cosmic sources, and instruments orbiting space. (**1100 types**)

HOW MUCH | *Budget*



50 euro

- To buy objects for demonstrations
- To buy materials to build an exhibit
- To pay the SIAE for copyright on videos, readings, music
- To pay travel and stay for your invited speakers/contributors
- To pay a professional moderator/an artist/a performer
- To rent technical material for your public event: screen, projector, lights, microphones, streaming system, simultaneous translation ...
- To rent the place where staging your activity (theatre, auditorium...)
- To pay professionals to create multimedia installations or a videos
- To pay professionals to design an exhibition (architect, stand builder ...)



5000 keuro

EVALUATION | *impact and appreciation of a single event*



	General Appreciation	Knowledge	Interest	Image&brand
Narration	Entertainment	Language	Research	INFN
Contents	Story	Contents (before and after)	Physics/Science	Fundamental research
People	Main Actors	Research policy	Career	Profession

Towards a quantitative and goals-based evaluation of PE projects →

	Objective	Metric	How measured	When
Goal 1.	Inform and motivate people on fundamental (or a specific field) research benefits			
	Reach a number of people with specific contents including research benefits; get % of them to follow up within Y weeks of outreach	<ul style="list-style-type: none"> N. of people reached Increase in the newsletter or the mailing list subscriptions, socials or website hits as a result of the outreach activity. 	<ul style="list-style-type: none"> Track people attending the event/events and those linking to that remotely. Ask socials and websites visitors how they get there. 	<ul style="list-style-type: none"> Start tracking within X weeks of outreach Tally ongoing results periodically
Goal 2.	Build credibility for the research program and its benefits through partners the community trusts			
	Recruit partner organizations (local or national) to actively promote the research program - or support specific outreach events (festivals or campaigns)	<ul style="list-style-type: none"> N. of partners committed to join Response rate on materials distributed by partners Leads generated by partner events 	<ul style="list-style-type: none"> Sum of organizations that have agreed to partner Sum of organizations that fulfilled agreement Rate of return on partner materials or follow-up from partner outreach efforts 	<ul style="list-style-type: none"> Assess periodically After any partner outreach effort or event
Goal 3.	Demonstrate the benefits of research to generate interest and self motivated political decisions.			
	Hold a N. of events with a call to action to sign up for a second step of deeper information/or subscribe for a newsletter/magazine/website.	<ul style="list-style-type: none"> N. of satisfied individuals in your public N. of event attendee N. of participants signing up for an assessment after events Conversation rate of assessment 	<ul style="list-style-type: none"> Sum of attendees per event Dimension of the satisfied public resulting from event referrals (questionnaire). Sum of requested assessments resulting from event referrals (questionnaire) 	<ul style="list-style-type: none"> Assess after each event Monitor periodically