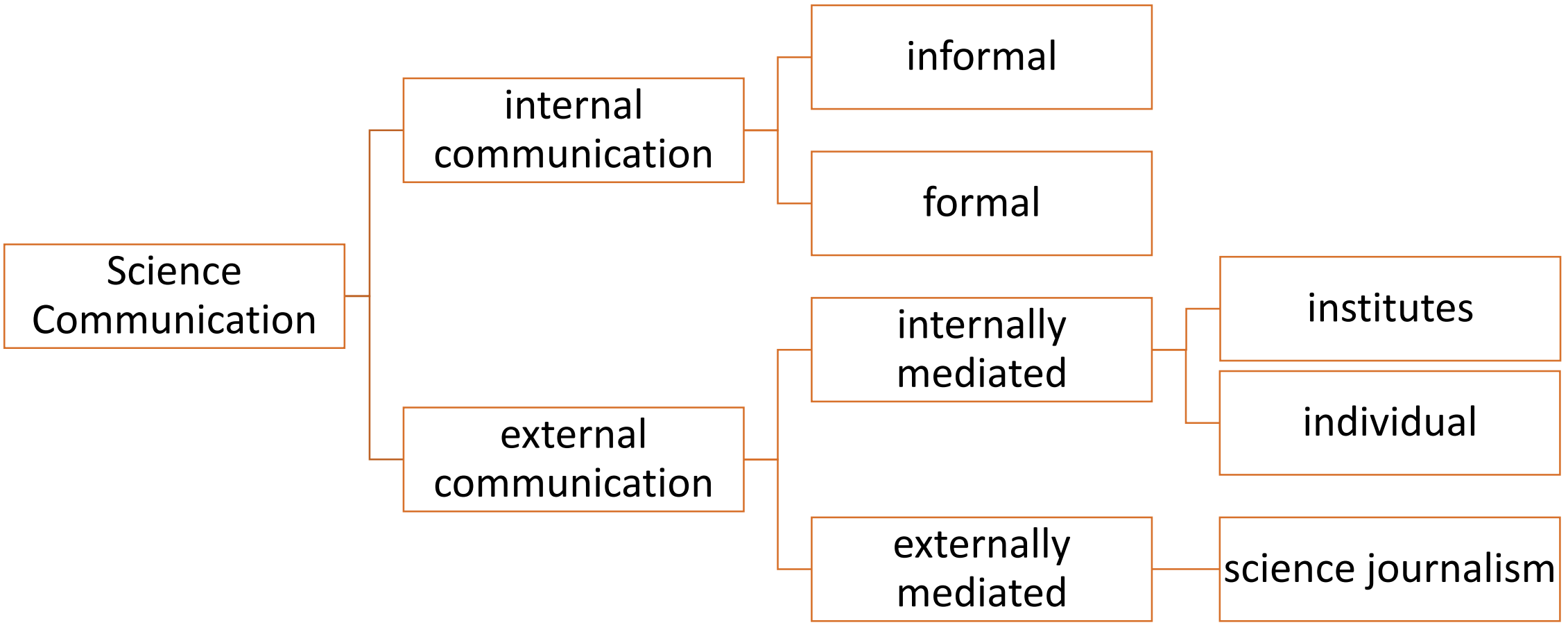
Science Communication & Outreach (for physicists)

Menu for today

- What is science communication & outreach?
- Why should we do it?
- How can you do it?
- What projects do exists & how can you use them?

Science Communication



Science communication is defined as

the use of appropriate

skills, media, activities, and dialogue

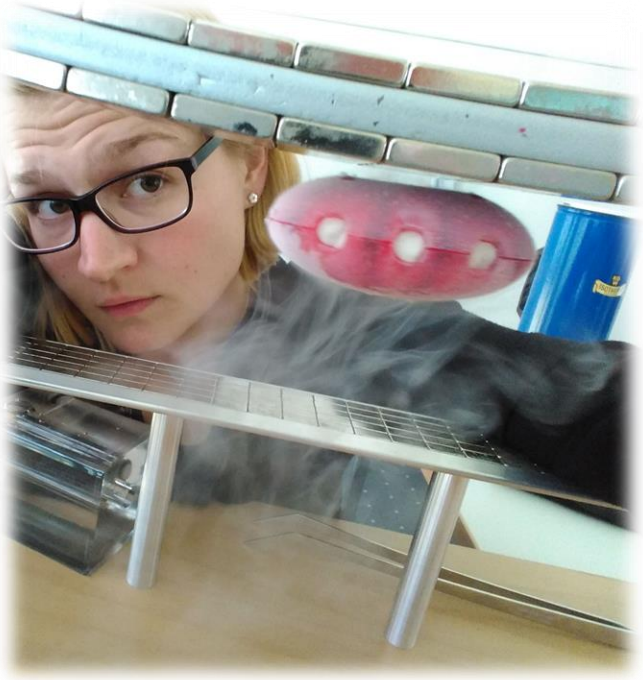
to produce one or more of the following personal responses to science:

awareness, enjoyment, interest, opinion forming, and understanding

Burns, Terry W. et al. 2003.
Science communication: a contemporary definition
Public Understanding of Science, 12 183-202

Why science communication?

I really love to talk about physics!



Intrinsic Motivation

Why science communication?

Explanation & Legitimation

Intrinsic Motivation

European Strategy Document 2013
https://cds.cern.ch/record/1567258/files/esc-e-106.pdf

Explanation & Legitimation

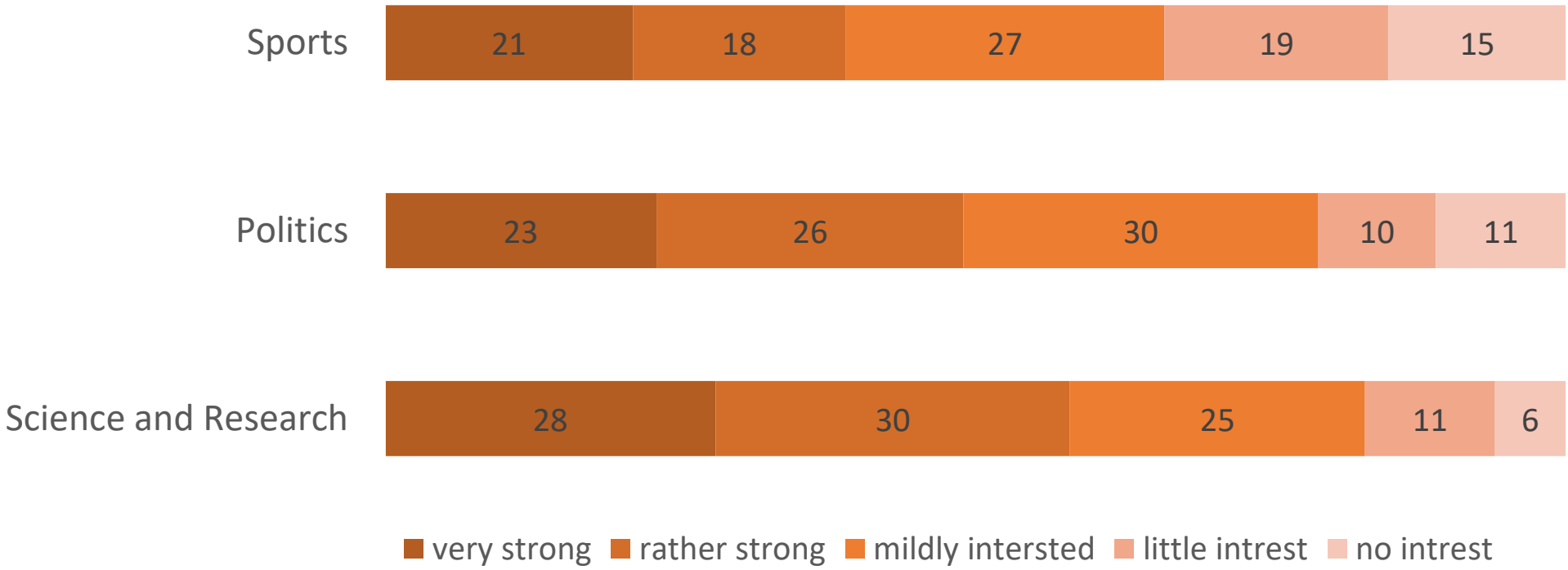
Sharing the excitement of scientific discoveries with the public is part of **our duty** as researchers.

Outreach and communication in particle physics should receive **adequate funding** and be recognized as a **central component** of the scientific activity.

Basis: 1.007 Befragte
Erhebungszeitraum: Juli 2017
Quelle: Wissenschaftsbarometer – Wissenschaft im Dialog/Kantar Emnid

Explanation & Legitimation

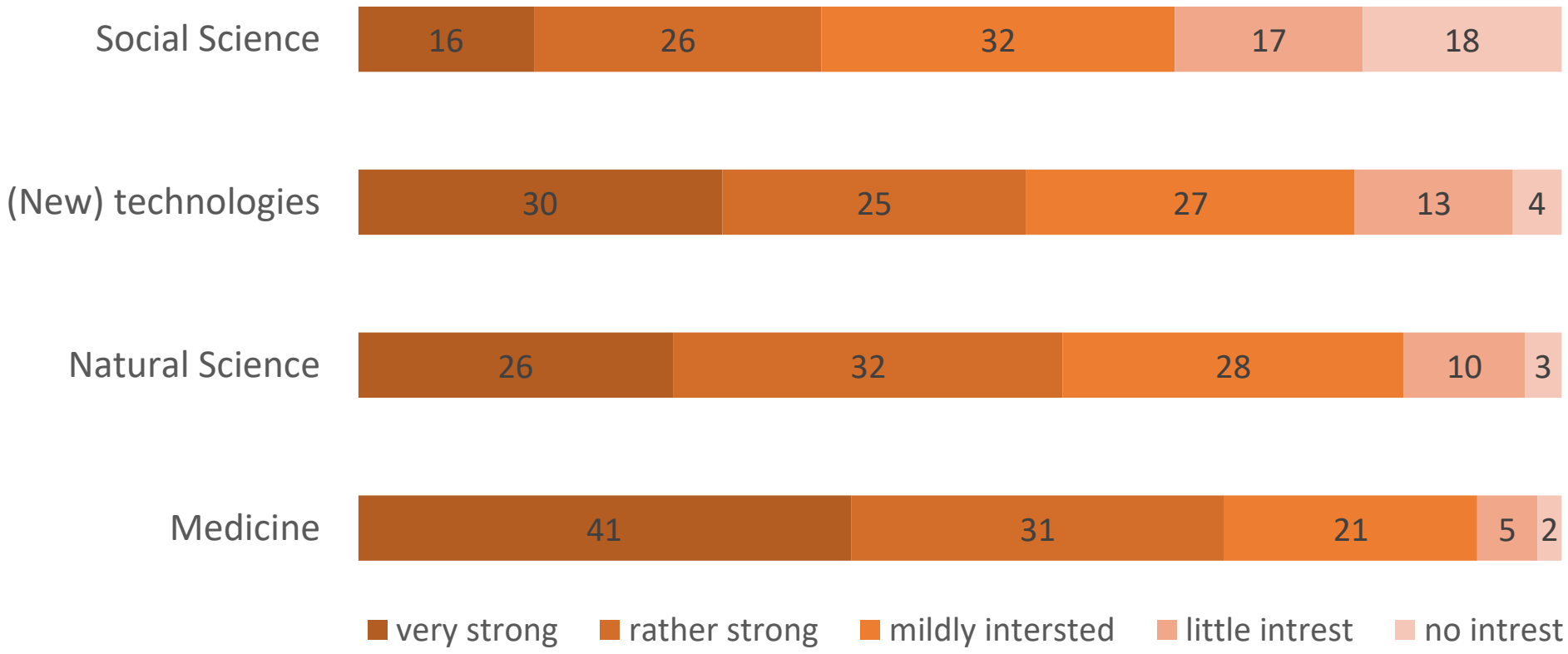
„How strong is your interest in the following topics?“



Basis: 1.007 Befragte
Erhebungszeitraum: Juli 2017
Quelle: Wissenschaftsbarometer – Wissenschaft im Dialog/Kantar Emnid

Explanation & Legitimation

„How strong is your interest in the following science topics?“



Explanation & Legitimation

Packages that support the **interdisciplinary transfer** of results as well as economical usage are **explicitly included** in the support.

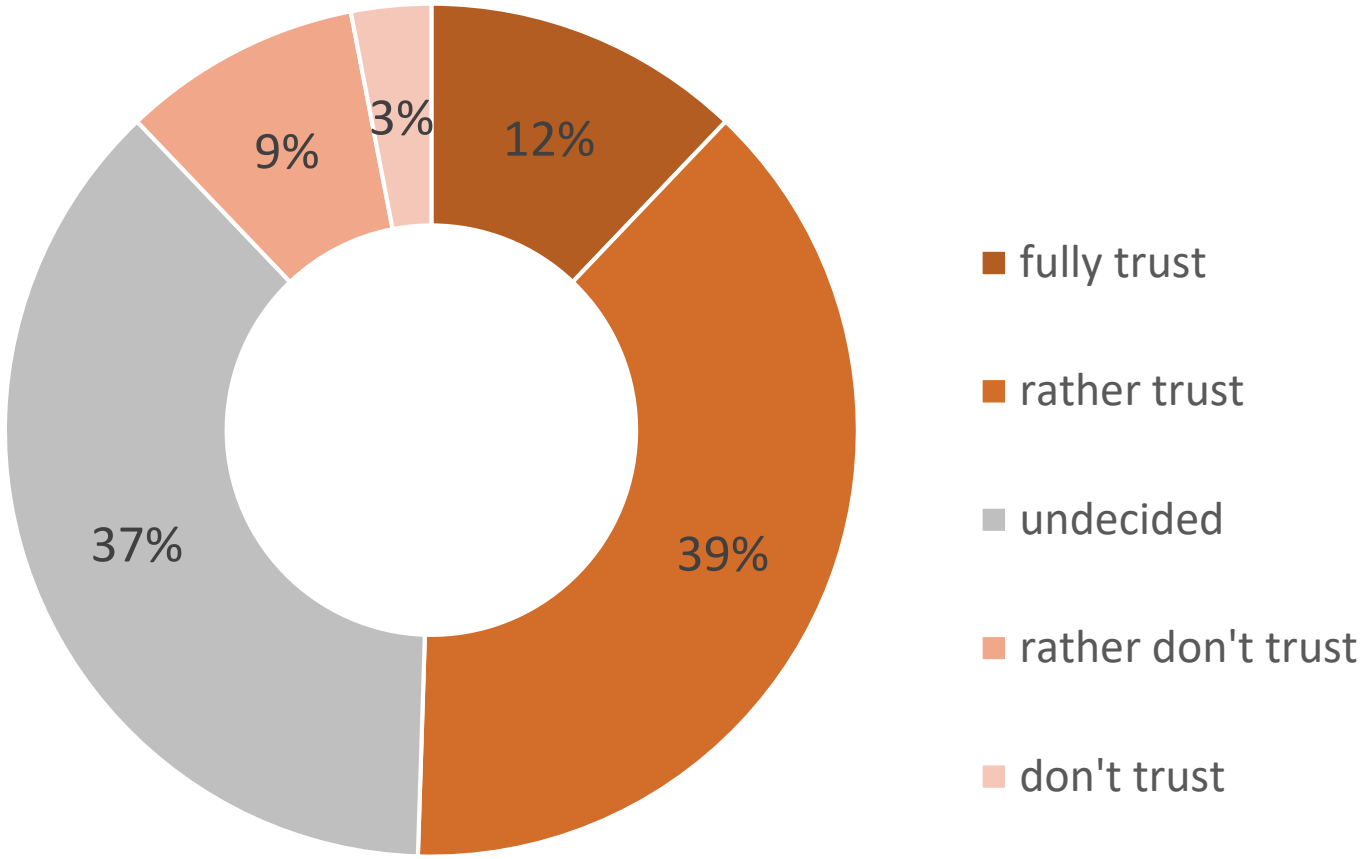
This encounters also contributions **for information and inclusion of a wide public audience.**

Basis: 1.007 Befragte
Erhebungszeitraum: Juli 2017
Quelle: Wissenschaftsbarometer – Wissenschaft im Dialog/Kantar Emnid

Why science communication?

Explanation & Legitimation	Creating & Receiving trust in science

"How much do you trust science and research?"

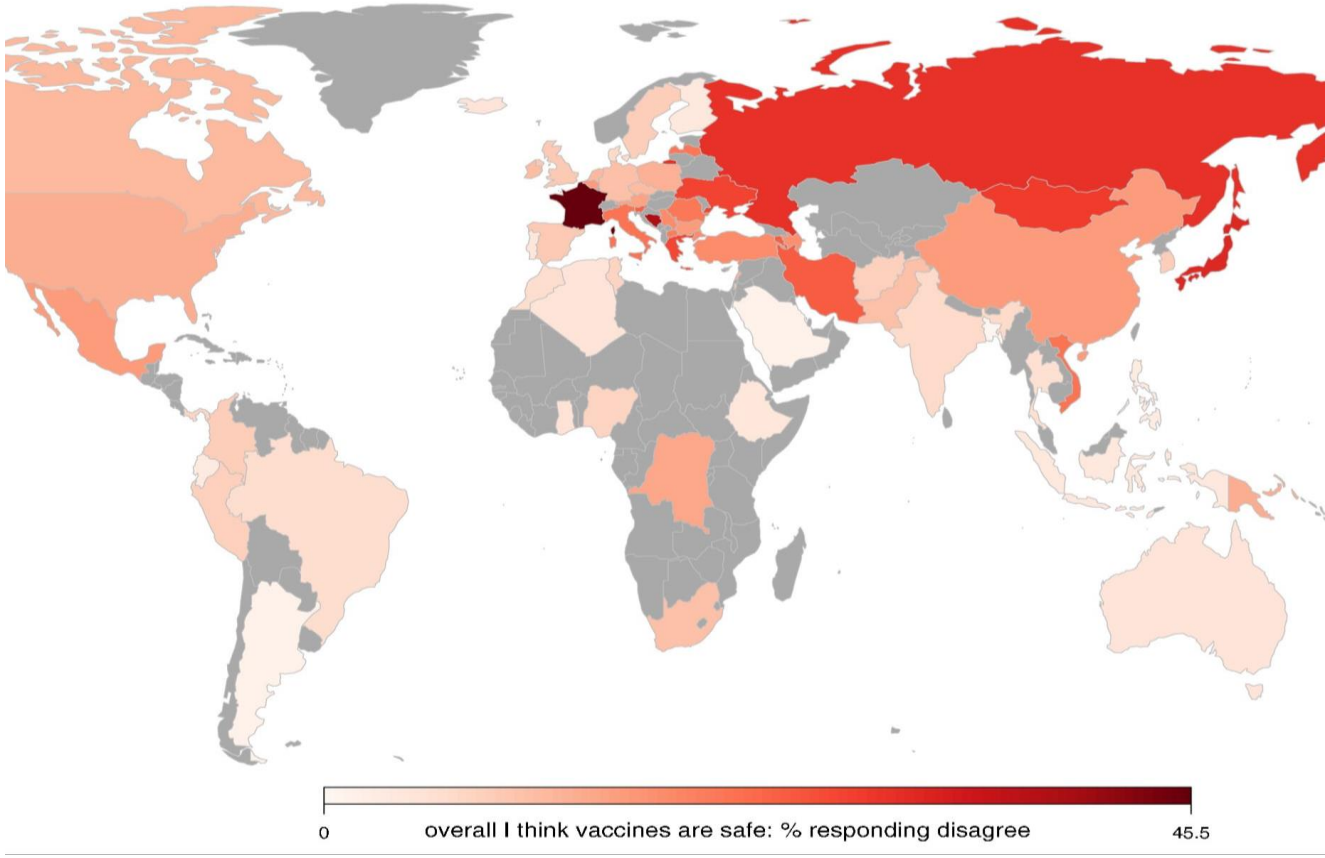


Creating & Receiving trust in science

The State of Vaccine Confidence 2016
Based on 65,819 people in 67 countries
https://doi.org/10.1016/j.ebiom.2016.08.042

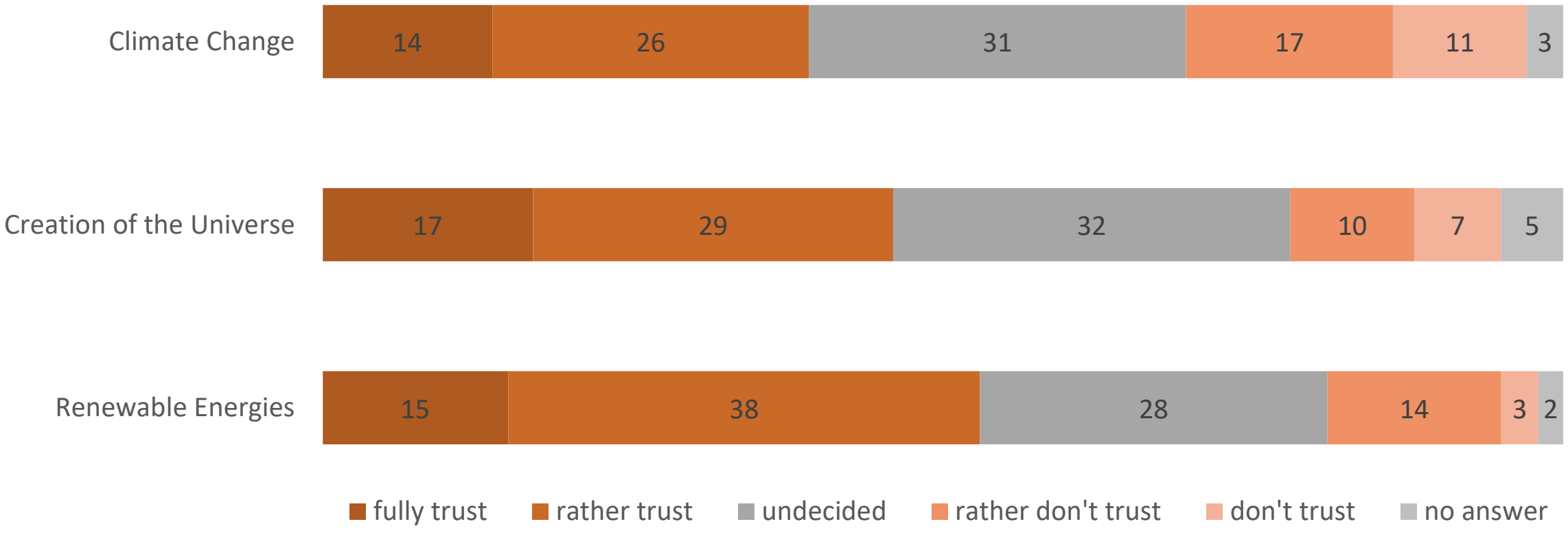
Creating & Receiving trust in science

- The European region has **the lowest confidence** in vaccine safety with France the least confident globally.
- **Bangladesh, Ecuador, and Iran** reported highest agreement that vaccines are important.
- Azerbaijan, Russia, and Italy reported most skepticism around vaccine importance.
- In **Germany 10.5%** of the population have no confidence in vaccinations
- **Education increases confidence in vaccine** importance and effectiveness but not safety.



Basis: 1.006 Befragte
Erhebungszeitraum: Mai 2016
Quelle: Wissenschaftsbarometer – Wissenschaft im Dialog/Kantar Emnid

Creating & Receiving trust in science



Why science communication?

Explanation & Legitimation

Creating & Receiving trust in science

Additional education to ensure responsible citizens

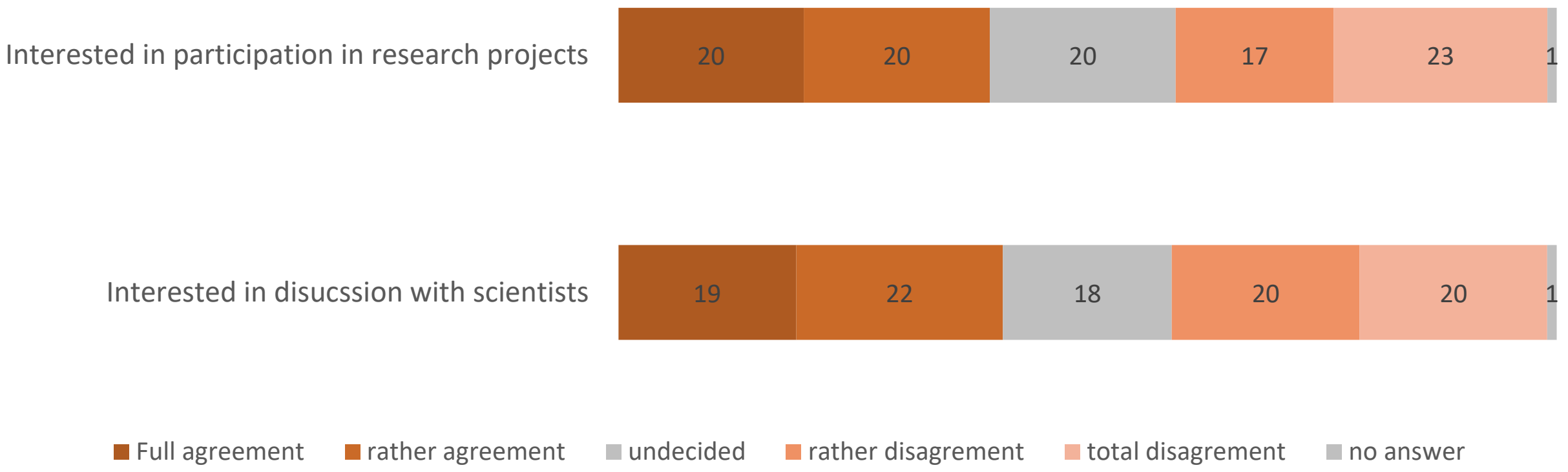
Intrinsic Motivation

Ensure responsible citizens

Why science communication?

Explanation & Legitimation	Creating & Receiving trust in science	Additional education to ensure responsible citizens	Inclusion of citizens in research	Intrinsic Motivation

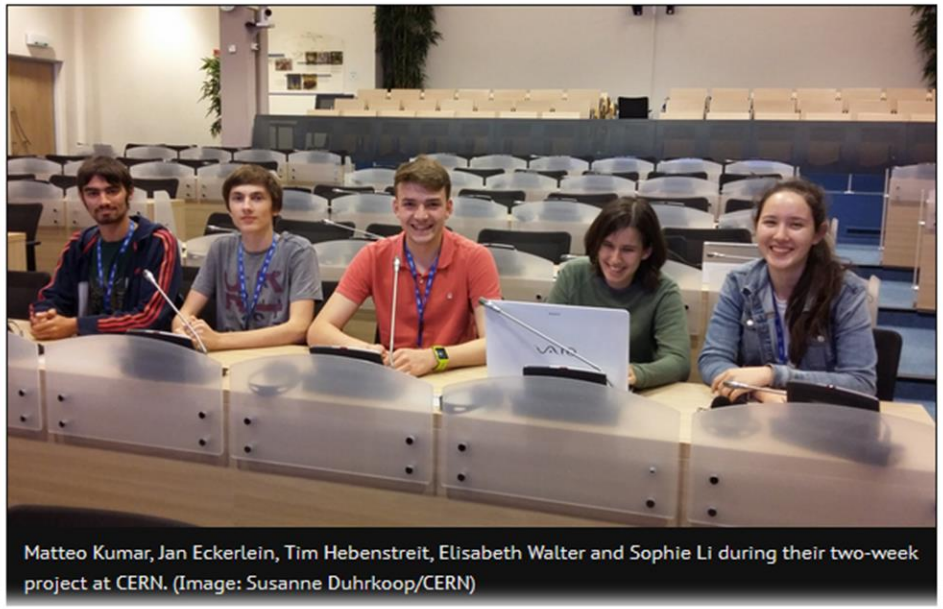
Inclusion of citizens in research



Why science communication?

Netzwerk Teilchenwelt: German high-school students at CERN

by Susanne Duhrkoop



Matteo Kumar, Jan Eckerlein, Tim Hebenstreit, Elisabeth Walter and Sophie Li during their two-week project at CERN. (Image: Susanne Duhrkoop/CERN)

Recruitment of future scientists

Based on Workshop results: Interdisciplinary Science Communication 2017, FIAS

Why science communication?

Explanation & Legitimation

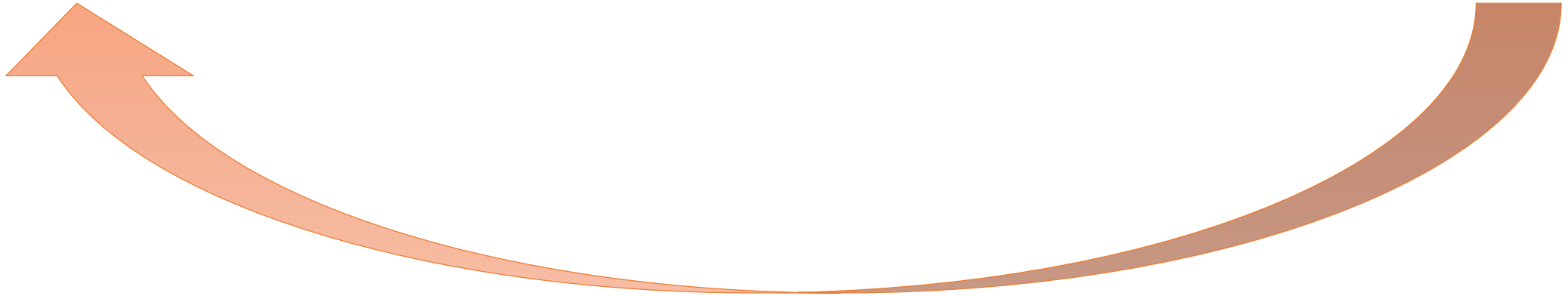
Creating & Receiving trust in science

Additional education to ensure responsible citizens

Inclusion of citizens in research

Recruitment of future scientists

Intrinsic Motivation



How to make outreach in 5 steps

- Define what you want to tell
- Define how and to whom you want to tell it
- Define what resources you have available
- Look for partners which already do outreach & collaborate
- Have fun

Based on Workshop results: Interdisciplinary Science Communication 2017, FIAS

Factors & Resources

Factors & Resources

Reach

Needed pre-knowledge

Affinity for topic

} To whom (Target audience)

Entertainment

Information content

Multimediatization

Interaction

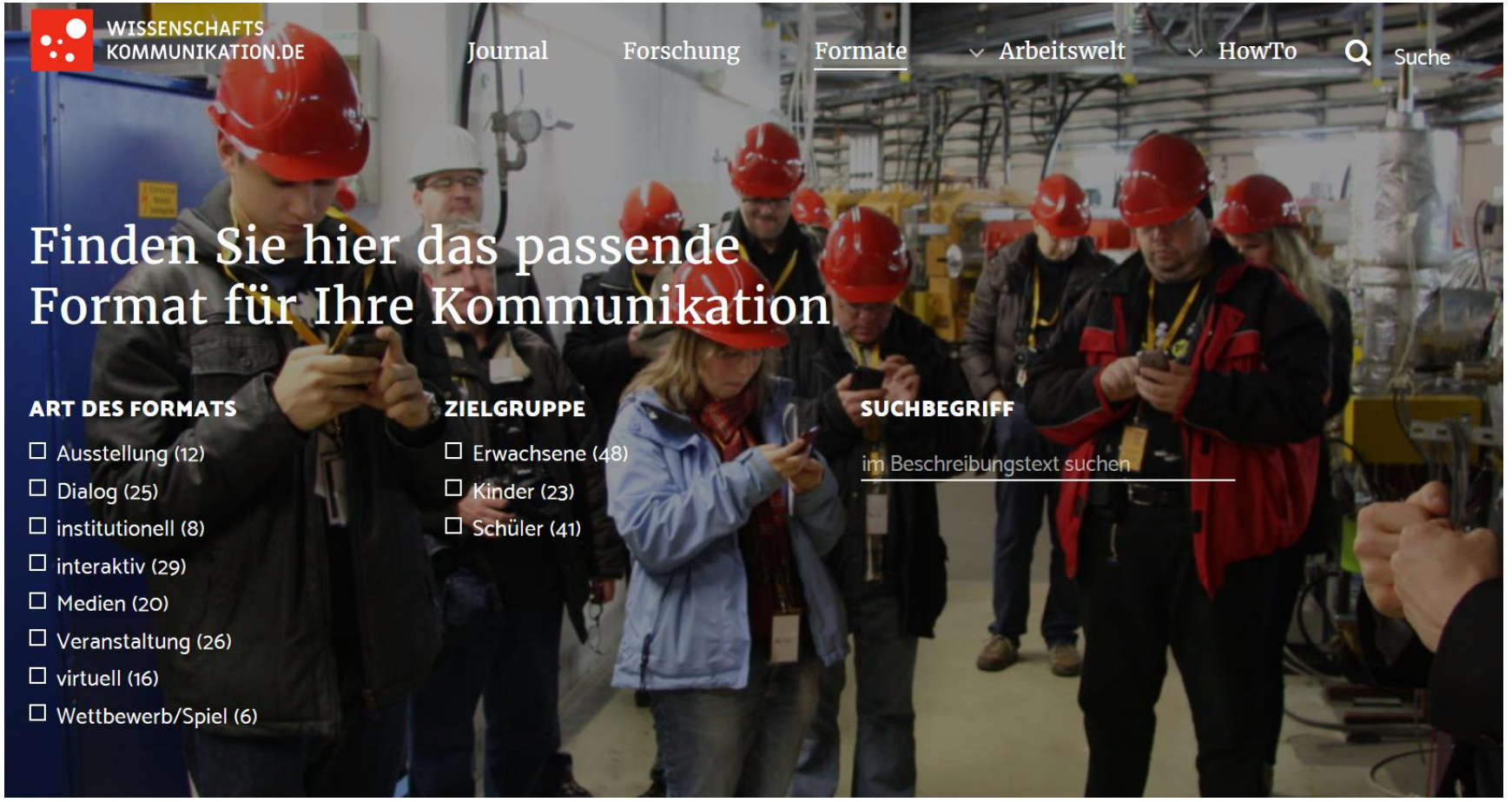
Specific Topics

} Content format

Based on Workshop results: Interdisciplinary Science Communication 2017, FIAS

Factors & Resources

Wisschenschaftskommunikation.de



What & how to communicate?

What you do?
Why it is important?
How does it impacts society?

Written

- News
  - Results
  - Records
  - Awards
  - …
- Evergreens
  - Physics
  - Computing
  - Methods
  - …

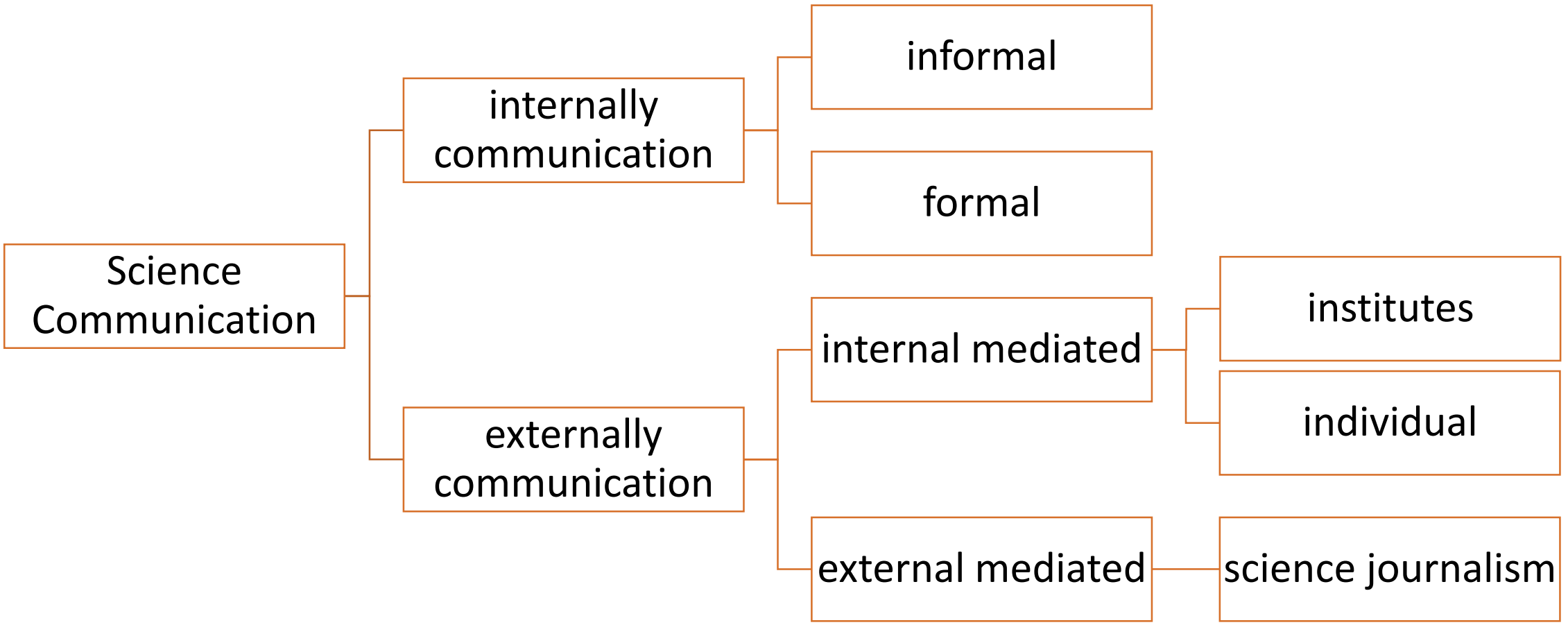
Multimedia

- Photographs
- Images, & GIFS
- Event displays
- Animations
- Videos
- Live Streaming
- ….

„Hands on"

- Open day
- Public talk
- Hands on data
- Citizen science

Science Communication

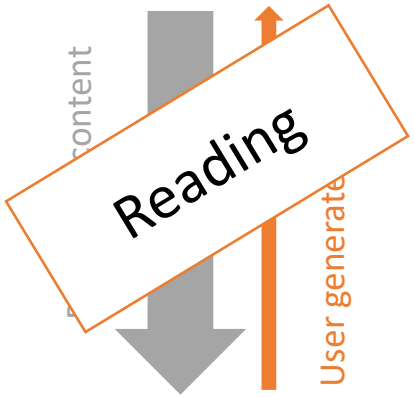


Science communication 2.0 = Web 2.0?

Web 1.0

1996

2.5 10^5 sites



45 Million Users

Web 2.0

2006

8.0 10^7 sites

1 Billion Users

Web 3.0

2016

8.0 10^8 sites

8 Billion Users

Science communication 2.0

Science communication 1.0:
classical publications via press releases, science journalists, public lectures, …

→ Education of the public

Science communication 2.0:
publications based on the web 2.0 strategies, hands-on

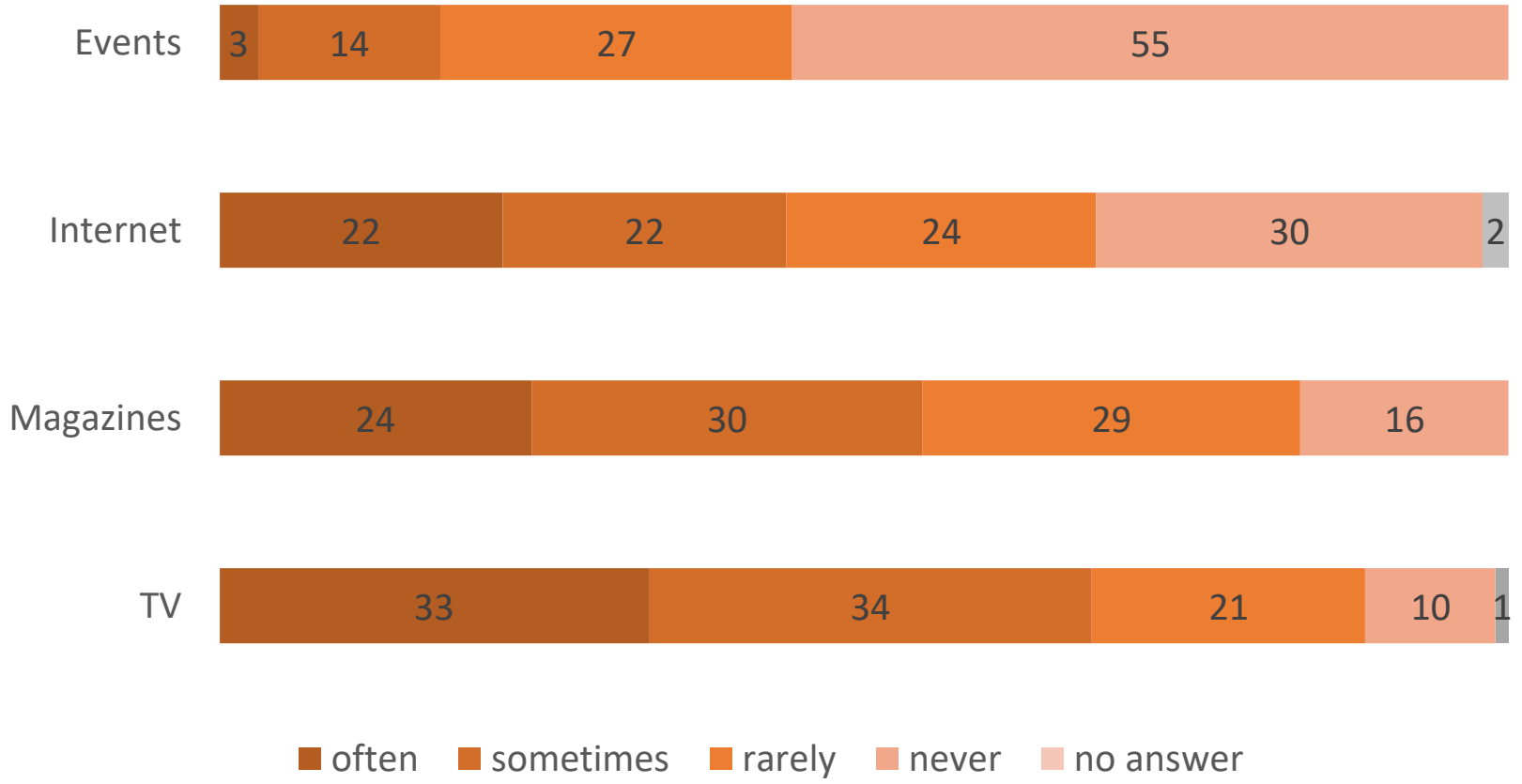
→ Dialog with the public

Basis: 1.006 Befragte
Erhebungszeitraum: Mai 2016
Quelle: Wissenschaftsbarometer – Wissenschaft im Dialog/Kantar Emnid

Science communication 2.0

Information sources:

How often do you use the following sources to inform yourself about science and research?

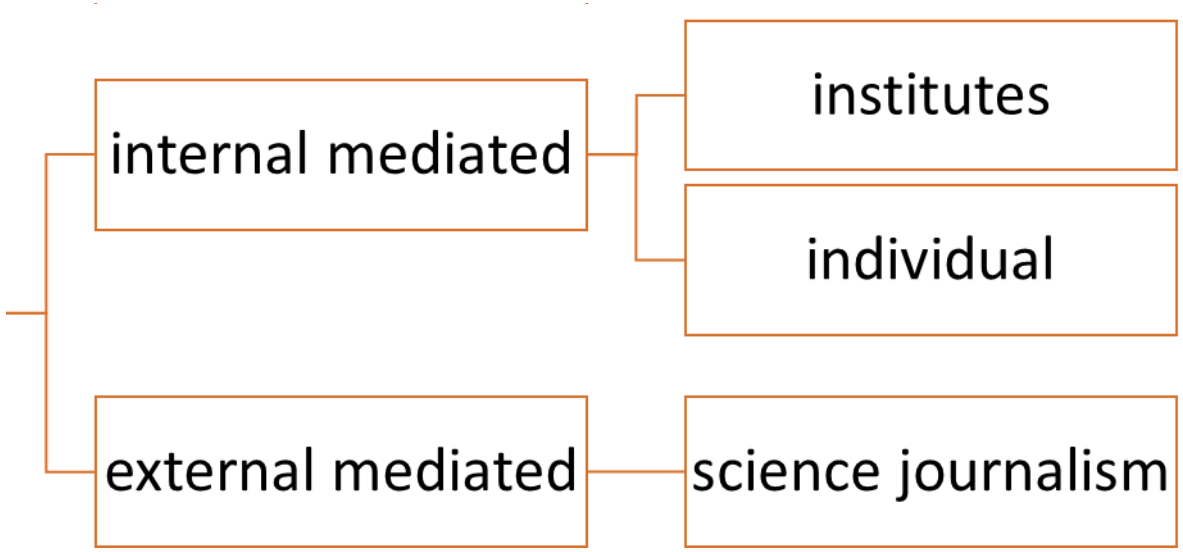


Target groups for selected formats

Explanation & Legitimation	Creating & Receiving trust in science	Additional education to ensure responsible citizens	Inclusion of citizens in research	Recruitment of future scientists	Intrinsic Motivation

Press release

Social Media



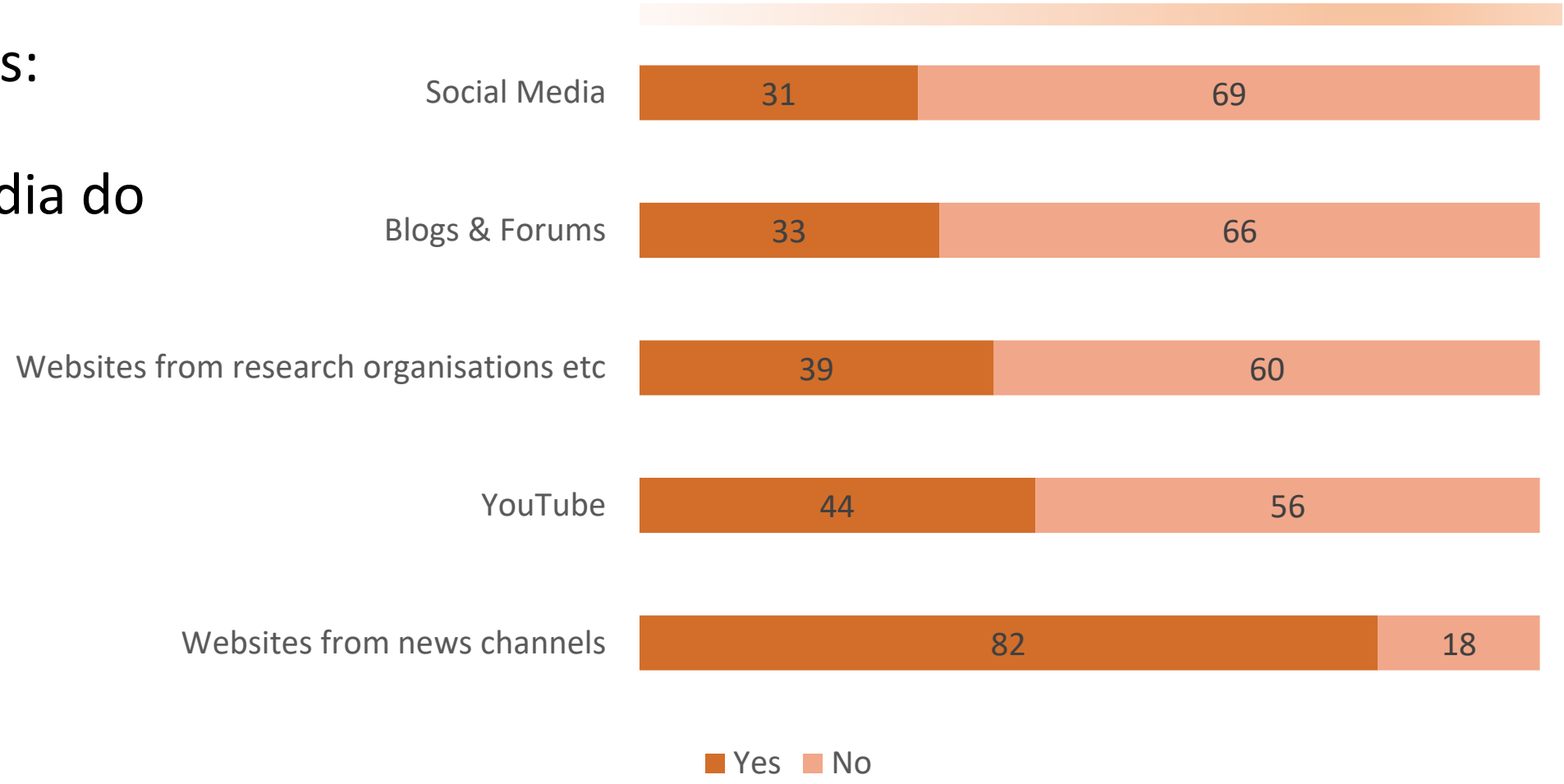
Web 2.0 = Social Media

Basis: 693 Befragte
Erhebungszeitraum: Mai 2016
Quelle: Wissenschaftsbarometer – Wissenschaft im Dialog/Kantar Emnid

Science communication 2.0

Information sources:

Which internet media do you use?



Web 2.0 = Social Media

	What	Demographics*	Purpose	Best for	Down Side
Facebook	Texts, Pictures, Groups, Links	1.8 Billion Users Age: 25-55	Building Relationships	News, Links	Limited reach
Twitter	Texts, Links	320 Million Users Age 20-29	News & Articles Conversation	Discussions, News	140 characters
Instagram	Pictures & Videos	600 Million Users	Building Relationships	News	Limited interactions & content creation

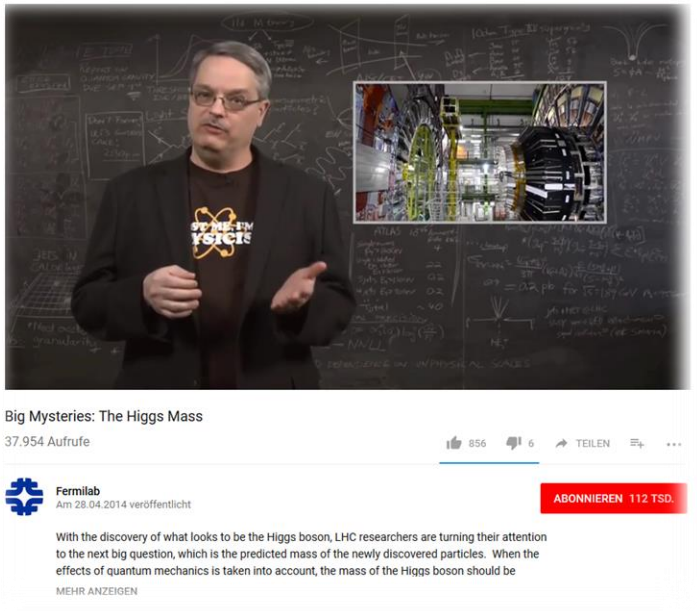
*August 2017

Target groups for selected formats

Explanation & Legitimation	Creating & Receiving trust in science	Additional education to ensure responsible citizens	Inclusion of citizens in research	Recruitment of future scientists	Intrinsic Motivation

Press release

Social Media



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Instagram	Pictures & Videos	600 Million Users Age <35	Building Relationships Conversation	News	Limited interactions & content creation
YouTube	Videos	1 Billon Users All Ages	Search „How-To“	Explanations, Evergreens	Resource Intensive
Blogs	Long Texts, Pictures	200 Millions? Age 20-35	News & Articles, “Diary”	Explanations, Evergreens	Resource Intensive & Limited Reach

*August 2017

Target groups for selected formats

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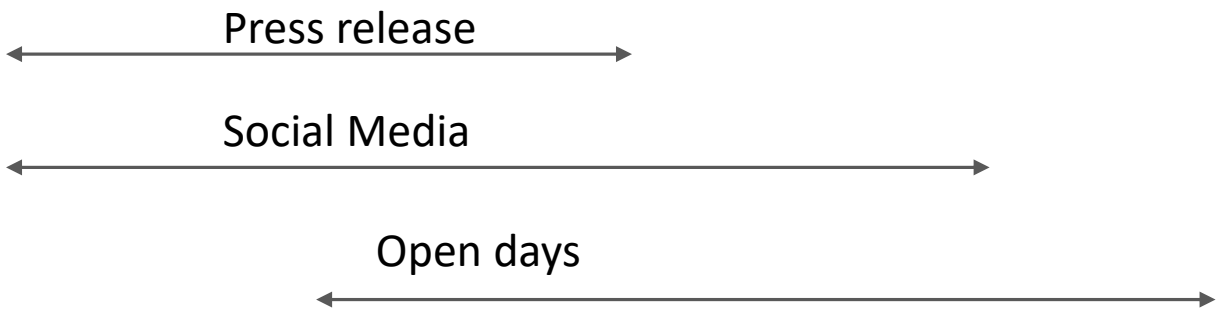

Open days – 2 success stories

- GSI Open day 2017:
  - 11.000 visistors

- Night of Science 2017:
  - 10.000 Visitors

Target groups for selected formats

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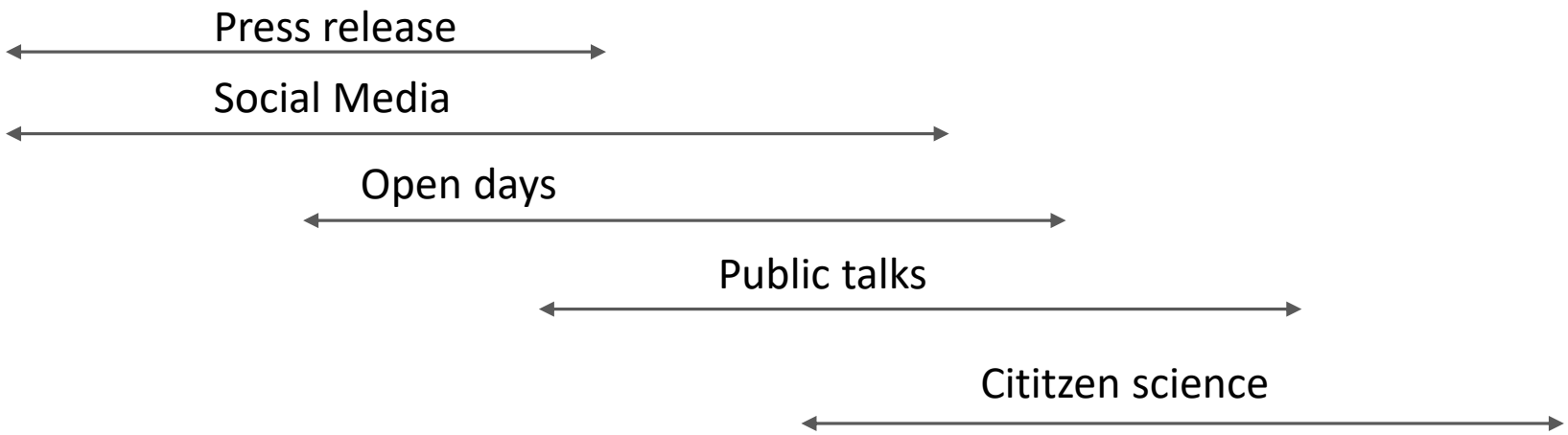
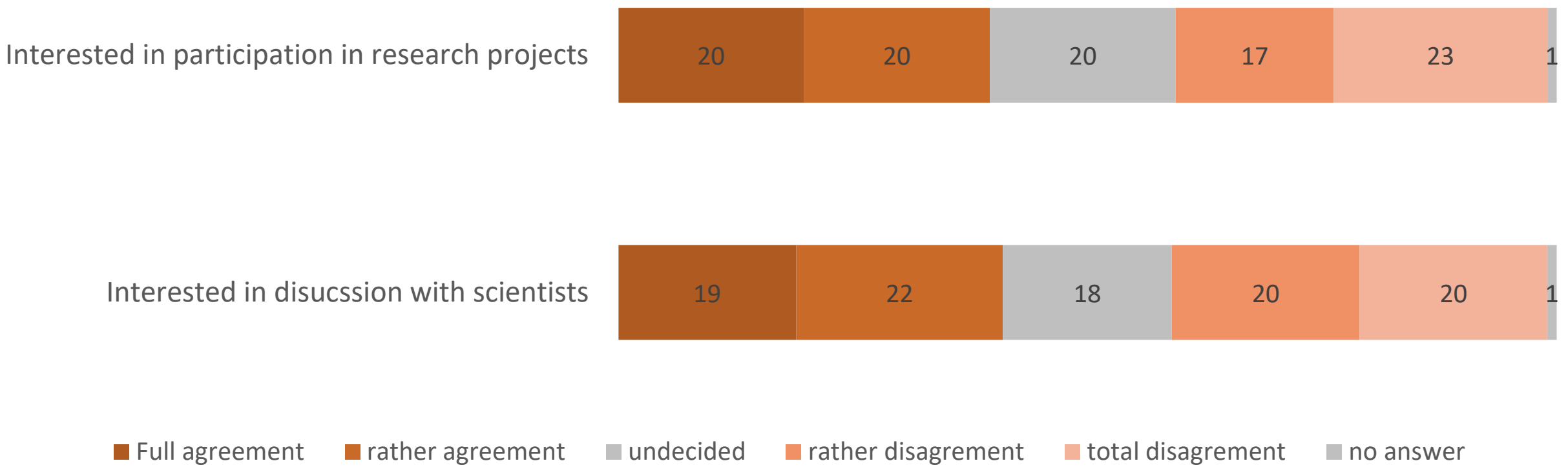


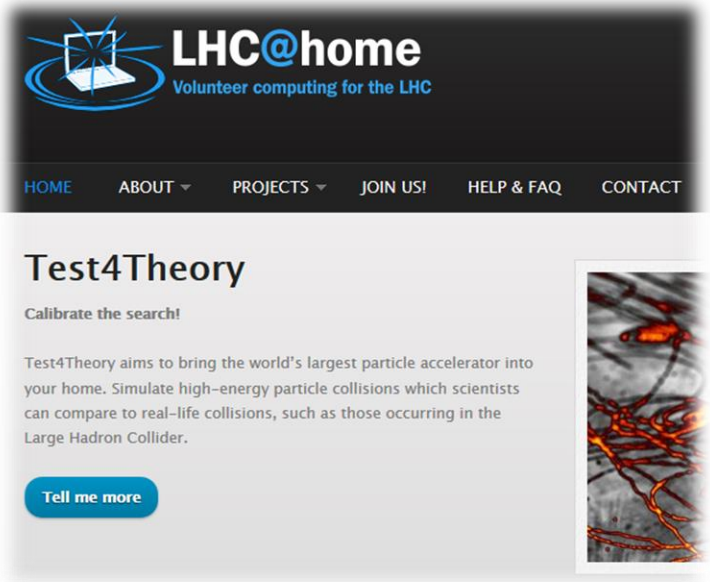
Inclusion of citizens in research



Citizen Science

scientific research conducted, in whole or in part,
by amateur (or non-professional) scientists

www.LightningMaps.org



Target groups for selected formats

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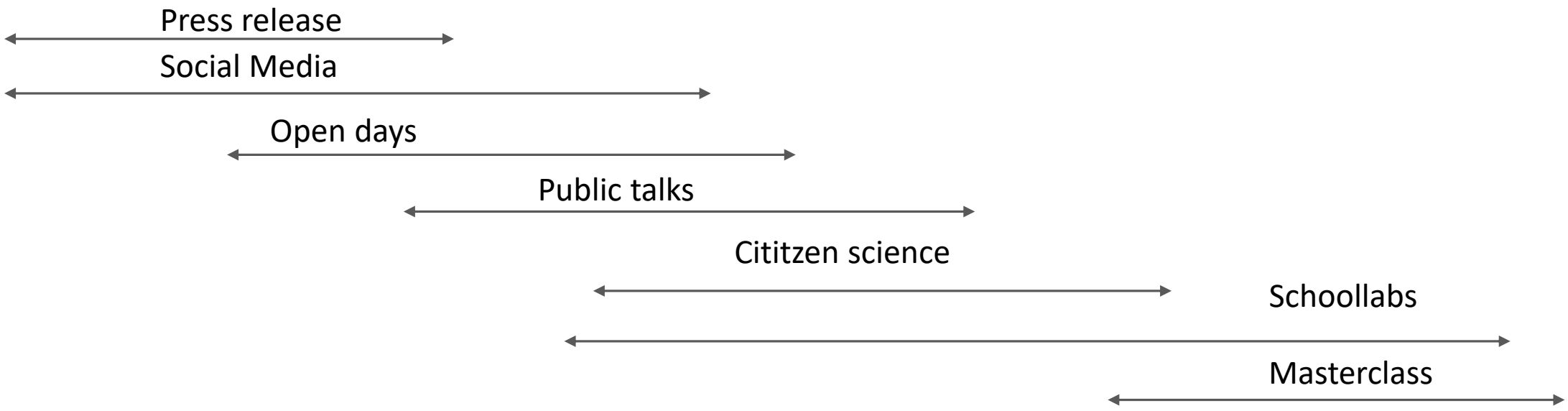

And where is (nuclear) physics now?

- Difficulties
  - Complex Topic
  - Not (really) part of school educations
  - A lot of mathematics
  - Unclear words
  - Excessive usage of abbreviations
- Advantages
  - Fundamental questions
  - State of the art technology
  - Impressive instruments (experiments)

What structures exist for us?

- Local activities
  - Frankfurt Physikalischer Verein
  - GSI outreach activities
  - Night of Science
  - Grundschulprojekt
  - Hessen schafft Wissen (FIAS)
  - Science Birds

FIAS

- Hessen schafft Wissen
  - Award Winning –
    Exhibition for (not only) school kids
  - Hessentag
  - Book Fair
- Public Talks
- Workshop
  Interdisciplinary Science Communication

Picture: Hessisches Ministerium für Wissenschaft und Kunst

Science Birds

- Project from Sascha Vogel
- Based in Frankfurt
- Various outreach projects
  - Interactive program for (not only) school kids
  - Science shows
  - Science slam
  - …

What structures exist for us?

- Local activities
  - Frankfurt Physikalischer Verein
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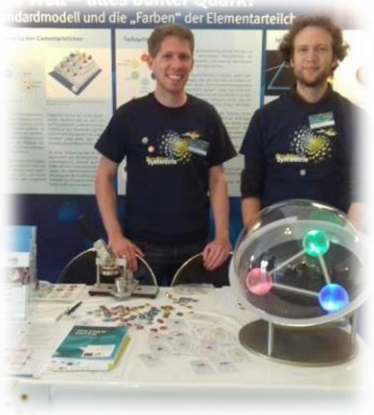
  - Science Birds
- Germany Wide activities
  - Wissenschaft im Dialog
  - Weltmaschine
  - FSP Pilotprojekt - Netzwerk Teilchenwelt
  - Highlights der Physik & Welt der Physik
- International activities
  - IPPOG

Weltmaschine Kommunikation

- The central information point for press and media
- Excellent contact for press and media releases
- Included in lab-Infrastruktur
  - DESY-Press office
  - Graphic designer
- Central Organisation of events
  - Journalistentage 2006+13, Pressesprechertag 2014
  - Tag der Weltmaschine
  - Media training for scientists
  - Mobile Exhibition

Highlights der Physik

- Annual science festival
- 2017 in Münster:
  Structure & Symmetry



DPG

Bundesministerium
für Bildung
und Forschung

Welt der Physik

- Website & Calendar

FSP Pilotprojekt „Spitzenforschung, Erkenntnisvermittlung und Nachwuchsgewinnung“

- Research, knowledge transfer and

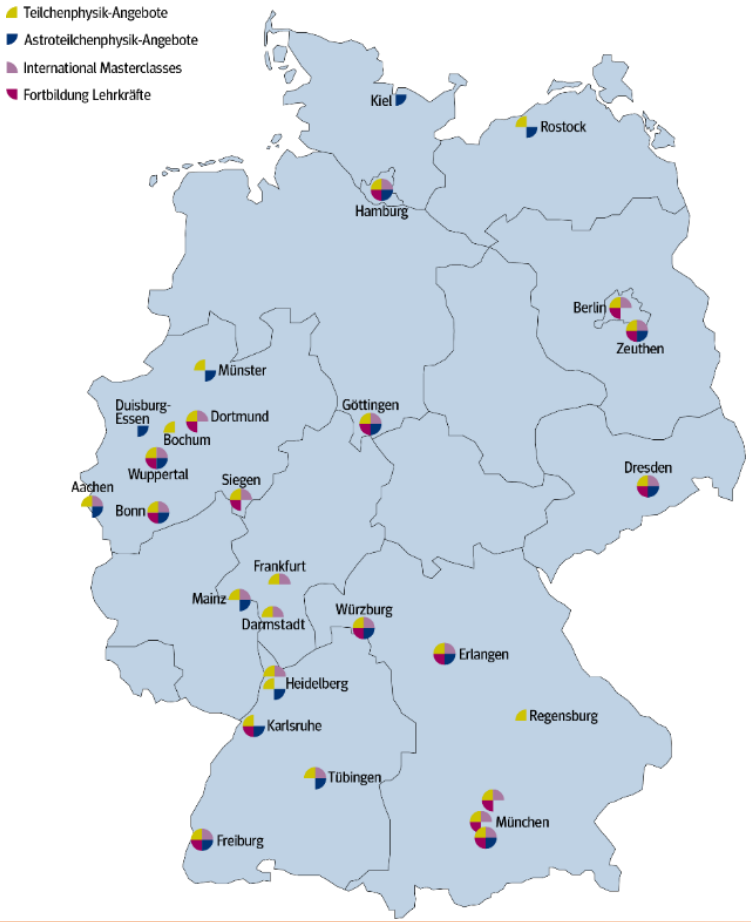
  und recruitment from a single source
- Project goals:
  - Experience the fascination of

    Astro-/Particle physics
  - Communicate about Science
  - Research on the spot and in school
  - Appreciation of gain in knowledge trough fundamental research

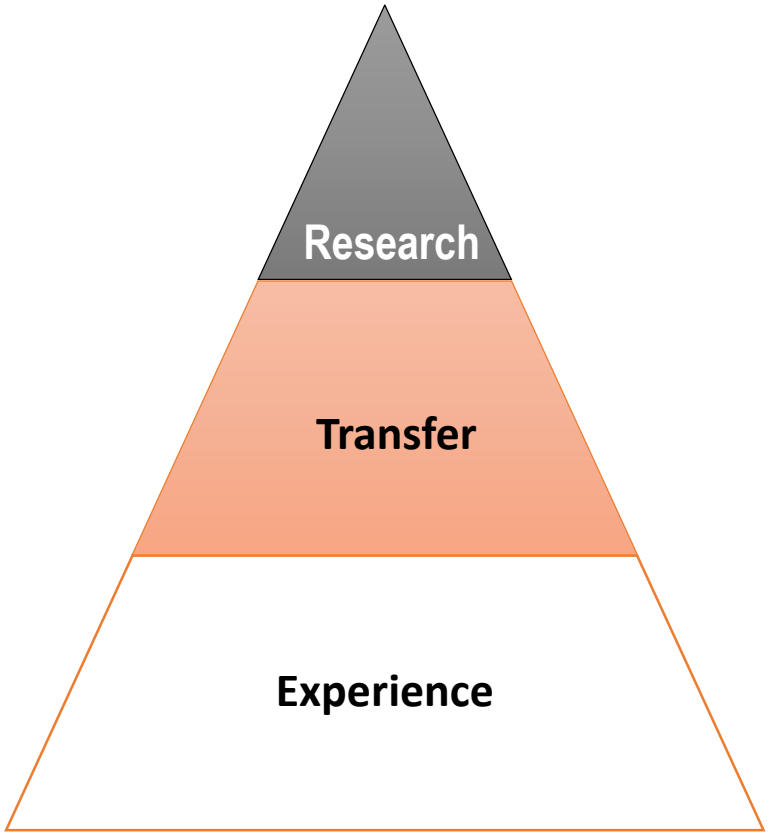
NETZWERK TEILCHENWELT

FSP Pilotprojekt „Spitzenforschung, Erkenntnisvermittlung und Nachwuchsgewinnung“

- Based on the project Netzwerk Teilchenwelt
  - 29 Universities & Research Centers + CERN
- Since 02/17 Netzwerk Teilchenwelt is the outreach project for the FSPs
- Coordination of the project is in Dresden & DESY Zeuthen
  - 4 Employees in Dresden & 2 at DESY & 1 at CERN + Students
- Focus currently on high energy particle physics & astrophysics
  - Projects planned with Hadron Physics (f.e. BELLE)
  - Interest for future collaboration with connected topics & theory



The pyramid principle

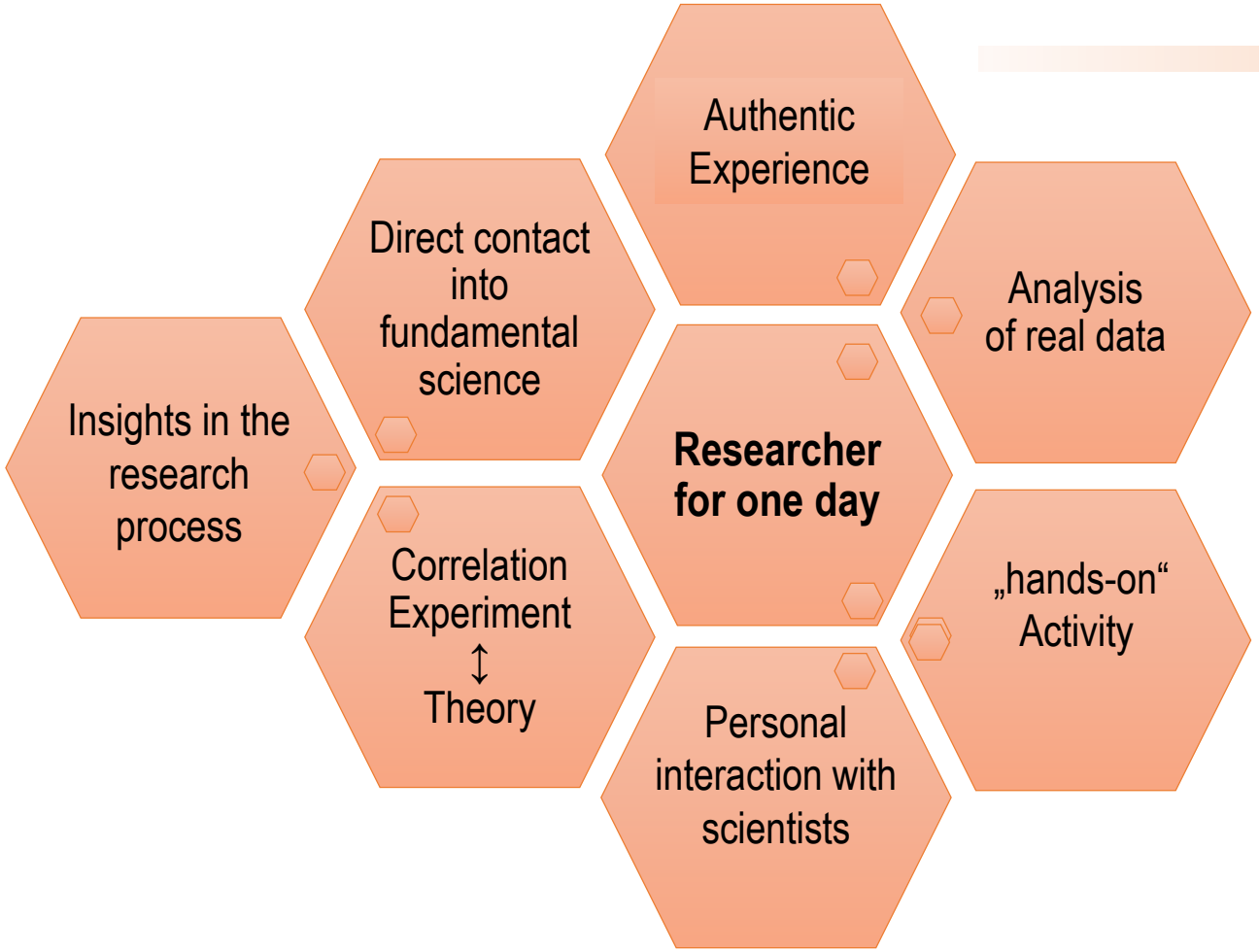


- Research program
- Qualification program
- Base program

Masterclass

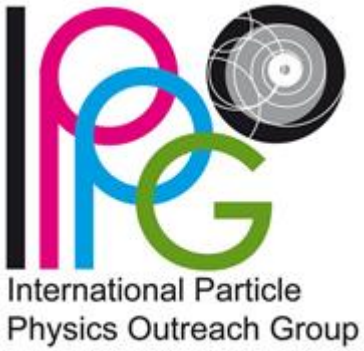
- Baseline activity
  - “Hands-on particle physics”
  - Duration ~1/2 day
  - Each year 4000 youths in the age of 15-19 years
  - More than 700 Masterclasses have been organized
- School kids solve a data analysis based on
  - LHC experiments or
  - Astro particle experiments
- Master classes are performed by Master & PhD students
  - Those get their travel reimbursed and allowances
  - Workshop once a year for soft skills
  - Speaking German is required

The concept


Authentic Experience
Direct contact into fundamental science
Analysis of real data
Insights in the research process
Researcher for one day
Correlation Experiment ↕ Theory
„hands-on“ Activity
Personal interaction with scientists

IPPOG

- International Particle Physics Outreach Group
- Network of
  - Scientists, science educators, communication specialists
  - From 22 CERN members states
  - + Brazil, Australia, Ireland, Slovenia, South Africa, the USA
- Focus on informal science education and outreach for particle physics topics:
  - DESY
  - CERN & especially the LHC experiments
  - Belle II experiment



International Masterclass

- Baseline activity
  - “Hands on particle physics”
  - Duration ~1 day
  - Each year 13.000 high school students years from 52 countries
- School kids solve a data analysis based on
  - LHC experiments
  - Have a video conference where they compare their results with other countries
- Master classes are performed by Master & PhD students
  - Those get their travel reimbursed and allowances
  - Workshop one a year for soft skills
  - ~~German Speaking is required~~

Based on Workshop results: Interdisciplinary Science Communication 2017, FIAS

Summary

Explanation & Legitimation	Creating & Receiving trust in science	Additional education to ensure responsible citizens	Inclusion of citizens in research	Recruitment of future scientists	Intrinsic Motivation

Education is the passport to the future,
for tomorrow belongs to those who prepare for it today.

Malcolm X

Questions?

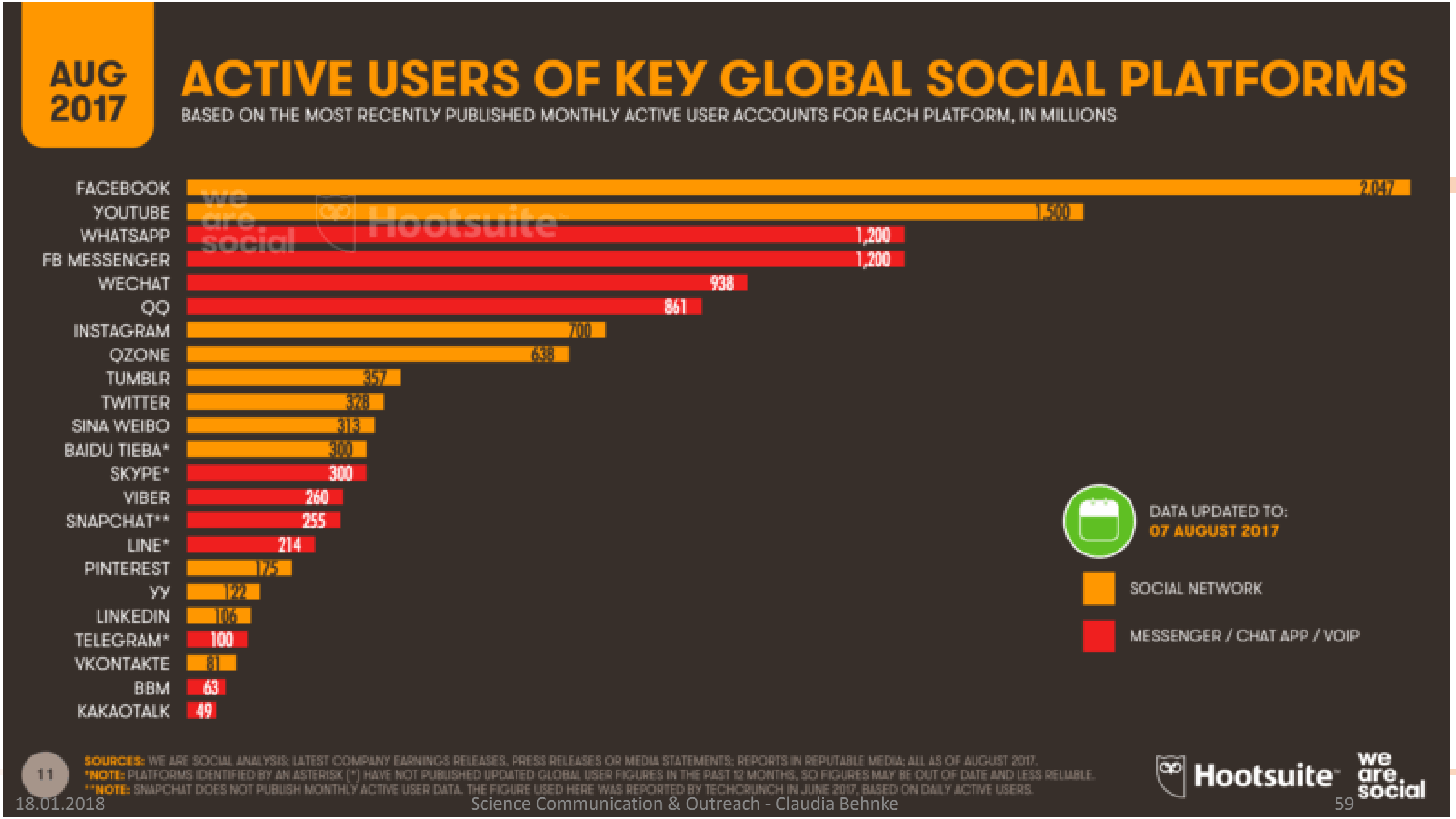
Thanks to:

PROJEKTLEITUNG

PARTNER

SCHIRMHERRSCHAFT

GEFÖRDERT VOM

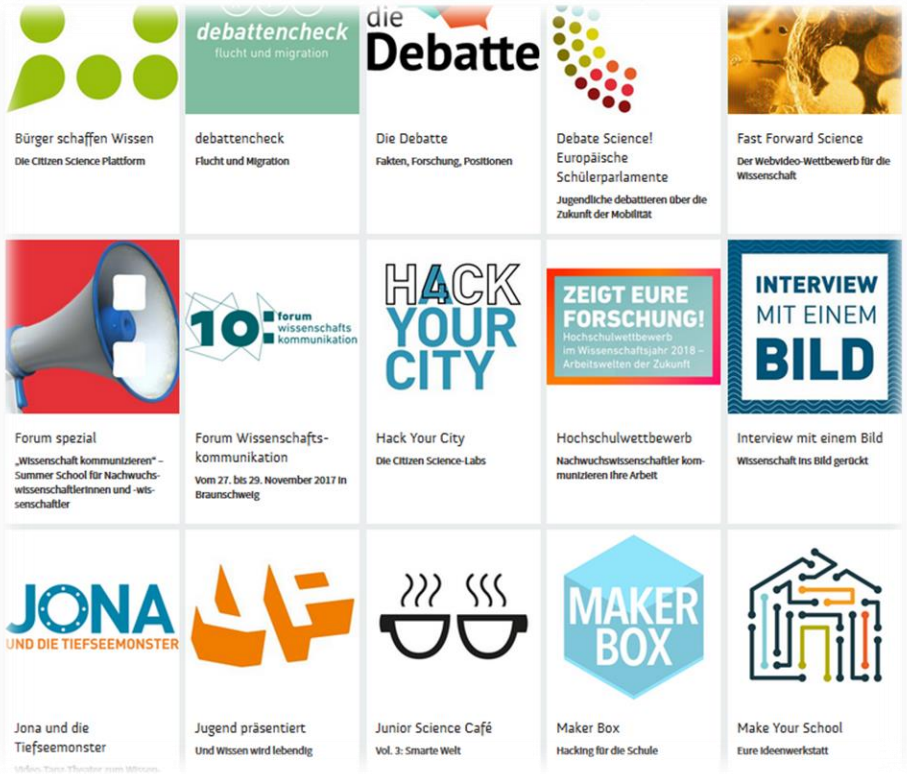

AUG 2017
ACTIVE USERS OF KEY GLOBAL SOCIAL PLATFORMS
BASED ON THE MOST RECENTLY PUBLISHED MONTHLY ACTIVE USER ACCOUNTS FOR EACH PLATFORM, IN MILLIONS
FACEBOOK 2,047
YOUTUBE 1,500
WHATSAPP 1,200
FB MESSENGER 1,200
WECHAT 938
QQ 861
INSTAGRAM 700
QZONE 638
TUMBLR 357
TWITTER 328
SINA WEIBO 313
BAIDU TIEBA* 300
SKYPE* 300
VIBER 260
SNAPCHAT** 255
LINE* 214
PINTEREST 175
YY 122
LINKEDIN 106
TELEGRAM* 100
VKONTAKTE 81
BBM 63
KAKAOTALK 49
we are social
Hootsuite
DATA UPDATED TO:
07 AUGUST 2017
SOCIAL NETWORK
MESSENGER / CHAT APP / VOIP
11
SOURCES: WE ARE SOCIAL ANALYSIS; LATEST COMPANY EARNINGS RELEASES, PRESS RELEASES OR MEDIA STATEMENTS; REPORTS IN REPUTABLE MEDIA; ALL AS OF AUGUST 2017.
*NOTE: PLATFORMS IDENTIFIED BY AN ASTERISK (*) HAVE NOT PUBLISHED UPDATED GLOBAL USER FIGURES IN THE PAST 12 MONTHS, SO FIGURES MAY BE OUT OF DATE AND LESS RELIABLE.
**NOTE: SNAPCHAT DOES NOT PUBLISH MONTHLY ACTIVE USER DATA. THE FIGURE USED HERE WAS REPORTED BY TECHCRUNCH IN JUNE 2017, BASED ON DAILY ACTIVE USERS.
Hootsuite
we are social

When press release

- New results
- Record
- Local events
- Effects many humans
- Importance for future
- Explainable
- Visual attractive
- Easy to understand

Wissenschaft im Dialog

- is the initiative for outreach in Germany
- Organizes & develops
  - seminars for scientists about outreach & communication
  - Various outreach projects



Based on Workshop results: Interdisciplinary Science Communication 2017, FIAS

Factors & Resources

Reach	10 People	100.000 People
Needed pre-knowledge	None	Specific
Affinity for topic	Penny	Nerd
Entertainment	dry	wow
Information content	Infosnack	Studying
Multimediatization	1 Medium	Many Media
Interaction	passive	participate
Specific Topics	1 Topic	Many Topics