

ANNUAL REPORT **2017**

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Your views are important to us. Please send your comments or questions to irgc@epfl.ch or write to Anca Rusu anca.rusu@epfl.ch.

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FOREWORD

In 2017, the IRGC foundation consolidated its collaboration with the Ecole Polytechnique Fédérale de Lausanne (EPFL) and worked towards bringing closer the field of risk governance and science and technology, with a clear policy focus. IRGC's mission is to improve the governance of complex, uncertain and ambiguous risks, including through the organisation of collaborative activities in research, education, dialogue, and with recommendations for public policies, by:

- Reflecting different views and practices and providing independent, authoritative information;
- Improving the understanding and assessment of important risks issues and ambiguities involved;
- Designing innovative, efficient and balanced governance strategies.



Philippe Gillet

Chairman of the IRGC Foundation Board

2017 was for IRGC a year of transition. Transition in a new role inside EPFL with a new academic director, as well as transition in the relation between the Center and the Council. The executive director succeeded in smoothly steering everything and everyone at the right place.

IRGC is now well introduced into the EPFL family with a clear role and mission. The set of instruments that IRGC has developed in the past years will be developed further and continuously adapted to the state of the scientific debate and practical requirements. The IRGC concepts and frameworks are well accepted and interest in them continues to be high. A glance at download figures (IRGC and EPFL websites) and citations make this unequivocally clear.



In an academic context, IRGC now faces additional challenges. The heritage of knowledge that IRGC owns shall be offered to the students and the EPFL community. Teaching will require more energy and IRGC is preparing for it. IRGC will also have to consolidate its research activities together with partner institutions and experts.

IRGC can deliver important results at the edge between technologies, society and governance making sense of the opportunities and risks of technological development and helping to define appropriate framework conditions for their successful deployment.

Bruno Oberle

Academic Director, EPFL@IRGC

IRGC's value also lies in the facilitation of collaborative research and the exchange of ideas in various forms. With its network of partner institutions as the backbone of its, IRGC continues its role as a science-based think tank and neutral convening place for bringing together scientists, policy-makers and representatives from industry and NGOs to talk about ways to advance the understanding and governance of risks.

I would like to thank all those who contributed to the success of IRGC in 2017, and I look forward to continuing our mission together with our partners in the years to come.



Marie-Valentine Florin

Executive Director, EPFL@IRGC

1 | IRGC's MISSION

Since 2016, IRGC consists of two distinct and independent entities, which collaborate and support each other:

- The International Risk Governance Center (IRGC@EPFL), a transdisciplinary centre at the École Polytechnique Fédérale de Lausanne
- The International Risk Governance Council Foundation, supervised by the Swiss Federal Government. Established in 2003 at the initiative of the Swiss government, the IRGC Foundation is based at École Polytechnique Fédérale (EPFL) in Lausanne, Switzerland, with network partners in Europe, the US and Asia.

They work together towards improving the governance of risk issues marked by complexity, uncertainty and ambiguity. As a neutral platform for dialogue about emerging risks as well as opportunities and risks related to new technologies, IRGC works to help improve the understanding and management of risks and opportunities by providing insight into emerging and systemic risks that have impacts on human health and safety, on the environment, on the economy and on society at large.

The three facets of IRGC

Dialogue IRGC operates as a neutral, science-based think tank that fosters creative approaches and guidelines. It is well known for its non-partisan convening power that enables multi-stakeholder dialogue.

Science - Policy IRGC builds on the latest scientific knowledge to improve risk governance. It has developed conceptual methods and tools and provides science-based policy recommendations to key decision-makers in the public and private sector.

Outreach IRGC reaches out through its publications, websites and events. It disseminates the results of its project work to leaders in various fields.

Innovation, risk governance and public policy

Considering that policymakers are interested in understanding which new risks should be addressed or how existing risks could be better managed, where technology goes, and how research and industry work together, a risk governance approach can help reap the societal benefits of innovation while ensuring citizens' welfare, safety and security.

2017 AT A GLANCE

PUBLICATIONS

**Transatlantic patterns of
risk regulation**

(Report)

**Governing Risks and
Benefits of Distributed
Ledger Technologies**

(Workshop highlights)

**Cybersecurity risks in the
Internet of Things, applied
to connected vehicles and
medical devices**

(Workshop report)

**A roadmap for the
development of
precision medicine**

(Policy brief)

**Update of the
Introduction to the IRGC
Risk Governance
Framework**

March

April

June

September

December

March & October

June

November

**How can organisations deal
with systemic risks?**

IRGC workshops
IASS Potsdam

**Governing risks and
benefits of Distributed
Ledger Technologies**

IRGC workshop
at Swiss Re Center for
Global Dialogue, Rüschlikon

**Trust and Precision
Medicine**

IRGC workshop
Campus Biotech
Geneva

EXPERT WORKSHOPS

2 ACTIVITIES IN 2017

IRGC fulfils its mission and goals by organising multi-disciplinary and multi-sectoral **expert workshops and roundtable discussions**. IRGC also publishes peer-reviewed **reports, policy briefs** and **opinion pieces**, non-peer-reviewed **concept notes or workshop reports**, all aiming to provide recommendations for better governance of risks marked by complexity, uncertainty or ambiguity, many of which are emerging or systemic.

IRGC activities are organised in two major work areas: development of concepts and instruments for risk governance and application to specific issues and recommendations for risk governance guidelines.

CORE CONCEPTS OF RISK GOVERNANCE

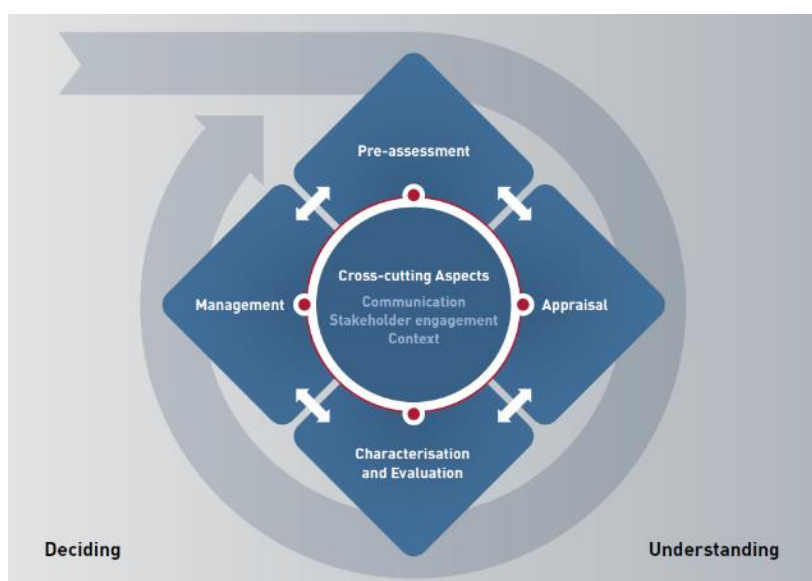
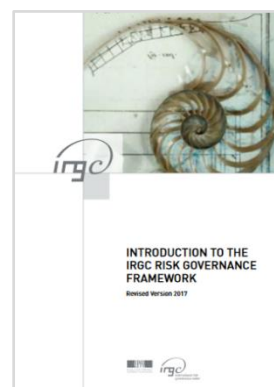
Regarding the development of concepts and instruments, in 2017 IRGC:

- Published a revised version of the short 'Introduction to the IRGC Risk Governance Framework'
- Continued its work on systemic risks in preparation for the forthcoming IRGC Guidelines for the Governance of Systemic Risks
- Continued its work on risk regulation and published a description of transatlantic patterns of risk regulation in four key sectors: food safety, automobiles safety, chemicals and pharmaceuticals licencing
- Continued work on resilience.

IRGC RISK GOVERNANCE FRAMEWORK

Revised version Introduction to the IRGC Risk Governance Framework

The IRGC Risk Governance Framework provides guidance for early identification and handling of risks, involving multiple stakeholders. It recommends an inclusive approach to frame, assess, evaluate, manage and communicate important risk issues, often marked by complexity, uncertainty and ambiguity. The complete description of the Framework was first published in 2005, under the leadership of Prof. Ortwin Renn, now IASS Potsdam. In December 2017, IRGC published an update of the short 'introduction' to the IRGC Framework, with illustrations of some of its components in various sectors.



Simplified visual representation of IRGC's Risk Governance Framework

Source: Introduction to the IRGC Risk Governance Framework, IRGC 2017

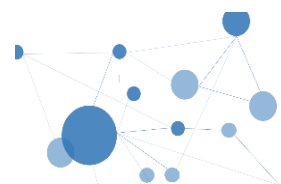
SYSTEMIC RISKS

Expert workshops How can organisations deal with systemic risks?

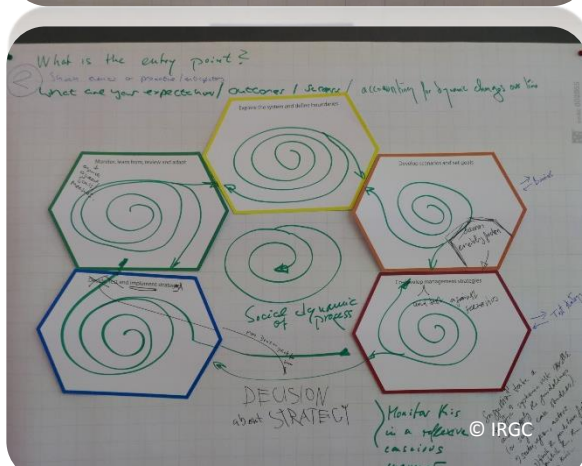
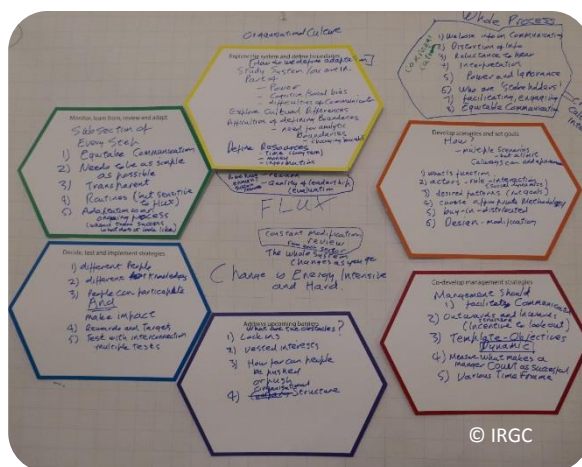
Interconnectivity between systems is one of the defining features of our modern world, which is becoming ever more complex and dynamic. While interconnectivity can increase system efficiency and improve service delivery, it can also expose the various layered systems to risk of various shocks and stresses, thus increasing overall risk exposure and reducing resilience.

In the course of two expert workshops in 2017, IRGC discussed the problem of risks that develop in complex and interconnected systems, with potential for cascading failures. The forthcoming IRGC Guidelines for the Governance of Systemic Risks aim to bridge the gap between theories and concepts, and realities of organisations' concerns and objectives. They will emphasise the need to develop management strategies in the context of transitions, requiring that organisations adapt to new context conditions, and transform themselves. This is one of IRGC's key project work areas in 2018.

15-17 March &
26-27 October 2017
IASS
Potsdam



Workshop on Systemic Risk Guidelines 15-17 March and 26-27 October 2017, IASS, Potsdam



RISK REGULATION

Report Transatlantic Patterns of Risk Regulation. Implications for international trade and cooperation

How risks are regulated can affect domestic outcomes, such as the benefits and costs of protecting consumers, health and environment. This can also foster or limit opportunities for international trade.

A question addressed in this report is whether different approaches to risk regulation lead to different levels of protection. On the other hand, regulatory variation can also be the basis for learning to improve future regulatory design, both by comparing outcomes across regulations in different jurisdictions, and by planning adaptive regulation over time. International regulatory cooperation involves collaboration to review existing regulations and design new approaches that improve outcomes for all.

Based on a study commissioned by and written for the European Parliament in 2016, this report offers a descriptive transatlantic comparison of regulatory standards in four key sectors: Food, automobiles, chemicals, pharmaceuticals. It shows that EU risk regulation is not always or generally more stringent than US regulation. The reality is a complex mix of parity and particularity between EU and US risk regulation.



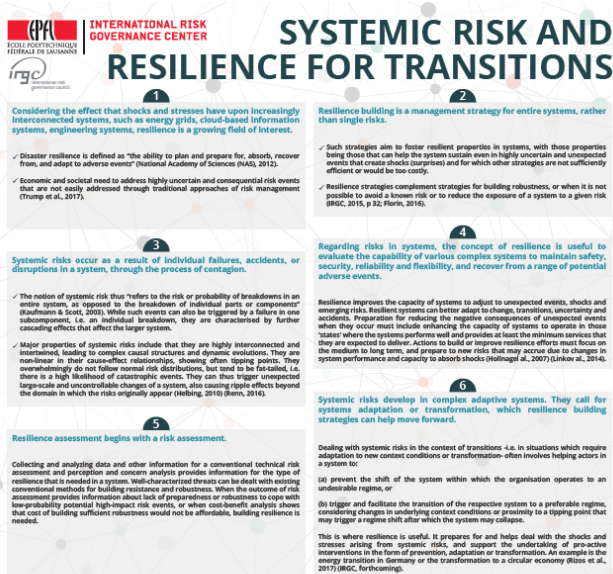
RESILIENCE

Resource Guide IRGC Resource Guide on Resilience

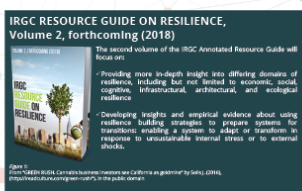
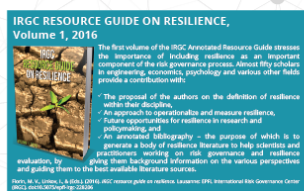
IRGC's Resource Guide on Resilience (volume 1) aims to serve as a state-of-the-art overview of various perspectives on resilience in selected disciplines and domains. It is composed of several pieces from thought leaders in academia, government, and industry, and helps formalise resilience in a manner that is useful to practitioners for applications as diverse as critical infrastructure and socio-technical systems, environment and social-ecological systems, economics, or organisational management.



The second volume of the IRGC Resource Guide on Resilience will be published in 2018. It will focus on articulating risk and resilience concepts in various sectors and developing recommendations for resilience for adaptation and transitions (in line with work on systemic risks).



RESOURCE GUIDE ON RESILIENCE



SPECIFIC ISSUES

IRGC selects some specific issues where the application of its concepts for risk governance could help improve opportunity and risk management. Selection criteria include that deficits or deficiencies in existing governance structures and processes hinder the development of promising technologies, and that an interdisciplinary and multi-stakeholder approach is needed to overcome those deficits. In 2017, IRGC worked on:

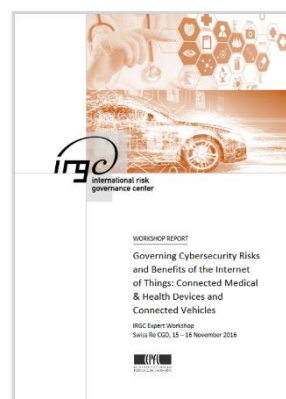
- Digital security, as both a technical and governance challenge that requires a dynamic and forward-looking collaborative approach between researchers, industry, users, regulators and insurers
- Precision medicine, as an area where ethical, economic and regulatory risks and uncertainties must be addressed early enough with all major actors, to organise dynamic and informed patient and citizen consents, data collection and sharing, respect for privacy and confidentiality, safety and efficacy assessment, and possibly new paying mechanisms.

DIGITAL SECURITY AND DATA GOVERNANCE

Cybersecurity risks in the Internet of Things, applied to connected vehicles and medical devices

Report

In 2017, IRGC published a report from the workshop organised in November 2016 about Governing Cybersecurity Risks in the Internet of Things (IoT), applied to connected vehicles and medical devices. Workshop participants discussed technical cybersecurity solutions, risk management options, standards and certification, regulation, liability and insurability issues.

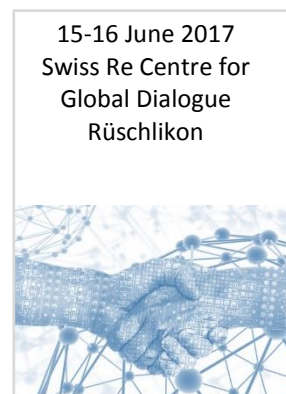


Governing risks and benefits of distributed ledger technologies

Expert workshop

The multi-disciplinary and multi-stakeholder expert workshop had the objective of discussing ways to improve the understanding of risks and opportunities related to the implementation of distributed ledger (blockchain) technologies in the medical/health, insurance, and institutional sectors. Participants discussed issues of cybersecurity, privacy, data integrity, trust, and law.

With the support of Swiss Re, 30 experts from research, technology, industry, policy, regulation and insurance convened to discuss the need for appropriate technical, governance, and regulatory context conditions for DLTs.



Distributed Ledger Technologies

Highlights

After the multi-disciplinary and multi-stakeholder expert workshop in June 2017, IRGC published the key insights resulting from the discussion. Among others, the document highlights the following points: there is a broad variety of views about promises and pitfalls of the technology; blockchain technologies may be transformative and enabling, but it is necessary to differentiate more clearly between various types of blockchains, e.g. public (permission-less, bottom-up) and private (permissioned, top-down); built-in cryptography can improve the security and privacy of applications of blockchain technology, but it cannot make applications fully secure.



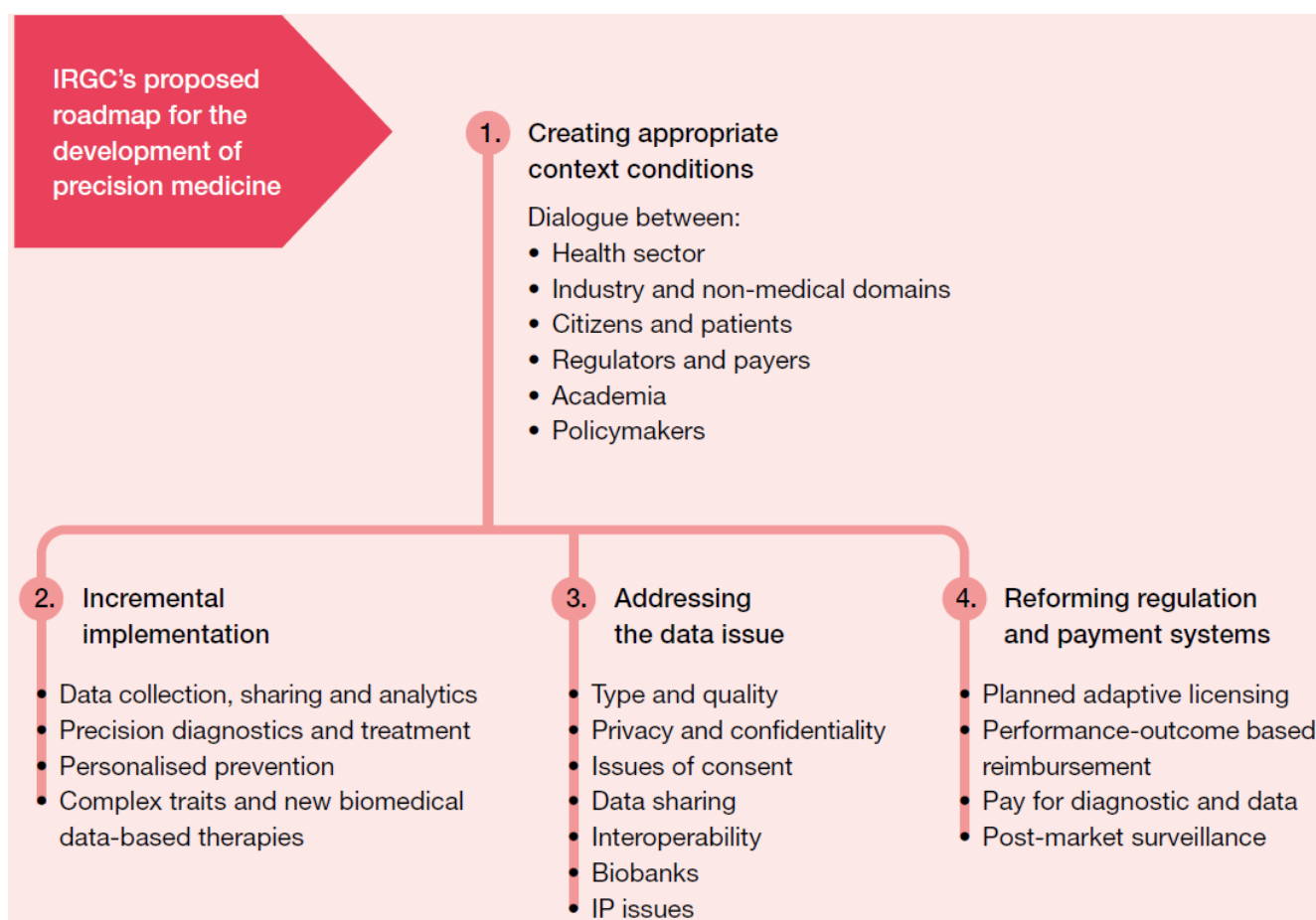
PRECISION MEDICINE

Policy brief A roadmap for the development of precision medicine

The purpose of the overarching and comprehensive roadmap is to recommend a structured process that organisations can follow in their transition towards the development of precision medicine. The process is adaptable, and each organisation should further develop it to align with its own needs, culture and objectives.

Acknowledging differences in cultures, legal frameworks, social contexts, economic aspects or health priorities, this roadmap does not prescribe certain specific policy and regulatory choices, but reminds important principles for public and personal health.

The recommendations in this roadmap primarily address an audience in government and other public institutions, which may use the roadmap as a set of generic guidelines for developing their own strategy for precision medicine. Other actors in the public and private sectors, such as patients associations, healthcare payers, civil society representatives, or professional and scientific associations may also find this roadmap helpful.



IRGC's Roadmap for the development of precision medicine

Expert Workshop
Trust and
Precision Medicine

In an open, facilitated discussion, 40 experts in the field of precision medicine, from various disciplines and backgrounds, convened to move forward an interdisciplinary and multi-stakeholder agenda for gaining insight into ways to build trust in precision medicine.

A lack of trust can be considered a risk in the development of precision medicine. The workshop discussed questions such as: What is 'trust' and 'trustworthiness' in the era of big data and precision medicine? Could novel technologies help build trust? What are the role and the responsibility of the medical sector in contributing to building trustworthy relationships with patients and citizens? What are the role and the responsibility of the private sector in contributing to building trust? Can trust be measured? How? Can it be mandated?

The workshop was organised with the support of the Swiss Personalized Health Network (SPHN) and the Swiss State Secretariat for Education, Research and Innovation (SERI).

23-24 November 2017
Campus Biotech
Geneva



Expert workshop on
Trust and Precision Medicine
Geneva, 23-24 November 2017

3 | DISSEMINATION AND OUTREACH

EXTERNAL EVENTS WITH IRGC CONTRIBUTION IN 2017

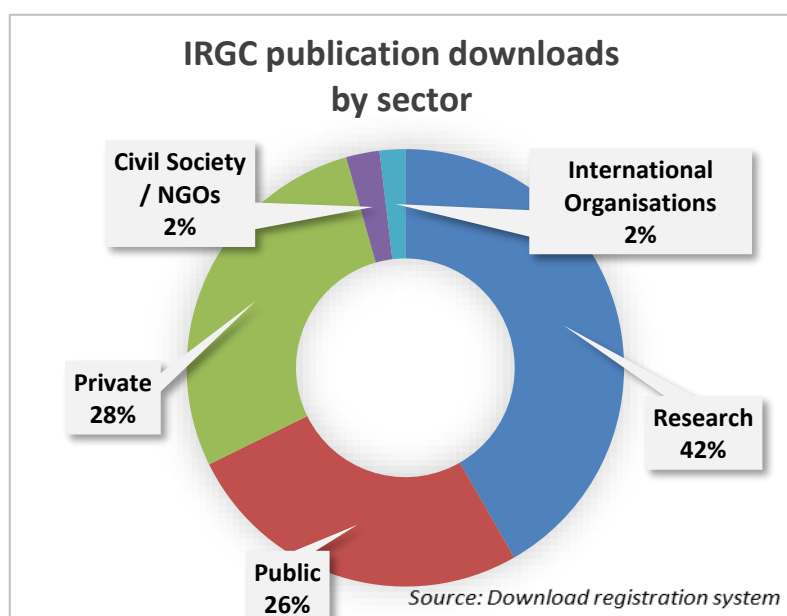
Selection

- | | |
|----------|--|
| December | Presentations at the Annual Meeting of the Society for Risk Analysis (SRA) on the governance of systemic risks, resilience, responsible research and innovation, as well as on the governance of new technologies. |
| November | Presentation on 'le déni du risque' at 'Les Entretiens du Risque', Institute pour la Maîtrise du Risque (IMDR), Paris. |
| October | One-day executive training session on risk governance at the GCSP International Course on Risk and Crisis Management, Schwarzenburg. |
| June | Risk governance of new technologies, Responsible Research and Innovation, Planned Adaptive Regulation, at a European Risk Forum Meeting roundtable, Brussels. |
| June | Symposium on applying risk governance to new technologies and systemic risks at the 26th SRA-Europe annual conference, Lisbon. |
| May | Lorentz Center workshop on multilateral governance of technological risk, Leiden. |
| March | Comparing patterns of risk regulation in the US and EU - Implications for international trade and cooperation, presentation at the German Marshall Fund's Annual Brussels Forum, Brussels. |
| March | Applying the IRGC Emerging Risk Governance Guidelines to antimicrobial resistance at the SRA Benelux annual meeting, RIVM Bilthoven. |
| March | Workshop on risk governance for key enabling technologies at the SRA Policy Forum, Venice. |
| February | Session on the governance of precision medicine at the Human Genome Meeting 2017, Barcelona. |

IRGC's main dissemination channels are its websites and a regular email newsletter sent by the IRGC Secretariat. IRGC also distributes hard copies of its publications at specific events and electronic copies in targeted mailings to key stakeholders.

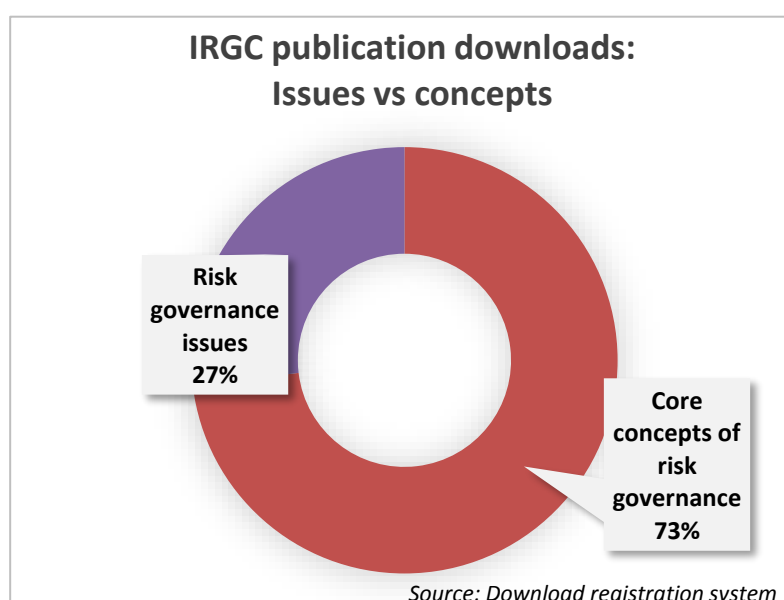
DOWNLOAD OF PUBLICATIONS

IRGC monitors the download of its publications with various analytical tools. Since 2015, IRGC uses a registration system on the IRGC Foundation website to identify who downloads the publications. While downloading and using IRGC reports and core concepts remains free of charge, the registration system allows IRGC to have a better understanding of which reports generate more interest and in which sectors. In July 2017, IRGC posted 21 of its publications on *Infoscience*, the EPFL institutional repository¹. Publications on *Infoscience* are open access.



IRGC publications are downloaded by researchers and practitioners in all sectors, reflecting IRGC's diverse audience.

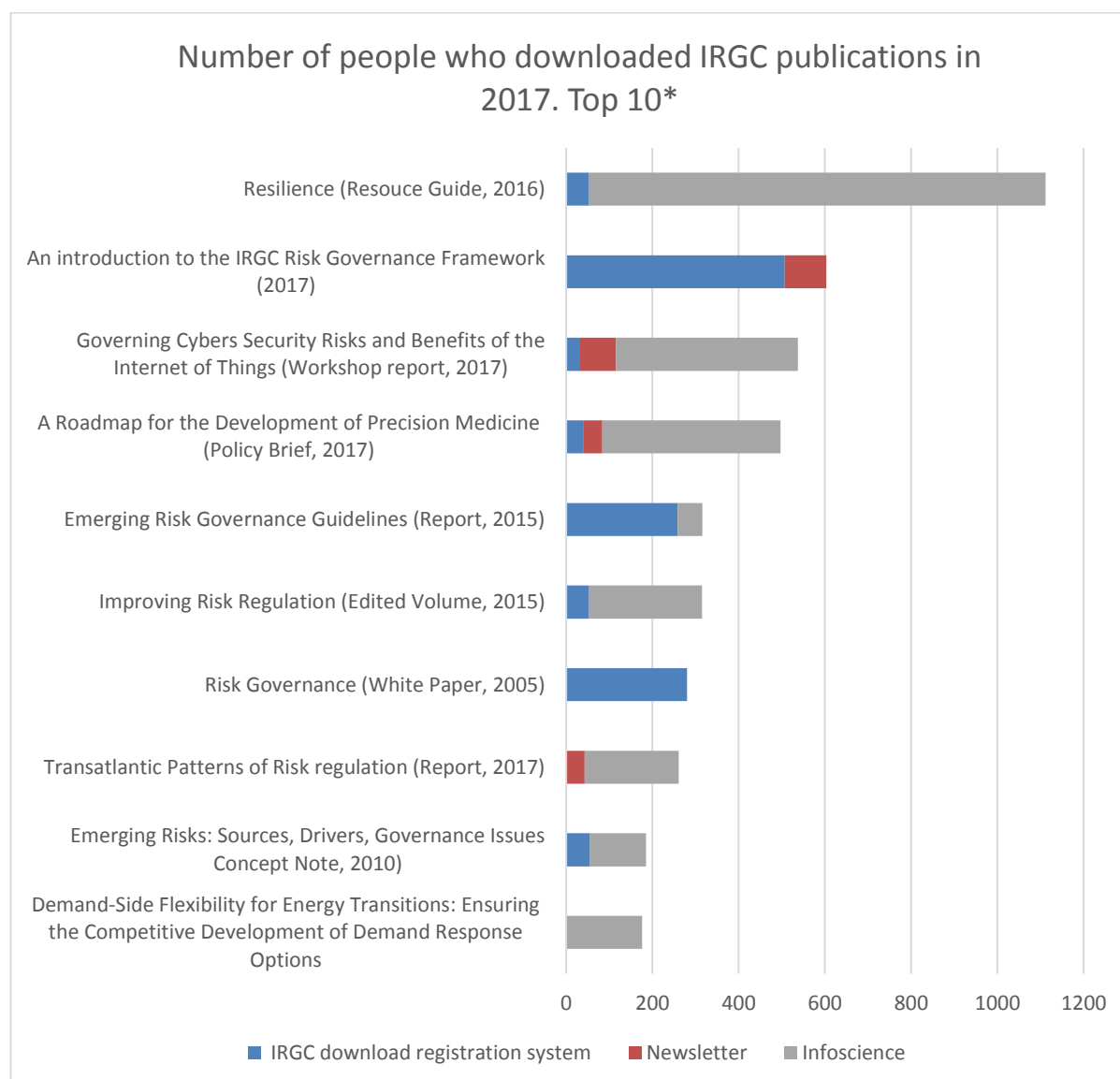
Overall, there is a strong interest in IRGC's work on core concepts of risk governance, in particular its Risk Governance Framework. The description of the most common Risk Governance Deficits, its Guidelines for the Governance of Emerging Risks, as well as the report on Improving Risk Regulation.



¹ Publications added on *Infoscience* include those that have been published since the creation of the IRGC@EPFL Center, and those with at least one author who represents EPFL.

The download counts for 2017 combine three sources: **IRGC download registration system** (2429 downloads²), **IRGC's newsletter** (268 downloads) and since July 2017, the **EPFL Infoscience repository** (3558 downloads). The recent change in sources makes the comparison with 2016 not possible.

Most frequently downloaded report in 2017 was IRGC's Resource Guide on Resilience (1112 times) followed by the Introduction to the IRGC Risk Governance Framework (603 people). The original white paper on Risk Governance (2005) remains of much interest too (downloaded by 280 people) and the reports on the IoT and Precision Medicine were mainly downloaded from *Infoscience*. The top 10 downloads for this period are shown below.



*Counts one download per individual per publication. Source: IRGC download manager, MailChimp, Infoscience

Would you like to stay up to date on IRGC publications and events?
Sign up for the **IRGC newsletter**

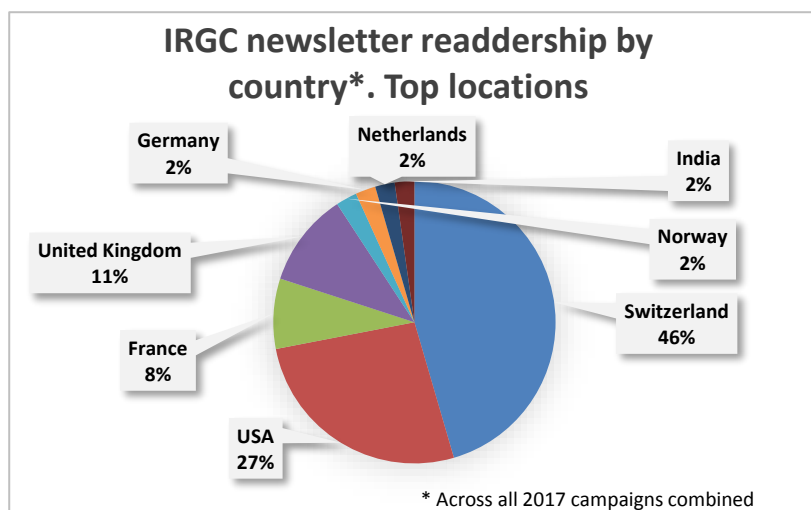


➤ <https://irgc.epfl.ch/>
➤ <http://www.irgc.org/newsletter/>

² Note that when a publication is announced in the IRGC newsletter, we register it a month later.

NEWSLETTER

In 2017, the newsletter (sent every two months to a global audience) was primarily used to announce the new publications. Since workshops are upon invitation, they are not publicly announced before.

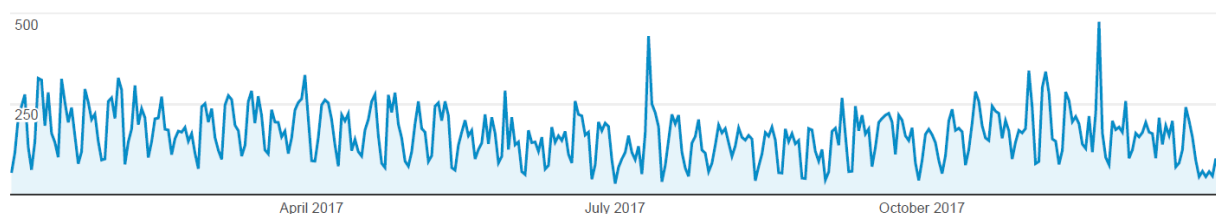


4,319 | Total number of individuals subscribed

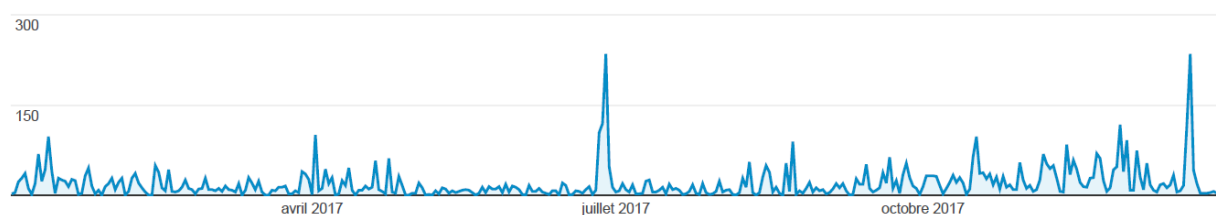
WEBSITE

With the full integration into EPFL, IRGC now maintains two websites: irgc.org (for the foundation) and irgc.epfl.ch (for the Center). These websites are the main point of information about IRGC and its work. They feature information about IRGC projects, publications and events. All publications since 2005 are still available on irgc.org.

19,803 | Total number of visitors on the www.irgc.org website in 2017*



7,031 | Total number of visitors on the www.irgc.epfl.ch website in 2017*



Compared to 2016, the number of visitors to IRGC's websites (both irgc.org and irgc.epfl.ch) has increased by 15% (2016: 23,202; 2017: 26,834).

ACADEMIC REFERENCES & CITATIONS

IRGC publications are widely cited in academic publications and business literature. In 2017, IRGC reports were referenced 240 times.³

240

Academic references from IRGC publications in 2017

Source: Google Scholar

As in 2016, the vast majority of citations refer to IRGC reports on concepts of risk governance: the risk governance framework and the resource guide on resilience (156 references).

IRGC's risk governance material is used in a variety of fields. Publications that cite IRGC and make reference to IRGC concepts and publications in 2017 include, among others:

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³ Source : Google Scholar

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FEEDBACK

IRGC regularly collects feedback on its events and publications. Below is a selection of comments received in 2017 from participants representing different sectors.

<p>Private sector Workshop on <i>Risks and benefits of Distributed Ledger Technologies</i></p>	<p>"I think that the background material and the structured focus of each session is very useful. I thought the conference facilitated good discussion across several diverse backgrounds, and I learned a lot".</p> <p>"Your event was one of the best I have attended in the 2,5 years I am in the blockchain space. The right mix between technology, law and strategy/philosophy. And all in a very inspiring surrounding."</p> <p>"The setting and structure of discussion enabled meaningful and focused discussion".</p>
<p>Private sector Workshop on <i>Trust & Precision Medicine</i></p>	<p>"It was an interesting day with a lot of new ideas and connections! Thank you for the invitation, I would be interested to stay informed/included going forward. Big thanks for the facilitation and hosting"</p>
<p>Intergovernmental organisation Workshop on <i>Trust & Precision Medicine</i></p>	<p>"Many thanks again for the opportunity to participate in the workshop – which I found very very interesting. I came away with the distinct feeling that the issue of trust measurement is perhaps a bit premature - and that - if ever, the group was more interested in trust in institutions than in opening up the Pandora box of trust in data governance".</p>
<p>Government Report: Transatlantic Patterns of Risk Regulation</p>	<p>"It is very useful indeed to have nailed the myth of EU being precautionary and the US reactionary. The point is well made that this isn't a number-counting game but you've shown enough to prove that it's not a binary issue at all".</p>
<p>Government Workshop report: Cybersecurity in the Internet of Things</p>	<p>"Thank you for the workshop report. Cybersecurity is for us as a national safety authority for railways an important issue. So it's good to learn what's happening in this context in other fields".</p>
<p>NGO Report: Transatlantic Patterns of Risk Regulation</p>	<p>"Broadly speaking, I found the report a good stock-taking exercise of current thinking and providing a clear overview trends about risk regulation in the EU and the US. Of course, the recent approaches by the current US Administration cannot be reflected in such a publication, but they eventually might provide food for a critical test to the conclusions".</p>
<p>EU commission Workshop report: Cybersecurity in the Internet of Things</p>	<p>"After a quick glance at the 32-page report I am strongly impressed by the quality of the analysis and I fully support the emphasis placed on connected vehicles and (medical) wearables.</p> <p>Presuming that you won't disagree, I intend to publish the full report on our collaborative social platform (called 'CONNECTED' and used to co-create, cooperate and discuss internally both within DG CNECT and among all Commission services)".</p>
<p>Academia Report: A roadmap for precision medicine</p>	<p>"Many thanks for sending me your newly published roadmap for the development of precision medicine. This is an impressive work. I'm looking forward to the further development of this field".</p>

4 | IRGC ORGANS AND NETWORK

IRGC@EPFL

The International Risk Governance Center is currently led by a management committee. An Advisory Board (to be confirmed in 2018) will provide policy and scientific advice for the strategy and development of IRGC, in collaboration with the IRGC Foundation Board and Advisory Committee.

MEMBERS OF THE MANAGEMENT COMMITTEE

- **Bruno Oberle** - Academic Director
- **Marie-Valentine Florin** - Executive Director
- **Gérard Escher** - Member

THE IRGC FOUNDATION

The International Risk Governance Council is governed by a Foundation Board, which acts as the main strategic, oversight and decision-making organ. Members of the Advisory Committee (to be confirmed in 2018) act as advisors and ambassadors.

MEMBERS OF THE FOUNDATION BOARD

- **Philippe Gillet** (Chairman), SICPA
- **Antoine Flahault**, University of Geneva
- **Stéphane Jacobzone**, OECD
- **Granger Morgan**, Carnegie Mellon University
- **Andreas Mortensen**, EPFL
- **Bruno Oberle**, EPFL
- **Ortwin Renn**, IASS
- **Daniele Tonella**, UniCredit

ACKNOWLEDGEMENTS

In 2017, IRGC received support – both financial and in-kind contributions – from the following organisations and institutions:

- Swiss Re
- State Secretariat for Education, Research and Innovation (SERI)
- Swiss Personalized Health Network (SPHN)
- Institute on Advanced Sustainability Science (IASS), Potsdam

IRGC benefits from in-kind and project-specific contributions from other partners.

IRGC would like to thank everyone who worked with and for IRGC in 2017 as workshop participants, co-authors, contributors, researchers, reviewers, staff and support staff.

IRGC is also grateful to all members of the previous IRGC Foundation Board and Scientific and Technical Council: V.S. Arunachalam, Wändi Bruine de Bruin, Luis Abdón Cifuentes, John Drzik, Gérard Escher, John D. Graham, Manuel Heitor, Janet Hering, Charles Kleiber, M. Granger Morgan, Christian Mumenthaler, Kenneth Oye, Arthur Petersen, Ortwin Renn, Daniele Tonella, Margareta Wahlström, Weizhong Wang, Jonathan B. Wiener, Lan Xue.



The EPFL International Risk Governance Center is a neutral platform for dialogue about opportunities and risks related to science and technologies, with the aim of providing recommendations for their governance. irgc.epfl.ch

The Center continues activities of the **IRGC Foundation**. www.irgc.org

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