# Next Generation Research & Innovation Networks

to inspire a network on learning through play

The LEGO Foundation

# Preface

For the past decades, the LEGO Foundation has been developing and supporting research on play, learning and creativity to support children's development, and to cultivate environments that nurture children's natural curiosity, playfulness, and ability to learn through play.

Recently, to share the importance of learning through play with a wider audience, we opened up access to some of our research results on these issues. As part of this process, we realized that if the goal is to foster creative, engaged, lifelong learners, then there is a bigger need to help re-define play and re-imagine learning.

However, we also realized that although collecting, supporting and talking about research on play, creativity and learning is essential, it is even more critical to initiate and transform attitudes and behaviors related to learning, play and creativity. This requires systemic change and a completely new way of working with research to influence and engage with practice and policy; also this is an effort which requires new tools, practices and convening platforms to showcase, develop and share knowledge.

This case report inspires us to think about a new space for supporting a community of engaged actors who are passionate about children, learning and creativity, and who believe that educational systems are pivotal to making real and sustainable changes. The report provides us with important insights into what spurs network members' motivations, and how collaborations and network structures would allow for cross-disciplinary partnership across theory and practice, fields and actors. It also highlights opportunities to catalyze a self-organized movement in the realm of a more innovative and creative society, where principles for bridging research with practice can push boundaries within numerous disciplinary contexts.

In the case of the LEGO Foundation, we foresee the following results as a stimulus to create a playful and creative society where children are our role models.

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# Executive Summary

Networks are an important tool to connect people spanning disciplinary areas, cultures, geographic locations and time zones. They provide a platform upon which new collaborations can take place, with the aim of stimulating innovation processes, and creating breakthroughs in the topic of interest. Nevertheless, challenges exist in how successfully such networks function, which fundamentally stems from the design and operation of a network. As such, the level of success and innovativeness a network can achieve is dependent upon a number of key elements.

The following report highlights key characteristics of successfully operating networks, by exploring existing best practices of various international network models. During a comprehensive case evaluation process conducted between June and August 2014, out of a pool of 78 pre-evaluated networks, 12 international networks were finally identified as best practice. Each case has been carefully investigated by analyzing primary data collected from 22 expert interviews with experienced members, managers, and other experts from the pre-selected international networks, in conjunction with secondary data. The 12 selected networks excel in achieving their respective purpose, and contain certain advanced network elements. Aside from showing involvement in current activities and collaborations, networks had to show stable or growing membership, and an ability to manage complexity as minimum requirements. The final 12 cases met a series of advanced criteria, including the ability to collaborate across cultures, motivate members, and manage interdisciplinarity; organization by a central player or self-organizing activities; steered member selection processes; needs-based identification for future research; bridging research and practice; and production of new solutions or insights within the network's thematic area. The selected networks are AIESEC, The ATLAS Collaboration, Carnegie Foundation for the Advancement of Teaching (CFAT), ConocoPhillips Networks of Excellence, EIT Climate-KIC, Impact Hub, James Lind Alliance, MacArthur Connected Learning Research Network, Stata Community, The New Media Consortium, Wikimedia Foundation, and Willis Research Network (WRN). Selected cases cover a broad range of goals such as improving learning, triggering social change, connecting patients with health research or jointly producing software.

With regard to membership, the outcome clearly supports the importance of generating a network with high member contribution and collaboration by decisively attempting high levels of self-organized activities within the network. A lot of organizations calling themselves "networks" are not able to mobilize their members for active contribution and therefore end up being either inactive, just existing on paper or

spending a lot of resources on running a kind of top-down organization. Especially in research, most purpose-driven networks neither show significant self-organizing activities nor attempt to bridge research and practice. How, in contrast, high member contribution and collaboration can be achieved is demonstrated successfully by selected user communities and social networks based on community-led approaches. Collaborative arrangements of individuals not only achieve higher levels of commitment and trust among members (provided a certain level of freedom to operate is given), but also increase their productivity, in comparison to pure top-town organized structures. However, self-organized activities need to be enabled by careful planning and application of a distinct set of governance, leadership and cultural instruments. Another important lesson is that those networks which aim for and generate true win-win situations for individual members and the overall network, are able to sustain high levels of member contribution over time. An important tool to make a high level of self-organized activities work, especially in large networks, is to structure membership around (self-organized) hierarchies, topics and geographies. Nevertheless, despite it being crucial for a network to have a highly compelling vision, mission and goals, this must be defined together with core founding members, so that the purpose of a network is deeply aligned with the individual member's core interests. Therefore, those networks exhibiting a balanced situation whereby purpose, member interests, and a degree of self-organization all work in harmony, subsequently create elevated contributions from their members.

With regard to governance, although case analysis suggests that networks need certain hierarchies to work properly, another major outcome is that a dominant role of a central player who defines all major structures and processes imposes risks regarding sustainability, credibility and accountability of a network. In addition, "shared ownership" was highlighted as having beneficial outcomes for the success of a network, given its ability to increase member "buy-in" in the process, and also ensure the network remains responsive to the needs of members and its wider network environment. Incorporating multiple streams of funding also increases network resilience, given on-going financial requirements for network infrastructure and network activities have a higher likelihood of being met if networks diversify their funding sources, as opposed to placing reliance upon one source.

Finally, a number of key activities and processes came to light, which are pivotal to the overall functionality of a successful network. Significantly, those networks incorporating a mix of online and offline means for communication increase trust and productivity. This is particularly relevant when participating in complex and creative projects which span a range of geographic areas and time zones. Another important outcome pertained to the continuous innovativeness and growth of knowledge of a network, in order to achieve impact. As such, case analysis suggests that creation of a virtuous circle of knowledge exchange between research and practice has the potential to create greater levels of impact. In addition, those networks that remain open to connections with non-members enabled new knowledge to permeate throughout a network, thus aiding networks to avoid blind spots. Importantly, continual measurement of impact was considered one of the most challenging, but worthwhile, endeavors a network can perform. Therefore, networks must identify what to measure, and how, in such a way that will enhance the functionality and outcomes of a network, without discouraging members through too much additional administrative burden.

Overall, the case analysis concludes that careful organization and management of networks, incorporating the range of lesson learned from the study (to varying degrees, and with sensitivity to the given context), will enable networks to enhance their functions and outcomes. It is recommended that network developers, managers, and coordinators carefully consider these findings, and apply these principles within their own networks.

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# Introduction 1

Networks are incredibly useful for stimulating innovation processes between people in order to utilize the benefits of collaboration for making break-throughs in a wide range of topical areas. Formation of a network can be highly beneficial in order to not only connect people within a certain field or discipline (for example), but to also coordinate people to work towards a common mission or end goal. Networks can span broad geographic areas, and also span a wide range of professional interests.

As such, networks have the potential to connect people on topics with the view of reaching a common goal; and through appropriate structure and organization, facilitate how well this endeavor functions. Provan and Kenis (2007) note that the advantages of network coordination in both public and private sectors are considerable, with enhanced learning, more efficient use of resources, and increased capacity to plan for and address complex problems, just some examples of the benefits that can be gained. Networks can be utilized to bridge research and practice in order to circulate knowledge and communicate problems and solutions through means of a virtuous feedback loop. This can be achieved when members of networks represent a variety of professional areas within the field collaborate together on joint projects (i.e. which includes those conducting research to those actually practicing in the area). Therefore, research can influence practice, and vice-versa, thus stimulating sustainable development within the topical area, and creating greater opportunities for knowledge transfer and innovation. Importantly, network effectiveness can be defined as, "the attainment of positive network-level outcomes that could not normally be achieved by individual organizational participants acting independently" (Provan and Kenis, 2007).

Therefore, collaboration, communication and community can be considered as important elements towards driving the success of a network model.

In the context of this study, it is important to define what is meant by the terms "network" and "network member":

### *Network* is defined as:

- A complex, interconnected group of people who share similar interests and concerns towards one topic.
- They engage in permanent, formal, as well as informal, collaboration with each other in order to address the purpose and achieve the mission of the network.
- Networks are created specifically with the goal of gaining knowledge related to their members' field, or evolve naturally because of the members' common interest in a particular domain or area (Lave and Wenger, 1991), and have to be goal-directed.
- Therefore, selected communities of interest and practice (e.g. Wikipedia) are included in the network definition of this study.

### *Network member* is defined as:

- Any person belonging to the respective network.
- In the context of this study, belonging to the network is defined as acting as an active player who contributes to the mission and purpose of the network by engaging in activities (e.g. group discussions, knowledge and idea sharing, etc.).
- Passive membership (i.e. those who are part of a network, but do not participate in any activities) was excluded from the analysis.

How a network is organized is critical towards its success. From a hierarchy perspective, structures in a network strongly define the roles that individual members can play, as well as the tasks they can engage in. In line with existing research results (Pearce and Manz, 2005; Carsom, Tesluk and Marrone, 2007), findings from this study indicate that leadership performed by members at all levels ("shared leadership") possibly has a positive effect on member motivation. Interestingly enough, in each of the cases analyzed in this study, a distinct membership hierarchy was developed over time, even if the network initially started without any member structure. While some networks begin with a deliberate creation of hierarchies of membership (e.g. EIT Climate-KIC), in other cases, structures of membership emerged more randomly (e.g. Wikimedia Foundation).

Pearce and Manz (2005) found that traditionally, a top-heavy, hierarchical model of leadership prevailed within organizations. However, they also noted that it is difficult for one person to be an expert on all things, and thus shared leadership has great potential for enhancing knowledge workers within a team. Yet, it is important to realize that leadership is still required, given it is critical to on-going success (Pearce and Manz, 2005). One must also consider the human aspect of networks, given networks consist of interconnected social relationships which both offer opportunities for, and constraints on, behavior (Brass et al., 2004). Therefore, the alignment of values and norms of network members with network mission, vision and goals is imperative to drive the success of a network. This is compounded by findings by Carson, Tesluk and Marrone (2007), who found that the internal team environment consisting of shared purpose, social support, and voice for example, are important predictors of shared leadership emergence.

The following network model study aims to explore these elements in more depth, in order to learn lessons about successful network model design. In particular, lessons arising from network membership and network governance were particularly interesting, in addition to the key processes and activities that can promote heightened member interaction, collaboration, and productivity within a network. This study is designed to explore lessons that can be learned from examples of successful network models. The main task is to identify key design elements of successfully operating networks.

# Research Approach

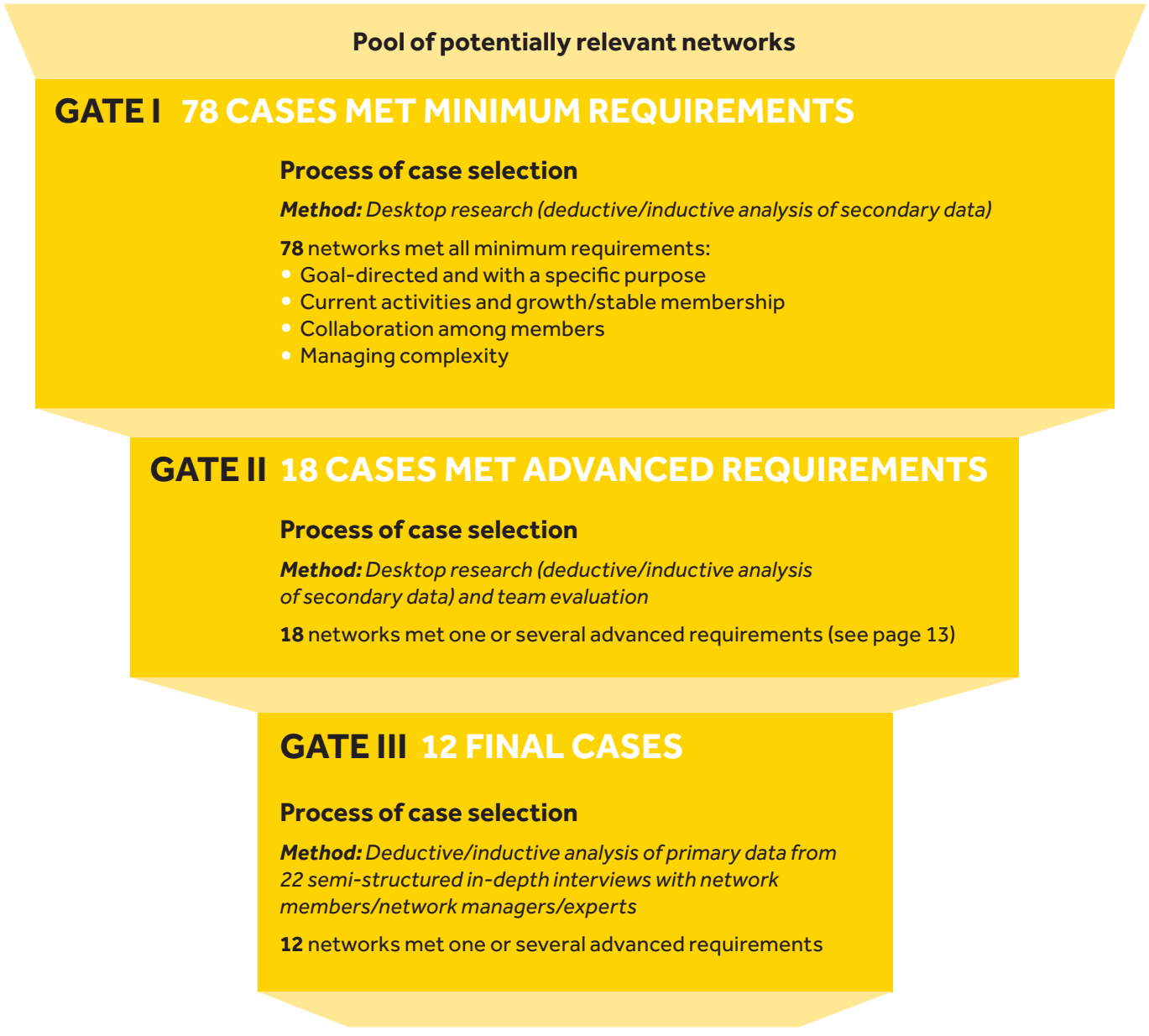
# 2

An exploratory, qualitative research design was adopted to identify key design network elements of successfully operating networks, in order to answer the following research question:

- **What are the design elements of successful international networks?**

International network models were systematically identified and evaluated to determine relevance for the study. In order to be able to select the best network models that fit to the defined purpose of the study, networks and communities were evaluated in a systematic three step process (Figure 1).

**Figure 1. Method and process description of case selection**



A first screening of network model designs revealed that although there is a lot of scientific literature available, this study's underlying research questions cannot be answered by exclusively focusing on existing research data. Therefore, an independent, multiple case-study research approach has been chosen in order to explore the elements of network model design, in-depth. This is regarded as being more robust than single case studies, since comparisons across cases foster greater validity in the development of patterns and insights (Yin, 1994; McDermott and O'Connor, 2002).

In the first filtering stage a set of mandatory minimum requirements for all networks was defined and applied to secondary literature (websites, journals, articles). In this stage, 253 websites of networks, and 62 publications related to networks (scientific publications, studies, reports, articles in media and special interest journals, etc.) were analyzed. Finally, 78 networks were identified matching the minimum requirement criteria.



## Minimum requirement criteria:

1. **Purpose:** The network is goal-directed and has a specific purpose.
   This is a clear distinction from serendipitous networks just connecting people with shared interests, or being in common situations like hobbyist communities, or peer-networks.

2. **Success:**
   - **Vitality:** The network shows current activities.
   - **Growth:** The network shows growing or (in cases of more mature networks) stable membership.
   - **Member collaboration:** Network members are directly collaborating with each other.
   - **Managing complexity:** The network has a traceable track record in spanning boundaries (disciplines, geography) or achieving complex tasks.

In the second filtering stage, cases were scrutinized in order to select examples exhibiting advanced knowledge and practices in distant fields. For instance, open source software communities are characterized by high levels of collaboration among members, which goes along with a high level of self-organization. Therefore, open source software communities are considered a valuable learning source for this study.

Subsequently, an advanced set of requirements (formulated from the secondary literature) was applied to selected cases. In order to be selected, cases had to demonstrate notable success in one or more of the below listed advanced requirement criteria. This set of advanced requirements serves as the second gate of the data collection process. Finally, 18 cases qualified for the last stage.

## Advanced requirement criteria:

**1. Strategic Goals**

- The network focuses thematically upon research, and/or innovation, and/or learning, and/or its purpose is to achieve societal change.

**2. Governance and Leadership**

- **Showing self-organizing activities and/or having a central player** (initiator, founder, etc.): The network has to balance community-led activities with the role of a central player.

**3. Membership**

- **Managing interdisciplinarity:** The network successfully connects members from different knowledge domains, sectors or professions.
- **Collaborating across cultures:** The network bridges different cultural spheres.
- **Motivating members to actively contribute:** Members are highly motivated to invest resources (like time, effort, etc.) into joint activities.
- **Selecting members in a steered process**: The network has developed or applied distinct processes for member evaluation and selection.

**4. Activities and processes**

- **Identifying need areas:** The network actively searches, identifies and/or selects areas where new research, projects and/or solutions are needed.
- **Bridging research and practice:** The network actively bridges the two worlds of research and practice.
- **Producing new solutions or insights:** The network creates, or applies new solutions or insights.

In the third and final filtering stage, interviews were conducted in order to confirm one or several of the advanced requirement criteria and generate specific insights. Overall, 22 semi-structured in-depth interviews with a length of 20 to 90 minutes per interview were conducted. Sixteen of those interviews (listed in Table 1) provided particularly interesting lessons for the study. The interviewees were either managers, experienced members or external experts (consultants, researchers). The interviews were conducted in the period between June 5th and July 22nd 2014. All interviews were transcribed and analysed in the subsequent inductive and deductive analysis. The remaining 6 interviews with other network managers were not selected to inform the final analysis.

**Table 1. Conducted interviews with network managers, members and experts**

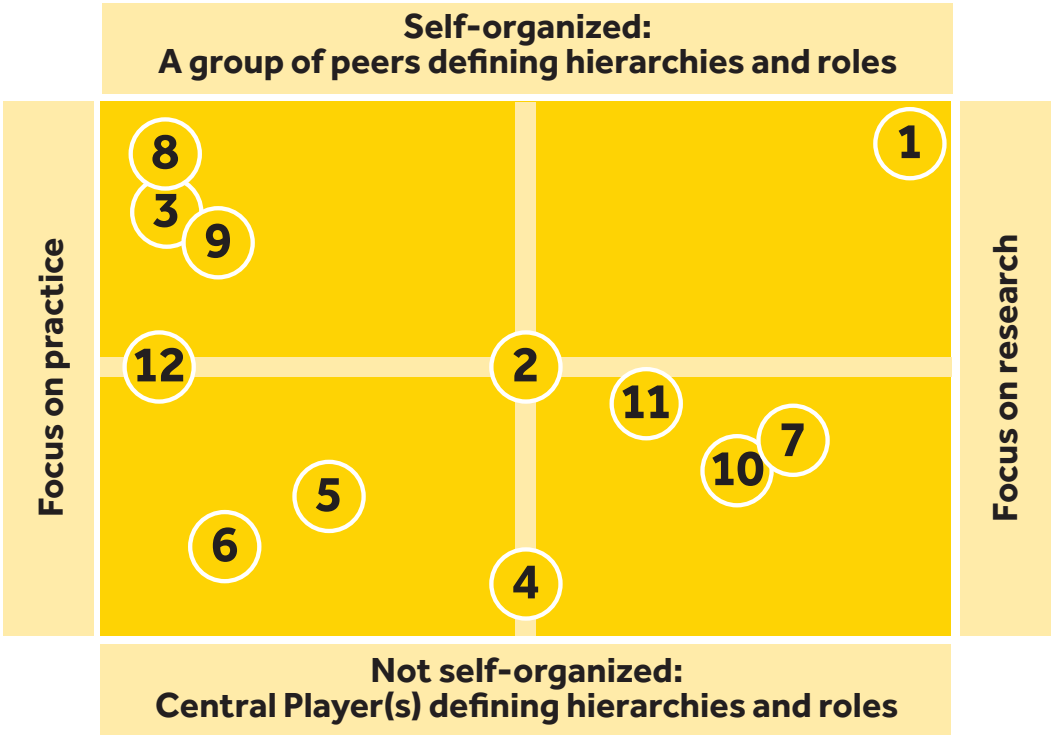
| No | Date | Network/ Organization | Name | Role in the network |
|---|---|---|---|---|
| 1 | 05/06/14 | Impact Hub | Hinnerk Hansen | Managing Director, Impact Hub |
| 2 | 06/06/14 | EIT Climate-KIC | Hans-Jürgen Cramer | Former Head of Climate KIC Germany, currently advisor to EIT Climate-KIC Germany |
| 3 | 15/06/14 | English Wikipedia | Adam Shorland | Administrator on the English Wikipedia; former member of the Wikidata development team |
| 4 | 20/06/14 | James Lind Alliance | Katherine Cowan | Senior Advisor to the James Lind Alliance at NIHR |
| 5 | 24/06/14 | The ATLAS Collaboration | Philipp Türtscher | Researcher conducted several studies about The ATLAS Collaboration |
| 6 | 29/06/14 | Stata Community | Christopher F. Baum | Highly active network member in Stata Community; responsible for Stata Archive |
| 7 | 30/06/14 | Stata Community - Statalist | Maarten Buis | Highly active network member and establishing member of the Statalist as a forum |
| 8 | 30/06/14 | MacArthur – Digital Media and Learning Hub | Mizuko Ito | Research Director of the Digital Media and Learning Hub, and Chair of the Connected Learning Research Network |
| 9 | 02/07/14 | Wikimedia.de | Lydia Pintscher | Product Manager Wikidata |
| 10 | 02/07/14 | Impact Hub | Gabriela Gandel | Managing Director, Impact Hub |
| 11 | 07/07/14 | EIT Climate-KIC | Thomas Aled | Director of the Regional Communities |
| 12 | 08/07/14 | Willis Research Network | Stuart Calam | Program Manager |
| 13 | 09/07/14 | ConocoPhillips | Juli Hennings | Manager Knowledge Sharing |
| 14 | 09/07/14 | Carnegie Foundation for the Advancement of Teaching | Gay Clyburn | Associate Vice President of Public Affairs; Secretary to the Board of Trustees |
| 15 | 16/07/14 | The New Media Consortium | Samantha Becker | Senior Director, Communications |
| 16 | 22/07/14 | AIESEC International | Orsolya Kovács | Former Regional Coordinator |

# 2.1 Selected Cases

The multi-stage filtering process has resulted in the selection of 12 cases that are relevant for this study, and provide deeper insight into the main topics of membership and governance. These selected cases demonstrate interesting findings about the design of networks. Figure 2 illustrates the organizational style and predominant orientation of each selected network. This highlights just how diverse the selected case networks are in their organization and functionality, thus demonstrating a wide range of network set-up possibilities.

**Figure 2. Selected cases and some of their main organizational characteristics**

1. The ATLAS Collaboration
2. James Lind Alliance
3. Wikimedia Foundation
4. Carnegie Foundation for the Advancement of Teaching
5. EIT Climate-KIC
6. ConocoPhillips of Excellence
7. MacArthur – Connected Learning Research Network
8. Stata Community
9. Impact Hub
10. Willis Research Network
11. The New Media Consortium – Horizon Project
12. AIESEC



The selected cases are highly successful in generating high quality outcomes, structuring membership and fostering collaboration. They also encompass a broad range of goals such as improving learning, triggering social change, connecting patients with health research, advancing fundamental physics, and jointly producing software. In addition, the organizational and structural design elements of the selected networks are highly diverse in character.

Figure 2 already highlights some characteristics present within the current landscape of network set-ups:

- Strong self-organization on the governance level seems uncommon in research networks, as there is only one network (The ATLAS Collaboration) that is doing research, whilst also exhibiting a highly self-organizing structure. However, most research networks use a mix of self-organization and hierarchy defined by (a) central player(s) in order to balance the values of the research profession (freedom to operate, individuality and self-organization) with the need to reduce network complexity.
- Networks having a central organization (being e.g. a foundation or a corporation; e.g. ConocoPhillips, Carnegie Foundation or European Institute of Innovation and Technology (EIT) ) are more likely to have less self-organizing elements, and exhibit a more hierarchical structure as defined by the central organization.
- Those networks showing and allowing for high levels of self-organization, also in their governance models (e.g. Wikimedia Foundation, Stata Community and Impact Hub), mostly have an evolutionary history, meaning that they were not developed with a predefined design in mind, but evolved naturally around a certain cause. Furthermore, those networks have very passionate members.

# Case Study Results

3

# 3.1 Overview of the Main Findings

The study produced findings in two main areas – membership, and governance. Interestingly, with regard to membership, a number of drivers and incentives were identified that promote active member participation. This included how the vision, mission, goals and purpose of a network were designed, how members were included within this process, and how visibility and recognition of members' contributions stimulated member interaction. Additionally, how members are structured within a network also impacted member interaction. Interesting insights were gleaned regarding the hierarchical structure of membership, including the benefits of having a stable core and a flexible periphery, the creation of local communities and topic related-sub-communities, and actually how members are selected.

Regarding governance, interesting lessons also arose from balancing a strong initiator role with self-organization, particularly with regard to the functionality of a central administrative body, and maintaining a structure which is ready for change. Ownership and funding were also pivotal towards network success. In particular, embracing balanced ownership and attracting multiple streams of funding have been explored in more depth. Finally, a number of key activities and processes were highlighted during the course of the study. These included the values and norms that must be present in order to promote successful network activities, how research topics are managed, the importance of including self-organizing activities, how communication can take place within successful networks, strategic approaches that can be employed for successful networking, the importance of bridging research and practice through bi-directional projects, the importance of disseminating network results and outcomes as broadly as possible, the need to sustain connections to non-members in order to maintain the flow of new knowledge into a network, and the importance of measuring impact of network activities to ensure the network is meeting its goals and purpose. An overview of the findings is presented in Figure 3. Each topic is explored in greater depth in the following sub-sections.

**Figure 3. Overview of the main areas where this study produced findings**

## Membership

### Drivers and incentives for active member participation

- Vision/mission and goals
- Inclusion of members
- Purpose of the network
- Peer recognition
- Visible network results

### Structuring membership

- Member hierarchies
- Creating local communities
- Creating topic-related sub communities
- Stable core, flexible periphery
- Selection of members

## Governance*

### Balancing a strong initiator role with self-organization

- Central administrative body
- Readiness for change

### Ownership and funding

- Balanced ownership
- Multiple funding streams

### Key activities and processes

- Values and norms
- Management of research topics
- Self-organization of activities
- Means for communication within a network
- Strategic networking activities
- Bi-directional projects
- Dissemination channels
- Connections to non-members
- Impact measurement

*Governing the network through laws, norms, structures, resources, leadership activities

These findings will now be explored in more depth.

# 3.2 Membership

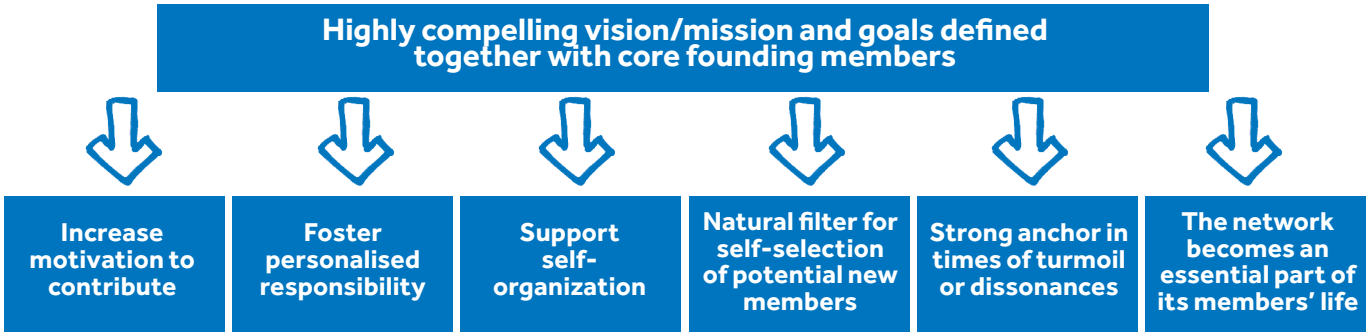
This chapter explores the drivers and incentives for active member participation, and how membership can be structured. The actual output of a network depends on the intensity of member engagement and contribution. The level of engagement and contribution is heavily influenced by the network design, as it determines the guiding principles and structures for organizing the individuals around the network's goals and visions. Incentivizing member contribution is key in all goal-directed networks, but especially important for networks aiming for high levels of self-organizing activities.

## 3.2.1 Drivers and Incentives for Active Member Participation

Member participation is crucial for networks to achieve their intended goals and outputs. As such, it is important to understand what motivates network members to invest time and efforts in a network's activities.

Therefore, understanding how this can be structured within a network provides insights which can lead to heightened productivity and the enhancement of member satisfaction. This study helps to identify various drivers and incentives for encouraging member participation, which are explained below:

## Vision, Mission and Goals, and the Inclusion of Members within the Process




Successful networks manage to unite their members under an umbrella of convincing, shared goals, combined with a highly compelling vision that the network members fully identify with. Such a vision, and the underlying shared goals, have to be clearly communicated in order to fulfil several roles at once. In order to ensure that all network members follow the same vision and mission, it is important to drive the vision and mission process as a highly participative effort within the network. As such, it is particularly important to define network goals with founding members from the outset.

## Some Case Examples

**1**

In AIESEC, vision and mission statements play an essential role in shaping a common organizational culture. The overall vision ("Peace and fulfilment of humankind's potential") has not changed since it was founded over 60 years ago. It serves as the cornerstone of the organization's identity and purpose, and is communicated to members of all levels. AIESEC also heavily involves their members in the usual five-year strategy process, e.g. local members across the globe could contribute their ideas and wishes through locally organized workshops and a global conference, where ideas arising from local workshops were further developed and finalised.

**2**

Impact Hub engaged the entire community in the vision and mission process and designed it as a bottom-up process. Impact Hub Makers (any active team member at local Impact Hub level that has a paid work engagement with the respective local Impact Hub) collected the wishes and ideas from their local communities and fed them into the global vision and mission process of the network.

## Aligning the Purpose of the Network Deeply with the Purpose of Individual Member's Core Interests

**Purpose of the network is deeply aligned with the individual member's core interests**

**Promotes member "buy-in" and encourages participation**

Besides having a vision that all network members highly identify with, a successful network additionally ensures that its purpose is deeply aligned with each individual member's purpose/ maxime (i.e. in their professional and/or private life), meaning that it brings benefits to the network members in their core activities.

By adding significant value to each individual's activities, the network becomes an essential part of its members' life. This helps to increase the level of active member participation. Furthermore, by bottom-up processes member interests can be incorporated into the vision and mission.

## Some Case Examples

**1**

For Impact Hub, aligning network level goals with individual member goals is an on-going focus. The initial needs they focused on were the shared desire amongst members to belong to something bigger, create more impact and have more credibility and visibility. However, they realised that self-organization and activity among the members was less than originally intended. A dialogue ensued with all network members on how to even more deeply align the network with the purpose of each individual player's (professional) activities in order to create benefits across the board. This was accepted as a prerequisite for the network to spur a high level of self-organized activities. This meant that network leaders have to ensure that members are central to each other professionally, so they can make use of the network's global scope for their own individual business activities. As a consequence, leaders are paying increased attention to joint business activities and scaling processes within the network.

**2**

Willis Research Network is an excellent example of a network that successfully manages to make the activities of the network relevant to the individual interests and needs of network members: The network members benefit from the collaboration in the network as the network oftentimes provides them funding and publication possiblities for their own research. Furthermore, they have the opportunities to work in close collaboration with the insurance industry to validate their research and test their models in practice.

**3**

ConocoPhillips managed to strongly tie the purpose of the Networks of Excellence to what each member is pursuing in his/her job. To achieve this, they made employees realise that efficiently soliciting knowledge from colleagues saves time and helps them find solutions to the problems they may face in their daily work. Moreover, testimonials of knowledge-sharing successes that resulted in time and cost savings, fully convinced employees, as well as top-management, to support and encourage participation in the networks.

## Embedding a Mechanism of Peer Recognition

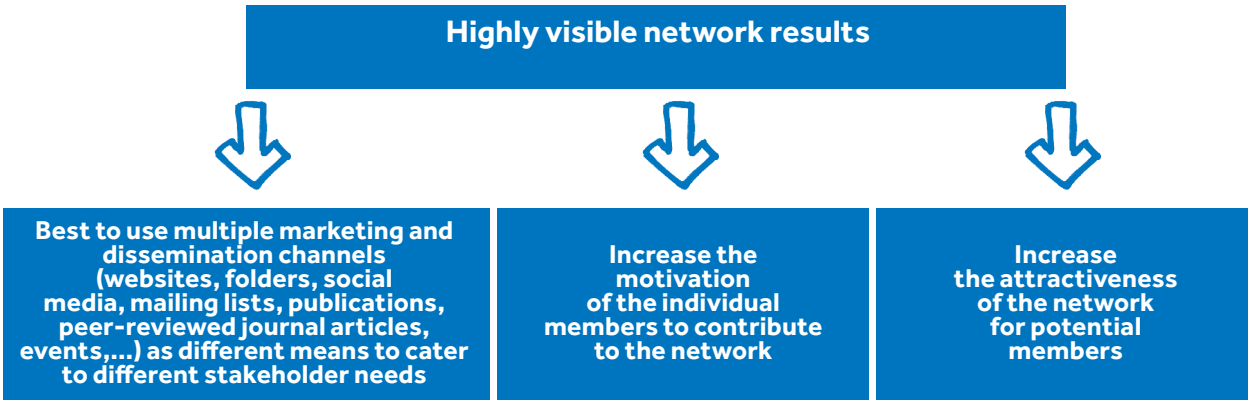

One main driver and incentive towards increased member activity is the strong mechanism for peer recognition. Building up social status by using peer recognition is a mechanism especially common in research and user communities. Peer recognition produces appreciation by individuals and groups of like-minded individuals and oftentimes goes along with hierarchy that evolved bottom-up over time. Highly qualified, as well as motivated individuals, are attracted by this type of professional recognition. A number of the selected network cases demonstrate successful mechanisms to promote peer recognition. Here is one example:

## A Case Example

**1**

For projects such as the English Wikipedia, the Wikimedia Foundation uses MediaWiki, a free and open-source wiki software that enables discussions and user communication about any Wikipedia article on the associated talk pages. There, contributing volunteers find the space to discuss the building and editing of articles, and also give kudos to editors that have done a good job. This tool helps editors build up a good reputation within the community.

## Making Results and Outcomes Visible




Visibility is of special importance to researchers, as they face the need to build up their reputation in their field via publications. A network can provide some substantial support by allowing researchers to publish findings derived from network activities in peer-reviewed journals and peer-reviewed network publications, as examples from Stata Community and Willis Research Network confirm. This increases the motivation of the individual member to contribute to the network, whilst also increasing the attractiveness of the network for potential new members.

## Some Case Examples

**1**

In 2001, Stata Corp. made contributions within the Stata Community more attractive by setting up a peer reviewed journal in which community members can publish their research findings. The editorial content of the publication is independent of StataCorp, its publisher. The publishing is financed by Stata Corp., authors do not get paid. Although the journal is not among higher ranked scientific journals, it serves as an incentive, especially for young researchers to join the Stata Community, as they can showcase their work.

**2**

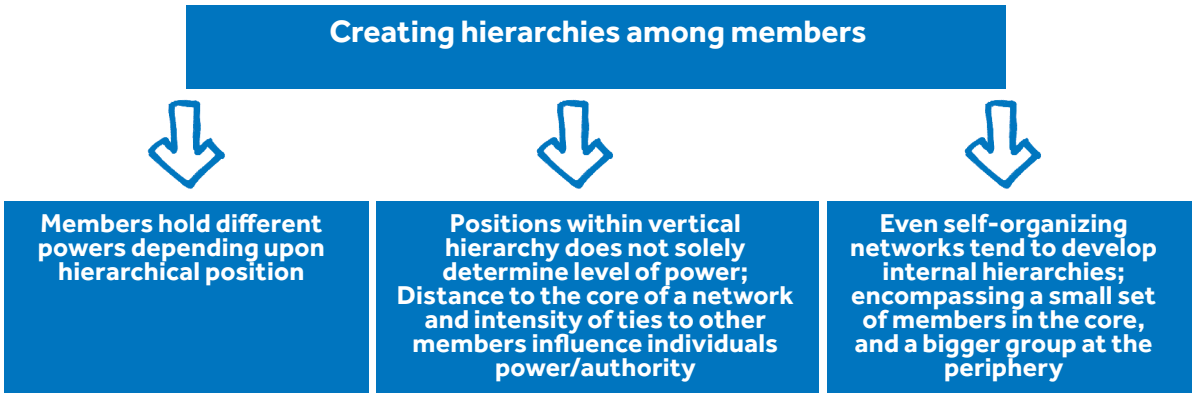
Willis Research Network uses multiple channels to increase the network's and its members' visibility. Besides doing marketing for the network's individual research projects and the related publications via online tools such as mailing lists and the Willis Research Network website, Willis organizes regular industry events and invites network members as speakers. This helps promote the work of the researchers and their affiliated institutions.

# 3.2.2 Structuring Membership

It is important to explore how to reduce the complexity of a network and its tasks through appropriate structuring of its members. Especially in large networks with complex tasks, it is essential to create substructures that enable efficient collaboration between members.

From a hierarchy perspective, structures in a network strongly define the roles that individual members can play, as well as the tasks they can engage in. Literature shows that leadership performed by members at all levels ("shared leadership") can possibly positively influence other members' motivation (e.g. Carson, Tesluk and Marrone, 2007). Interestingly enough, in each of the cases analyzed in this study, a distinct membership hierarchy has developed over time, even if the network initially started without any member structure. While some networks begin with a deliberate creation of hierarchies of membership (e.g. EIT Climate-KIC), in other cases, structures of membership emerged more randomly (e.g. Wikimedia Foundation).

## Creating Hierarchies among Members




Membership can be structured through a pre-defined or self-emerging set of hierarchical layers within a network. As shown in the EIT Climate-KIC example, this method can also be used to differentiate between those members who contribute regularly, and those who do not, but instead assume an affiliate member status. Therefore, members hold different powers depending upon their position within a hierarchy. Nevertheless, where a member assumes a position within a vertical hierarchy does not necessarily determine how much power is afforded to that member. As such, the intensity of ties beween members, and the distance of a member from the core, appears to influence the level of power and authority a member has. These principles are also true in self-organized networks given members can develop internal hierarchies as more of an organic process, rather than hierarchical structures being installed in a top-down manner by the network's central organization.

## Some Case Examples

**1**

Wikipedia, which is the most known project of the Wikimedia Foundation, displays a highly interesting case for self-emerging hierarchies. Generally, hierarchies are created by volunteers among themselves. For instance, in the English Wikipedia, subject to peer approval, contributors can apply for higher power levels (administrator, bureaucrat, steward, etc.). This structure aims at enforcing meritocracy, and functions as a quality control mechanism. Decision-making is done by peers who discuss applications, list its pro's and con's, and evaluate whether the application has received approval of around 75–80%.

**2**

Hierarchical changes evolved over time at EIT Climate-KIC. Currently, EIT Climate-KIC has two different levels of membership: core members and affiliate partners. Most core members are from the national level (currently around 30). They are key players in the national KICs, and have a seat in the Climate-KIC assembly. Core members have more say in terms of strategic direction than other members. In contrast to the core members, affiliate partners are usually based in regional KICs, and do not influence the strategic direction. They bring in expertise for specific projects/tasks.

## Creating Local Communities


Results reveal that local communities bring substantial benefits for the productivity of an international network, as they help to build up trust among members. Research conducted for this study has shown that particularly globally spanning networks highly benefit from their own local communities, and are a meaningful tool for structuring membership. This is a particularly useful instrument for reducing levels of complexity which exist in large, international networks. Therefore, implementation of such local communities appears to improve overall productivity of a network, thus stimulating greater activity among members.

## Some Case Examples

**1**

EIT Climate-KIC is organized with a European Headquarters and over 13 centres across Europe so there are multiple points of access for members of the community. Relationships with and between partners happen at both levels.

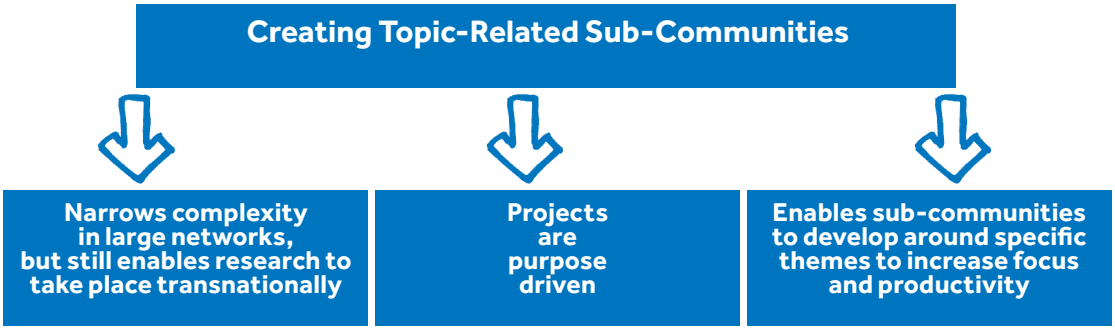
**2**

On a local level, the initiatives driven by the Wikimedia Foundation are supported by the respective local chapters. e.g. Wikimedia Danmark or Wikimedia Deutschland. The local chapters collect donations, organize projects and local events, and serve as a point of contact for the Wikimedia communities in the respective geographical area.

**3**

Impact Hub is an excellent example of a network that combines local and global structures. While the Impact Hub network connects more than 9,000 individuals around the world, the members still have a strong local rooting in their respective local Impact Hub. By combining global and local structures, Impact Hub ensures that the network is productive despite the added complexity of globality in terms of time zones, distance, culture and different languages.

## Creating Topic-Related Sub-Communities




This study shows that members can be efficiently structured around topics. This way, the overarching goal of a network can be divided into more workable pieces that can then be tackled by those members that feel most strongly connected to the respective topic. In sub-communities, members then collaborate in a more focused way and build stronger ties between each other. Therefore, structuring membership, either by distinct roles of members or by forming sub-communities around topics/ geographies could improve the efficiency of a network and create stronger ties among members. In this sense, sub-communities have the big advantage of decreasing anonymity in networks and making productive collaboration easier, and enabling a group of members to focus their work on a topic of joint interest (e.g. Communities of Practice at Impact Hub). Depending on the desired degree of self-organization, the organization of sub-communities can either be fully put in the hands of network members, or can be the responsibility of a central player in a top-down manner.

## Some Case Examples

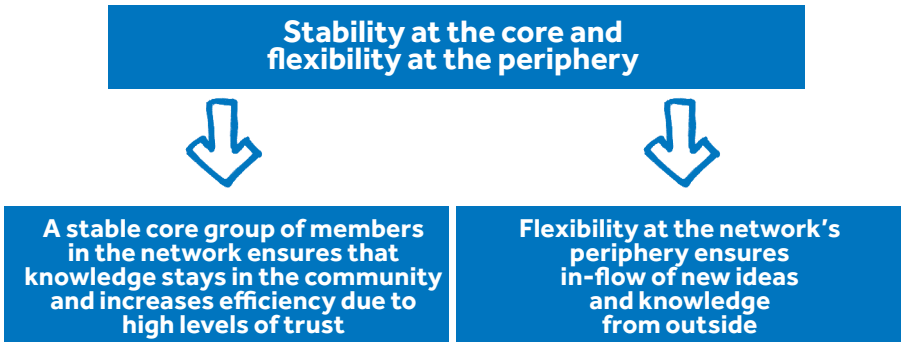
**1**

At Impact Hub, clusters are established for topics that have financial, legal, or brand implications for Impact Hub, given they are of strategic importance to the association. Each new cluster must be approved by the general assembly and is driven by several local communities. This design has been selected for cross-Impact Hub groups of learners (that comprise up to 250 members) in order to facilitate knowledge transfer between different Impact Hubs, and to spur new initiatives and innovations among the network members.

**2**

The ATLAS Collaboration initially aimed to build and develop the Large Hadron Collider (a detector based on a very complex system with different sub-systems). It made sense to structure the collaboration based on the sub-systems of the detector, considering highly specialised experts could best contribute to the network by working in a group of people that dealt with very specific, narrowed-down topics.

## Creating Stability at the Core and Flexibility at the Periphery




Analysis shows that innovative networks are characterised by being stable at the core while showing flexibility at the periphery. The study at hand has confirmed that in the core of a network, continuity, in the sense of a stable group of members, is required to be productive, as otherwise a lot of time and energy is spent on aligning the members around strategic goals and the vision. It seems a balance is required to achieve both stability and innovation. Therefore, a network with a stable core, that still allows for new members to join, and potentially work their way into the core over time, seems favourable.

## Some Case Examples

**1**

For the Willis Research Network, it is important membership continues to grow, to incorporate new people and ideas, to foster innovative research and focus on emerging areas of interest. At the same time, Willis Research Network benefits from long term relationships with academia, providing a very stable group of research institutions and researchers that have been collaborating in the network since its founding.

**2**

For the expert panels for each new edition of the NMC Horizon Report, The New Media Consortium tries to retain two thirds of the experts who have already served on previous panels. These people have demonstrated a high level of involvement over time, and have showcased high quality in their work in previous reports. In order to include new perspectives in each edition, however, every year one third of the experts on the panels are newly appointed.

# 3.2.3 Member Selection

The appropriate selection of members is crucial to the success and productivity of a network. The case analysis suggests that incorporating a heterogeneous selection of core and new members can enhance the types of collaboration that take place. This is particularly true if members represent a mix of research and practice-based occupations. Considering knowledge circulation between research and practice can consequently be enhanced, the innovative impact of such results can be more broad-reaching as a result. This is further explained below:

## Heterogeneous Selection of Founding Members and New Members

**Wise selection of heterogeneous founding members and new members over time**

- **Selection of a network's first handful of members is crucial for the overall success of the network**
- **Custom-tailored member recruitment process ensures that the "right" people join**
- **Constant network renewal ensures innovative capability and in-flow of new ideas**

Selection of a network's first members is pivotal, given it can influence the overall network, its activities, scope, and focus, whilst it is built, or emerges, over time. In the case that heterogeneity is favored within the network, the study has shown that broad representation of domains, professions, cultures, and geographies in the founding members is particularly beneficial for catalyzing innovation. Importantly, the addition of new members to a network over time ensures the network not only remains innovative, but also safeguards the network's long-term development. During the case analysis, a range of recruitment/selection processes for new members were identified, and some are explained in further detail below. Overall, it appears that successful networks have a range of approaches that work, and therefore, no single model exists with regard to structuring this process.

## Some Case Examples

**1**

Impact Hub's management team is highly attentive to the selection of founding teams and new members for new Impact Hubs, as first members represent strong role models for the kind of ambition or impact they want to see in the world. The application process is comprised of various steps, which include assigning an internal expert to support the applicant, an unbiased vouching process, and a guided on-boarding process with an assigned sister Impact Hub. This ensures that the common purpose is fully shared by the new Impact Hub, and strengthens ties in the network through familiarisation of the applicant with other Impact Hubs during the process. The lengthy application process is beneficial for the selection of additional members at local Impact Hub level, as the group of founders is well curated and fully aligned in terms of goals and vision.

**2**

In AIESEC, the recruitment and selection process of new members is independently organized by all local offices. Therefore, processes vary in terms of complexity and length based on available resources and local realities. Selection criteria are usually developed on a country level involving representatives of all local offices to create alignment towards the global community and direction.

# 3.3 Governance

This chapter explores how to balance a strong initiator role with self-organization principles. As such, governance (from the perspective of a central administrative body), will be discussed in conjunction with a network's need for readiness for change. Ownership and funding will be examined next. This is followed by a breakdown of the key activities and processes to consider when structuring governance within a network.

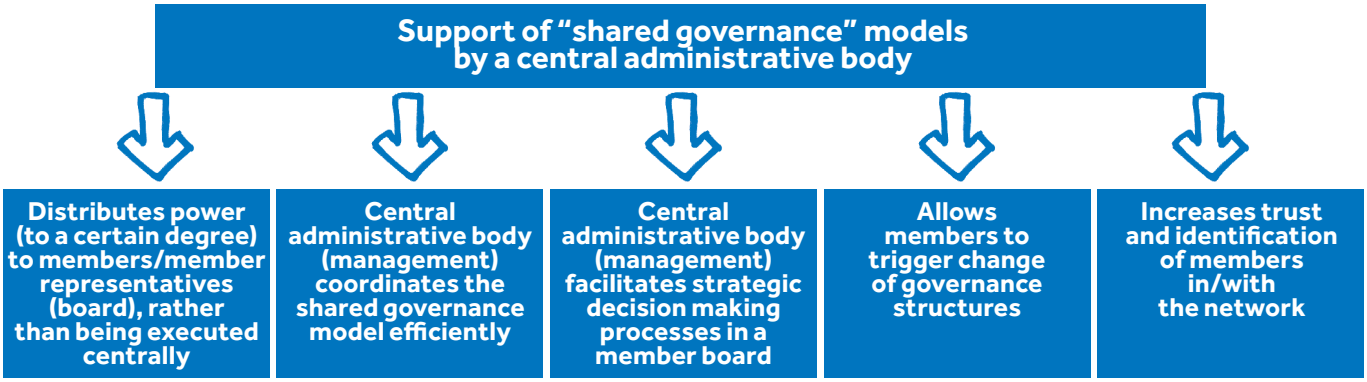
Networks are collaborative, participatory arrangements. This does not mean that they would, in comparison to hierarchies, work without any formal mechanism of control: networks need specific governance structures that depend on their goals, participants, and characteristics. Network governance is of particular importance for goal-directed networks, as it can hugely impact the effectiveness in reaching their goals. Taking into account that network participants have less formal accountability reaching goals, and fewer obligations to follow rules and procedures than members of hierarchies e.g. in organizations such as companies, network governance has to be carefully balanced with member motivation.

## 3.3.1 Balancing Network Organization with Self-Organization of Members

The case analysis has indicated the importance of balancing a strong initiator role with the self-organization of members within a network.

Importantly lessons arising from the study suggests that particular elements must be taken into consideration to balance both the organizational and human aspects of a network model.

## Central Administrative Body




Evidence suggests that strong initiating organizations (being non-profit or for-profit, e.g. foundations and corporations like MacArthur Foundation, Carnegie Foundation for the Advancement of Teaching, Willis, a global insurance broker, and ConocoPhillips, an energy multinational) tend to start with pre-defined, more centrally governed structures, and give less or no space for the self-organization of hierarchy among members.

What are the possible reasons for this?

- To ensure enough structure and control is exercised in order to maintain efficiency within a network
- To avoid inactivity given a disorganized and unfocused mass of interactions could actually inhibit members from interacting

However, several existing networks demonstrate that networks can function highly efficiently despite - or just because - they support self-organizing activities of members and member groups, and even allow for a self-organization with regard to governance. Therefore, implementation of a "shared governance" or "shared leadership" model promotes member representation.

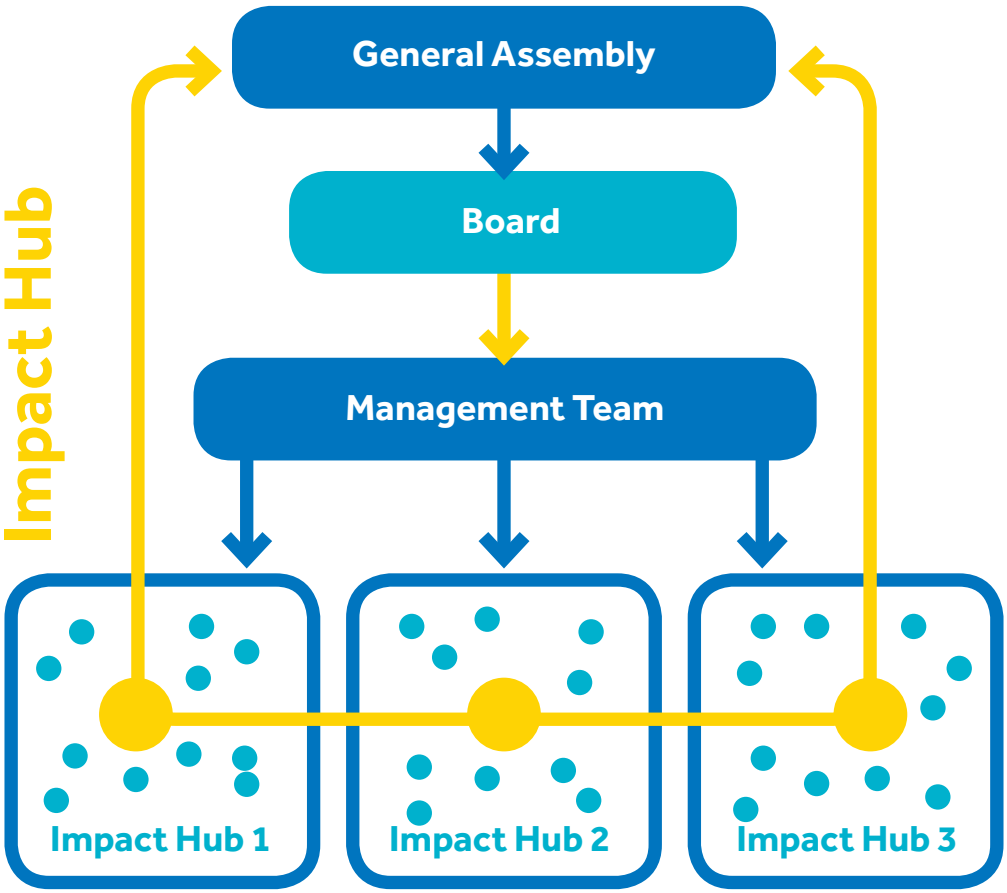
This study's results suggest that in order for a network to be successful, it is very helpful to have a central administrative body or a management team who can leverage relationships with others in an effort to guide the direction of the network's goals and objectives. This body or team can be appointed by e.g. the general assembly, and can have a very specific set of responsibilities and mandates. Adopting self-organization could enable emerging shared governance.

Figures 4, 5, and 6 demonstrate some examples of governing models gleaned from the case analysis.

Each model illustrates how governance structures have been set up, and how the locus of control is exercised.

## Some Case Examples

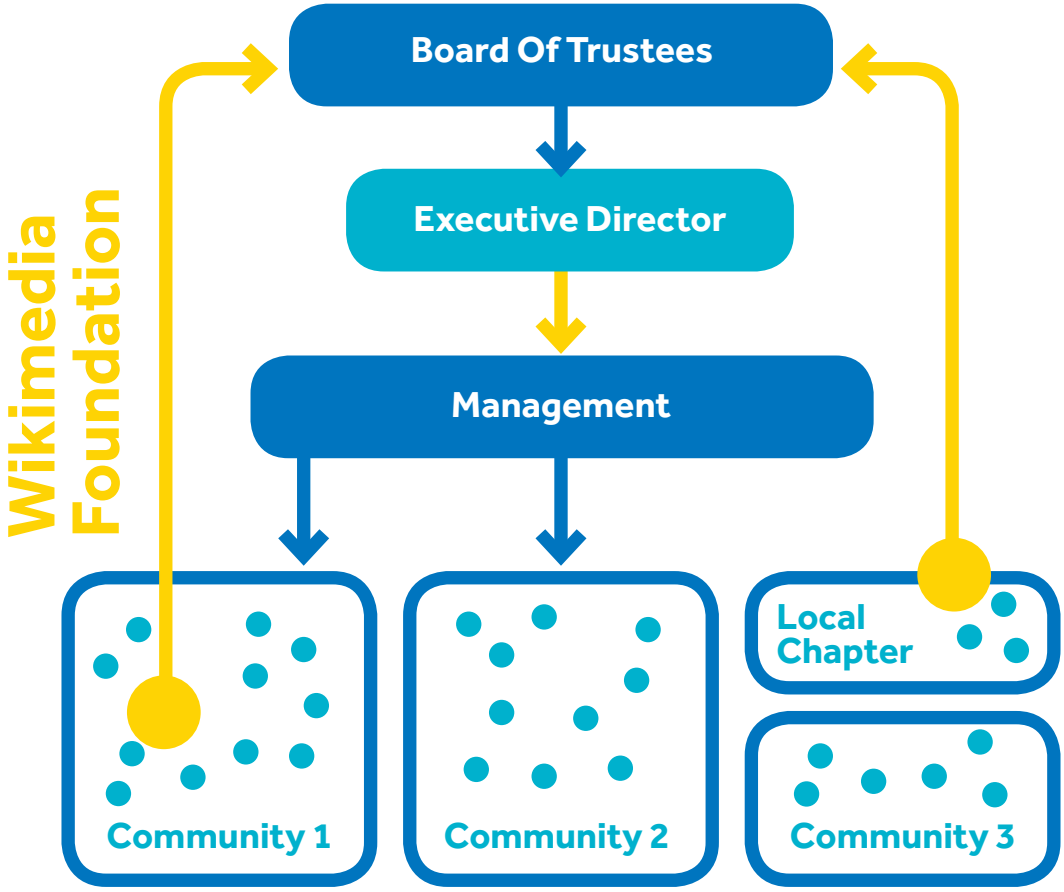
**Figure 4: Impact Hub organization** (simplified)




**1**

At Impact Hub (a global network with a highly self-organizing culture) (Figure 4), the general assembly comprises of a representative of each local community and takes important strategic decisions. It is represented by the board. The management team is in charge of executive, operational tasks and manages the local communities.

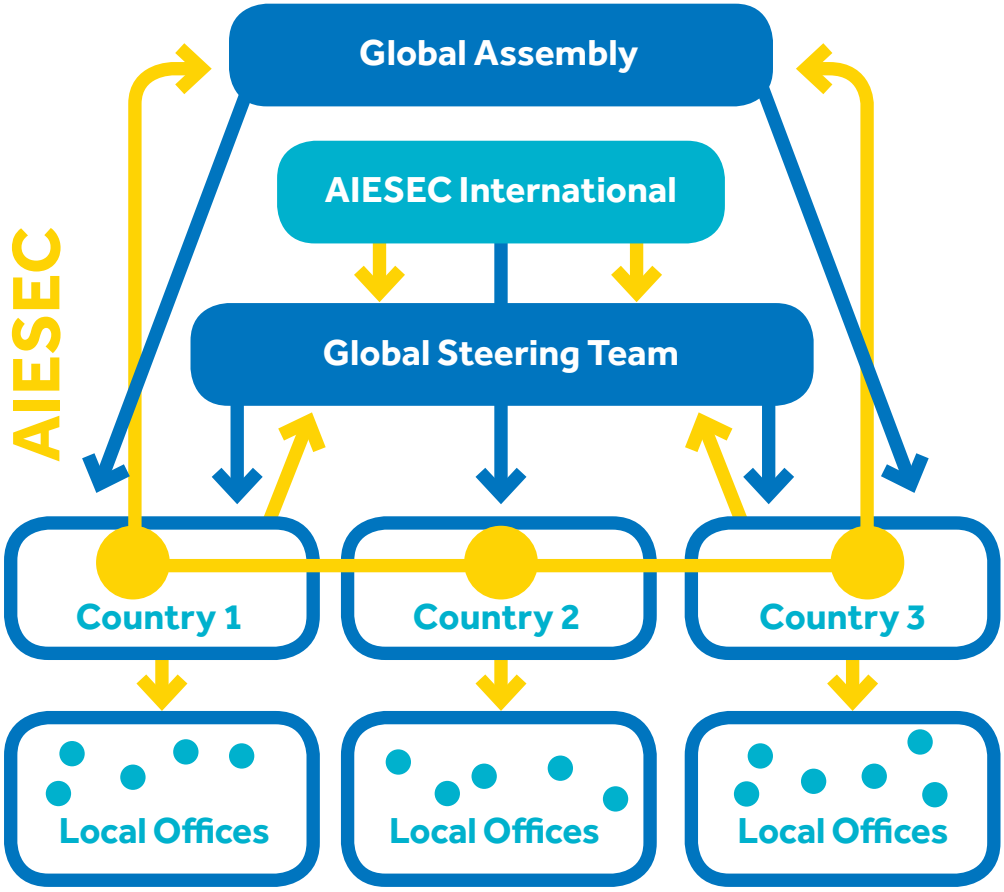
**Figure 5: Wikimedia Foundation organization** (simplified)




**2**

Wikimedia Foundation, which is also a network spanning several sub-networks (like Wikidata, language-based Wikipedia networks etc.), is led by a Board of Trustees out of which three trustees are selected by the Wikimedia sub-communities. The Board of Trustees appoints an executive director and its management is in charge of key corporate functions such as Engineering & Product Development, Grant Making and Human Resources. Additionally, Wikimedia is building an international network of associated organizations that are organized as local chapters (e.g. Wikimédia France or Wikimedia UK). Generally each community operates freely.

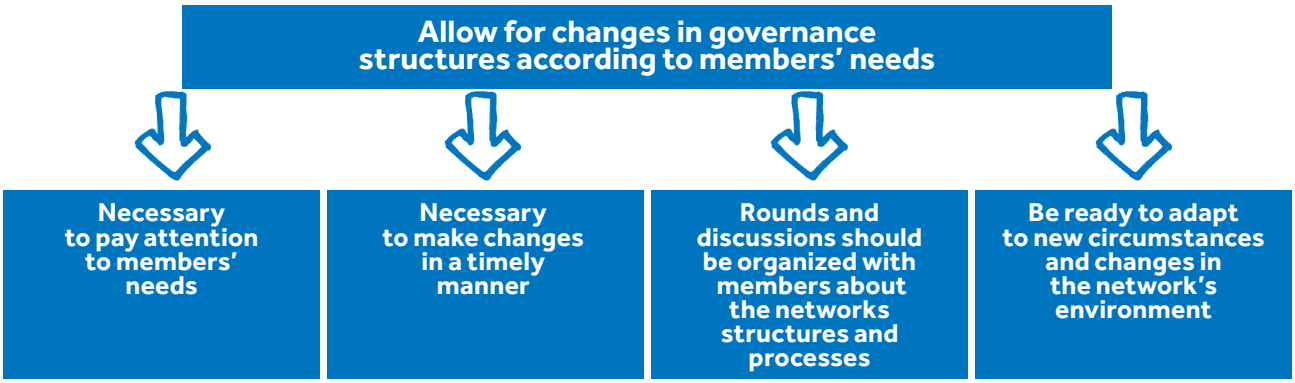
**Figure 6: AIESEC organization** (simplified)




**3**

AIESEC is led by AIESEC International, which is the highest entity within the organization, and serves as the global headquarter. However, many important strategic decisions are discussed and passed by the global assembly, which is comprised of all country chapter presidents. Members of AIESEC International do not have voting rights in the global assembly. All member countries, as well as AIESEC International, are bound to the decisions which are passed by the global assembly. Another important entity is the global steering team which is comprised of two members of AIESEC International and 10 country presidents. They can be seen as a high level consulting/working group and serve as a bridge between AIESEC International and the country presidents. Their main task is to analyze current issues and develop solution concepts that are presented to the global assembly as points for discussion.

## Readiness for Change




Importantly, networks are living organisms; Case analyses revealed that most of the networks had to carry out major changes and restructuring activities after a certain time, mostly because they discovered that the original structure did not suit their members' needs and/or changes in the environment. Therefore, networks must endeavor to become aware of requirements for change early, and have enough flexibility to be able to react.

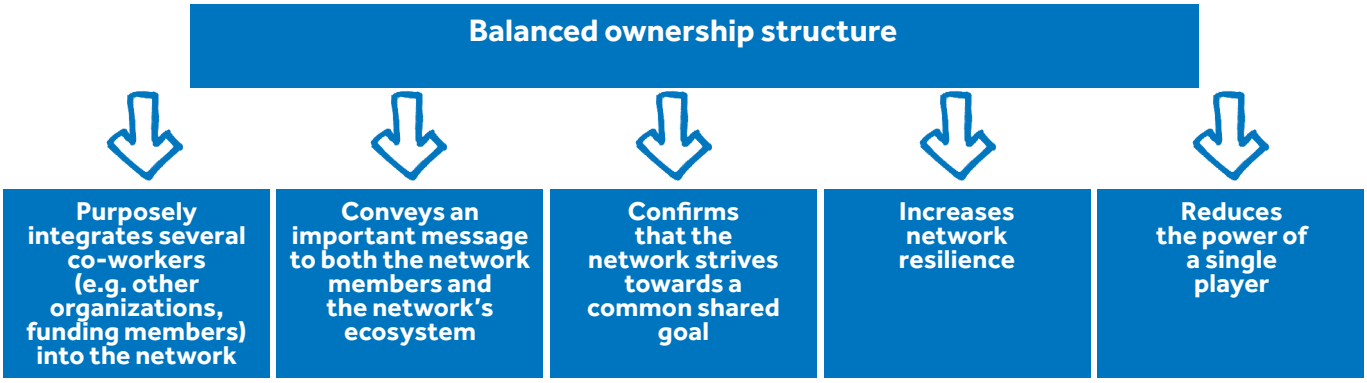
## A Case Example

**1**

The network structure of EIT Climate-KIC did not originally emerge as it is today. The community has organically grown and organized its structure for this growth. The core partners hold a degree of responsibility and account-ability for the strategic direction of EIT Climate-KIC. The levels of membership are clearly distinguished between core partners or affiliate partners.

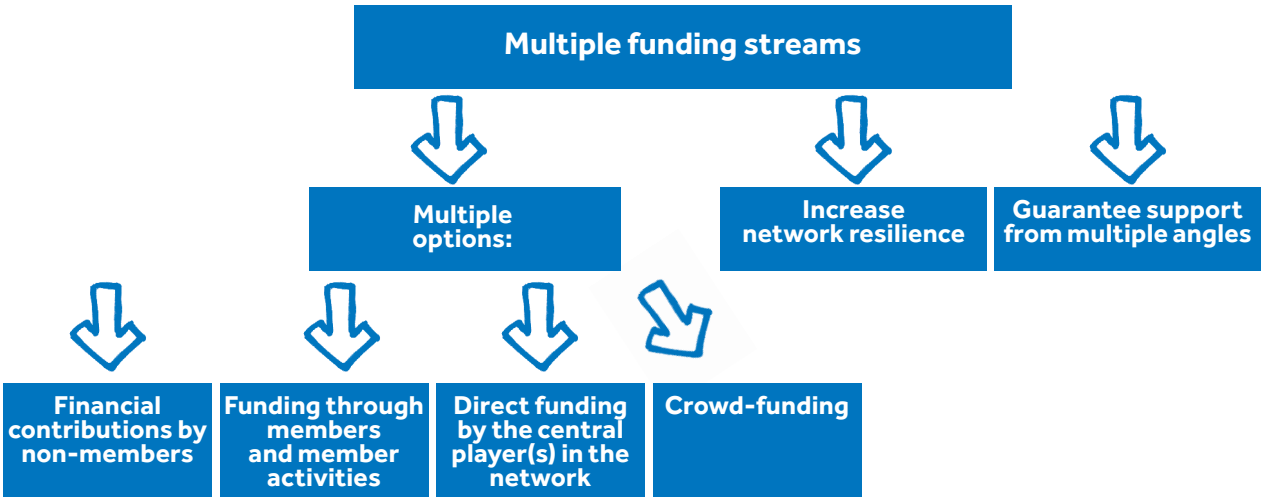
# 3.3.2 Ownership and Funding

## Balanced Ownership Structure




When deciding who should own and fund a network in order to make it resilient in the long run, several experts from existing networks emphasized the importance of balancing the power a single, central player may execute. This can be achieved by purposely integrating several co-owners into the network to create a balanced ownership structure.

## Multiple Funding Streams



Network managers and members of successful networks have emphasized that multiple funding streams help to increase the financial sustainability of a network, which is important for funding the core structure of a network and network activities. This multiple case study shows that networks require financial resources for two main elements:

- the core structure (including expenditures for administration and network management, technical infrastructure, communications, etc.); and
- network activities (such as programs and projects, events, but also financial expenditures for funded members or institutions)

Underlying patterns revealed that while network activities are oftentimes supported by funding from all of the above-mentioned sources, in most cases, non-members do not fund a network's core structure.

In addition to financial resources, networks can also consider in-kind contributions, which have proven to be of great value within a network, for example, within The ATLAS Collaboration and Willis Research Network. This could include:

- allocated manpower
- access to data
- provided infrastructure, or
- use of the network as a platform for dissemination
- access to industry expertise and subject matter experts to help define and scope research ideas

It appears in-kind mechanisms can be included within funding mechanisms in multiple directions. For example, members or member organizations can be invited or obliged to give in-kind contributions, or central players can draw on in-kind support for members' activities. Therefore, the study has revealed that several options are available with regard to resourcing a network.

## Some Case Examples

**1**

For the James Lind Alliance, individuals and organizations can form a steering group and propose new partnership topics, identifying further partners who might be interested in participating. If they are unable to find funding partners, the central administration at James Lind Alliance, or the mother organization NIHR (National Institute for Health Research), may in some cases be able to help to put an external funding consortium together (backup function). The Wikimedia Foundation relies on multiple financial sources for both its core structures and its activities. The main funding comes from donations from hundreds of thousands of individuals – among them also Wikimedia volunteers – as well as from several grants and gifts they receive, such as servers and hosting. Concrete projects of the Wikimedia Foundation like language-based Wikipedias or Wikidata are jointly financed by resources allocated by the Foundation, and by funding from external organizations.

**2**

All local Impact Hubs contribute to the central budget. Own funding at local level is not secured by the mother entity either. They themselves have to create sustainable business models to secure their activities. Beyond local activities, there is a mechanism to get co-funding from the mother entity if projects involve several local Impact Hubs. One instrument the organization successfully uses to finance projects is crowdfunding.

**3**

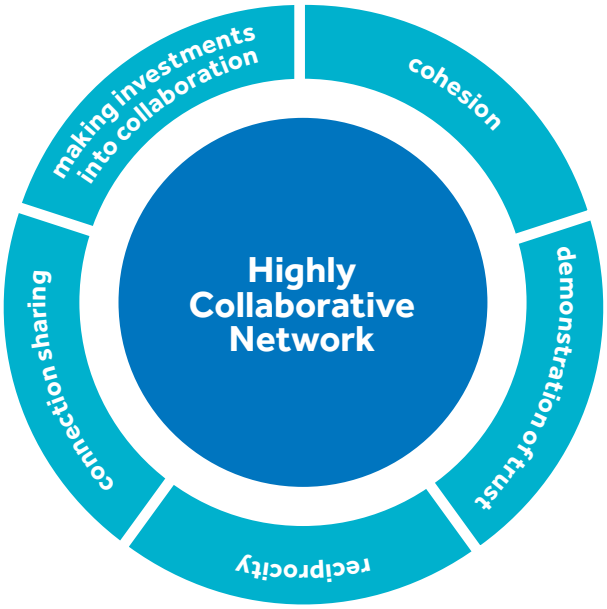
EIT, the initiator and mother organization of KICs, always requires local co-funding from its KIC consortia (universities, businesses, public organizations) to make individuals and their organizations responsible for what they do. EIT Climate-KIC is strategically planning for the long term, and is working towards being self-sustainable, and becoming less reliant on one source of funding.

# 3.3.3 Key Activities and Processes

Within a network, activities can be designed in multiple ways to sustain the network and its innovation capabilities in the long run. Nevertheless, reliance is placed on members to carry out important activities and processes, and as such, they are a crucial component within the functionality of a network. Therefore, to align with the direction and goals of a network, analysis suggests that members must intrinsically exhibit key values and norms. In addition, the study highlights several key activities and processes, which are pivotal to increasing member contribution and productivity. These are outlined with some case examples below.

## Values and Norms Contributing to Network Goals

**Figure 7. Important values for membership collaboration**




A network functions through the initiative and collaboration of its members. As such, a number of values and norms must be encouraged and protected to create trust and high levels of collaboration within a network, in order to deliver the network´s goals, and thus provide the seed-bed for carrying out key activities and processes (Figure 7).

## Some Case Examples

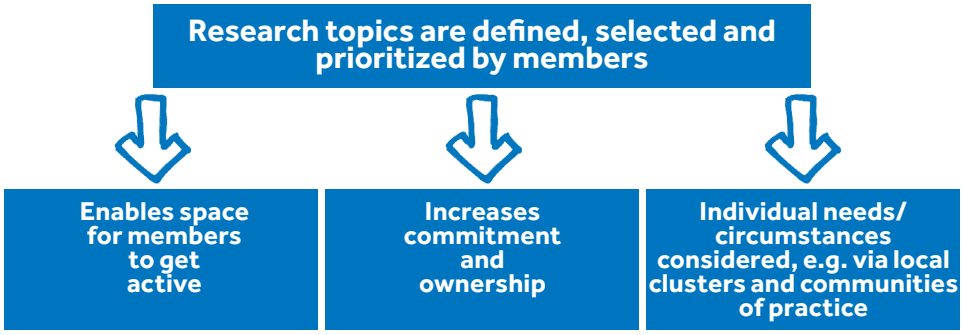
**1**

The Wikimedia Foundation has defined a code of conduct that is applicable for all Wikimedia projects. The Wikimedia Foundation's staff and members of the Board of Trustees have to abide by this code of conduct. As the respective Wikimedia communities consist of volunteers, the Foundation cannot force them to abide by it. However, the code of conduct is intended to provide some guidance, also for these volunteers.

**2**

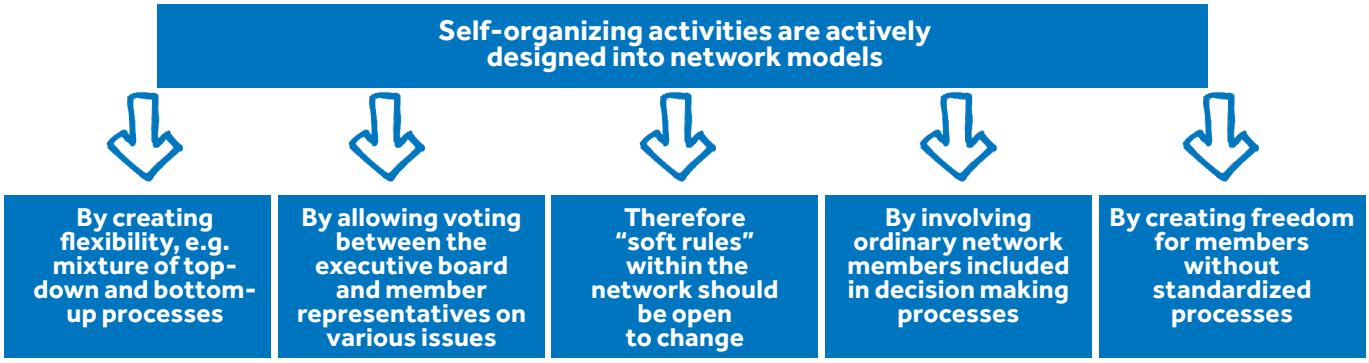
Impact Hub's values are trust, courage, and collaboration. The interviewee intimated that trust is the most crucial value, as it is a precondition for the other two values to be embraced.

## Management of Research Topics




Analysis shows that involving members in defining, selecting and prioritizing research topics increases the commitment and ownership of a network. In addition, it appears that when a network allows members to actively contribute in the proposal and selection of research topics, it increases member identification with the network. Also, by giving members the opportunity to vote, fair selection of topics can take place that both reflect personal preferences of members, and service the evolving needs of the wider research environment.

## Self-Organization of Activities




Several networks found efficient ways to involve their members (resp. their representatives) into agenda setting and decision-making processes at different levels. This appears to spur self-organizing activities within the network. Within the study, a range of organizational styles exist, varying from full self-organization with members having the possibility to initiate projects, to very structured systems encompassing approval processes for new projects. However, the analysis has provided evidence that it is important that the organizational style of member involvement is actively communicated and highly transparent, so that members know what they can do.

## Some Case Examples

**1**

The ATLAS Collaboration, being a network with an especially high degree of self-organization, established a collaboration board in which elected representatives (one or two people) of each institute and the executive board of The ATLAS Collaboration have a vote with equally distributed stakes. Each year there are three to four ATLAS Collaboration weeks, depending on the need and pressure of the members, where the collaboration board meets to clarify issues that could not be resolved at lower levels (e.g. bilaterally). During these meetings, voting takes place.

**2**

The Wikimedia Foundation allows anybody to bring project proposals forward. Ideas for projects are discussed on discussion pages and the community is invited to challenge the proposals. Currently, no standardized process exists. As a rule of thumb: The lower the scale of a project (e.g. with regard to required resources), the easier it is to start working on a project. If a project has bigger implications (e.g. with regard to infrastructure), the Foundation's management has to be asked for approval.

## Means for Communication within the Network


In goal-directed networks, successful communication and collaboration among members are prerequisites for network success. Means for communication and collaboration include both online (e.g. emailing, chatting, videoconferencing) and offline interactions (e.g. face-to-face, meetings, events). Particularly in a globalized world, oftentimes communication is hard to imagine without online channels. According to Gloor et al. (2004), physical meetings help build trust among members. Trust subsequently accelerates the process of developing a shared understanding on a topic, and allows for the exchange of ideas. Following this argumentation, it seems that face-to-face meetings increase effectiveness when collaborating. However, the overall effectiveness of utilizing online and offline methods means communication and collaboration highly depend on the nature of the collaboration, the tasks involved, and the membership structure. The heterogeneity of network members, and the orientation of tasks, dictates the exact needs for communication and collaboration.

## Some Case Examples

**1**

A highly active Stata Community member described his collaboration with two other members as a 10 year long collaborative effort without any face-to-face meetings. Three people on three different continents (Europe, North America and Australia) were heavily discussing scientific topics as well as software development issues via e-mail. Together they generated one of the most cited scientific publications about statistics, specifically in connection with Stata software.

**2**

The volunteer communities of the Wikimedia Foundation, e.g. Wikidata, almost exclusively collaborate via online tools. Interestingly, they still include certain face-to-face elements among their activities, such as the Hackathons[1] and Wikimania[2] events that spur additional motivation among the volunteers, and enable for personal contact among people who usually only communicate via the worldwide web.

**3**

Most of the work for the Horizon Project of The New Media Consortium happens in wikis, which are collaborative spaces where experts can share information and discussions about specific topics.

**1** *A Hackathon is an event in which computer programmers and others involved in software development, including graphic designers, interface designers and project managers, collaborate intensively on software projects. It usually lasts between one day and a week.*

**2** *A Wikimania event is the official annual event of the Wikimedia movement, where all kinds of projects that people are making with wikis and open content can be discovered.*

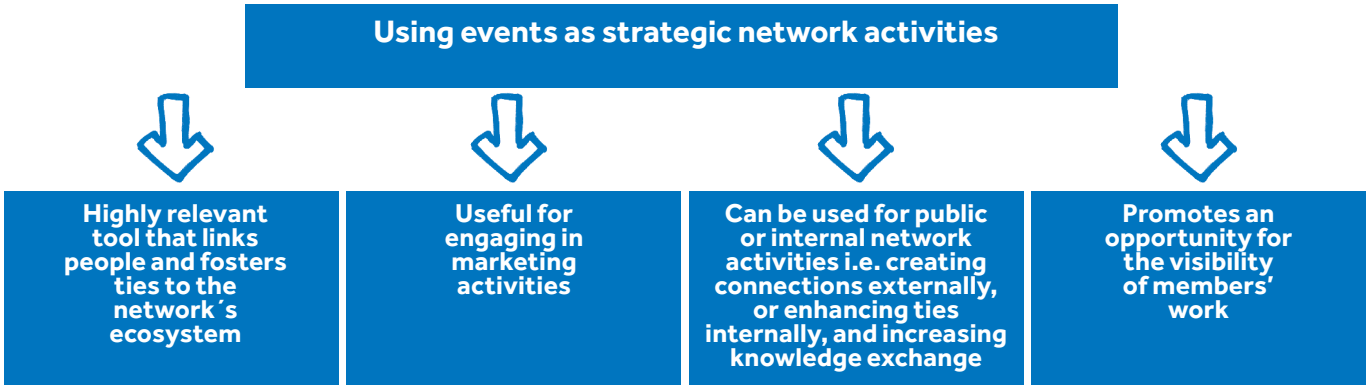
**4**

The ATLAS Collaboration successfully combines online and offline tools for communication, as this has proven to be the most effective way of designing collaboration. Particularly for highly complex topics, face-to-face meetings seem to be unavoidable, as during such meetings, people can share their opinions and get a feeling for the dynamics in the team. At The ATLAS Collaboration, certain meetings take place regularly, and others only on demand.

**5**

ConocoPhillips uses mainly text-based and online communication. The company believes strongly that meeting face-to-face regularly creates the most success, given they are important for creating the relationships that make virtual conversations work, and tacit knowledge exchanges occur more efficiently in face-to-face situations. Most of the networks have annual conferences for smaller groups. Every November the ~150 network leaders meet for a two day summit to share knowledge transfer techniques and success stories. Once every two to three years, ConocoPhillips Networks of Excellence organize functionally based meetings for larger groups (thousands of persons).

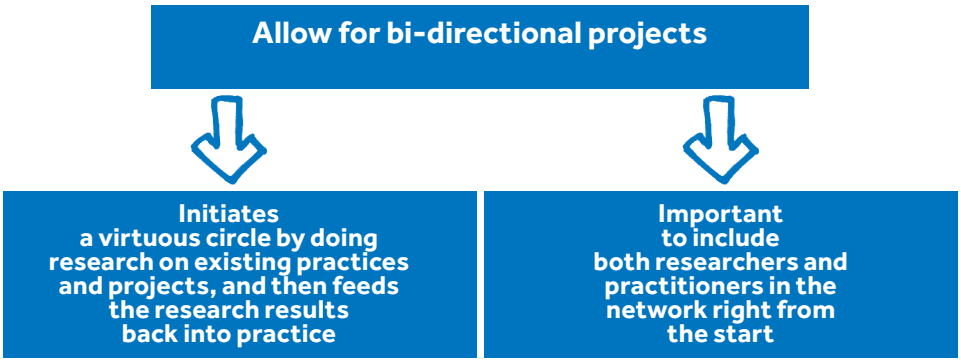
## Strategic Networking Activities




Targeted events are a strategic tool to boost networking activity. Not only does this provide increased visibility of a network and its members, but it is also pivotal for building up personal relationships between network members.

As such, this endeavor enhances ties between members, and also increases knowledge exchange, which can ultimately lead to new collaborations.

## Bi-directional Projects




With the aim of creating impact and systemic change, and implementing new solutions or approaches developed collaboratively by networks' members, some of the networks are making important steps in bridging research and practice. This usually happens by including both researchers and practitioners in the network, and through initiating projects and designing specific sets of activities to put research findings into practice, and vice versa. Therefore, it is important to enable joint projects, and include regular feedback loops in both directions to encourage circulation of knowledge, and continuously create learning opportunities.

## Some Case Examples

**1**

One of the Carnegie Foundation for the Advancement of Teaching's initiatives is to strengthen developmental mathematics teaching and learning at the college level (program called "Community College Pathways"). As such, work has been organized into "Networked Improvement Communities". Researchers are organized to work with practitioners in order to accelerate field-based experimentation on everyday practices, and practitioners work with researchers to test, revise, refine, and iteratively improve their everyday practices. They provide a structure for researchers to work on problems and priorities set by the Pathways, called the Alpha Lab Research Network, which draws on cutting edge research to deepen understanding of problems and test theory-based solutions.

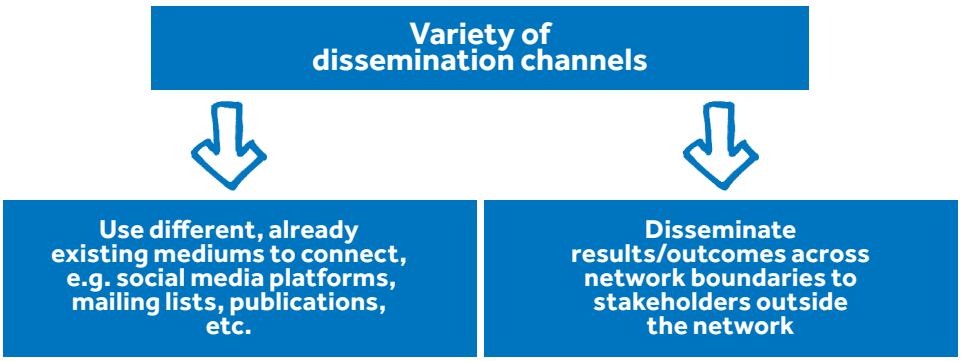
**2**

The MacArthur Connected Learning Research Network conducts both qualitative and quantitative studies on environments that support connected learning, as well as the conditions that limit access. In addition to research conducted in a wide range of sites around the US and in the UK, the network also conducts research in collaboration with partner programs that have been funded by the MacArthur Foundation. Early on, the Foundation funded a few core design experiments which became a focus for research and design iteration. Quest to Learn and YOUMedia are living laboratories for design research that inform the work of the research network. Two of the network members are practitioners who play a key role in the respective design implementations, and feed research results directly back into the practice in order to improve the implementations.

**3**

With the Priority Setting Partnerships, James Lind Alliance identifies and prioritizes current needs and uncertainties of treatments from practitioners (e.g. carer, clinicians, etc.) and patients. The aim is to create – e.g. out of the needs of patients – scientific research questions. After defining concrete research questions, James Lind Alliance actively communicates the identified research questions to relevant stakeholders (e.g. research institutions etc.).

## Dissemination Channels




When reaching out to the wider community and to external partners, virtual tools usually prevail. As mentioned above, many useful tools already exist, and can be used to target intended audiences. In addition, public events can be very beneficial for this purpose. Therefore, selection of mediums of dissemination should be aligned to the needs of a network. In addition, these channels should be maintained in order to ensure the network is creating the desired level of impact of its outcomes and results.

## Some Case Examples

**1**

Once James Lind Alliance Priority Setting Partnership has prioritized the uncertainties, the members of the Partnership and the James Lind Alliance's administrative centre actively spread the results. First, the "top ten list" of uncertainties is provided to NIHR (closely connected to James Lind Alliance). Secondly, partners are encouraged to communicate results in existing networks. Additionally, all collected uncertainties are published in the UK Database of uncertainties about the effects of treatments (UK DUETs). The database is open to the public without any registration barrier.

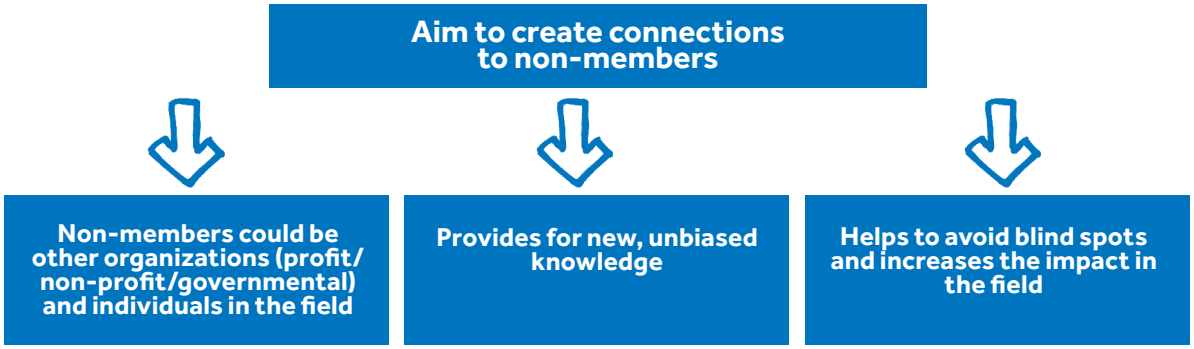
**2**

The Willis Research Network, employ numerous communication channels to raise credibility and visibility of conducted research results. Besides featuring new research papers and research results on the website, Willis organizes various industry events, and invites researchers as speakers. Press releases and social media channels are also used as mediums to reach the rest of the sector.

**3**

The New Media Consortium provides regular communication via different social media platforms (Facebook, Google+, Twitter, Flickr, LinkedIn etc. ), as well as publications in the form of electronic newsletters, and online Wikispaces where everyone can watch real-time conversations on different topics between the experts serving on panels. Network members strive to make their work more globally relevant by creating content for specific countries or regions. As such, reports are translated into multiple languages to increase accessibility and impact.

## Connections to Non-Members



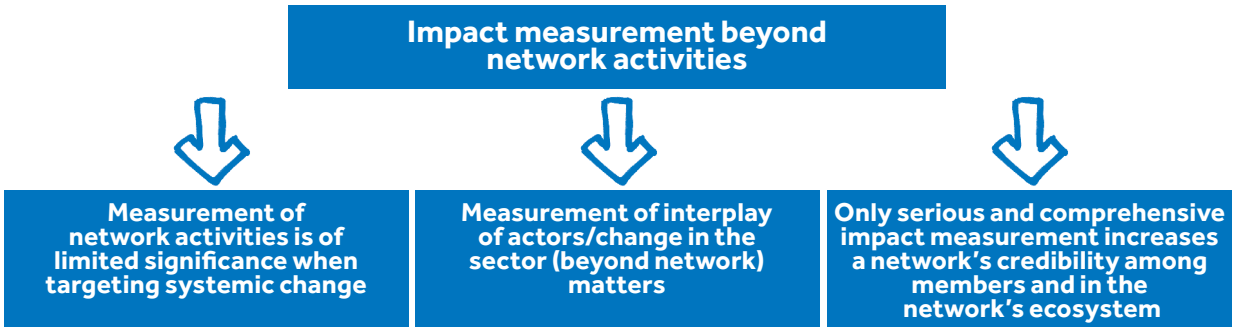

For a network, it is important not to lose the connection to network external individuals/ organizations who could provide new, unbiased knowledge (perspectives, need- or solutions-based information etc.). By engaging strategically with non-members, the network can avoid blind spots and ensure that it does not stew in its own juice. Therefore, a network that remains open to non-members in targeted ways, means it can enhance its innovation capabilities through the infusion of new knowledge into the network.

## A Case Example

**1**

James Lind Alliance Priority Setting Partnership includes non-members in a smart twofold way: Via the Priority Setting Partnership initiation, where new projects are suggested by individuals or organizations who are non-members of the network (e.g. patients, carers, associations, or universities); and by opening up their research process to include the wider public when collecting data on under-researched health areas.

## Impact Measurement




Analysis of the case studies revealed that impact measurement is one of the most challenging tasks when building and sustaining a network. Although most of the analyzed networks claim to achieve systemic change and global impact in their respective fields, only three interviewees mentioned impact measuring as a relevant topic in their network. Therefore, a network must consider what exactly should be measured, and how this should be done. In addition, achieving a balance of how such measurements are reported is paramount, as a heavy administrative burden can discourage motivated network members.

## Some Case Examples

**1**

Mizuko Ito, chair of the Connected Learning Research Network suggested that many foundations are focused on measuring the impact of specific funded interventions, rather than looking more broadly at how their investments are part of a broader set of interventions and shifts. Most commonly, programs are asked to measure the impact of a specific program, e.g. "What are the learning outcomes of the kids who went through the program?" If the foundation is only assessing the results of the one program, they are not capturing the more systemic picture of how this program fits into and complements other programs to have a more global effect.

**2**

The Impact Hub network has partnered up with the Vienna University of Economics and Business Administration to develop a comprehensive impact measurement scheme for Impact Hubs. Members are asked to evaluate the support provided by the network, the value of membership for the members, effects on society and economy, impact areas, and impact orientation, just to name a few. Further metrics are under development.

# Conclusions 4

Having explored 12 diverse examples of best practice in network model design, the case analysis has pinpointed several crucial learning points. In particular, membership and governance were the main areas where this study produced findings.

Regarding membership, it is clear that numerous drivers and incentives can be utilized to promote interaction of members. It is crucial to establish the core purpose of the network, as this not only sets the exact focus of the network, but also aids self-selection of potentially new members who may wish to contribute to the network´s activities. Aside from establishing the purpose, development of a clear mission, vision, and goals, is crucial in order to align and deliver upon the networks purpose, and provide a framework for members to understand their interaction and growth within the network.

Members are what drive the level of success a network can achieve. As such, members fostering a personalized responsibility for the network are likely to work hard to ensure its success. In addition, creating benefits for members has been proven to encourage active member participation. This can be achieved through creating a strong mechanism for peer recognition, which stimulates appreciation and trust between members, and acts as an important leadership tool whereby peers can self-organize themselves through merit based hierarchies.

Indeed, the visibility of network results, which extend beyond the borders of the network, is also pivotal. This can create symbiotic benefit for both members and the network itself, given visibility can first of all act as a motivator for members to contribute to the network; secondly, increase potential member interest in the network, thus introducing new streams of knowledge; and thirdly, it can also increase the practical impact of the work of the network, thus bridging research with practice.

Nevertheless, structuring membership appears pivotal to reducing complexity within network models, particularly large networks. Therefore, the case examples point towards maintaining a stable core that not only deals with the administration of the network, but maintains its core founding principles. This ensures knowledge stays within the community, and promotes high levels of trust through efficient management at the core. Case examples also highlight the importance of flexibility at the network´s periphery, given this promotes an in-flow of new ideas and knowledge from outside the network. This new knowledge is essential to feed the work of the network, whilst also promoting dynamism for organically innovative, growth and success.

As such, the strategic selection of a new network´s founding members is crucial, as their knowledge and drive is what feeds the growth and success of any network. Therefore, tailored customization of the recruitment process is highly necessary if the “right” people are to be recruited. Over time, it is also imperative to not only maintain the network, but also to allow network renewal, so that the innovative capability and in-flow of new knowledge and ideas are continuously regenerating. Therefore, maintaining equilibrium is imperative to balance the continued maturity of a network with organic renewal.

Regarding governance, analysis showed that despite networks being collaborative, participatory agreements, for them to function properly, a formal mechanism of control is advisable. Nevertheless, the level to which this locus of control is implemented has proven to have differing effects on the outcomes of the

networks under review. As such, the goals, characteristics, and participants of a network can determine the end design of the governance structure. In particular, the study suggests that finding balance between the adoption of a central administrative body (designed to maintain the efficiency, functionality, and core goals of a network), and self-organization (whereby members have more power and freedom to trigger change in governance structures), will enable a model of "shared-governance". This in turn stimulates more trust within the network, and promotes member "buy-in" of activities, given a network's readiness for change can then align with the changing needs of its members.

This principle can be extended towards incorporating balanced ownership within the structure of a network. Case analysis suggests that the purposeful integration of several co-owners into a network can increase the network's resilience, given all members truly strive to achieve a common goal. Adoption of this more flexible and inclusive structure avoids the pitfalls and polarization strong central governance can potentially impose.

Financial resources are needed to fund the core structure of a network and its activities. The study revealed that it is important to source multiple streams of funding, to avoid risks associated with reliance on only one source, and increase a network´s long-term resilience. Importantly, analysis showed that in most cases, non-members do not provide funding which is then used for a network´s core structure, with most funds generated from, or by, members, or the central player within a network. Therefore, network developers must consider how a network will maintain sustainable resources for the functionality of the network itself throughout its lifetime.

In addition to financial resources, in-kind contributions are also proven to be of great value to a network. How such contributions are adopted remains at the discretion of the network developer. Therefore, members could either be invited or obliged to give in-kind contributions; alternatively, the central player could draw on in-kind support for member activities.

Several key activities and processes also arose from the study. As a network is driven by its participants, an understanding of the values and norms required to build trust and stimulate high levels of contribution is paramount. Therefore, network designers should extend enough freedom to members as a means to achieve the goals of a network.

Lessons arising from the analysis showed that research activities defined, selected, and prioritized by its members, provides space, and increases commitment and ownership of the network and its activities. Combining various means of communication between members (both online and offline) was proven to increase trust and productivity, particularly in complex and creative tasks. Also, connecting research with practice enables a virtuous cycle through circulation of learning and dissemination of research results, both within a network community, and also more broadly to the wider public.

In this regard, impact is of great significance, both as a means to make visible the outcomes of the network, but to also aid in the process of making connections to non-members. In fact, analysis showed that such connections are pivotal to introduce new knowledge, and extend scope, so as to avoid blind spots in network activity. Overall, case analysis suggests that, although challenging, measuring impact

of a network is imperative to gauge interplay between actors, and research impact within their field. When targeting systemic change, it is crucial to comprehensively measure the network´s credibility among members and the wider ecosystem to determine impact. This is useful to inform future direction and any required organizational enhancement. Nevertheless, networks must take care not to overburden members with such administrative tasks, given this can demotivate members, and thus reduce productivity.

To conclude, this comparative case analysis indicates that most purpose-driven research networks neither attempt bridging research and practice, nor show significant self-organizing activities. However, bridging research and practice can highly increase innovativeness, as the creation of knowledge transfer loops promotes the formation of sustainable and applicable research outputs.

In addition, productivity can also be enhanced, as affording network members enough freedom enables them to design and carry out projects which are not only of interest to them, but also allows them to decide how to do this, thus increasing interaction and member contribution. Analysis also suggests that although networks do need certain hierarchies to work properly, the dominance of a central player (who solely defines all major structures and processes) imposes risks regarding sustainability, credibility, and accountability of a network. As such, experienced network managers pointed out the importance of defining the roles developers of networks want to play, early on in the process.

Results also suggest that generating a network with high member contribution and collaboration is important, and can be initiated by decisively attempting high levels of self-organized activities within the network. This can be achieved by creating selected user communities, and social networks based on community-led approaches.

The study shows that collaborative arrangements of individuals not only achieve higher levels of commitment and trust among members, provided a certain level of freedom to operate is given, but also increase their productivity in comparison to pure top-town organized structures. As such, careful planning and application of a distinct set of governance, leadership, and cultural instruments is necessary to enable self-organized activities. Therefore, mobilization of members is crucial to avoid wasting resources on inactivity, which can result from running a top-down organizational structure. In addition, it appears that those networks which aim for, and generate, true win-win situations for individual members and the overall network, are able to sustain high levels of member contribution over time. In these cases, structuring membership around (self-organized) hierarchies, topics, and geographies was highlighted as an important tool to make a high level of self-organized activities work, especially in large networks.

# Authors and Imprint

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**winnovation consulting gmbh** (www.winnovation.at)
was commissioned to conduct this study.
The following team members were responsible for
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# Annex: Information about Selected Cases

7

## AIESEC

**Short description:** AIESEC is a global, non-political, independent, not-for-profit organization run by students and recent graduates of institutions of higher education. It provides young people (mostly students) with intense leadership experiences within the organization, and operates global internship programs for its members to foster cultural exchange.

**Founded:** 1948
**Mission/Vision/Intention:** Empowering young people for peace and fulfillment of humankind's potential
**Sector of activity:** Youth Leadership development
**Size of the network:** 100,000 members in 125 countries

**Web address:** https://www.aiesec.org

## Carnegie Foundation for the Advancement of Teaching (CFAT)

**Short description:** The Carnegie Foundation for the Advancement of Teaching is an independent policy and research center. The goal of the network is to develop networks of ideas, individuals, and institutions to advance teaching and learning. With this purpose, they bring together scholars, practitioners, and designers to solve the practical problems of educational practice. Toward this end, they work to integrate the discipline of improvement science into education with the goal of building the field's capacity to improve.

**Founded:** 1905
**Mission/Vision/Intention:** "The Carnegie Foundation for the Advancement of Teaching aims to realize educational improvement that is deep, widespread and enduring."
**Sector of activity:** Educational research
**Size of the network:** 67 staff members

**Web address:** http://www.carnegiefoundation.org

## ConocoPhillips Networks of Excellence

**Short description:** ConocoPhillips Networks of Excellence is one of the biggest internal knowledge networks. It provides global access to high-quality learning and development through collaboration opportunities in the field of engineering and geoscience to their employees and support roles like IT and HR.

**Founded:** 2004
**Mission/Vision/Intention:** "The focus is on business transformation that leads to additional business value."
**Sector of activity:** Exploration & production in the field of energy (oil and gas)
**Size of the network:** More than 125 networks serving 12,500 employee members and 4,500 contractor members, which totals 17,000 network members.

**Web address:** http://www.conocophillips.com/Pages/default.aspx

## EIT Climate-KIC (European Institute of Innovation and Technology Knowledge and Innovation Communities)

**Short description:** The Knowledge and Innovation communities of the European Institute of Innovation and Technology connect leading edge research centers and practioners, which are scattered all over Europe. The EIT Climate-KIC is the EU's main climate innovation initiative. It is Europe's largest public-private innovation partnership focused on mitigating and adapting to climate change. Climate-KIC consists of companies, academic institutions and the public sector.

**Founded:** 2009
**Mission/Vision/Intention:** "Our vision for the future is to provide the people, products and leadership to address the challenge of global climate change."
**Sector of activity:** Climate change mitigation and adaptation
**Size of the network:** 6 co-location centers and 6 regional centers across Europe

**Web address:** http://eit.europa.eu/activities/innovation-communities

## Impact Hub

**Short description:** The Impact Hub is a locally connected and globally embedded community of individuals, organizations and businesses. The community pursues the goal of jointly creating platforms and experiences that inspire, connect and enable individuals and institutions around the world to sustainably impact society through entrepreneurship.

**Founded:** 2005
**Mission/Vision/Intention:** "We believe a better world evolves through the combined accomplishments of creative, committed, and compassionate individuals focused on a common purpose."
**Sector of activity:** Social entrepreneurship
**Size of the network:** More than 9,000 members worldwide

**Web address:** http://www.impacthub.net

## James Lind Alliance

**Short description:**
The James Lind Alliance is a non-profit making initiative which brings patients, carers and clinicians together to identify and prioritize uncertainties, or 'unanswered questions', about the effects of treatments that they agree are most important.

**Founded:** 2004
**Mission/Vision/Intention:** "Tackling treatment uncertainties together"
**Sector of activity:** Medical research
**Size of the network:** Over 500 organizations and individuals

**Web address:** http://www.lindalliance.org

## MacArthur Connected Learning Research Network

**Short description:** The MacArthur Connected Learning Research Network is an interdisciplinary network dedicated to understanding the opportunities and risks for learning afforded by today's changing media ecology, as well as building new learning environments that support effective learning and educational equity.

**Founded:** 2011
**Mission/Vision/Intention:** "Dedicated to researching and reimagining learning for the 21st century"
**Sector of activity:** Educational research
**Size of the network:** Around 60 members, advisors, associated researchers and staff

**Web address:** http://www.macfound.org/networks/research-network-connected-learning

## Stata Community

**Short description:** Stata Community is an independent user community with a strong influence on the Stata software solution and on the support of the statistic software of Stata. The users develop new solutions and actively collaborate in the community, with the purpose of making the software usable for researchers.

**Founded:** 1994
**Mission/Vision/Intention:** "We discuss Stata, statistics, and Stata and statistics."
**Sector of activity:** Development and improvement of the statistics software Stata
**Size of the network:** About 5,300 members

**Web address:** http://www.stata.com/community

## The ATLAS Collaboration

**Short description:** The ATLAS Collaboration is an international collaborative research network between physicists and students from more than 177 universities and laboratories. The ATLAS Collaboration is one of the largest collaborative networks in the physical sciences.

**Founded:** 1992
**Mission/Vision/Intention:** Developing and testing the standard model of particle physics and searching for new physical theories beyond
**Sector of activity:** Research on fundamental physics
**Size of the network:** 3,000 researchers

**Web address:** http://atlas.ch

## The New Media Consortium

**Short description:** The New Media Consortium (NMC) is an international community of experts in educational technology. The role of the NMC is to help their member universities, colleges, museums, and organizations drive innovation across their campuses.

**Founded:** 1993
**Mission/Vision/Intention:** The consortium serves as a catalyst for the development of new applications of technology to support learning and creative expression
**Sector of activity:** Educational technology
**Size of the network:** More than 250 colleges, universities, museums, corporations, and other learning-focused organizations

**Web address:** http://www.nmc.org

## Wikimedia Foundation

**Short description:** The Wikimedia Foundation is a nonprofit organization, dedicated to encouraging growth, development and distribution of educational content. The Wikimedia Foundation operates some of the largest collaboratively edited reference projects in the world, including Wikidata, a collaboratively edited knowledge base. It is intended to provide a common source of certain data types (e.g. birth dates) which can be used by Wikimedia projects such as Wikipedia.

**Founded:** 2003
**Mission/Vision/Intention:** "Imagine a world in which every single human being can freely share in the sum of all knowledge. That's our commitment."
**Sector of activity:** Multilingual, web-based, free-content, wiki-based internet projects
**Size of the network:** since its start, over 48 million registered users and numerous anonymous contributors made contributions

**Web address:** http://wikimediafoundation.org/wiki/Home

## Willis Research Network (WRN)

**Short description:** Based in London, led and sponsored by Willis, a global insurance broker and risk advisor, the Willis Research Network was formed in 2006 to integrate science, insurance and resilience at a scale never before envisaged. It has become the world's largest collaboration between public science and the financial sector with a membership of around 50 leading research institutions.

**Founded:** 2006
**Mission/Vision/Intention:** "The Willis Research Network enables the risk and (re)insurance sector to confront the challenges of managing risk and delivering resilience within environmental systems, financial markets and public policy."
**Sector of activity:** Risk analysis and Re/Insurance in the field of natural catastrophe, legal liability, financial and security issues.
**Size of the network:** Around 50 leading research institutions (e.g. KIT, University of Reading, Tohoku University and Princeton University)

**Web address:** http://www.willisresearchnetwork.com