       IAB Thoughts on the Role of the Internet Research Task Force (IRTF)

Status of This Memo

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Abstract

   This document is an Internet Architecture Board (IAB) report on the
   role of the Internet Research Task Force (IRTF), both on its own and
   in relationship to the IETF. This document evolved from a discussion
   within the IAB as part of a process of appointing a new chair of the
   IRTF.

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1. Introduction

   As part of the process of appointing a new chair of the Internet
   Research Task Force (IRTF), the IAB considered the future role of the
   IRTF both on its own and in relationship to the IETF. The IAB has
   expanded this discussion into this IAB report on the role of the
   IRTF, and circulated this document for wider community review. (As
   one result of this discussion, Aaron Falk was appointed the new chair
   of the IRTF in March 2005.)

2. The Relationship between the IRTF, the IAB, and the IETF

   Before 1989, the IAB (then called the Internet Activities Board)
   oversaw a number of task forces. In 1989, organizational changes
   were made to coalesce these task forces into two groups, the IETF and
   the IRTF. The IRTF was tasked to consider long-term research
   problems in the Internet, and the IETF was to concentrate on short-
   to medium-term engineering issues related to the Internet. At this
   time, all of the task forces except the IETF were restructured as
   IRTF research groups. For example, the End-to-End Task Force became
   the IRTF's End-to-End Research Group (E2ERG) and the Privacy &
   Security Task Force became the IRTF's Privacy & Security Research
   Group (PSRG) [IABWebPages] [RFC3160] [E2ERG].

   Much of the early participation in the IETF as well as in the IRTF
   was from the academic and research communities. (We don't have a
   citation from this, but a look at the members of the IAB from the
   1980's and early 1990's shows IAB members from institutions such as
   MIT, UCLA, BBN, UCL, SDSC, and the like, while IAB members from the
   last few years were more likely to list their organizations at the
   time of service as Cisco, IBM, Microsoft, Nokia, Qualcomm, and
   Verisign [IABWebPages]. We expect that a study of authors of RFCs
   would show a similar trend over time, with fewer authors from the
   academic and research communities, and more authors from the
   commercial world.) While the IRTF has continued to have significant
   participation from the academic and research communities, the IETF
   has focused on standards development and has become dominated by the
   needs of the commercial sector.

   The IRTF has generally focused on investigation into areas that are
   not considered sufficiently mature for IETF standardization, as well
   as investigation of areas that are not specifically the subject of
   standardization, but could guide future standards efforts.

   The IRTF Research Groups guidelines and procedures are described in
   RFC 2014. The IRTF Chair is appointed by the Internet Architecture
   Board (IAB), and charters IRTF research groups (RGs) in consultation
   with the Internet Research Steering Group (IRSG) and with approval of

the IAB. The chairs of the RGs comprise the main part of the IRSG,
although the IRTF Chair can also appoint at-large members to the
IRSG.

As RFC 2014 states, the IRTF does not set standards. While
technologies developed in an RG can be brought to the IETF for
possible standardization, "Research Group input carries no more
weight than other community input, and goes through the same
standards setting process as any other proposal" [RFC2014] (Section
1.1). This is necessary to ensure that RGs don't become a part of
the standards process itself.

RFC 2014 continues to say that "since the products are research
results, not Internet standards, consensus of the group is not
required" [RFC2014] (Section 3). However, the NameSpace Research
Group was one RG that did require consensus decisions; this group was
chartered exclusively to make a recommendation to the IETF.

RFC 2014 goes on to describe Research Group operation, meeting
management, staff roles, group documents, and the like. This
document is not a revision of RFC 2014, but instead a more wide-
ranging discussion of the possible roles of the IRTF.

The past history of IRTF Chairs is as follows: Dave Clark
(1989-1992); Jon Postel (1992-1995); Abel Weinrib (1995-1999); Erik
Huizer (1999-2001); Vern Paxson (2001-2005).

2.1. Differences between IRTF and IETF Groups

Two key differences between IRTF research groups and IETF working
groups are that IRTF groups are not trying to produce standards of
any kind and that the output of IRTF groups does not require
consensus within the RG, or broad consensus from the IETF.

In some cases, IRTF groups have acted as research groups with minimal
constraints, creating a community for discussing research proposals,
with mature proposals "tossed over the fence" to an IETF group for
standardization. The Reliable Multicast Research Group (RMRG) was an
example of such a group, with standardization efforts in the Reliable
Multicast Transport working group (RMT).

2.2. Research Groups as Non-blocking Entities

As stated in RFC 2014, the IRTF does not set standards. It is
important that, unless clearly specified otherwise by the IESG,
research groups do not act as gateways controlling the advancement of
standards, experimental RFCs, or informational RFCs produced by
working groups in the IETF.

   Similarly, as stated in RFC 2014, existing research groups also do
   not necessarily prevent the creation of new research groups in
   related areas. Of course, when considering a proposal for a new
   research group, it is perfectly appropriate for the IRTF and the IAB
   to consider the relationship with existing research groups. However,
   "multiple Research Groups working in the same general area may be
   formed if appropriate" [RFC2014] (Sections 1.1 and 2.1).

3. The Range of IRTF Groups

   There is a wide range of ways that IRTF groups can currently be
   structured. Some of the most significant are:

   * Membership: Groups might be open or closed (in terms of
     membership). The End-to-End Research Group and the NameSpace
     Research Group are both past examples of closed RGs.

   * Timescale: While RGs are generally long-term, groups could be
     either long-term (ongoing) or short-term with a specific goal; the
     NameSpace Research Group is an example of an RG that was chartered
     as a short-lived group [NSRG]. We note that RFC 2014, written in
     1996, assumed that RGs would be long-term: "Research Groups are
     expected to have the stable long term membership needed to promote
     the development of research collaboration and teamwork in exploring
     research issues" [RFC2014] (Section 1).

   * Relationship to IETF: Groups can include a goal of producing
     proposals to be considered in the IETF (e.g., the Anti-Spam
     Research Group) or can be independent of any current or proposed
     work in the IETF (e.g., the Delay-Tolerant Networking Research
     Group).

   * Range of activities: IRTF activities could consist not only of
     research groups and their associated meetings, workshops, and other
     activities, but also of separate workshops or other one-time
     activities organized directly by the IRTF. To date, however, the
     IRTF has not organized such activities other than in the form of
     BOFs at IETF meetings.

   * Both research and development: IRTF groups can focus on traditional
     research activities, but they could also focus on development, on
     tool-building, on operational testing or protocol interoperability
     testing, or on other activities that don't fit the framework of a
     working group (WG). Instead of having a specific plan for the
     evolution of the IRTF, we think that this will have to be explored
     over time, with discussions between the IRTF Chair, the IRSG, and
     the IAB (and with the IESG as appropriate).

As discussed above, the IAB believes that the range of research
groups could be expanded further, in terms of timescale, relationship
to the IETF, range of activities, and range between research and
development.

4. Issues for the Future

This section discusses some of the issues in the future evolution of
the IRTF. A key issue, discussed in Section 4.1 below, concerns how
the IRTF can best contribute on questions of network architecture.

Similar issues could be raised in how the IRTF can best contribute to
incubating technology for later development in the IETF. We
emphasize that we are not proposing that the IRTF should become a de
facto holding point for technologies that are not making clear
progress in the WGs. Some technologies might not make progress in
WGs because of key open issues, making an RG an appropriate step.

Other technologies, however, might not make progress in WGs because
of a lack of interest, inherent design weaknesses, or some other
reason that does not justify moving it into an RG instead.

4.1. IRTF Groups and Network Architecture

One interest of the IAB is how progress is made on issues of network
architecture. This includes help in developing and evaluating new
architectures, and in understanding the evolving architecture and
architectural issues of the decentralized, deployed Internet
infrastructure. This also includes developing tools that could be
used in the above tasks.

The spectrum of potential activities for IRTF groups ranges from the
visionary to the specific, including the following:

* Architecture: Where are we, and where do we go from here?

* Incubation: We think we know where to go, but we don't yet have
  the tools to get there.

* Problem focus: We have some specific problems to solve or potential
  solutions to evaluate.

Some RGs have addressed broad architectural issues, with a mixed set
of results; examples of such RGs include the End-to-End Research
Group, the NameSpace Research Group, and the Routing Research Group.
For other RGs (e.g., the Host Identity Protocol Research Group), the
focus of the group is to study a specific proposal, with wider
architectural issues raised at workshops held by the RG. Finally,

some RGs are in specific areas with well-defined boundaries, with
topics that don't have broad impact on the wider Internet
architecture.

Where an IRTF RG lies on the spectrum of possible activities depends
in part on where the IETF and the field itself lie. For example, in
areas such as network management where the IETF community has doubts
or concerns about where we should be going with management
technology, it would be useful for the IETF to be able to look to the
IRTF for architectural evaluation. In contrast, in areas where the
architectural approach is better established, an RG with an
incubation approach might be more appropriate. Finally, where many
pieces of the puzzle are in place, but some significant problems
remain, an RG with a problem focus might make sense.

For those RGs with an architectural focus, it would not be
appropriate for the IAB to charter an RG to come up with *the*
architectural perspective on some topic; any such result would
necessarily have to pass through the wide feedback and consensus
procedures of the IETF. However, it is appropriate for the IAB to
ask an RG for exploration and discussion of an architectural issue;
e.g., the IAB has asked the Routing Research Group for feedback about
research objectives for inter-domain routing improvements
[IABMinutes]. It is also possible for RGs to make recommendations on
architectural or other issues, with or without the request of the
IAB; e.g., the End-to-End Research Group [RFC2309] and the Crypto
Forum Research Group have both made recommendations to the general
IETF community. However, some RGs function better as a breeding
ground for ideas, and not as a consensus-building community. For
example, while the NameSpace Research Group was "an invitational
research group chartered exclusively to make a recommendation to the
IETF" [NSRG], the group never achieved a clear consensus.

While the IAB doesn't have clear answers on the evolving role of the
IRTF in addressing and understanding open architectural issues, this
is an area that will be explored in the upcoming years, in
collaboration with the IRTF Chair. One of the goals of the IAB is to
make more use of the IRTF in investigating architectural issues.

4.2. The Relationship between the IETF and the IRTF

Another area that could use more attention is making the relationship
between the IETF and the IRTF more productive. For many (though not
all) of the research groups in the IRTF, part of the power of the RG
lies in its relationship to the IETF. Of current and recent RGs, for
example, this is true of the Anti-Spam (ASRG), the Crypto Forum
(CFRG), Host Identity Protocol (HIP), and a number of others.

The interchange between the IETF and the IRTF could be improved in
both directions: from the IETF to the IRTF in terms of information
about IETF problems that could be helped by further research and
development, and IETF evaluation of RG efforts and direction; and
from the IRTF to the IETF in terms of reports, documents, proposals,
BOFs, and the like. Current paths for this interchange include IRTF
reports at IETF plenary meetings; RG meetings before or after the
IETF, or in one of the scheduled sessions during the IETF; workshops;
and IRTF documents.

One possibility (for some research groups, not for all of them) could
be for an RG to have a design-team-like relationship to the IETF or
to an IETF working group, with an RG charter that includes an
agreement of deliverables, with some notion of the time frame for
those deliverables. An issue that would need to be resolved here is
when is it appropriate for an RG to undertake such a relationship vs.
an IETF WG doing it directly, as is sometimes already done.

We note that as in WGs, RGs are composed of volunteers who make their
own choices of research and engineering topics. RGs are usually
started by a proposal from individuals who want to form the RG.
Thus, it is important to realize that IRTF activity often will not be
viable in the absence of individuals who would like to take on the
particular work, and this tempers the usefulness of IETF WGs
providing input to the IRTF regarding desired IRTF directions or
activities. For example, while the IETF can request specific
research activities from IRTF RGs, results will require individuals
within the RGs willing to undertake this work.

IRTF RGs have been of significant benefit to the IETF; a number of
IETF proposals began as discussions in the End-to-End Research Group,
for example. At the same time, the interchange with RGs can take
significant time and effort from WG chairs and from ADs, sometimes
with little to show for it if the RG's direction is at odds with that
desired by the WG chairs or ADs. One task for the future is to
improve the dialogue between the IETF and the IRTF while not
increasing the load on WG chairs and ADs.

One role of the IRTF could be to open some new communication paths
between the research community and the IETF. Over the last ten
years, as the Internet has grown and matured, and the difficulties of
making changes to the Internet architecture have increased, the
research community's participation in the IETF has dropped. We are
not necessarily expecting to reverse this trend, but it would be good
for the output of the research community to reach the IETF somewhat
more than it does now, and for the research community to hear more
from the IETF.

We would like to shape an IRTF that meets the needs of researchers in
this domain, providing interaction both with other researchers and
with other industry technologists. In this respect, we would like to
see an IRTF that has momentum that is self-sustaining from voluntary
efforts, that undertakes (some) work on topics that align to the
interests of the IETF, and in such a fashion continues to be of
material assistance to the IETF standardization effort. We would
also like to see an IRTF that continues to give thoughtful
consideration and input to the development of the Internet
architecture.

4.3. Relationships between the Research and Development Communities

One of the current and future roles played by the IRTF is that of a
bridge between the research and development communities; the research
community in general is less of an active force in the IETF than it
was in the beginning of the IETF's history. At the risk of resorting
to stereotypes, IETFers sometimes view the network research community
as irrelevant or disconnected from reality, while researchers
sometimes view the IETF as insufficiently thoughtful or as an
unproductive place for investing one's research energies. There is
also a natural difference in timescales, with the IETF more focused
on near- to medium-term issues, and researchers often more focused on
longer-term issues.

Unfortunately, disconnections between the research and development
communities can hurt both the research and the development. Just as
one example, from "Failure to Thrive: QoS and the Culture of
Operational Networking" [B03]: "Remarkable intelligence and energy
have been lavished upon the architectural design of QoS, but much
less attention has been devoted to careful analysis of the relevant
problem space from an operational or economic perspective. This
discrepancy is symptomatic of a broken (or attenuated) feedback loop
between network operations and research." Thus, one potential role
of the IRTF is to help provide a productive forum that improves the
communication in both directions between the two communities.

4.3.1. What's in a Name: On the Name 'Research Group'

There have been proposals that for some groups the name "Research
Group" is incorrect or unnecessarily off-putting to some potential
participants and that other names such as "Architecture Group" might
in some cases be more useful. Such a terminology change is
potentially quite significant, and needs to be evaluated in terms of
the IAB's overall role and responsibility for guiding the development
of architectural considerations within the IETF. Another issue is
that different RGs have different mixes of people, in terms of

   researchers from academia, industry practitioners, and IETF WG
   participants; it is not clear how changing the names would affect
   this.

4.4. The RFC Track for IRTF Documents

   Currently, RFCs produced by RGs are published as individual
   submissions, under the review of the RFC Editor [RFC3932]. There is
   currently a discussion (and pending Internet-Draft) about the need
   for a venue for publishing RG output that is clearly marked as
   research, as opposed to the output of an IETF WG. This is both to
   more clearly distinguish RG output from standards documents of the
   IETF and to give RG output more visibility than that of individual
   submissions. Similarly, RG output might have different reviewing
   criteria from that of other documents considered as individual
   submissions. This discussion is ongoing.

   More visibility for RG Internet-Drafts could increase the level of
   interchange between the RG and the rest of the community.

   It would also be helpful to decrease the delay in the publication
   time for IRTF RFCs. Anything that *increased* the publication time
   would probably be counterproductive.

5. Security Considerations

   There are no security considerations in this document.

6. Acknowledgements

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   Bob Braden, Rajeev Koodli, J.P. Martin-Flatin, and Gabriel Montenegro
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7. Normative References

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    We note that when this document was begun, Sally Floyd was a member
    of the IAB, and Vern Paxson, as IRTF chair at the time, was an
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