Research coordination function under NGA

This document sketches our views on the research coordination function under ATIS NGA. In the following, we assume that this function is part of the working group for technology directions (WGTD).[1]

In the big picture, we view NGA as having a "push/pull" role, regardless of how its specific organization will settle. The push part is about influencing the national strategy on 6G, and lobbying the government to promote the importance of 6G research and increase available funding from various agencies. The pull part is about reaping the benefits of the lobbying effort, and translating it into funding proposals leading to research projects that deliver on the 6G vision. We propose that the WGTD will have the operational role for pull on behalf of NGA, ensuring that the 6G research priorities are realized with research projects. As will be discussed in further detail, here we assume that on one end the steering group owns the 6G research priorities, and on the other end the 6G Research Initiative (6GRI) consists of the actual research projects, which take place outside of NGA.

The recent focus on US 6G research activities has put the spotlight on the complicated US research landscape. Many government agencies and departments are present in this landscape, providing funding primarily to academia but also to industry, hosting their own labs conducting research, and engaging in collaborations. NGA has to be adept at navigating this complicated landscape and leverage its enormous resources to spur US 6G research. Our ambition is to spur academic research and industry-academia collaborations in the direction of 6G, fueled by government funding. But we need to work with the established funding mechanisms on their own terms. We believe our approach with an emphasis on an operational role for WGTD will afford us the flexibility to thrive in this landscape.

In the remainder of this document, we first re-iterate our "push-pull" strategy for NGA, then we cut to the chase and focus on the operational role for research coordination of the WGTD, and how it fits within NGA. Then we backfill with our argumentation, including the research we wish to promote in a pre-competitive phase, the NSF partnership proposal as a leading pilot project, the types of funding opportunities, and the evolution of projects over time.

NGA and push-pull

The NGA structure is still under construction, but at a basic level we view its role as a push-pull function, as shared on the first FMG meeting in November 2020 (Figure 1). The push part is about influencing the national strategy on 6G, and lobbying the government to promote the importance of 6G research and increase available funding from various agencies. Our preference so far is research in the narrower sense, in contrast to full blown R&D in the sense of product development. But if large funding were made available for R&D we would of course have to reconsider.

The pull part is about reaping the benefits of the lobbying effort, and translating it into funding proposals leading to research projects that deliver on the 6G vision. Here we assume that on one end the steering group owns the 6G research priorities, and on the other end the 6G Research Initiative (6GRI) consists of the actual research projects, which take place outside of NGA. We propose that the WGTD will have the operational role for pull on behalf of NGA, ensuring that the 6G research priorities

[1] We use group names such as WGTD as they were recently stated in NGA discussions around Jan 2021. The names and boundaries may move around.

are realized with research projects. The essence of WGTD should be to reduce friction in the interactions between industry, academia and government, and facilitate the initiation of research activities. It would serve as a community, with information sharing about funding opportunities, matchmaking among different parties to coalesce around projects of common interest, reporting on research outcomes, organizing workshops with funding agencies etc.

Proposed role of Working Group for Technology Directions

We propose that the Working Group for Technology Directions (WGTD) will have the operational role for pull on behalf of NGA. Key elements of WGTD include:

- Engage with government agencies to initiate and expand opportunities
    - Advise on calls for proposals along the research themes of NGA.
    - Invite agencies to workshops with NGA community.
- Facilitate common interest groups to coalesce on funding proposals
    - Successful proposals then become projects executed outside NGA, each following the framework agreed with its funding source.
- Reduce friction with proposal processes
    - Prepare vetted templates for different types of project proposals and different agencies, reducing bureaucratic hurdles.
- Disseminate information on progress in ongoing projects
    - The community learns outcomes, identifies new opportunities, recognizes new trends.
- Report to the steering group and identify gaps
    - Provide the steering group a view of progress, and identify gaps with respect to the research priorities.

By default, we wish for WGTD to be a single group, to emphasize the system aspects and cross pollination among different interest groups. Over time, subgroups may be formed, or even multiple parallel working groups. A summary drawing of the operational role WGTD is shown in Figure 2.

In keeping with operational role, we propose that the boundaries of WGTD are:

- Northbound interface to the steering group, to receive priorities and report back on them
    - The steering group would own the priorities and research themes of NGA
- Southbound interface to 6GRI, which consists of the actual funded or ongoing projects.
    - Projects would run according to their different templates
- Also interfaces to outreach groups as needed.
    - In particular Research Liaisons and Government Relations

A summary drawing of the place of WGTD within NGA and its internal and external connections is shown in Figure 3.

Having sketched the role of the WGTD, we now provide our argumentation and put it in context.

6G research

It's important to establish the general scope of the research we wish to support. What we mean by 6G or next G research is technical advances aimed beyond the natural evolution of 5G, which will still take

several releases of the standard over multiple years. Without getting bogged down in timelines, we can think of the target date for 6G to be “around 2030”. Typically, the advent of a new “G” provides opportunities more radical changes, unconstrained by backwards compatibility. The technologies that drive such changes need time to develop, and more time to be integrated and evaluated within a complex system, and yet more time to begin reducing them to practice in a “pre-standards” phase. Working back from 2030, we feel there is some urgency to get going and move forward. The time to support academic research towards 6G is now.

Precompetitive phase

In our view, the early phase of research should be precompetitive in nature, allowing relatively close collaboration with academia and within industry, and resulting in openly available published outcomes. We need to join forces with others to create and sustain the initial momentum, and this can only happen with cooperation and openness.

Later as we move to a pre-standards phase and a full competition, companies would choose to champion certain basic technologies and further tune them and reduce them to practice internally. Some of these technologies become part of standard contributions or proprietary product solutions.

NSF partnership

For the past few months, we have been engaged in discussions with NSF and industry partners about setting up a multi-party partnership on 6G. The purpose is to spur early academic research towards our 6G vision. The partners and NSF define the theme of the proposal solicitation. As of this writing, the basic funding structure is $500 K per partner per year over 3 years, matched 1 to 1 and possibly more by NSF, depending on the eventual number of partners. An optimistic timeline would have the solicitation out in a few months with the winners announced in the fall and projects starting by year end.

In the context of NGA, we view this NSF partnership as a leading pilot for pull. In this particular instance, the funding comes from industry and government and is earmarked for academia, and we adopt the NSF partnership model with all its associated mechanisms. It would constitute a template for how to set up new projects or extensions under 6GRI. This illustrates how WGTD can reduce friction.

Categories of pull opportunities

The NSF and DoD examples serve to remind us that here are many ways in which we may be able to leverage government resources, which fall roughly in the categories below. In each case, there are appropriate mechanisms regarding patents, publications, ownership of the work etc., and they may be very different. As stated before, a very useful role for WGTD would be to create templates for the different categories, based on previous successful examples. That way, as group of potential partners organize a proposal to a certain agency, they know the terms of engagement beforehand. Hopefully negotiations would be simplified to a few key details. In addition, this flexibility in engagement allows us to adapt and follow the money. A 6GRI operating in command and control mode would struggle with the pull, and end up pushing on a string trying to harmonize different projects.

We list the main categories of pull opportunities:

Government funding for our own research

We may apply for government funding on our own or in partnership with industry or academia. The recently launched DoD spectrum sharing group of projects exemplifies this category.

Government match for our own funding

We may trigger funding by initiating a public private partnership where we shape the scope and benefit from government funding match. The NSF partnership exemplifies this category.

Augment government funding with our "in kind" staff time

We may augment a government funded project of interest by contributing our own staff's time to collaborate with the project. We would take the staff allocation on our own budget. The ongoing NSF PAWR program enables such a setup, and the staff time is accounted for as part of our support to the program.

Augment government funding with our in kind equipment

We may augment a government funded project of interest by contributing our own equipment to the project. The NSF PAWR program also enables such a setup, and the equipment cost is accounted for as part of our support to the program.

Evolution of projects over time

In addition to different agencies and different categories of funding, the WGTD needs to have the flexibility to handle the evolution of projects. In a roughly 10 year time span, we expect that initial projects would tend to be small and exploratory, with sub-million dollar budgets focused on basic research and involving a handful of persons. Later larger center type projects would have multiple million dollar budgets and involve dozens of persons. Also, some later projects would focus on large experimental testbeds with high infrastructure costs. In turn, such testbeds would spawn a new wave of small experimental projects, and so on. This evolution of projects is illustrated in Figure 4. We wish for the WGTD to evolve along with the various opportunities and continue to support the research community along this journey.

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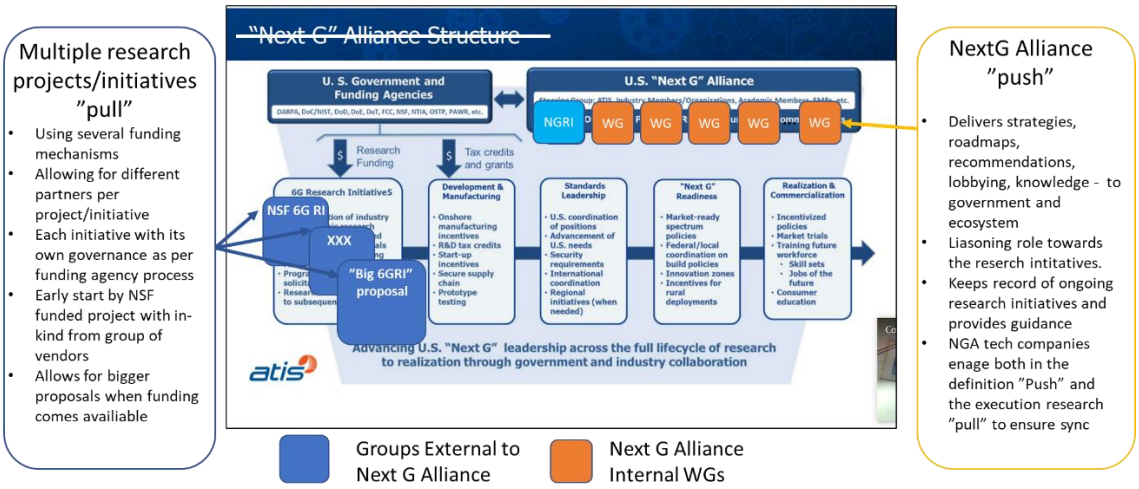

Figure 1. Relationship NextG Alliance to Research Initiatives - a push/pull model

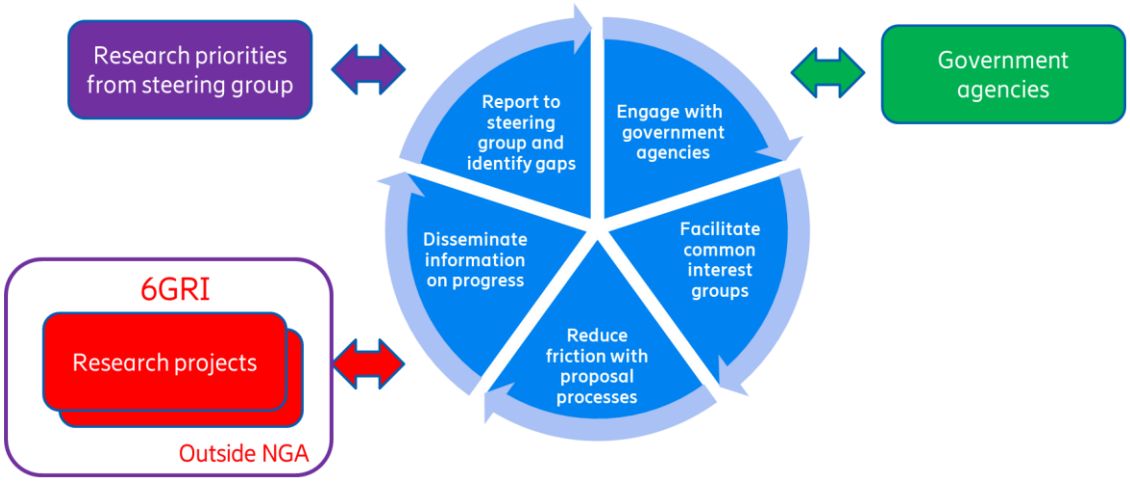

Figure 2. Operational role of WGTD.

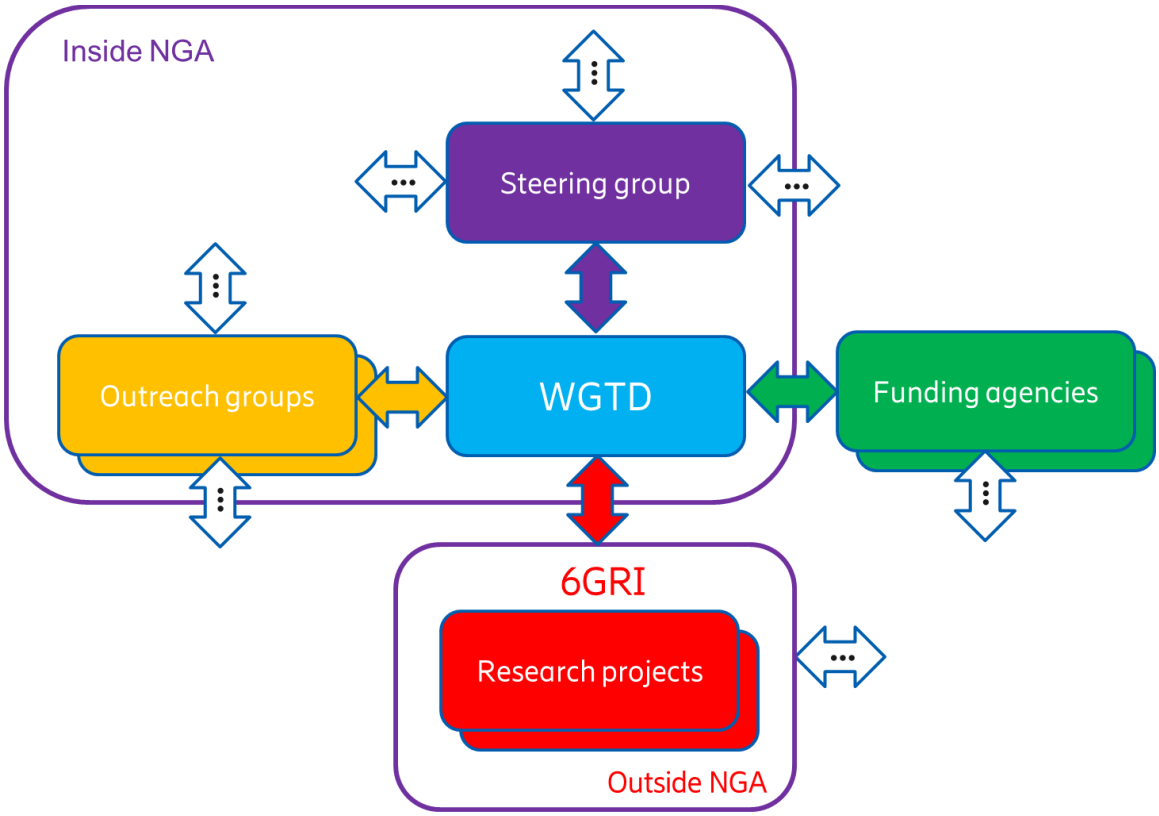

Figure 3. Place of WGTD in context of NGA. The dotted arrows indicate other interfaces which are downplayed here.

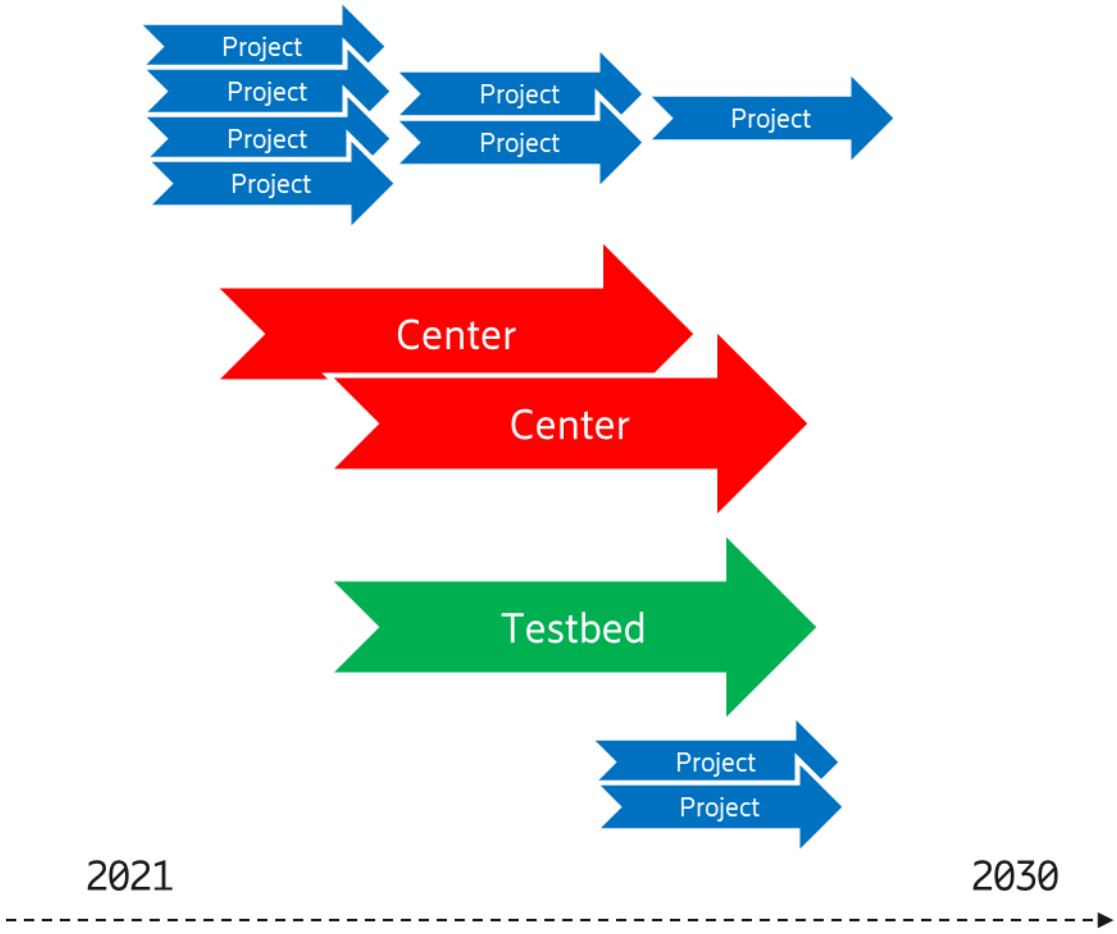

Figure 4. Evolution of research projects over time.