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Article

Agile management of innovation networks—A theoretical approach

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Abstract: This paper explores the role of the agile approach in managing interorganizational relationships in innovation networks. Design/methodology/approach. Relevant literature related to agile team management, network theory, innovation theory and knowledge management was studied. Based on collaboration between different approaches, a conceptual model for agile management of an innovation network was generated. Conceptual modeling was supplemented with graphical notation (diagram) of the main elements of the model. At the stage of testing the conceptual model, the action research method was applied, which provides an opportunity for organizational innovations to be carried out with the participation of researchers. The object of the pilot implementation of the conceptual model is the Bulgarian division of a global non-governmental organization (NGO) dedicated to community service. The organizational innovation applied in the testing of the model is related to improving the communication environment between individual teams (clubs), which are autonomous, but in the conditions of a network can generate projects for common, large-scale initiatives for community service. Findings. The pilot testing of the model shows its applicability, insofar as a traditionally managed structure switches to an agile communication model, in which horizontal connections become more frequent and knowledge between individual participants is transferred more efficiently. The possibility of decentralized decision-making creates the potential for generating numerous new and larger-scale initiatives for the benefit of the final beneficiaries. The participants in the network have also outlined some shortcomings, such as the need for better preliminary preparation when introducing organizational innovations in order to adequately explain and accept them.

Keywords: innovation networks; network management; conceptual modelling; action research; agile, knowledge management

1. Introduction

The modern economic and social environment is marked by increasing complexity and dynamism, which largely require adopting an innovative approach to create and maintain competitiveness and sustainability. In this context, the creation of innovations in networks is accepted by some researchers (Hurmelinna-Laukkanen et al., 2022; Iqbal, 2020; Yaqub et al., 2020) as one of the most effective ways of cooperation between organizations, through which to achieve the exchange of knowledge, technologies, and resources. In the literature, innovation networks are divided into two main types (Rank, 2008): formal and informal, each with its own structural features, management mechanisms, and implementation capabilities.

Argyres et al. (2020) explore some of these features in relation to the management of formal networks. They identify the presence of a high level of control and formal structure, which, on the one hand, facilitates coordination but can limit flexibility and create challenges in adapting to change. Their study also introduces another important point about the specifics of more centralized research and development activity,

namely that it leads to a wider range of innovations. Still, the organizational mechanisms that underlie this relationship are insufficiently studied. This limits the information on the extent to which the formal network can be used as a lever to influence the results of scientific research.

On the other hand, informal innovation networks are built based on social ties, personal contacts, and mutual trust between individuals or organizations, without the need for contractually regulated relationships. Researchers define them as a type of social capital and an informal institution of the relevant business environment at the same time (Horak, 2022). This introduces the study of informal networks as an intersection of social capital, social networks, and (informal) institutional theory. In the scientific literature (Horak et al., 2020; Iqbal and Piwowar-Sulej, 2023) one of the main advantages of informal networks that emerge is the ability to generate innovative ideas by quickly responding to changes. This relative freedom, however, can lead to difficulties in coordination and assessment of progress, as well as limit the possibilities for accountability and strategic planning (Alsarhan and Al-Twal, 2024).

The theory validates the claim that, depending on the specifics of organizations and their form of cooperation, it is possible to apply fundamentally different approaches to managing innovation processes (Ojasalo, 2018). Some are more effective in a strictly hierarchical structure and increased control, while others adopt a more agile approach. In the first so-called traditional approaches to management, the distribution of roles and responsibilities is clearly defined. This to some extent facilitates coordination and provides predictability in formal networks (Bertello et al., 2022; Iqbal and Piwowar-Sulej, 2023). Due to the specifics of informal networks, other models are not as effective. This is because the management of the informal environment is based primarily on trust and mutual understanding, which are not typical of the strongly regulated system (Al-Twal et al., 2024). Some authors identify relevant shortcomings in applying only one approach and the other (Whetsell et al., 2021) (Greany et al., 2024). In the traditional approach, there are lack of flexibility and limited adaptation to changes, which can hinder innovation. When fully implementing the agile approach, major deficiencies are found in terms of possible problems with accountability and sustainability of joint projects in the absence of a formal structure.

In this regard, the principles of agile management themselves, including adaptability, process flexibility, and decentralized decision-making, may be particularly suitable for managing innovation networks, taking into account the need to balance structure and freedom, and considering the type of thr network – formal or informal.

2. Materials and methods

In this paper, a mixed research strategy is applied, which includes several methods. Relevant literature related to several main topics has been studied: agile team management, network theory, and, in particular, features of formal and informal networks, innovation theory, and knowledge management. Based on a collaboration between different approaches, a conceptual model for agile management of an innovation network has been generated. Conceptual modeling is supplemented with

graphical notation (diagram), and the main elements of the model are described in their interrelation with the previously formulated principles of agile management.

At the stage of testing the conceptual model, the action research method was applied, which provides an opportunity for organizational innovations to be carried out with the participation of researchers. The object of pilot implementation of the conceptual model is the Bulgarian division of a global non-governmental organization (NGO), dedicated to community service. This NGO is located in over 200 countries in the world, including Bulgaria. The organizational innovation applied in the testing phase of the model is related to improving the communication environment between individual teams (clubs), which are autonomous, but, in a network environment, they can generate projects for common, large-scale community service initiatives.

3. Results and discussion

The study focuses on the institutionalization and functioning of the network in terms of the capacity for the absorption of innovations by the participants (Green et al., 1999; Giuliania and Bell, 2005; Lee et al., 2010). The existing mechanism for open innovation (Laursen and Salter, 2006) based on the attraction of knowledge and resources, outsourcing of intellectual property, and introduction of new business models shows that interaction with external partners is key to successful absorption. The diffusion of knowledge and know-how is carried out through intensive communication and sharing between individual participants—researchers and organizations, as well as other stakeholders (Brown and Duguid, 2001; Malerba et al., 2016).

The application of the agile project management approach shows higher efficiency than the traditional one (Bogdanova et al., 2020). As an ideology, it is applicable, after some adaptation, to the innovation process that takes place within a network. Research shows that presenting innovation processes linearly or cyclically is too simplistic and in practice, complex dynamic processes are at the heart of every innovation (Swann, 2014). The process approach allows for the delineation of key stages of the innovation process, similar to the project approach, which in turn presupposes the definition of the input and output of the process, the process transformation within its implementation. Communication is perhaps the basic process in the entire life cycle of an innovation. It ensures the dissemination of knowledge and experience in the network and allows for contribution to its development, improvement, and absorption. In this context, the agile approach, which is largely more liberal and less bureaucratic, allows for accelerated diffusion of knowledge, active feedback, direct participation in the innovation process, easy access to knowledge, know-how, increasing the innovation potential and attitudes to absorb innovations.

The definition of a conceptual model for agile management of an innovation network, which would provide a new perspective on its functioning, is important from the point of view of the intensively ongoing processes of digital transformation and the related shortening of the duration of the innovation life cycle in terms of the increasingly widespread penetration of open innovations.

In constructing the conceptual model, some features of the team approach were

considered, through which specific roles are allocated entirely in terms of agile management and autonomous decision-making by teams, reducing the volume and complexity of tasks, iterations, rapid feedback, and self-control (Hass, 2007). The application of the model can contribute to improving the organizational capacity for effective and efficient management of the innovation process, knowledge transfer, and multiplication of results. It also contributes to improving the implementation of innovation initiatives and to assist with adequate change management.

The conceptual model is based on the following principles:

1) Relationships between network participants are a leading value and the focus is on their creation, affirmation and maintenance.

2) Short distance between participants in the communication process, simplicity of tasks, reduction of complex or unnecessary operations and works.

3) Stimulating self-organization between participants by creating a favorable environment for achieving better results, including reorganization of work if necessary.

4) Promoting cooperation between participants and with stakeholders, without focusing on formal contractual relations.

5) Emphasis on working solutions, effective practices, and transfer of knowledge and experience, rather than on exhaustive documentation.

6) Attention to flexibility through rapid response and communication when change occurs, rather than on the implementation of the plan.

7) Short iterations, broad participation, active feedback, open sharing, exchange of experience, ideas, and resources.

As a prerequisite for implementing the model, the development of a project-oriented approach to cooperation can be indicated. This implies that a large part of the initiatives and business processes should be considered as projects that must achieve a planned result, i.e., the network initiatives should be result-oriented.

Creating an environment for implementing this model requires an adequate “tone at the top”, i.e., managers, leaders or nodes of the network should support the principles presented above and apply them themselves. This implies delegating trust to participants in a specific initiative, encouraging and supporting, rather than controlling and acquiring. Trust is key to the success of the agile approach.

The model implies a network attitude towards teamwork and allowing participation in the work of external stakeholders. It is on this principle that open innovations are created, which demonstrate a high degree of perspective.

All these specifics largely determine the completeness of the model's implementation. Full implementation is possible when there is freedom of decision-making and participation, capacity, trust, and willingness to cooperate. Partial implementation is appropriate with a lower degree of interaction between participants, as well as with varying degrees of organizational commitment to the goals of the network initiative. The applicability of the model also depends on the readiness of the participants for organizational change, as well as their attitudes to create and implement innovations, and to collaborate and disseminate knowledge. Network capability is necessary, i.e., readiness of the cooperating organizations to manage and adapt to change, i.e., perception of the network as an agile, adaptable, and learning system.

The advantage of the model is the integration of a comprehensive team approach to problem solving, which:

1) is based on a common understanding of the nature of the problem and the motivation to solve it,

2) considers all members as qualified and valuable participants in team management,

3) relies on the collective ability of individual teams as the main mechanism for solving problems,

4) limits planning, emphasizing rapid adaptability to dynamically changing conditions.

This philosophy leads to the minimization of formal relations, bureaucratic procedures, cumbersome communication and poor network permeability, which makes it more adaptive and effective in terms of quantitative and qualitative results.

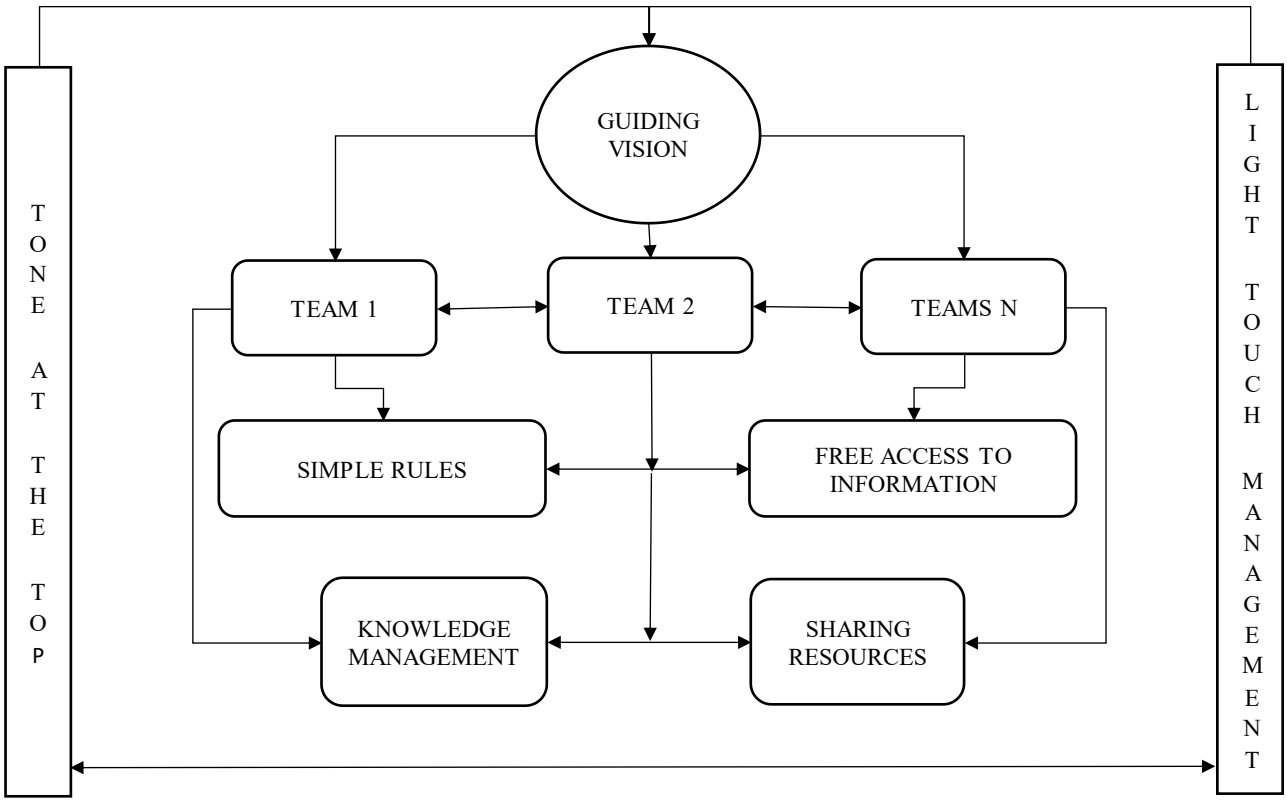

Figure 1. Conceptual model for agile innovation network management.
Source: author's research.

The main elements of the model are:

1) GUIDING VISION—a well-founded, shared vision or overall goal is the basis for the formation of a formal or informal network. Its disclosure and understanding by participants and other stakeholders have a powerful effect on behavior. Agile network managers or leaders guide individual network participants or teams by defining, disseminating, and maintaining a vision that influences the behavior patterns of individual members.
2) TEAMS or network participants interact effectively within certain groups. This means that long communication channels between many participants are

ineffective. Teamwork implies a limited number of teams, for example between 3 and 9 people, and interaction within 5 to 7 teams. These numerical values are not restrictive, since in the composition of individual teams there may be representatives of different organizations and individuals with different profiles and capacities. Self-organization in teams is leading. Communication and coordination are facilitated, and interaction is more effective. Flexibility is associated with the free mode of work, which in turn contributes to faster adaptation to changing conditions. When the network initiative requires a larger number of participants, smaller sub-teams can be formed, which work in parallel.

3) SIMPLE RULES for agile management, which are adopted by all, are the basis for the success of the network initiative. These rules need to be adopted at the very beginning of the cooperation in the network. This does not mean that they cannot be corrected and supplemented in the process of work. Currently, practices that are not followed can be identified in the network, they should be reviewed, if necessary, and obstacles to their implementation should be removed, if any, or reduced if they are unnecessary. This largely ensures the autonomy of work and the reduction of business processes that do not add value to the network.
4) FREE ACCESS TO INFORMATION and fast communication. Information about plans, progress, goals, and organization is a condition for adaptation by each participant and team to the network initiative. The intensity of interaction between members depends largely on their openness to the exchange of information and the level of trust built. For effective interaction in the network, information needs to be easily accessible and available in full. With agile management, information flows freely and network participants benefit from the power of knowledge, regardless of its source.
5) KNOWLEDGE MANAGEMENT is associated with the transformation of existing and incoming knowledge into the network and its transformation into its asset. The goal is for knowledge to reach such a level of management that ensures its subordination, i.e. integration of knowledge with the leading vision of the network and its inclusion in the culture of network cooperation. In this way, it is possible to add value to the network, since knowledge management creates prerequisites for its accelerated diffusion and implementation of network initiatives of participants or teams.
6) SHARING RESOURCES between participants provides an opportunity to achieve network sustainability. In practice, the partnership regime is applicable here (Musiolik et al., 2020), in which resources are available, under the control of several organizations, and cooperation is based on a complementary principle, i.e. each participant in the network joins it with its material and intangible resources, which it shares with other actors in the network. In this way, a higher degree of adaptability of the participants and better efficiency of joint initiatives are ensured.
7) LIGHT TOUCH MANAGEMENT style. In traditional approaches, everything is managed through the prism of control – of change, of risk, and of people. The developed agile methodologies, tools, and practices have evolved to be applied outside of conventional control systems. Fine agile management implies less control, clearer and simpler tasks to perform, faster feedback, greater freedom in

performing the work, and insignificant interference in the innovation processes.

8) TONE AT THE TOP. Applying the same rules and principles in terms of agile management to different network initiatives with similar features, to a large extent, creates an environment for the affirmation of the agile approach and builds trust and positive attitudes among the participants. This leads to a higher organizational and personal commitment to the shared vision of the network. This is extremely important for providing initiators and driving forces of project network initiatives. Interaction in this context is both an opportunity and a tool for sharing knowledge, extracting good practices, and transferring lessons learned to network participants and to its future existence and functioning.

Such a model can be applied in both formal and informal innovation networks. In formal networks, it will contribute to overcoming some its weaknesses related to long communication channels, strict adherence to contractual relations, and strict adherence to the plan. In informal networks, it will reinforce its strengths related to shared values, a high degree of autonomy in work, and quick feedback. The model is not universal, and its application should consider both the specific features of the network and the readiness of the participants for organizational transformation in cooperation.

4. Discussion

4.1. Implications

A key issue in generating management models is the degree of their applicability. In the social sciences, for obvious reasons, it is not possible to apply laboratory experiments to accept or reject the hypothesis of the model.

For this reason, researchers usually apply the approach of direct or indirect observation and analyze the effect of introducing change. In this study, the action research method was applied. As is known, it combines theory with practice and allows researchers to participate directly by observing and analyzing an immediate problem situation, implementing actions, and analyzing the results obtained. In the literature, these three stages are known as problem diagnosis, action intervention, and reflective learning (Avison et al., 1999).

The unit of observation in this case is a local division of a global non-governmental organization (NGO) dedicated to community service. This NGO is located in over 200 countries around the world, including Bulgaria.

The global nature of the organization (over 500 districts, over 37 thousand clubs, and over 1.2 million members) suggests the dominance of a traditional approach to management, especially since the organization was established at the beginning of the 20th century. By the middle of the century, projects gradually became the main tool for achieving goals (mainly of a humanitarian nature, related to the needs of communities), which is why the traditional approach was gradually supplemented by decentralized initiatives. Numerous global projects are being implemented, which are initiated by individual participants, but are approved and financed centrally.

While in the 20th century, despite the increasing complexity of management, the traditional approach to communications was quite effective, at the beginning of the 21st century the situation changed. Due to increased competition in the non-

governmental sector, some members left, internal horizontal ties weakened, which is why there was a certain decline in the number of members.

The Bulgarian part of this global NGO is experiencing identical problems to those at the global level. The internal structure of the organization includes over 80 volunteer clubs, geographically distributed across the country. They are united in 18 zones of several clubs. Each of these clubs realizes its own goals, implements projects that are important for the community, but the collaboration between the clubs is weak. This harms the organization, which can work better organized and achieve much more significant results. For example, uniting several clubs around environmental projects (cleaning, collecting plastic waste, etc.) can engage local communities in meaningful integrated and larger-scale projects and lead to a change in the culture of communities towards sustainability.

However, achieving scale requires a true network that has a shared vision at a strategic level, a built understanding of the goals, and a motivation to participate in the implementation of this vision. In a volunteer organization, motivation is the driving factor, and this is where agile management is important.

At the tactical level, network agility requires communication. To address this issue, the organization's leadership, supported by the research team, implemented an approach to operationalizing communication that is based on agile team management theory and, more specifically, the Scrum methodology (Bogdanova et al., 2020).

Scrum is applied in the IT sector, i.e., in intra-organizational teams, but its approach can be adapted to larger groups or between organizations. Scrum is based on regular communication, which is managed purposefully. In IT teams, for example, it is done at the beginning and end of the day, i.e., communication is not left to chance, but is organized, according to a schedule. It is facilitated by a specially appointed scrum facilitator (agile coach), whose main job is to clear the way for communication. Meetings for exchanging ideas and planning tasks are short and fruitful, focused on operational issues that the team thinks about collectively.

It is this approach to operationally mediating communication between individual clubs that was applied in the Bulgarian branch of the NGO that is the subject of analysis. The conceptual model for agile management of an innovation network was applied (shown above in **Figure 1**), with the main goals of the sought-after change being twofold: 1) creating an environment for the exchange of ideas and practices that other clubs have recognized and successfully implemented, and 2) generating ideas for joint projects that would have a large-scale effect.

In practical terms, over 10 zonal meetings were held almost simultaneously in the different zones, in which as many participants as they wished could participate. To ensure the organization, preliminary training was conducted, as the emphasis of the trainings was on facilitating small groups that would have the opportunity to exchange free ideas. Brainstorming techniques were applied, modified for the needs of the individual groups.

Despite the initial response of a cautious attitude towards the unknown, the results of the joint meetings were more than positive.

Over 94% of the participants wanted to participate in the next meeting. Over 74% found that other clubs faced similar challenges, over 65% indicated that they had found at least one idea for organizational innovation to implement in their club. Nearly 30%

had come up with one or more ideas that they could implement together with other clubs.

4.2. Limitations

In methodological terms, by following almost all elements of the model, several conclusions can be drawn about the applicability of the Conceptual Model for Agile Management:

- A leading moment in the philosophy of change is the vision for such a change. In a volunteer organization, this is especially important, because the vision is the most important factor for retaining members. If there is no vision, they find other ways for civic initiatives.
- Effective interaction was achieved within certain groups; long channels of communication were shortened. Despite the possibilities of technology, participants prefer direct contact and these zonal meetings provide such an opportunity. Participants in each meeting were divided into small groups according to the instructions given and made fruitful contact, which gives a feeling of satisfaction to most volunteers. Such type of dominant horizontal connections is a novelty in the organization at the inter-club level and the potential of their implementation is highly appreciated.
- Simple rules were applied, but some were adapted in the course of preparing the meetings depending on dominant issues in the respective zone. To pre-test possible gaps in the implementation processes, methodological materials were created that regulate the meetings, but the facilitators had the opportunity to change them, and some did so.
- Efforts were made to stimulate open communication and free access to information. Largely, the participants have - each within their own club - accumulated knowledge and attitudes about how clubs should work. The free conversation provoked them to learn about new practices that they could implement and this should not be an instruction from the top, but a shared experience from other volunteers at the same level. In a sense, this is a more efficient source of innovation, as it has already been tested and the source of the idea can always be sought.
- In this regard, knowledge management was implemented in the participants. In practice, they receive ideas for benefit of management in their own clubs and at the same time make contacts at a horizontal level, which is a potential for new, larger initiatives. Volunteers also gain insight into who they can implement these initiatives with, as the organization includes leaders from different businesses.
- The potential for sustainability of the network is growing. It exists in an administrative perspective, but the presence of weak and sporadic ties makes it unsustainable. Strengthening ties provides opportunities for much stronger partnerships, which increases the possibilities for adaptability and better efficiency of joint initiatives.
- The implementation of the model was carried out based on very clear and simple tasks to be performed, faster feedback, and minor interference in the innovation processes. Over 85 of the participants' responses received reflected the attitude

towards the meetings held.

- As a result of the understanding of the organization's management, the appropriate tone was set at the top, which created the necessary confidence that this was a necessary approach to breaking traditional attitudes. There is no doubt that this contributed to the personal commitment to the shared vision of the network.

One of the weaknesses of these meetings, shared by many of the moderators, was the small number of participants. The initial expectations were for a much larger number of participants, but in reality, only 2–3 people from each club participated. As a possible reason, insufficient time was given to promote the initiative and insufficient understanding of the model itself. In this sense, better preliminary preparation, and disclosure of such a type of organizational innovation is needed to create an attitude. However, as many of the moderators shared, the pilot implementation of the organizational change model is adequate to the needs of the organization and will be applied in the future.

A disadvantage of the applied conceptual model in the specific organization is that it cannot provide the necessary knowledge for the development of the organization. Due to the rotational nature of leadership in it, where leaders change on an annual basis, it is necessary to complement the traditional model with an agile one, with the two being used in a balanced manner. In this way, the both top-down and bottom-up approaches will complement each other.

5. Conclusion

This paper proposes a conceptual model of agile management of inter-organizational innovation networks. The model was tested for a global non-governmental organization with a regional division in Bulgaria. An action research methodology was applied, in which organizational change was carried out with the expert assistance and participation of the authors of the publication.

The pilot testing of the model shows its applicability, insofar as a traditionally managed structure switches to an agile communication model, in which horizontal connections become more frequent and knowledge between individual participants is transferred more efficiently. The possibility of decentralized decision-making creates the potential for generating many new and larger-scale initiatives for the benefit of the community, which is the goal of the organization. At the same time, the attractiveness of local structures can increase, which can contribute to the sustainable development of the organization.

Since non-governmental organizations have different motives for management compared to business organizations, the authors are interested in the applicability of the conceptual model in business networks. The variations in the literature regarding business networks range from cluster formations to various informal associations, where the partnership requires collaboration of a vertical or horizontal type. Even more interesting are the mixed-type innovation networks, where public-private partnership is implemented. These directions of research remain in the authors' intentions in the future work.

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