

**WORLD BIODIVERSITY AND EUROPEAN TAXONOMY
STRATEGIES IN TAXONOMY: RESEARCH IN A CHANGING WORLD
Russian Federation National review**

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Taxonomists of Russian Federation are actively working not only in the field of preparing biological cadasters of main regions of the country, but developing taxonomy of many systematic groups including modern taxonomy methods. Complexity of methods in the field of taxonomy is very significant part of this process, because if we need to get more adequate view on these questions it needs to unify traditional taxonomy methods with molecular and the other one. The questions of taxonomy became more and more actual from year to year in the light of global changes on our planet, because we have to know what real taxonomic groups our national biodiversity consist from now before to conserve it.

1-Taxonomic Information: Strategy and Methods

Inventory and Identification: “What is it, and how does it fit among its relatives?”

1.1 Does your country use taxonomy-based tools for biodiversity assessments and policy making? What are these tools?

Surely in Russian Federation biologists use (as it was mentioned above) both traditional and modern methods in taxonomy. Traditional means not only morphology, but cytogenetic, cariologic, albumine electrophoresis, immunological tests e.t.c. Modern taxonomy methods we mean DNA flow-cytometry, PCR, cequence, aminiacid analysis and some other. All the data that collected on taxonomic status of any group or species then used in national Red Data Book and system of regional Red Data Books of Russian Federation, that gives different status of protection for species including in these official issues. The issues mentioned above are the official documents for regional divisions of Federal service of supervision of nature usage, Federal Border Service, Local Federal executive authorities, Ministry of Agriculture of Russia, Ministry of Natural Resources of Russia, Ministry of Science and Education of Russia, Ministry of Justice of Russia. In the case of any illegal actions concerning to specimens of species under local or Federal protection the infringer is prosecuted by punishment according to the law.

1.2 Does your country have a national species checklist? When was it last revised and updated? Is there any national assessment of which taxonomic groups in particular lack taxonomic information? Did you submit a response to the GTI questionnaire on these issues?

Creation of Red Data Books also one of the elements of strategy for halting the loss of biodiversity. In Red Data book of Russian Federation (Red Data Book of RF, 2001) included 414 animal species and

subspecies, 516 plant species and 17 species of mushrooms. On internet-site of IPEE RAS – www.sevin.ru developed information system with database on rare and disappeared species of Russia. There is two parts in the system. First - Red Data Book of Russia (animals) – 434 species, the second part - Red Data Book of Russia (plants) – 533 species. The information is updating annually. Biologist of Russian Federation participate in many GIS projects: “Index Herbariorum” <http://www.binran.ru/projects/herbaria/index.html>, “Global Amphibian Assessment” (<http://www.globalamphibians.org/partners.htm>) e.t.c.

Understanding Patterns and Change: “Where is it, what’s happening to it, and where is it going?”

Describe 1-2 flagship projects related to bullet points below and suggest some recommendations useful for meeting as a result from these projects:

1.3 Please outline any national taxonomy-based monitoring or surveys designed to establish the distribution, status and trends of any taxonomic group.

At the Botanical Institute (BIN) RAS is developed the information system "Historia Gagearum" (<http://www.binran.ru/infosys/gagea/index.htm>) with the purposes of discussion and exchange of the items of information on taxonomy and morphology tribe Gageae Rouy (Liliaceae). The critical judgment of a regular state of species traditionally joining in a genus *Lloydia* taxons is required. On a site it is supposed to discuss the various approaches to taxonomy of this group of Liliaceae, no less than common features of morphology, ontogenesis, embryogenesis, structural organization of runaway etc. in other related groups.

There are some national taxonomy based surveys on amphibians to establish the distribution, status and historical trends in *Triturus*, *Rana* species, *Pelobates fuscus*, *Bufo viridis complex* (Borkin et al., 2001, 2002, 2003, 2003a, 2004; Litvinchuk et al., 1998, 2002), the data on *Lacerta agilis* (Kalgabina et al., 2001; Grechko et al., 2006) phylogeography and taxonomy (Kupriyanova et. al., 2003).

1.4 Is there any coordinated effort in your country regarding bar-coding for identification or the assessment of biodiversity?

On June 15, 2005 the Academy of Sciences made a basic decision on forming the project entitled "Bar code for flora and fauna of Russia". This project is to continue the initiative by the world Consortium for the Barcode of Life (CBOL), established in 2004 (http://www.informnauka.ru/eng/2005/2005-07-08-5_48_e.htm).

1.5 Are you aware of any major efforts (or projects) in your country to integrate morphological and molecular taxonomy?

There are some surveys in Russian Federation that trying to integrate morphological and molecular taxonomy. One of the first attempts was

made on vole species (Borodin, Rybnikov, 1988). Another – on the viviparous lizard - *Zootoca vivipara* (Kupriyanova et. al., 2003).

2-Taxonomy as a Basis for Ecological Research and Sustainable Management of the Biodiversity

Ecological Functions and Services: “What does it do, and what does it interact with?”

How does taxonomic research contribute to better understanding of the functions and attributes of species, and to the management of biodiversity?

2.1 Do you know projects involving taxonomists in the understanding of ecological functioning, or the assessment of ecosystem services?

Scientists of BIN RAS are cooperating in frameworks of the project "Panarctic flora" (<http://www.binran.ru/projects/paf/index.htm>). The site is devoted as results of the international project "The species concept in the High North - A Panarctic Flora Initiative", and further development of this project, and, mainly, researches of the international botanical collective on the manuscript of vascular plants of Circumpolar Arctic Region.

Interdisciplinary Expert Group (IEG) for assessment of the modern state of ecosystems of the Russian sector of the Baltic Sea (<http://www.zin.ru/projects/ieg/index.html>).

Caspian Sea Biodiversity Project under umbrella of Caspian Sea Environment Program (<http://www.zin.ru/projects/caspddiv/index.html>).

Dr. A.A.Kotov (Institute of Ecology and Evolution of Russian Academy of Sciences) one of taxonomists who involved in Global Taxonomy Initiative, Convention on the Biological diversity UNEP as a Member of the Coordination Mechanism.

2.2 What is the contribution of taxonomy in your country to the management of biological invasions?

There are divisions in National Platform on Biodiversity of Russian Federation that directed on studying of invasive species. So part of scientists in RAS actively working in the field of that problem including taxonomists from ZIN RAS, because only specialist on taxonomy can help first to identify specimens, then determine where are they are (from what population or region). Usage of this information joint with some genetic-population processes in populations of invasive species can give possibility of forecasting some changes in communities structure (Reshetnikov, 2001; Biologicheskie..., 2004; Vershinin, 2005a, b; Vershinin, Ivanova, 2006;). One of impressive examples of biological invasion is expansion of common kilka - *Clupeonella cultriventris* in Volga. This species moved 3000 km to the North and reached Beloye Lake. By that reason communities' structure is seriously transformed now (Nauchnye..., 2006). Another example of contribution of taxonomists to

the management of biological invasions is the project KRONAROS (<http://www.zin.ru/projects/kronaros/index.html>). The project is directed on an evaluation of changes in biodiversity of a blood-sucking insects in selected regions of Russia under effect of geographical and anthropogenous transformations. The significance of a problem is determined by global changes in climate and character of land use in different regions. As a consequence of these processes we got serious transformation of landscapes and a vegetation cover. Now within the framework of the project KRONAROS under support of the Russian Foundation for Basic Research (RFBR) going on the project: "Evaluation of blood-sucking insects biodiversity changes and development of analytic database for their monitoring in Northwest of Russia".

2.3 What is the contribution of taxonomy in your country to efforts to understand the status and trends of key functional groups such as pollinators?

In Russian federation there are fundamental and taxonomic investigations connected with studying of many key functional groups for every big region of Russia, because of well developed scientific school of ecologists in central part of Russia (IPEE RAS), in the Urals - Institute of Plant and Animal Ecology RAS, Ural branch, Ekaterinburg, in Siberia - Institute of Animal Systematics and Ecology of the Siberian Branch RAS in Novosibirsk (<http://szmn.sbras.ru/>), on the North – institute of Biological problems of North in Magadan, on the Far East – Institute of Biology and Soil, Institute of Sea Biology in Vladivostok and some other.

Taxonomy, biodiversity and its conservation: “How to manage it in sustainable way?”

Describe 1-2 flagship projects related to bullet points below and suggest some recommendations useful for meeting as a result from these projects:

2.4 Are there also non-professional organisations recording biodiversity data collections (e.g. ornithologists) involved in the decision process of landuse planning etc.?

It's possible to mention Cooperative project "Sustainable Socio-Economic Development with Indigenous People of the Russian North, Siberia and Far East" The project is corresponding with on-going UNDP/GEF biodiversity persons in the modern circumstances and economic conditions in Russia. (http://arctic-council.npolar.no/Meetings/SDWG/2002%20Ou/8_4v2.pdf). and a concept for the sustainable growth of traditional land use zones in Sikhote-Alin

(<http://www.biodiversity.ru/publications/arctic/archive/n12/sikhote.html>).

Unfortunately in Russian Federation real non-professionals are often official decision-making stuff.

2.5 Are there some indicators (or red-list species) either for monitoring Natura 2000 sites or for delimitation and management of nature reserves used in your country?

Officially in Russian Federation predominate “chemical” approach for control and ecosystems transformation criterion. That means underestimation of biological (and taxonomy) data for system of ecological monitoring and for delimitation and management of nature reserves between decision-making people in Russia.

2.6 Which taxonomy-related research (standardized taxonomic metadata, delivery of checklist building tools, building expertise network) in developing non-European biodiversity-rich countries is supported by policy-makers from your country based on your national expertise and experience?

On the experience and national expertise of Russian Federation based some methods (standardized taxonomic metadata, delivery of checklist building tools) in countries of former Soviet Union. Now these countries developing their own systems of national biodiversity monitoring and in the case of necessary cooperation in the field of biodiversity control and conservation is supported by policy-makers from Russian Federation.

The Russian Government spent more than \$13 million on nature conservation in the North Caucasus in 2002, four times more than in 2000. The Georgian Government recently made a commitment to preserve 15 percent of the country's forests in protected areas (IUCN I-IV) as part of WWF's Gifts to the Earth initiative. The Government of Azerbaijan contributed \$1 million to creation of the Shakhdag National Park. The government is developing a program for protection and expansion of forests and for environmentally sustainable socioeconomic development. In the framework of the Caspian Environment Program. The Ministry of Nature Protection in Armenia carried out several projects with support of the GEF and the United Nations Development Programme (UNDP) on combating desertification, climate change and building capacity for implementing the Convention on Biodiversity. The Turkish Government has supported biodiversity and natural resource management in the Turkish Caucasus. In 1995, the Iranian government funded a study and management plan for the Sabalan protected area.

There are system of multilateral donors in the Caucasus region for monitoring and conservation of biodiversity and globally threatened species

([http://www.cepf.net/where we work/regions/europe central asia/caucasus/ecosystem profile/Pages/synopsis of current investments.aspx](http://www.cepf.net/where_we_work/regions/europe_central_asia/caucasus/ecosystem_profile/Pages/synopsis_of_current_investments.aspx)).

The First Ural River Basin International Workshop “Rescue of Sturgeon Species by means of Transboundary Integrated Water Management in the Ural River Basin” (NATO-ARW) was held in Orenburg on June 13-16 within the Ural Basin Project framework. Organized by Research and Consulting Center DonEco and Central European University the

Workshop was co-sponsored by the Security Through Science Programme (NATO-ARW) and the Caspian Environmental Program. The Workshop was conducted under the auspices of Orenburg Regional Government and Parliament with active involvement and assistance by the Russian Federal Agency for Environmental Inspections. The Project's ultimate goal is the establishment of a Ural Sturgeon Park to facilitate conservation and restoration of the sturgeon population in the Caspian Sea, rehabilitation of the Ural River ecosystem, and sustainable development of the Ural Basin. The workshop was attended by more than 60 experts, researchers and practitioners from Governmental Environmental Agencies, NGO and business representatives from both basin countries (Russia and Kazakhstan), and representatives from relevant international organizations such as the Food and Agriculture Organization of the United Nations, the Secretariat of Wetland Convention (RAMSAR), the International Association on Danube Research, and many others covering the whole spectrum of Ural Basin management stakeholders.

Drawing on recommendations of previous workshops and on the results and materials of other conferences and meetings dedicated to the problems of the Caspian Sea, (http://www.ramsar.org/mtg/mtg_ural_basin2007_conclusions.pdf).

It's also possible to mention cooperation between Finland, Estonia and Russia on biodiversity in the gulf of Finland organized by Finnish Ministry of the Environment, 12-13 April 2007, Kotka, Finland (http://www.zin.ru/projects/baltdiv/materials2/Golubkov_Kotka_2007.pps)

2.7 Is there a National Needs Assessment of GTI in your country? If yes, what are your specific needs, e.g. for conservation, protected areas, CITES/customs, dealing with invasive species etc?

National needs of Russian Federation in GTI development are evident, because of scales, big territories with different types of landscapes and geographic zones. It needs for for conservation, protected areas, border control, forests pests and fire control e t.c.

3- Taxonomy, Potential Users and Capacity Building of Experts Open

Access to Information: "How to find out about it?"

How does taxonomic information get from where it resides to where it is needed elsewhere in the world?

3.1 To what extent is taxonomic research in your country contributing to international biodiversity initiatives and projects (e.g GTI, GBIF, PESI, EOL)

Many of specialists in taxonomy of Russian Federation cooperate with scientists from EU countries that contributing to international biodiversity initiatives and projects such as: World Wide Fund program for marine conservation in the Russian Far East (<http://www.biodiversity.ru/publications/arctic/archive/n12/marine.html>);

The Arctic initiative
 (<http://www.biodiversity.ru/publications/arctic/archive/n12/protokol.html>)

A concept for the sustainable growth of traditional land use zones in Sikhote-Alin

(<http://www.biodiversity.ru/publications/arctic/archive/n12/sikhote.html>);

UNDP/GEF Project "Kamchatka Biodiversity Conservation" (<http://www.unkam.ru/english/>).

The Global Tiger Initiative was launched on June 9th at the Smithsonian's National Zoo in Washington D.C. It brought together global experts, tiger conservationists, scientists, celebrities, many national and international NGOs, along with representatives of World Bank Group and the Global Environment Facility (GEF)

(<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/RUSSIANFEDERATIONEXTN/0,,contentMDK:21919207~menuPK:305605~pagePK:2865066~piPK:2865079~theSitePK:305600,00.html>).

Specialists of ZIN RAS involved into ArcOD - an international research program assessing and explaining the diversity, distribution and abundance of marine organisms throughout the Arctic ocean (<http://www.zin.ru/projects/arccoml/eng/index.html>). Another international program where researchers of ZIN working is CAML - an international research program assessing and explaining the diversity, distribution and abundance of marine organisms throughout the Southern Ocean (<http://www.zin.ru/projects/ecoant/index.html>).

CNAF – (Computer Network for Arctic Marine Fauna) NATO Science Program where eight scientists from ZIN working (<http://www.zin.ru/projects/cnamf/index.html>) on a development of a computer Network for the creation of an information retrieval system on Arctic Marine Fauna. The objectives of the project proposed here are: to foster the communication and collaboration of researchers on the benthic ecology of the Eurasian-Arctic seas by establishing a network of scientists from Russia as well as from Western Europe; to combine the various biogeographic and ecological data sets sampled in Eurasian-Arctic seas that are available at the participating institutes in a joint database.

Zin RAS also involved into European project SaLLE. SaLLE - database of saline lakes and lagoons of Europe includes data on physical and hydrochemical characteristics of moderate and hypersaline waterbodies and also on biodiversity and functioning of their ecosystem. The main task of the base is a facilitation of public access to the basic physical, chemical and biological data on saline lakes and lagoons, which may be useful for sustainable management of saline water bodies in Europe. (<http://www.zin.ru/projects/saltlakes/default.asp>).

3.2 What is the state of the art in biodiversity informatics in your country? e.g. etaxonomy and e-science tools)

Zoological Institute of RAS (ZIN) – one of the leading institutions on zoological taxonomy in the world has signed the state contract (in January 31, 2002) on performance of research and skilled - design works on a theme "Information system on a biodiversity". Co executors of the project are Institute of problems of ecology and evolution RAS (IPEE), Botanical institute RAS (BIN) and Institute of cytology and genetics Siberian branch of RAS (ICG).

The main task of the project "Information system on a biodiversity" (ISBD) creation of program complex and data bases for animal and plant taxonomy, that will serve as a basement of information-search system (ISS) on Russia biodiversity that supporting non-uniform collections of information resources on systematic, collections and ecology.

Development of standards, formats and methodology of united national database on biodiversity of all taxons (microorganisms, plants and animals) and information about collections supported by all institutes co-executors in Russian part of Internet also part of the tasks of the project.

The initial data for realization of work are served with results of researches of structural divisions ZIN, BIN, IPEE and ICG in the field of biology, including already scientific product, created and partially published by them, in the field of animals and plants taxonomy.

Objects of research are procariotes, protists, the mushrooms, plants and animal, living on territory of Russia and neighbor territories. The special place (occupies study of the Arctic animals and plants, due to which is especially felt significance of the contribution of the national scientists in biodiversity research of whole Earth.

During that work the theoretical and applied researches will be carried out, and also are developed and the applied programs, databases, information systems and Internets - sites on various taxonomic groups of organisms will be improved.

The information systems and databases under construction will be very helpful for decisions of many fundamentals scientific applied, educational and nature protection tasks connected with conservation of biodiversity in Russia.

3.3 Has there been a national assessment of best practices for taxonomic data quality and validation?

There are three world-wide known best national institutions on biological taxonomy in Russian Federation - Zoological Institute of RAS (ZIN) of RAS in St.-Petersburg, Institute of Animal Systematics and Ecology of the Siberian Branch RAS in Novosibirsk, Botanical institute RAS (BIN) in Moscow.

3.4 Do you have any national guidelines on how to approach the proof of absence?

National guideline on how to approach the proof of absence is cooperation of scientific institutions with Federal and local legislation systems in the field of improvement of Red Data Books (Federal and regional) system and Federal service of supervision of nature usage for the best executive results.

3.5 What are the taxonomic standards used in the databases (TDWG, Darwin core, COL, PESI, etc.)?

The national taxonomic standards used in digital description of animals collections of the Zoological Institute RAS and their metadata - Presently in the information retrieval systems some standards of data input, description and presentation are being used, among them Darwin Core, RDF, Dublin Core Metadata Elements. The collection includes more than 100000 samples of 26000 species of sea invertebrates. For this purpose at the Institute (ZIN) developed systems: IPS Ocean, Zoocode and Ecoant in format dBase. In taxonomic data base ZOOCOD were added field SYN, with synonymic taxons (rcdl2008.jinr.ru/presentation/conf_hall/08_10_2008/Smirnov.ppt).

Experience of databases in ZIN RAN is developing as standard TDWG.3, taxonomic standards Darwin Core 2. The most widely deployed formats for biodiversity occurrence data are Darwin Core (wiki) and ABCD (wiki). New deployments of these and other XML based formats should use the TAPIR exchange protocol. The TDWG community's priority is the deployment of Life Science Identifiers (LSID), the preferred Globally Unique Identifier technology and transitioning to RDF encoded metadata as defined by a set of simple vocabularies. All new projects should address the need for tagging their data with LSIDs and consider the use or development of appropriate vocabularies.

3.6 Could you identify the major digitization efforts for biodiversity data (e.g. collections, observations, species checklists)?

The major digitization efforts for biodiversity data on collections and observations are now under construction, because of huge volumes of collections, lack of financial support and specialists on digital technologies. The data on rare and disappeared species of Russia (species checklists) are now accessible for any user on internet-site of Institute of Problems of Ecology and Evolution (IPEE) RAS in Moscow – www.sevin.ru developed information system with database from two parts. First one - Red Data Book of Russian Federation (animals) – 434 species, the second part - Red Data Book of Russian Federation (plants) – 533 species.

3.7 Is there any effort in your country to make taxonomic information especially identification services easily accessible and useful to practitioners?

There are information resources on collections, ecology and taxonomy of some systematic groups and species, identification services that accessible on ZIN RAS internet-site www.zin.ru and can be easily useful to practitioners.

Some of these resources are:

Information System ZooInt (ZOOlogical INTEgrated retrieval system) is intended for gathering author's projects on animal systematics (<http://www.zin.ru/projects/zooInt/zooIntw/zooIntw.asp>). It will include: databases with hierarchical classification of animals of the World or regional faunae, which consist of valid scientific names of taxa, including synonyms; databases with the lists of collected specimens deposited in the ZIN collection as well as in other museums, including all data from labels; databases of type specimens of the ZIN collection; databases of number species in higher taxa in World, USSR, Russia and other regions; geographical databases used in classification of locality data from the labels. Standards and procedures of development and maintenance of databases, elaborated in frameworks of the project ZOOINT, are available on the separate page.

ZINSECTA - an interactive database of World Insects fauna taxonomy (<http://www.zin.ru/projects/zinsecta/index.html>). Information System ZInsecta is intended for gathering author's projects on insect systematics and structure of entomological collections. It may include: databases with hierarchical classification of insects of the World or regional faunae; which consist of valid scientific names of taxa, including synonyms; databases with the lists of collected specimens deposited in the ZIN collection as well as in other museums, including all data from labels; databases of type specimens of the ZIN collection; geographical databases used in classification of locality data from the labels.

PICKEY - an interactive multi-entry polychotomous key for identification of organisms by intensive use of images (<http://www.zin.ru/projects/pickey/index.html>).

WebKey-X - an interactive identification program for Internet users (<http://www.zin.ru/projects/webkey-x/indexe.html>). The elaborated software will be applied to compile keys, including keys to the groups, databases on which have been already put on the sites of portal of the Zoological Institute.

Botanical Institute RAS (BIN) developed Guide to main collections of the LE herbarium (<http://www.mobot.org/MOBOT/Research/LEguide/>). The Herbarium of Vascular Plants of the Komarov Botanical Institute (LE) is one of the largest collection in the World and main herbarium in Russia. The Herbarium numbers more than 6.000.000 specimens from over the World. Collections from LE are playing an important role as a basic source of data for investigating of plant resources, especially their taxonomy, distribution, phylogeny, morphology, molecular biology, conservation and economic importance. Virtual Guide to the main collections of the LE Herbarium has been created in 2005-2006 with kind

support of the U.S. Civilian Research & Development Foundation (CRDF).

At Botanical Institute (BIN) RAS developed “Checklist of the Panarctic Flora (PAF) Vascular” (<http://www.binran.ru/infsys/paflist/index.htm>) including English version, Palynological Laboratory Database (http://www.polba.binran.ru/new_site1_5_eng/), Checklist of fungi and lichenicolous fungi of the Russian Arctic (http://www.binran.ru/infsys/ra_fun/index.htm), database of the lichens of the Russian Arctic (http://www.binran.ru/infsys/ra_lich/index.htm), flora of Chukotka mosses (<http://www.binran.ru/infsys/chubrio/index.htm>), herbarium of lichens – type collection (http://www.binran.ru/infsys/li_type/),

Capacity Building in Biodiversity-rich Countries and Worldwide

What is the state of training and education in systematics and are there any gaps in capacity?

3.8 Are there any policy initiatives in your country to orient capacity building in taxonomy?

It's possible to say that a period of recent developments in Russian Federation characterized as utilitarian approach to environmental management. Russia's response to the recent World Summit on Sustainable Development (WSSD) is assessed in the broader context of the country's problems in effecting major environmental policy changes.

3.9 Are there any sources of finance or policy actions in your country dedicated to applied taxonomy (e.g. identification tools, training for parataxonomists, i.e. field-trained biodiversity collection and inventory specialists recruited from local areas)?

In 2003 it was stopped financial support of project BioDiv (<http://www.zin.ru/ZOODIV/index.html>) after re-organizing Ministry of industry, science and technology into Ministry of education and science of Russian Federation. Attempts to get some grants for support the project in 2004 were failed. Now (from 2006) the project “Animal Biodiversity” (ZooDiv) (<http://www.zin.ru/ZooDiv/Project.htm>) were supported by Russian Foundation for Basic Research (RFBR).

There are no other special resources for financial support or policy actions in Russian Federation that directly dedicated to any needs of applied taxonomy, but there are possibilities for training of parataxonomists, i.e. field-trained biodiversity collection and inventory specialists as amateur volunteers from different local areas. At Zoological institute RAS now exist program «Small ZIN» (<http://www.zin.ru/projects/tinyzin/index.html>). Within the framework of this program amateurs can get information on this oldest research establishment of Russia and take part in researches of the institute. Actually we have some amateurs who work in the field of biodiversity collection and inventory specialists after training in the

leading Institutes mentioned above (ZIN, BIN e.t.c.) on their own initiative. Any funding does not support this activity.

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