

2024年度 リポジトリ担当者の基礎知識研修 実務紹介(1)

学術コミュニケーションと 機関リポジトリの基礎知識

2024年9月3日

JPCOAR イベント運営作業部会

1. 学術コミュニケーションの基礎知識

- ① 学術雑誌とはどのようなものか
- ② 論文とはどのようなものか
- ③ オープンアクセスとはどういうことか

2. 機関リポジトリの基礎知識

- ① 機関リポジトリとは
- ② オープンアクセスに関する政策と動向
- ③ 機関リポジトリ業務担当者の役割

1. 学術コミュニケーションの基礎知識

- ① 学術雑誌とはどのようなものか
- ② 論文とはどのようなものか
- ③ オープンアクセスとはどういうことか

「1. 学術コミュニケーションの基礎知識」の内容は、杉田 茂樹, 「学術コミュニケーションの基礎知識」, 2020
を基にしています。

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それを生み出した
のが私だと世界
に認知してほしい

その科学的真価
を認めてほしい

世に広まって
ほしい

後世にも伝え
たい

“Smaismrmilmepoetalevmibunenugttaviras”



altissimum planetam tergeminum observari.

“学術雑誌の4機能”

それを生み出した
のが私だと世界
に認知してほしい

論文の先取
権の確立

査読による
質の保証

その科学的真価
を認めてほしい

世に広まって
ほしい

知見を世に
知らせる

知見を後世
に伝える

後世にも伝え
たい

ヘンリー・オルデンバーグ氏の書簡(1664～1665)より。同氏は、世界最古の学術雑誌と言われるイギリス王立協会「フィロソフィカル・トランザクション」(1665～)創刊時の事務総長

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- ・著者は対価を得ない

- ・研究論文執筆・公開の目的は金銭でなく、著作が広く行き渡り、科学の発展に寄与すること
- ・収入は所属機関の給与など。学術的名声を得て、ポストを獲得することが間接的に収入に寄与

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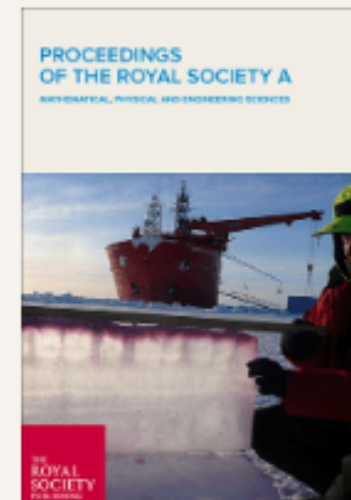
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A power packet is a unit of electric power composed of a power pulse and an information tag. In Shannon's information theory, messages are represented by symbol sequences in a digitized manner. Referring to this formulation, we define symbols in power packetization as a minimum unit of power transferred by a tagged pulse. Here, power is digitized and quantized. In this paper, we consider packetized power in networks for a finite duration, giving symbols and their energies to the networks. A network structure is defined using a graph whose nodes represent routers, sources and destinations. First, we introduce the concept of a symbol propagation matrix (SPM) in which symbols are transferred as links during unit times. Packetized power is described as a network flow in a spatio-temporal structure. Then, we study the problem of selecting an SPM in terms of transferability, that is, the possibility to represent given energies at sources and destinations during the finite duration. To select an SPM, we consider a network flow problem of packetized power. The problem is formulated as an M-convex submodular flow problem which is a solvable generalization of the minimum cost flow problem. Finally, through examples, we verify that this formulation provides reasonable packetized power.

1. Introduction

Electric power has been considered as a continuous flow based on circuit theory, in which power flow is governed by Kirchhoff's Laws and Tellegen's theorem [1]. The circuit theory can be generalized to represent various nonlinear complex systems in the system topology with energy dissipation and energy storage as a network

Power packet transferability via symbol propagation matrix

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manner under the conservation on theory [3] that 'all technical all technical communications of random binary digits' [4]. Inner by using packet switching, dynamic assignment of network router, power distribution will be, we consider electrical energy over packetization [6–15]. Image complicated power flows regulation [16]. In the proposal, are installed into the electrical e according to the flow control for the difference between the work, power packet transactions e concept of power packet also cium, rooted in lessons learned gned for distributed renewable 'Energy packet networks' were servers [20]. There is a proposal r is delivered through discrete versal power router is designed nd, in most of these proposals, physical design is not mentioned. ith electric power in the same c power has been high-power sed with low-power and high-ical layer and the logical layer, aging power. con carbide (SiC) and gallium device operation at potentially current Si technology [23,24]. high-frequency switching over high-frequency electricity, and In the developed system, an ket with its voltage waveform. dual packet level. A schematic The system consists of network nding to the tag's information. power due to different sources, send the power packets using

the power at each line by using the unites to identify the different kinds packets between routers [10,14,15]. transfer. In Shannon's information digitized manner [3]. Referring to this minimum unit of power transferred symbol is a minimum unit of power, nsferred during a unit time in the y determined as a real number.^{1,2} f messages and energy with symbol of messages is treated as a coding the length of codewords. In power en energy during a finite duration resentation is a problem unique to ed with a set of symbol sequences

ation, which was introduced in [12], on problem of power packetization. networks. Then, packetized power is and quantized manner: a symbol is is represented with symbols sent to n. d power, we refer to the work about sequences [27,28]. In this work, so over a sufficiently long time period ies are designed by prioritizing the directed acyclic graphs whose edges with their matching probability in

ew concept to represent packetized mporal correspondence. In power each symbol has its energy and poral connectedness is important in w 'strain', i.e. the spatial difference y stored in each router. Then, we lerability, that is, the possibility to g the finite duration. To select an er, weighing supplied energy from energy at each link during each unit the problem is formulated as an M-ization of the minimum cost flow

n provides reasonable transmission iver with a network flow problem, rgy packet networks with queuing ly different from our problem, it is sing a specific system similar to the discuss our formulation referring to

reated as routers. Thus, power is discussed single symbol. The proposition that symbols do in terms of redundancy of the system.

a power pulse with an information tag. Here, packetized power is spatially and temporally transferred as symbols in a digitized and quantized manner. At each node, the energy is represented as the total amount of energy of symbols which are sent to and received from neighbouring nodes during a finite duration.

To mathematically represent such transmission of packetized power, we introduced the SPM, in which a symbol is transferred at a link during a unit time. Via SPM, packetized power is described as a network flow in a spatio-temporal structure. Then, we considered a network flow problem for selecting an SPM in terms of transferability, that is, the possibility to represent given energies at sources and destinations during the finite duration. In networks, packetized power appears as supplied energy from sources and supplied energy to destinations (V1), transferred energy at each link during each unit time (V2), and change of stored energy in each router (V3). Setting a laminar family of subsets of nodes in spatio-temporal structure for the cases of V1 and V3, we can formulate this problem as an M-convex submodular flow problem which is a solvable generalization of the minimum cost flow problem. Unlike conventional minimum cost flow problems, here, we weighed not only values of network flow (V2) but also values of boundary of network flow and their time integrals (V1 and V3). Finally, the formulation was discussed through examples and it is shown that power can be packetized and be controllable while preserving reasonable properties of power.

The established packet-centric framework is completely different from the circuit theory, in which power is handled in a continuous manner and is governed by Kirchhoff's Laws and Tellegen's theorem [1]. Here, the concept of a power packet is introduced as a unit of electric power, so that power is digitized and quantized. The results of this paper suggest a mathematical framework which integrates energy and information in electrical energy networks.

Data availability. This work does not have any experimental data. All computational results were obtained with the cycle-cancelling algorithm [29].

Authors' contributions. The concept of SPM was conceived by S.N. and A.M. The network flow problem was formulated and numerically stimulated by S.N. T.H. designed the power packet network and initiated the study. The paper was drafted by S.N. and carefully revised by all the authors. All authors gave final approval for publication.

Competing interests. We declare we have no competing interests.

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Acknowledgements. The author (S.N.) thanks the current and former members of the Robotics, Perception and Learning Laboratory of the Royal Institute of Technology (KTH) for fruitful discussions. The authors acknowledge three anonymous referees for their helpful comments on the initial draft.

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Power packet transferability
via symbol propagation matrix

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の共著であることが多い

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者が2名、2が1名

著者を表す記号
「ORCID」
この例は筆頭著者の縄田
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1. 学術コミュニケーション ②論文とはどのようなものか

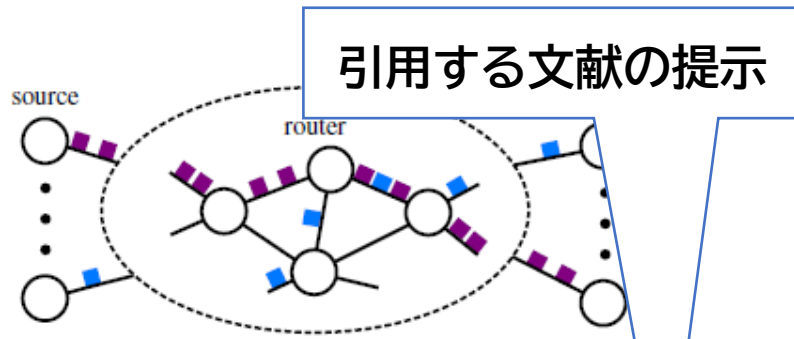


Figure 1. A schematic of power packet dispatching network. (Online version in colour.)

thermodynamics [2]. Here, energy flow is handled in a continuous manner under the conservation of energy. On the other hand, it is shown in Shannon's information theory [3] that 'all technical communications are essentially digital; more precisely, that all technical communications are equivalent to the generation, transmission and reception, of random binary digits' [4]. Communication networks have been developed in a digitized manner by using packet switching, which breaks messages into smaller pieces named 'packets', for dynamic assignment of network resources [5]. If we handle electric power in a digitized manner, power distribution will be changed completely different from the conventional. In this paper, we consider electrical energy networks in a digitized manner.

- 科学の発展＝先人の業績を踏まえ、新たな知見を積み足す
 - 参考とした先行研究に対しては引用という形で礼を尽くす
 - 多く引用された研究論文は、後続研究に大きな影響を与えたものと評価される

(参考)掲載した論文が多く引用されると、その雑誌自体の評価が上がる
(それを数値化したものとして「インパクトファクター」がある)

power levels directly to customers [21]. In the physical layer, a universal power router is designed and evaluated for residential applications [22]. On the other hand, in most of these proposals,

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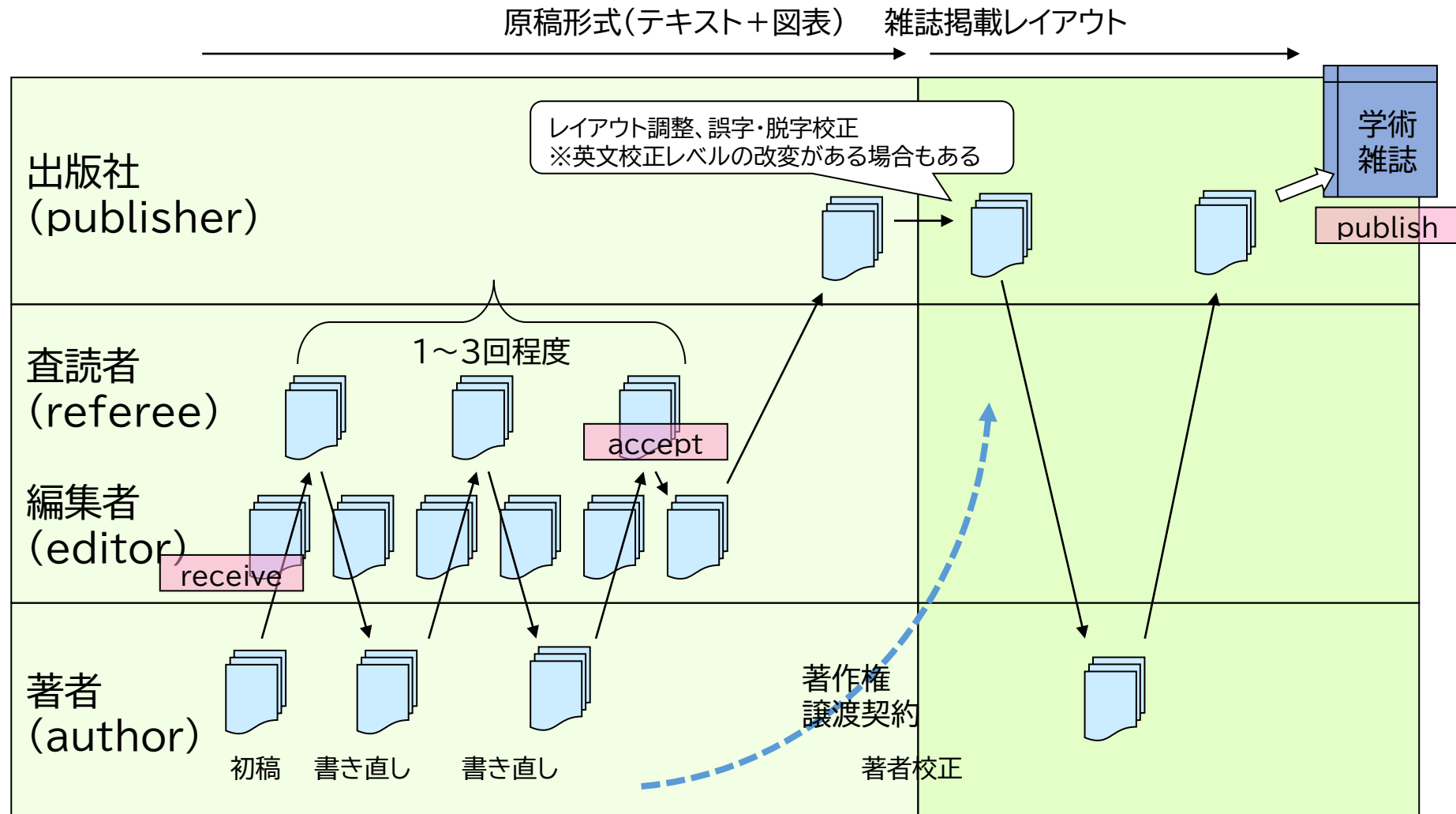
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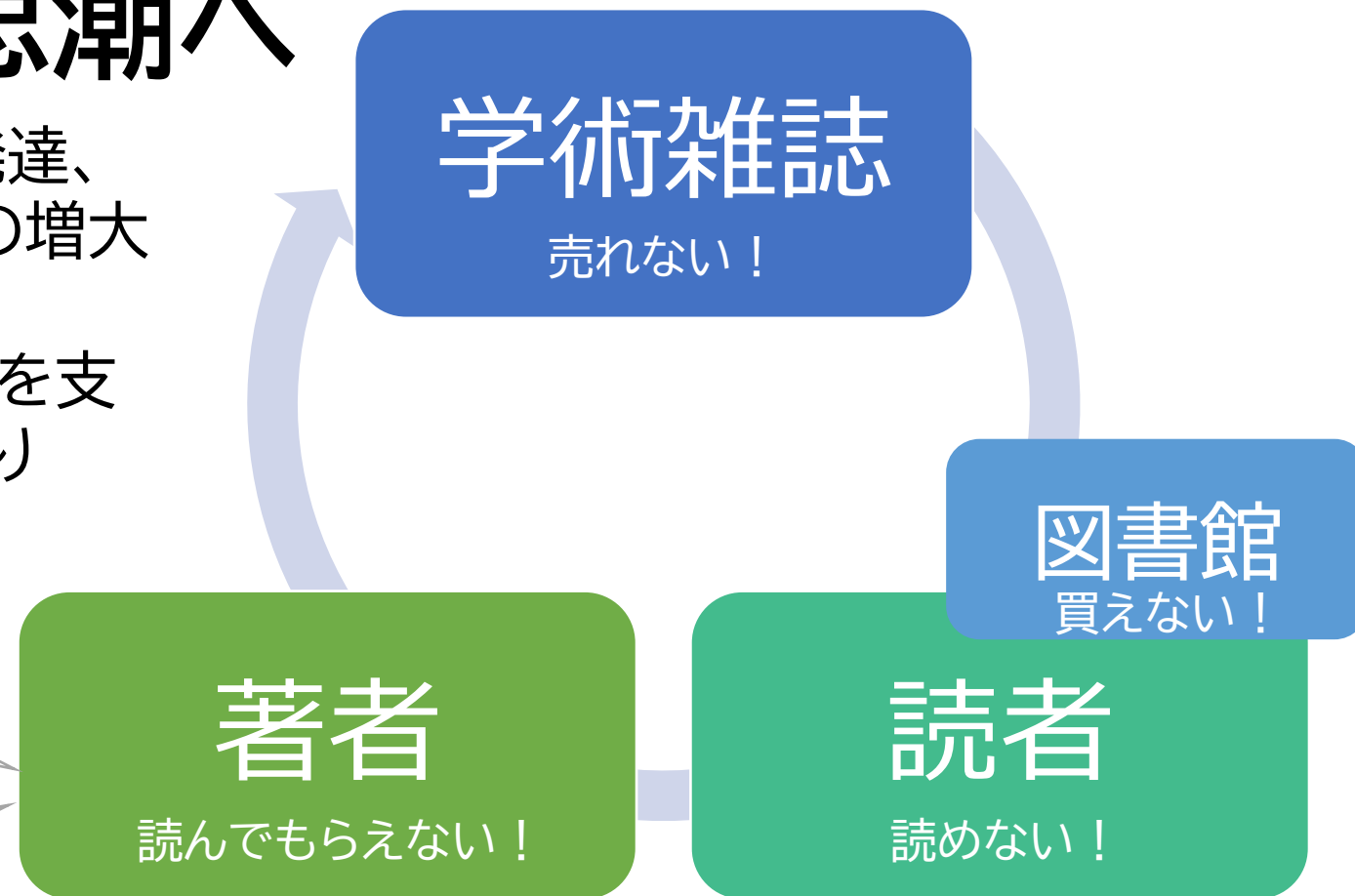


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- 世界の拡大、人口の増加、産業の発達、科学の拡大、生まれる科学的知見の増大
- 論文数の増加、学術雑誌の増加
- 情報流通のコストは増えるが、それを支えるべき大学の購買力には限度あり

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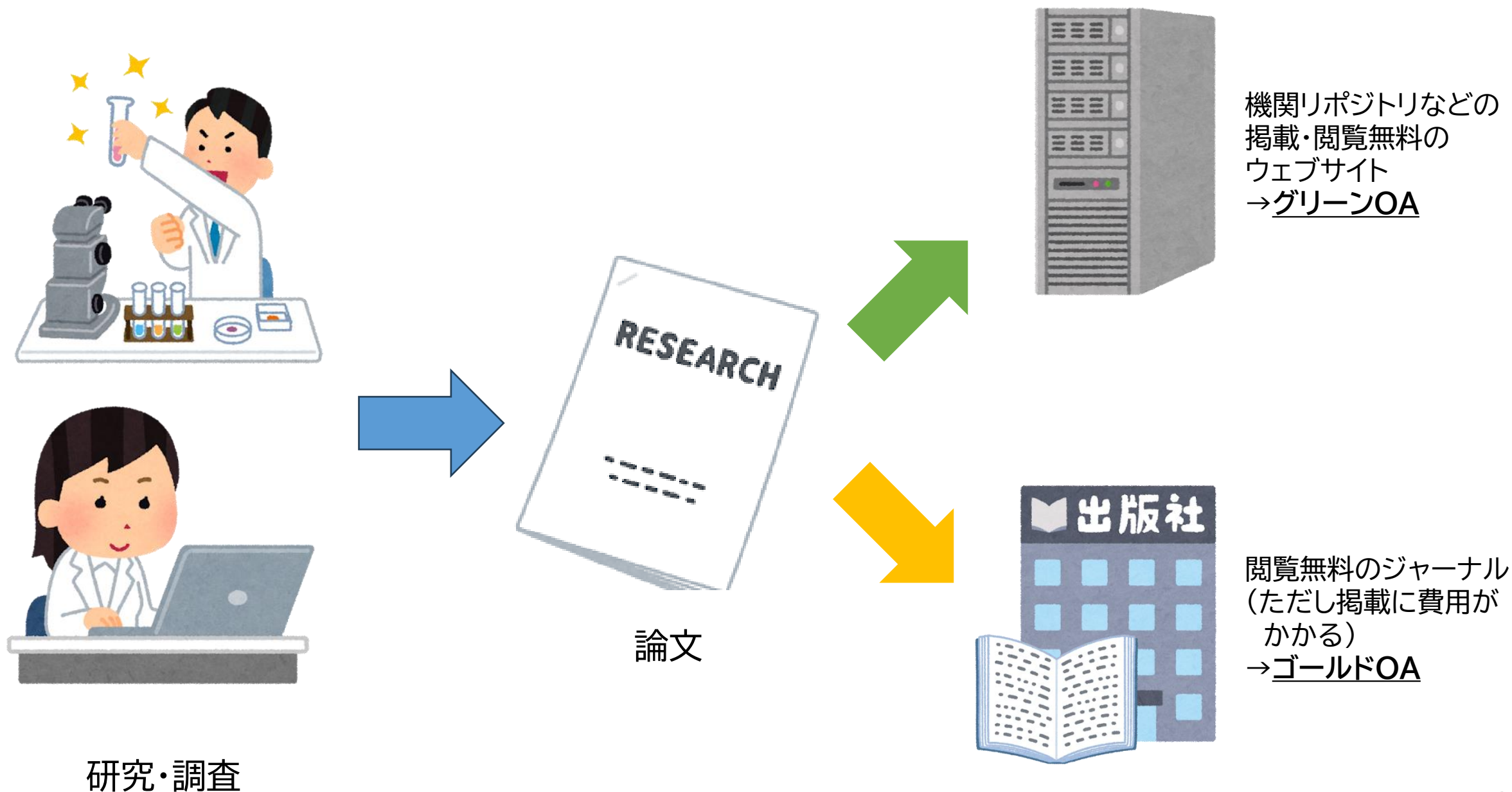
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- ①機関リポジトリとは
- ②オープンアクセスに関する政策と動向
- ③機関リポジトリ業務担当者の役割

<機関リポジトリの目的>

各機関で生成される学術研究の成果物を収集・保存・公開し、更なる文化の発展に貢献すること

(神話)読者のための論文提供サービスである

(真実)著者のための可視性向上サービスである

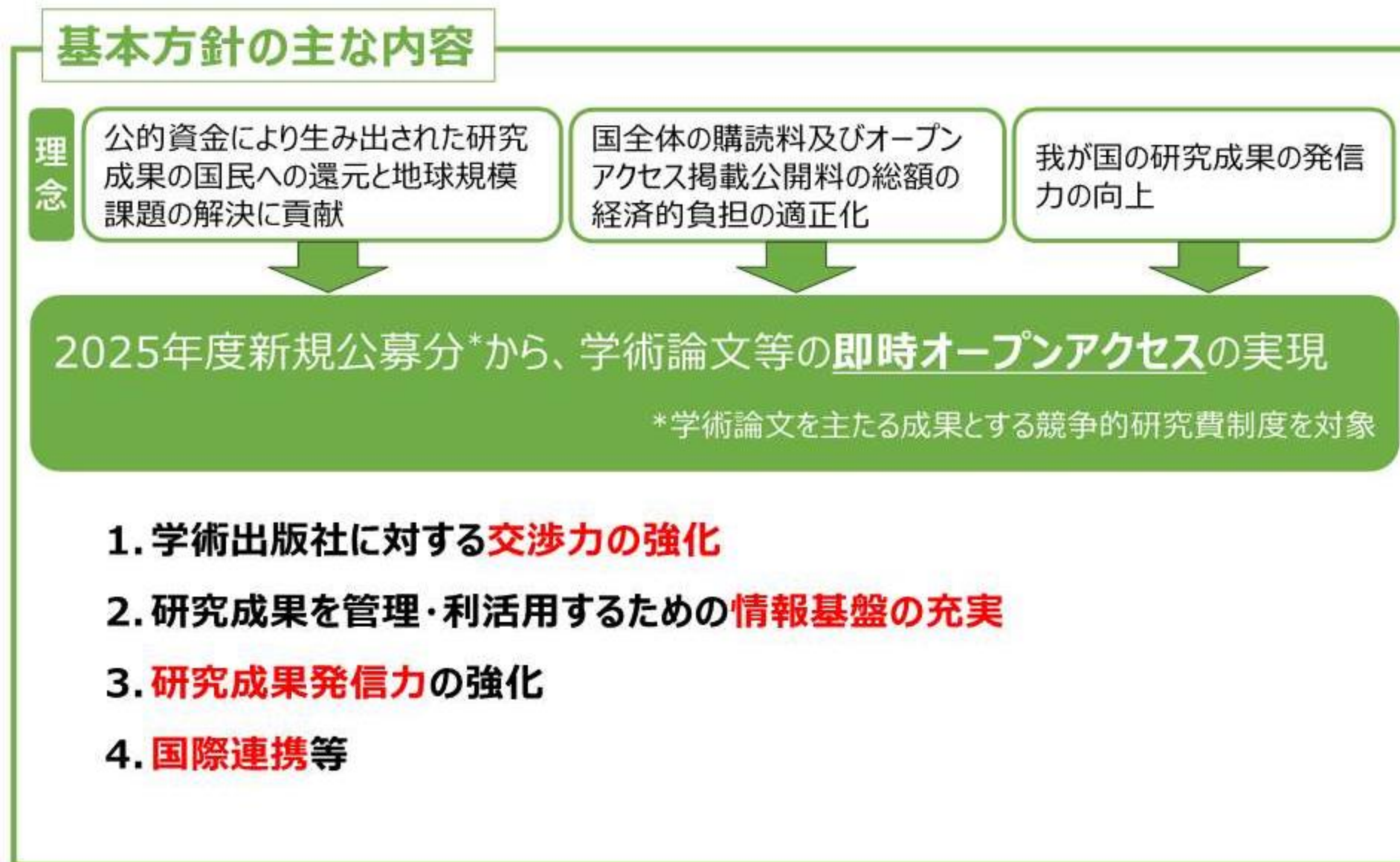
(神話)著者の許諾の下に、図書館が論文を公開する

(真実)著者が自らの意志で論文を公開する。大学(図書館)はそのための場所を提供する

(神話)機関リポジトリの発展により、電子ジャーナル価格の上昇が抑制される

(真実)抑制されない。電子ジャーナル価格上昇に対する著者サイドの対抗策である

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- 2024.2 学術論文等の即時オープンアクセスの実現に向けた基本方針
→学術雑誌への掲載後、公的資金による学術論文、及び根拠となるデータを即時に機関リポジトリ等の情報基盤へ掲載することを義務づける
- 2024.8 「学術論文等の即時オープンアクセスの実現に向けた基本方針」の実施にあたっての具体的方策に係る説明会
→「基本方針」の改定案を公開、即時OAできない際の対応や達成率の確認方法について記載



<機関リポジトリ業務担当者の役割>

研究者が研究成果物を公表する際に必要な支援を行うこと

＝各機関内のオープンアクセスに関する業務全般

- 機関リポジトリシステムにデータを登録する
- オープンアクセスに関する情報を伝える
- オープンアクセス化を支援する
- オープンアクセス方針を整備する
- …etc.

★業務上で得た知識や情報・人脈は、他の業務にも生かすことができる

これで本講は終わります。