第15回月刊JPCOAR「オープンアクセス新任担当者相談会」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

2022年　JPCOAR イベント運営作業部会

本講の内容

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. 機関リポジトリの目的と役割

① 機関リポジトリの目的
② 日本の機関リポジトリの現状
③ オープンアクセスに関する政策と動向
④ 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　①学術雑誌とはどのようなものか

1. 学術コミュニケーション　①学術雑誌とはどのようなものか

“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

その科学的真価を認めてほしい

査読による質の保証

世に広まってほしい

知見を世に知らせる

後世にも伝えたい

知見を後世に伝える

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

一般的な出版物

- 著者・作者は原稿料や印税などを受け取り、収入とする

学術雑誌

むしろ著者がお金（例えば20万円とか）を払うケースもある。

- 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

1. 学術コミュニケーション　①学術雑誌とはどのようなものか

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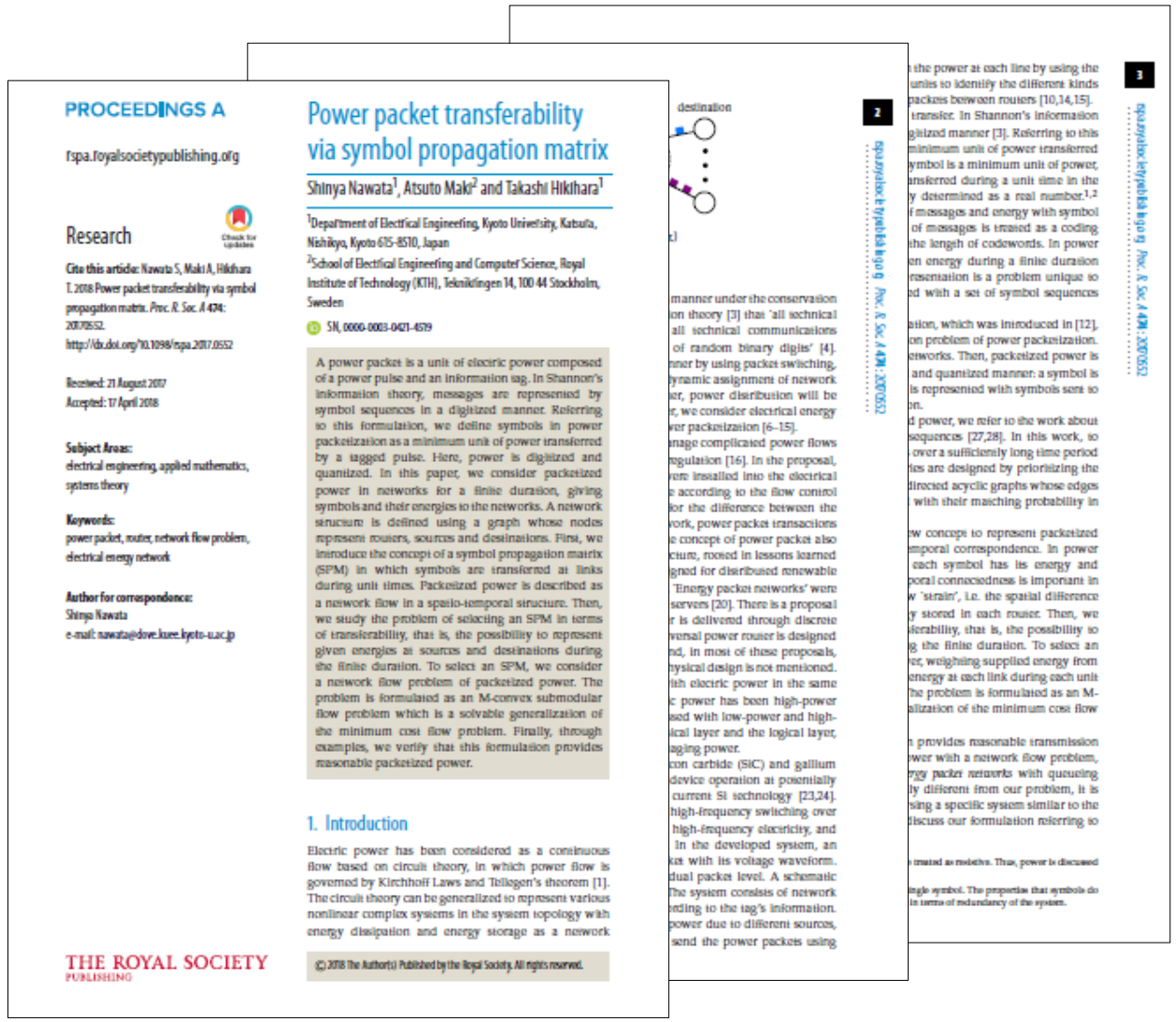
1．学術コミュニケーション　②論文とはどのようなものか

Nawata S, Maki A, Hikihara T. (2018)
Power packet transferability via symbol propagation matrix.
Proc. R. Soc. A 474: 20170552. http://dx.doi.org/10.1098/rspa.2017.0552



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Subject Areas:
electrical engineering, applied mathematics, systems theory

Keywords:
power packet, router, network flow problem, electrical energy network

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Power packet transferability via symbol propagation matrix

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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 at 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 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

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 weighted 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 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 accessibility. 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 simulated 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.
Funding. Part of this work were financially supported by the Cross-Ministerial Strategic Innovation Program from New Energy and Industrial Technology Development Organization, Japan, and by the Super Cluster Program (Kyoto) from the Japan Science and Technology Agency. The work of the author (S.N.) was financially supported, in part, by Kyoto University.
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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4. Massey JL. 1984 Information theory: the copernican system of communications. *IEEE Commun. Mag.* **22**, 26–28. (doi:10.1109/MCOM.1984.1091871)
5. Kleinrock L. 2010 An early history of the Internet [history of communications]. *IEEE Commun. Mag.* **48**, 26–36. (doi:10.1109/MCOM.2010.5534584)
6. Takuno T, Koyama M, Hikihara T. 2010 In-home power distribution systems by circuit switching and power packet dispatching. In *Proc. 1st IEEE Int. Conf. Smart Grid Commun., Gaithersburg, MD, 4–6 October*, pp. 427–430. Piscataway, NJ: IEEE.
7. Takahashi R, Takuno T, Hikihara T. 2012 Estimation of power packet transfer properties on indoor power line channel. *Energies* **5**, 2141–2149. (doi:10.3390/en5072141)

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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 at 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

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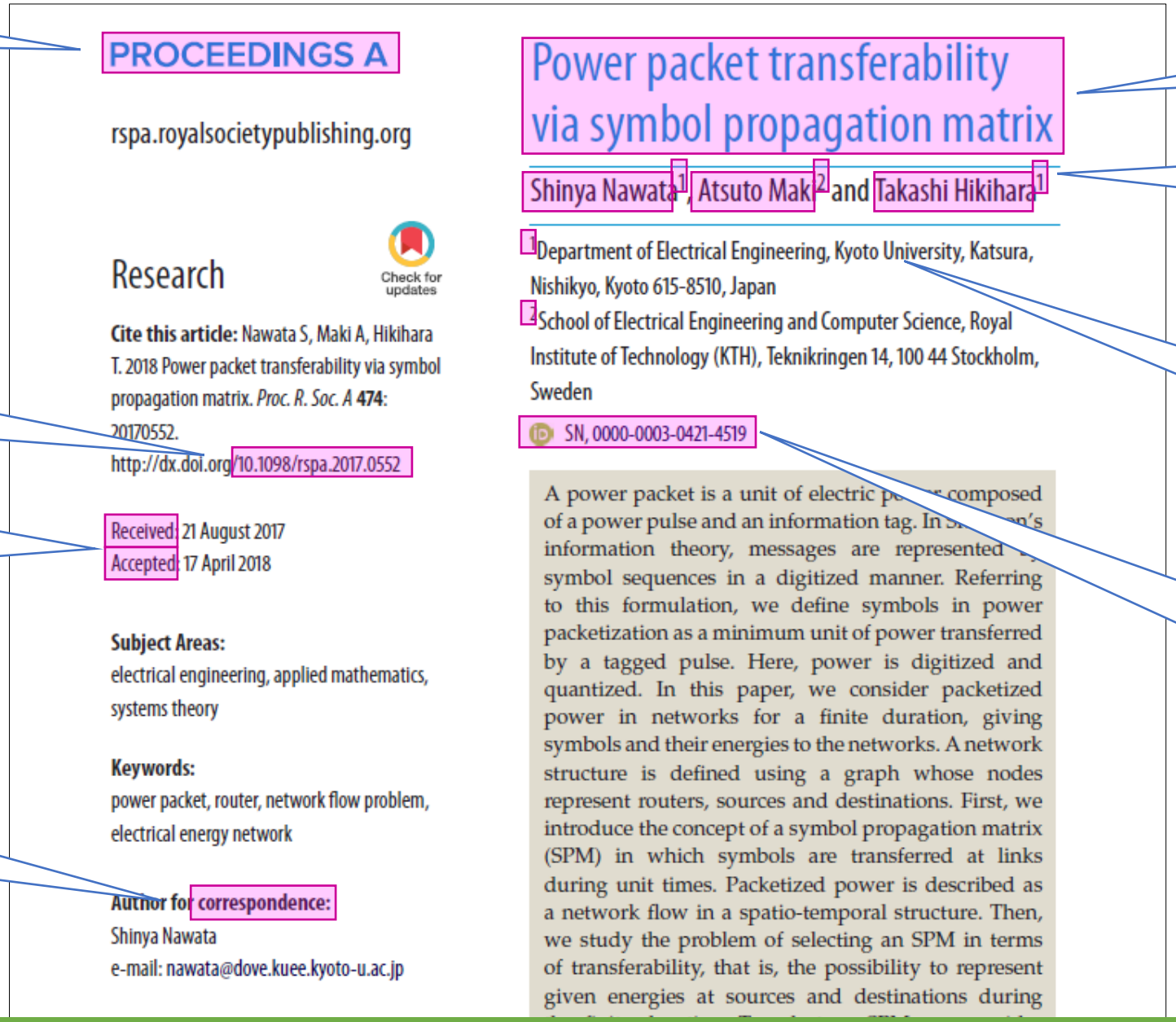

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この論文の著者
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著者の所属
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著者を表す記号「ORCID」
この例は筆頭著者の縄田信哉先生のもの

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

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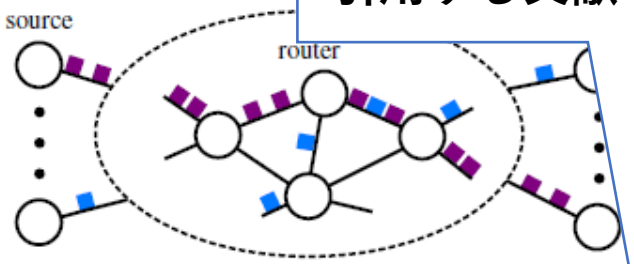

gure 1. A schematic of power packet dispatching network. (Online version in colour.)

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

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Data accessibility. 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 simulated 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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T, Hikihara T. 2012 Estimation of power nsfer properties on annel. *Energies* **5**, 2141–

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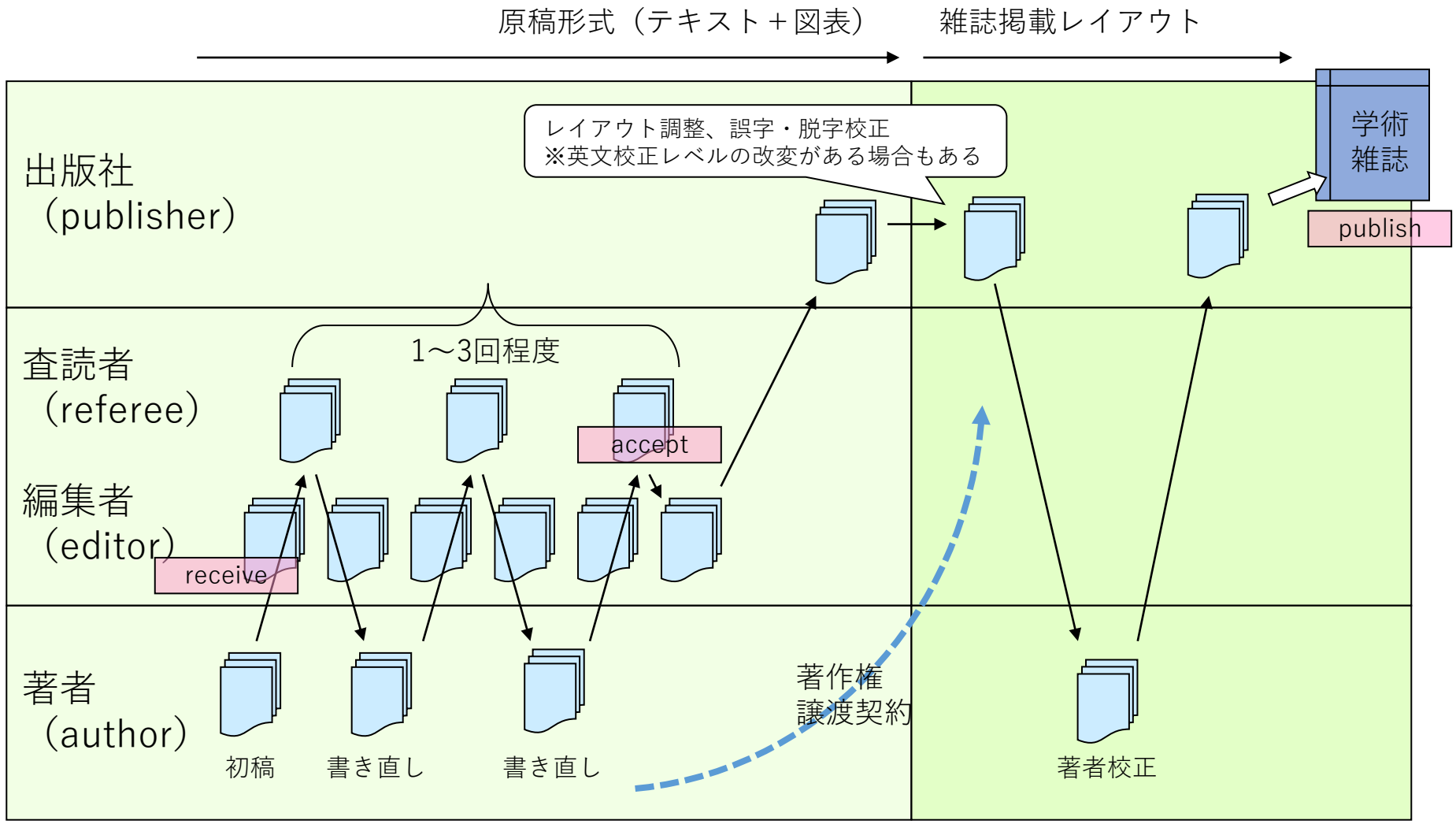

学術情報の流通不全から オープンアクセス思潮へ

- 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
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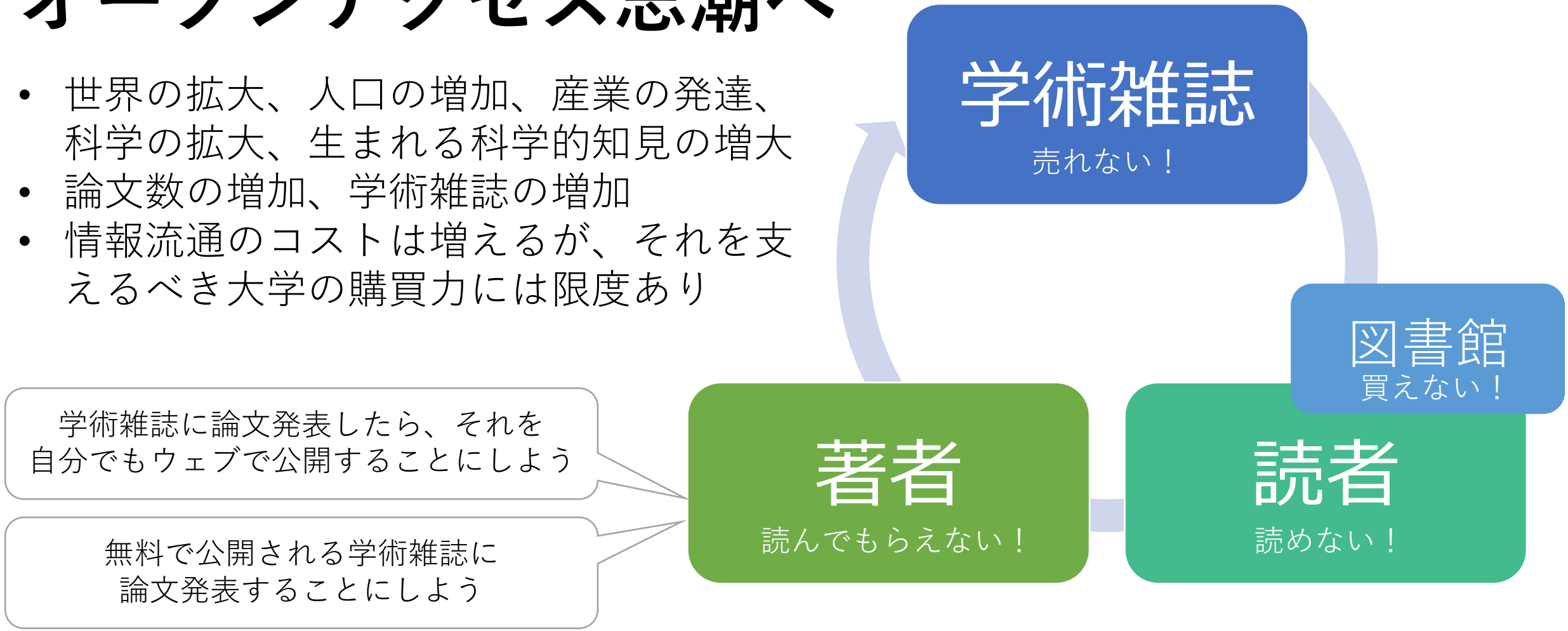

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学術雑誌

機関リポジトリ
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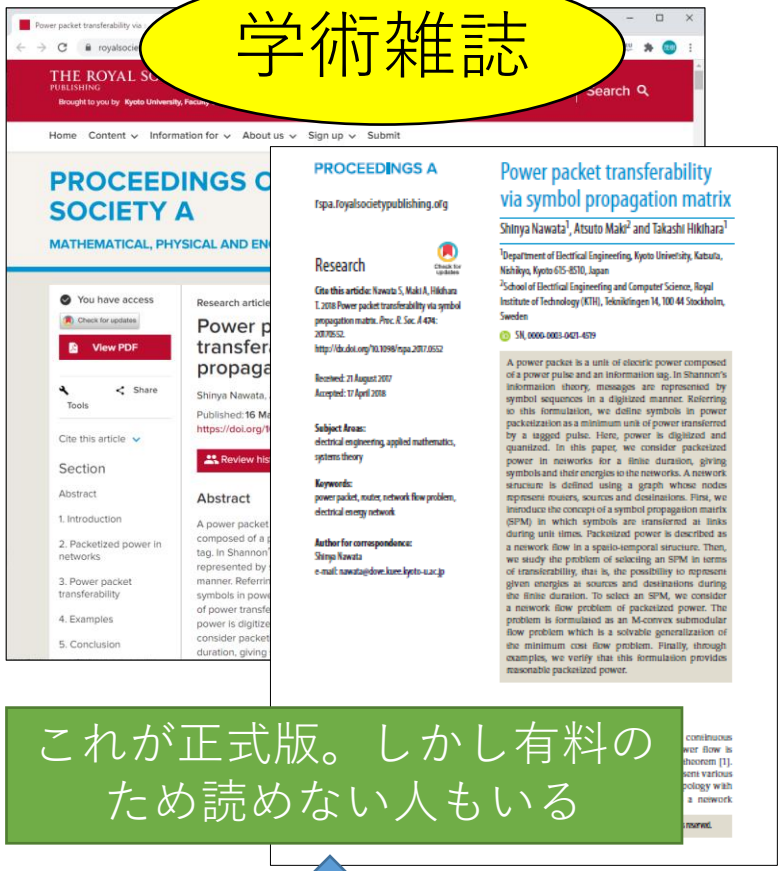

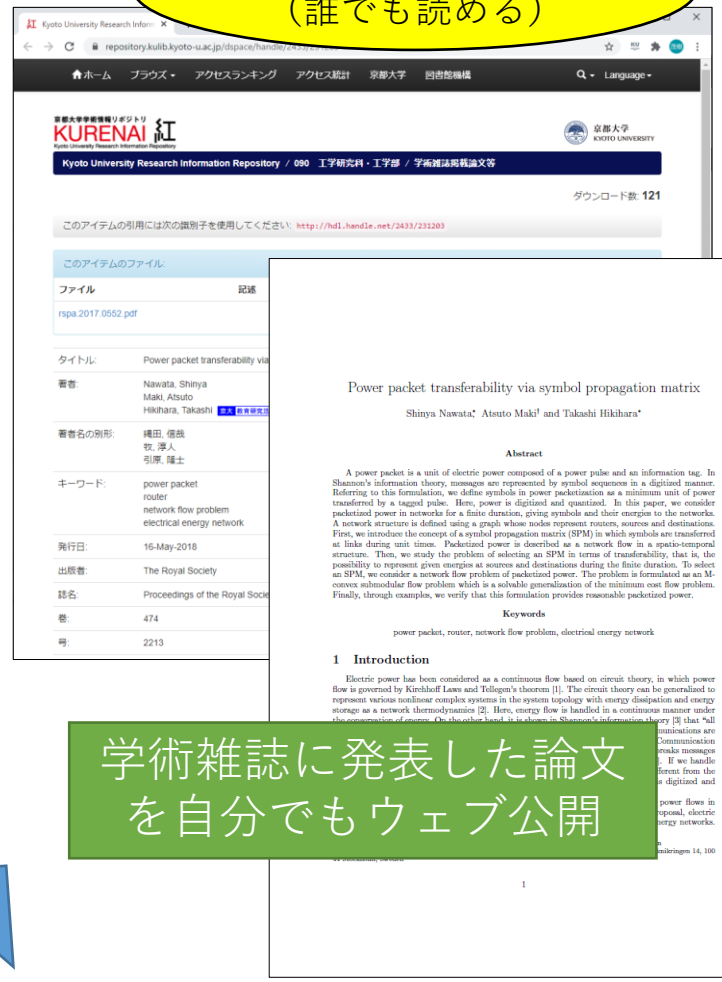

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２．機関リポジトリの目的と役割

①機関リポジトリの目的

②日本の機関リポジトリの現状

③オープンアクセスに関連する政策と動向

④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

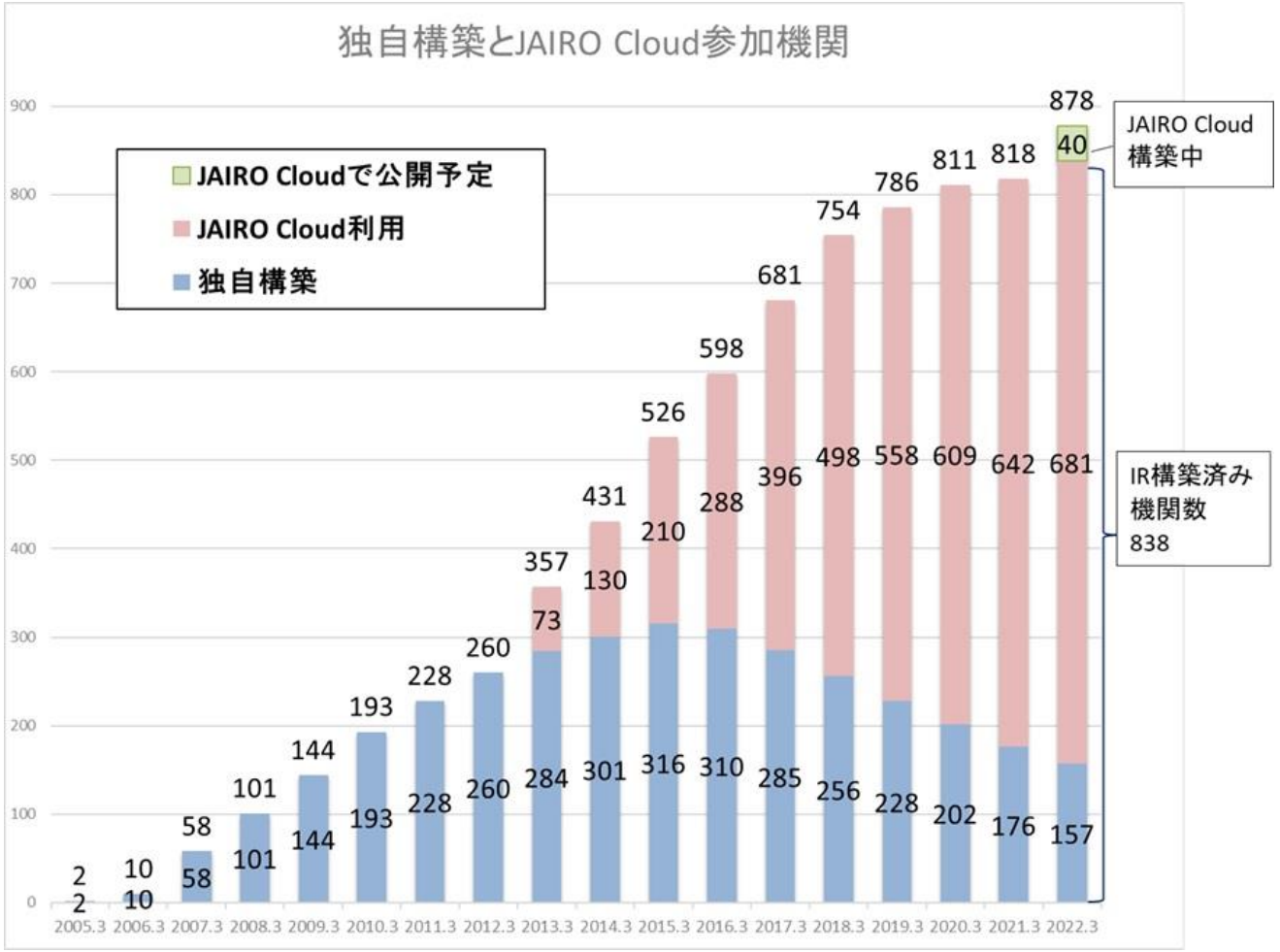
（神話）著者の許諾の下に、図書館が論文を公開する
（真実）著者が自らの意志で論文を公開する。大学（図書館）はそのための場所を提供する

（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

杉田 茂樹, 第11回月刊JPCOAR「オープンアクセス新任担当者向け相談会」実務事例紹介(1), 2022

2. 機関リポジトリ　②日本の機関リポジトリの現状

【構築機関数】



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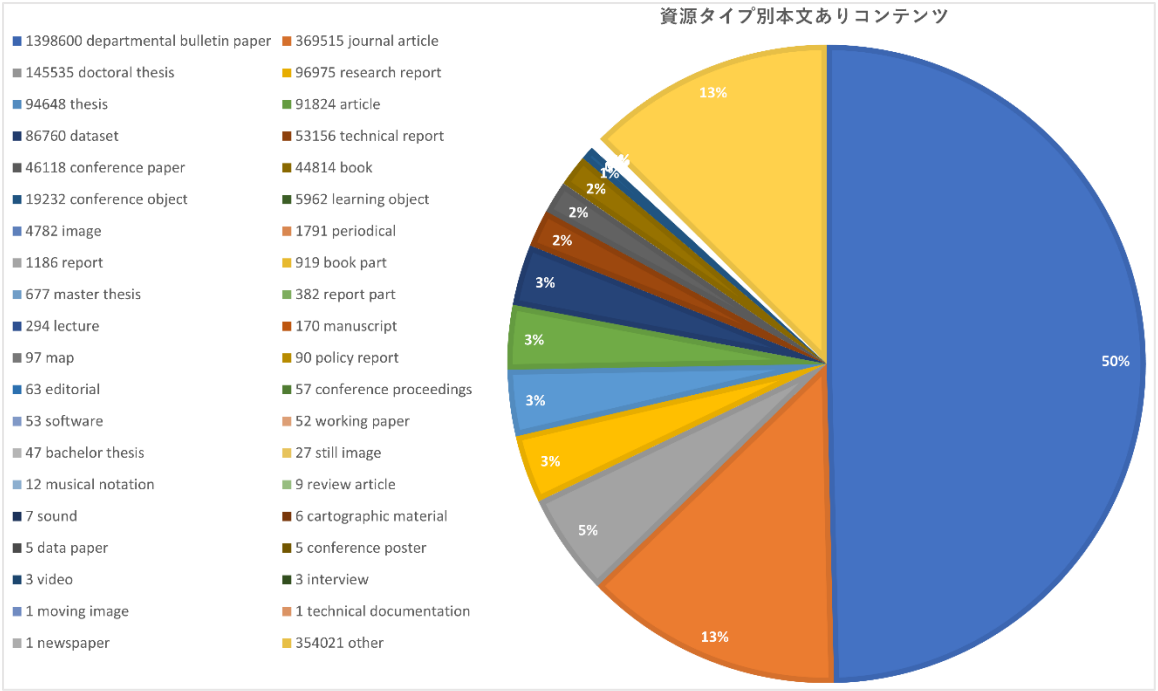

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（2022-11-04参照）

2. 機関リポジトリ　③オープンアクセスに関連する政策と動向

【オープンアクセスに関する政策文書】

機関リポジトリは大学図書館の取り組むべき課題として繰り返し登場

- 科学技術・学術審議会　学術分科会　研究環境基盤部会　学術情報基盤作業部会
  「学術情報の国際発信・流通力強化に向けた基盤整備の充実について」(2012.7)
  ―「機関リポジトリ」をオープンアクセスの受け皿として活用
  ―機関リポジトリは、社会への貢献が求められる大学等の責務を果たすための重要な手段
- 内閣府
  「第5期科学技術基本計画」(2016.1)
  「第6期科学技術・イノベーション基本計画」(2021.3)
  ―オープンサイエンス(オープンアクセスとデータのオープン化)の推進
- 科学技術・学術審議会　学術分科会　学術情報委員会
  「学術情報のオープン化の推進について(審議まとめ)」(2016.2)
  ―大学等は、機関リポジトリをグリーンOAの基盤として拡充
  ―論文のオープンアクセスに係る実施方針を定めて計画的に取組む

https://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu4/toushin/1323857.htm (参照2022-11-07)
https://www8.cao.go.jp/cstp/kihonkeikaku/index5.html (参照2022-11-07)
https://www.mext.go.jp/b_menu/shingi/gijyutu/gijyutu4/036/houkoku/1368803.htm (参照2022-11-07)
https://www8.cao.go.jp/cstp/kihonkeikaku/index6.html(参照2022-11-07)

2. 機関リポジトリ　③オープンアクセスに関連する政策と動向

【オープンアクセスに関する動向】

- 日本学術振興会（JSPS）＞科研費の助成
  ―実施方針を公表(2017.3)し、公募要領等で明示。科研費の助成を受けて執筆した論文(成果論文)は原則OA化
- 科学技術振興機構（JST）＞研究助成、J-STAGEの運営
  ―基本方針を公表(2017.4)。成果論文OAのため機関リポジトリ等の活用・公開を推奨
- 文部科学省＞博士論文
  ―学位規則を改正（2013.4)し、博士論文のインターネットの利用(原則機関リポジトリ)による公表義務化

https://www.jsps.go.jp/data/Open_access.pdf (参照2022-11-07)
https://www.jst.go.jp/pr/intro/openscience/policy_openscience.pdf (参照2022-11-07)
https://www.mext.go.jp/a_menu/koutou/daigakuin/detail/1331790.htm(参照2022-11-07)

2. 機関リポジトリ　③オープンアクセスに関連する政策と動向

＜研究機関でのオープンアクセス方針＞

大学等の研究機関が研究成果のオープンアクセスを義務とする、
あるいは推奨する方針を定めたもの
＝方針を公表することで、機関の研究成果物に対する姿勢を表明することにもなる

JPCOAR「オープンアクセス方針策定ガイド 改訂版」

https://jpcoar.repo.nii.ac.jp/records/57（参照2022-11-07）

オープンアクセス方針・実施要領　リンク集

https://jpcoar.repo.nii.ac.jp/page/53（参照2022-11-07）

（神話）オープンアクセス方針、RDM方針を定めることにより自動的に論文が集まるようになる
（真実）ならない。方針策定の意義は、その過程での大学執行部へのOA概念浸透にある

杉田 茂樹, 第11回月刊JPCOAR「オープンアクセス新任担当者向け相談会」実務事例紹介(1), 2022

2. 機関リポジトリ　③オープンアクセスに関連する政策と動向

【オープンサイエンスに関する動向・研究データオープン化への動き】

- 内閣府 国際的動向を踏まえたオープンサイエンスの推進に関する検討会
  「国立研究開発法人におけるデータポリシー策定のためのガイドライン」(2018.6)
  「研究データ基盤整備と国際展開ワーキング・グループ報告書
  ー研究データ基盤整備と国際展開に関する戦略ー 」(2019.10)
  「研究データリポジトリ整備・運用ガイドライン」(2019.3)
- 日本学術会議 オープンサイエンスの深化と推進に関する検討委員会
  「提言オープンサイエンスの深化と推進に向けて」(2020.5)
- 内閣府
  「第6期科学技術・イノベーション基本計画(再掲)」(2021.3)
  ー機関リポジトリを有する全ての大学・大学共同利用機関法人・国立研究開発法人において、2025年までに、データポリシーの策定率が100%になることを目標に掲げる

https://www8.cao.go.jp/cstp/tyousakai/kokusaiopen/index.html (参照2022-11-07)
http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-24-t291-1.pdf (参照2022-11-07)
https://www8.cao.go.jp/cstp/kihonkeikaku/index6.html(参照2022-11-07)

2. 機関リポジトリ　④機関リポジトリ業務担当者の役割

＜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です。