

A brass key is positioned diagonally across the frame, pointing towards the bottom right. The background is a blue-toned puzzle with a faint globe pattern. The text is overlaid on the key and puzzle.

**Open Science policy in Japan
as a part of the Integrated Innovation Strategy
to change the landscape of Science, Society
and 'Science and Society'**

NISTEP, MEXT, Japan

Kazuhiro Hayashi

STM Member Connect Japan

Publishing innovation and Open Science – the next 50 years

Nov 1st, 2018

Happy Anniversary!



Oct, 1968

STM launched (Frankfurt Book Fair)

Oct, 2018

50th anniversary (Congratulations)

Nov 1st, 2018

STM Connect

also



Nov 8th, 1968

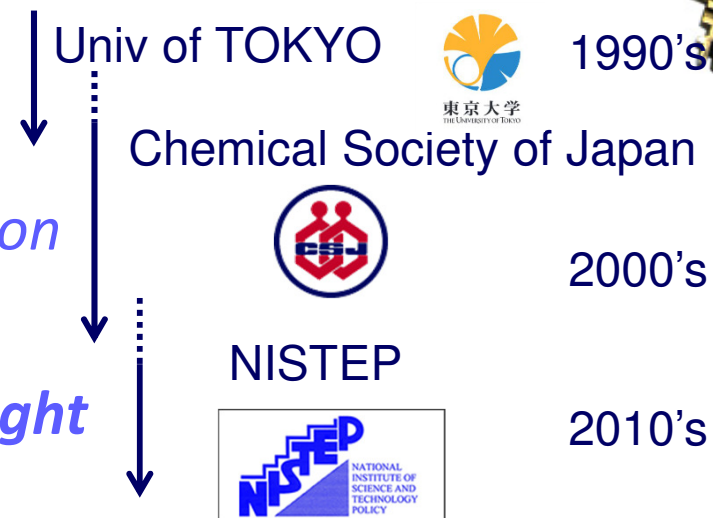
★HAPPY★
BIRTHDAY!

Who speaks?

ORCID ID: 0000-0003-1996-4259

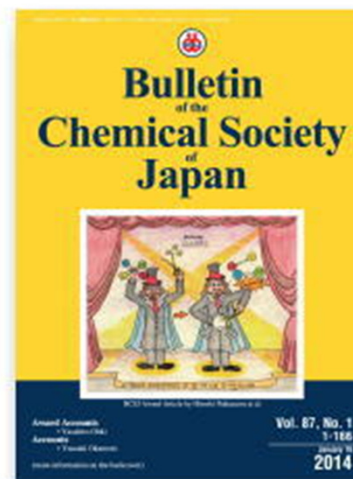
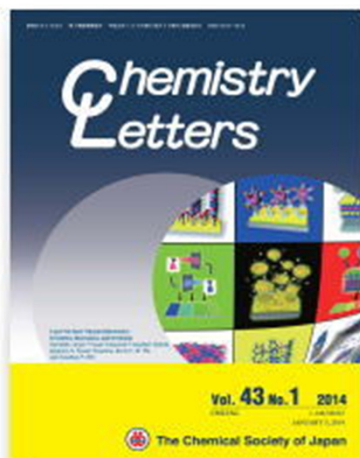


- ❑ *Scientist, DC1*
- ❑ *System Developer since 1995, EJ*
- ❑ *Editor and Publisher, rapid publication*
- ❑ *Project and Business Manager, OA*
- ❑ *Researcher for policy makers, Foresight*
- ❑ *Open Science experts*



- ◆ To see scholarly publishing from a birds-eye view and find a way to implement new paradigm of Scholarly Communication (now *Open Access(Science) and emerging metrics*)
- ◆ To be: *enhancer, catalyzer, or translator* between stake holders to get all transferred to the next stage

Publishing 1995-2012



2005
OA
(Hybrid)

2001
Japan
Collaboration



2006
Asian
Collaboration

<http://www.chemistry.or.jp/journal/index.html>

Still,




Annals of
Gastroenterological
Surgery



Annals of
Gastroenterological
Surgery

<https://onlinelibrary.wiley.com/journal/24750328>

PEPS
Progress
in Earth
and Planetary
Science




Springer Open

<http://progearthplanetsci.org/>

CHEMISTRY
International

PURE AND
APPLIED CHEMISTRY



I U P A C

<https://iupac.org/>

Multi Roles in one for looking forward



- [Publishing Industry]
 - **Board member of ALPSP (2011)**
 - J-STAGE & JaLC (2001-)
- [Library and Open Access]
 - SPARC Japan Steering Committee (2007-)
 - **Open Access Week International Advisory Board (2014-)**
- [Community of Science]
 - Specially appointed member of Science Cour of Japan (2010-)
 - IUPAC Titular Member (2012-)
- [Policy and Administration]
 - NISTEP, MEXT (2006-)
 - Cabinet Office, OECD, G7



Agenda



1. Integrated Innovation Policy

- Open Science Policy and its implementation

2. Perspective of Science, Society and Science and Society

- Emerging of Game-changing in publishing
- Societal engagement (citizen science)

(as a personal view)

Integrated Innovation Strategy - Basic Concepts

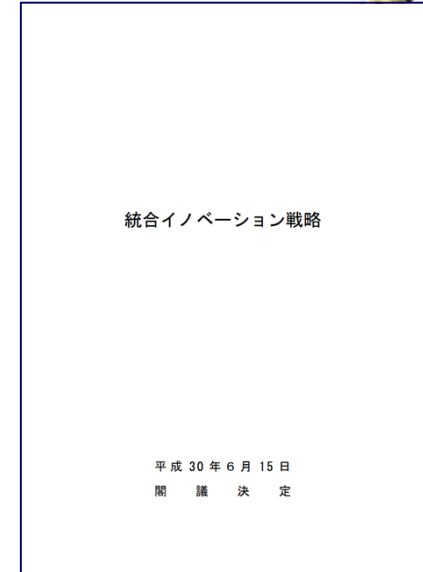


1. Creation of Optimal Socioeconomic Structure for Society 5.0

- Current rigid structure \Rightarrow flexible and agile structure

2. Total renovation on STI Policies

- Back ground : Global game change of innovation mechanism
- Way forward: Break away from past trajectory of STI policies
cf. 'The 5th Science and Technology Basic Plan',
'Comprehensive Strategy on STI 2017'



Integrated Innovation Strategy – Action 1 : Source



- **3 pillar model cf. “Data fusion” = “Source of Innovation”**

- **Social Data = Platform for Society 5.0**

- Comprehensive architecture design on “cross-field” and “field-specific” data linkage platforms
cf. data-interface, semantic data, applications, data market, cyber security, privacy, related inter/intra discipline, etc.)
- Global linkage cf. NIEM(US), FIWARE (EU)

- **Academic Data = Promotion of open (closed) science**

- Ex. Data administration guideline for machine/AI-readable research data⇒“reverse MI”, “data driven bio research”

- **Official Data = quasi-Utility Function model**

- Ex. Evidence, based on comprehensive analyses on R&D funds and outputs from governmental STI projects, etc.

Other Action and Prioritized Fields



- **Action 2: Creation (University and R&D management reform)**
- **Action 3: Implementation (for Private and Public Sector)**
- **Action 4: Global Contribution (for SDGs etc)**
- **Prioritized fields**
 - **AI Technology**
 - **Biotechnology**
 - **Environment and Energy**
 - **Safety and Security**
 - **Agriculture**

Integrated Innovation Strategy June 2018

統合イノベーション戦略(2018年6月15日閣議決定)



統合イノベーション戦略

平成30年6月15日
閣議決定

Chap.2 Knowledge Source (知の源泉)

- (1) Collaboration Platform towards Society 5.0)
- (2) Data infrastructure for Open Science
- (3) EBPM/EB University Management

第5期科学技術基本計画(Plan)・総合科学技術イノベーション戦略2017(Do)の取組を評価(Check)し、今後とるべき取組(Action)を提示(概要資料より抜粋)

- 国益や研
- データ基盤
- その結果

In a nutshell

1. Data policy for Research Institutions (open-close-secret)
2. DMP by funding agency
3. Data infrastructure by NII and University, including Institutional repositories
4. Human Resource Development
5. Monitoring Survey

<Cabinet
国研のデー
策定を促進
ラインを策

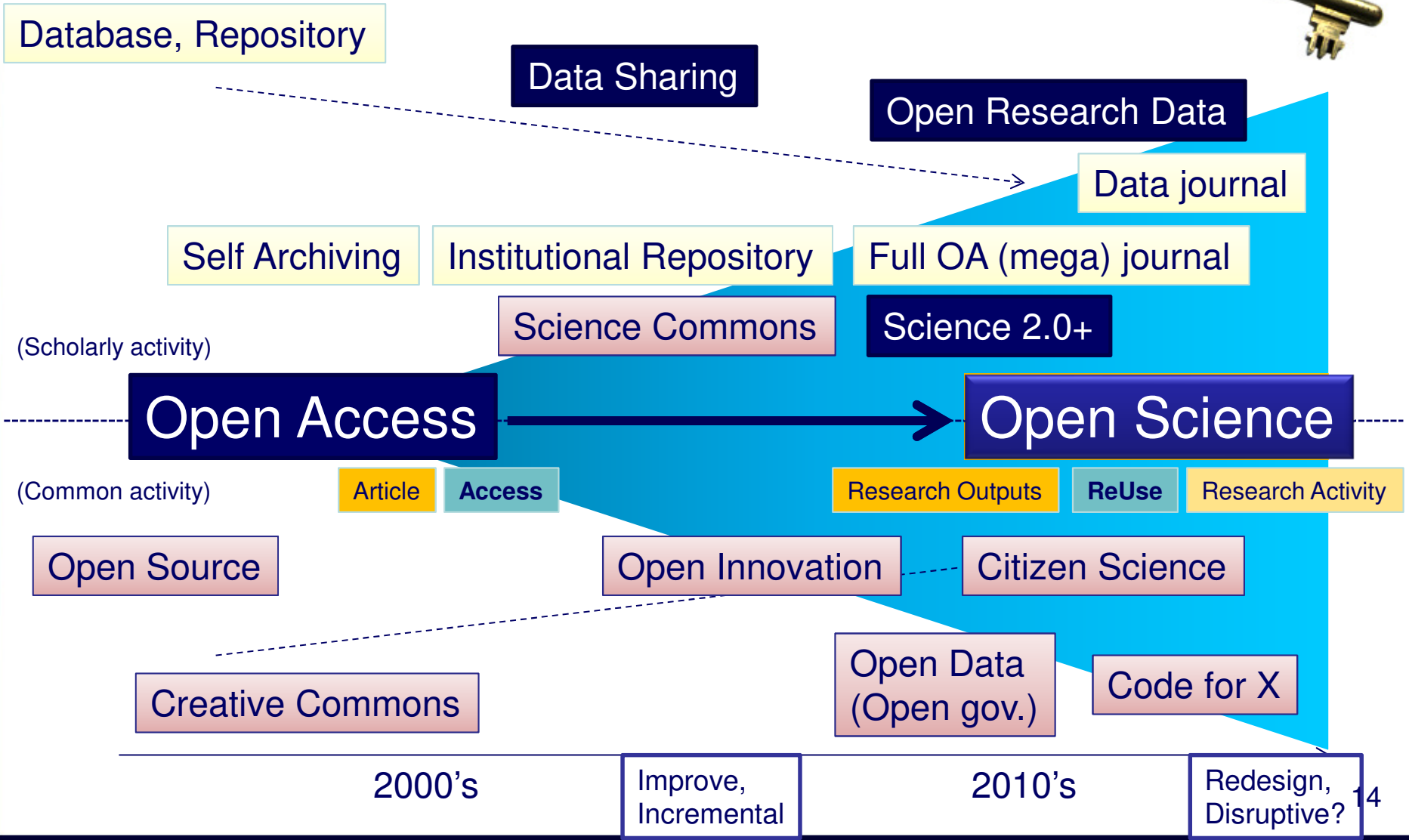
<Ministry
Funding A
>
競争的研究
研究実施者
管理を適切
組みを、各
究費制度に

「の源泉」
の構築

To foster FAIR Data Infrastructure for innovation

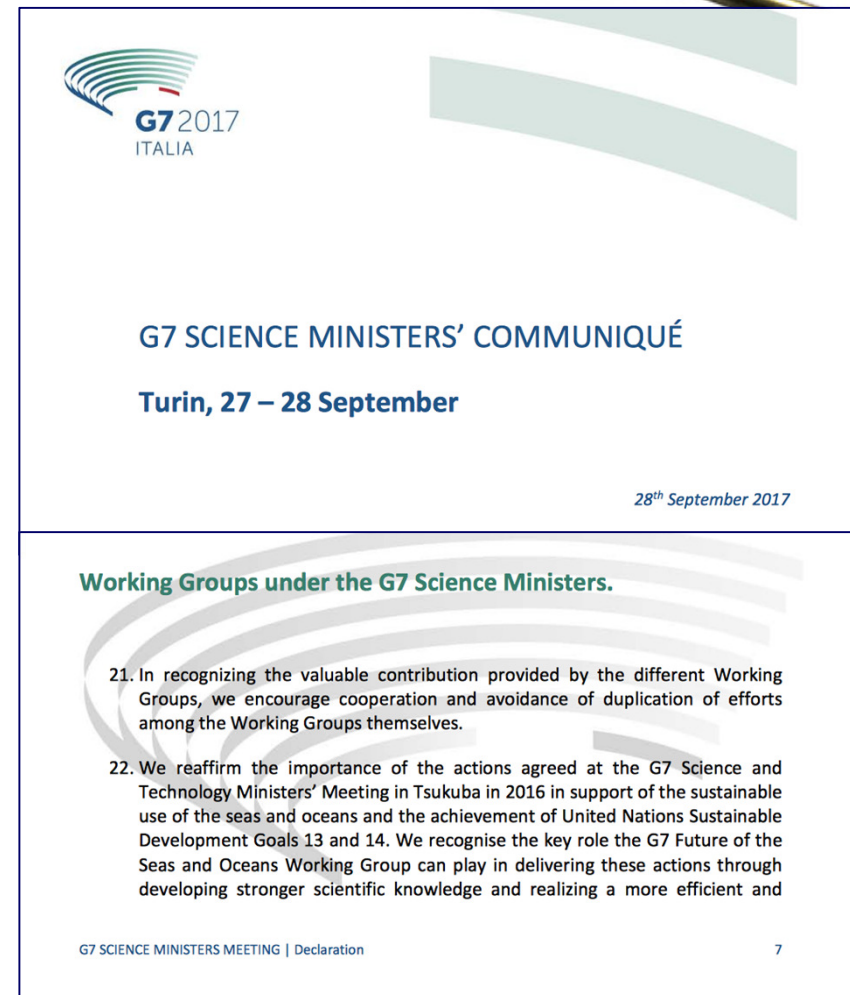
Open Access to Open Data and Open Science

Overview example (for Cabinet Office 2014: revised)



Open Science as a key policy issue

- **G7 Science Ministers' Meeting**
 - 2016.5 Tsukuba, Japan
 - 2017.9 Turin, Italy
- **Transforming Science**
 - To change science itself
 - To change society
 - With new framework of industry
- **So, far**
 - Sharing research-data
 - Data-driven research



(to solve various problems related journals, papers, and citation)

The Book in the Renaissance

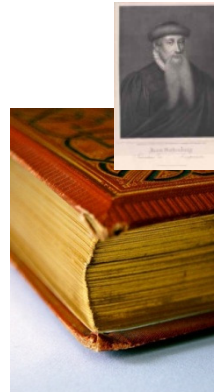


- We already exploited openness once in the 15th Century

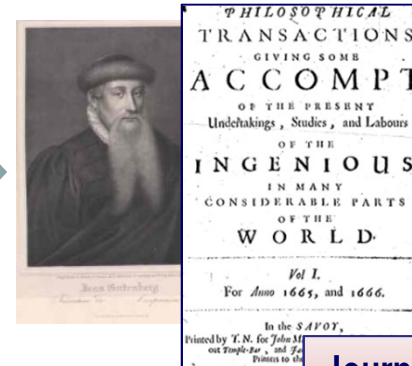
Letter, Hand-writing
Hand-copy



Book, Journals
Mass-printing



Explosion of
information



Open
Infrastructure

Journal development and
Science revolution and



『THE BOOK IN THE RENAISSANCE』

「印刷という革命」白水社

Printed book had changed the society in 200 years

(Business, Religions, Culture, Education)

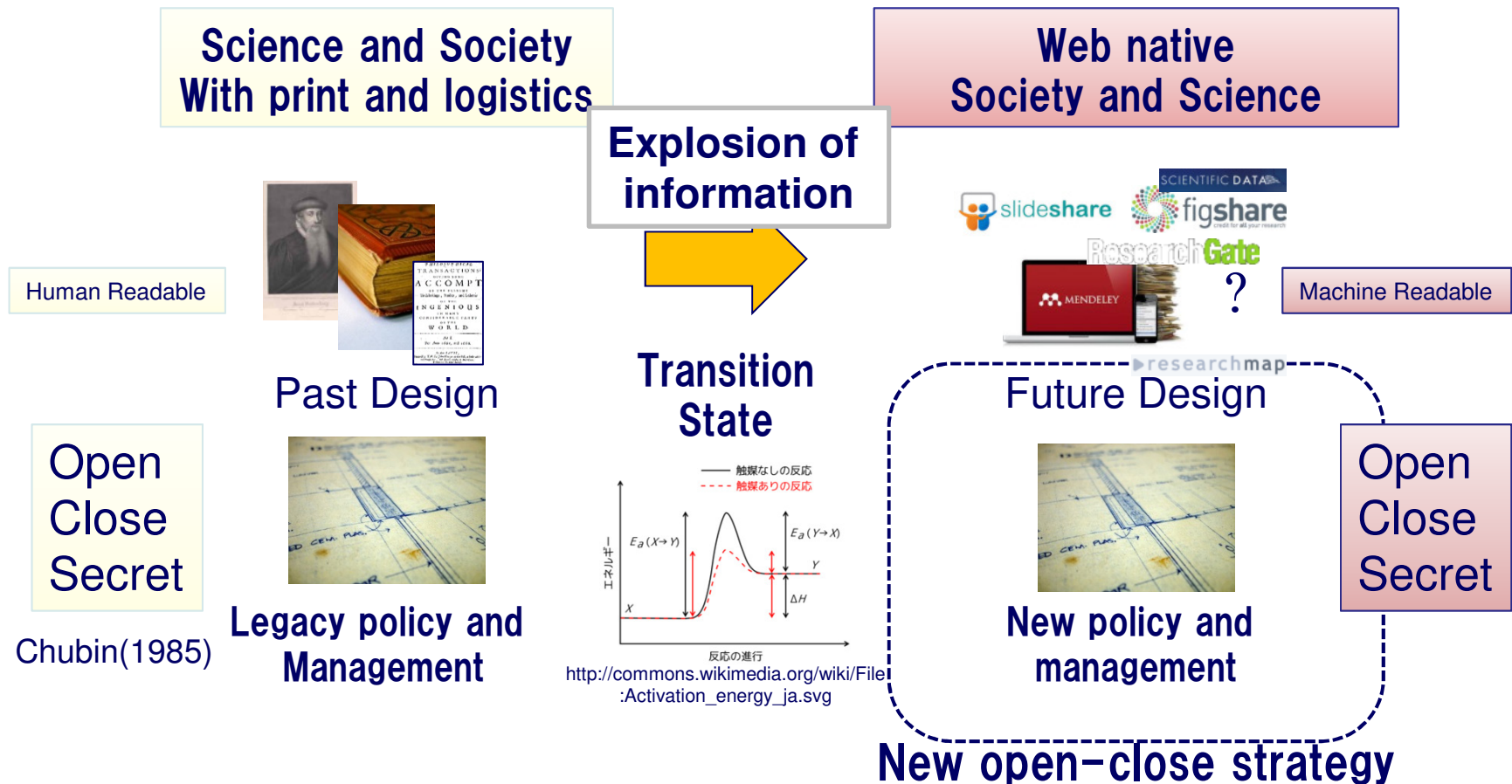
Connected to science revolution

<https://doi.org/10.1241/johokanri.58.643>

Re-framing of social framework



- We partially digitalized society but not fully especially in the context of social framework including laws and customs



Already happening and emerging



① Collaborative Analysis . . . 大量の実験データをグループでは解析しきれない

- ✓ LHC-ATLAS実験 : 約1000回/秒の陽子・反陽子衝突の即時解析のためには100万台のCPUが必要 ⇒ 170研究機関を通信ソフトで結び共同解析 = ヒッグス粒子を数十事象/110億衝突事象 を発見

② Collaborative Observation . . . 観測する対象が大きすぎて1機関では扱えない

- ✓ GEOSS (全球地球観測システム) : 世界全域を対象とした人工衛星や地上観測など多様な観測システムが連携した、包括的なシステムを構築

③ Sharing Unique Data . . . 何度も同じ解析をしない

- ✓ ヒトゲノム計画 : ヒトのゲノムの全塩基配列 (約30億塩基対) を解析するプロジェクトの実施

④ Data driven Science with data including failure data . 新しい科学の手法

- ✓ マテリアル・インフォマティクス : 調べられた化合物データの解析により新たな物質を探索 物性を予測して合成が可能な時代へ

⑤ New Science and Society . . . Citizen Science、クラウドファンディング

- ✓ Galaxy Zoo : ハッブル望遠鏡がとらえた何百万の銀河系の画像を20万人以上の市民ボランティアが分類・整理 新たな銀河発見にも繋がる

Top-down and Bottom-up approach



Top
Down

- Basic principle
- Guideline
- Incentives

- Data Assessment
- Data Policy
- Data Infrastructure
(Data Repository)
- Internal Incentives

Bottom
Up

G7 Science and Technology Minister Meeting
EU (DSM) , OECD (Going Digital)
The 5th Science and Technology Basic Plan
(Society 5.0)

The Cabinet Office (Open Science workforces)
MEXT and Other Ministries Funding Agency

Developing **knowledge basis** to transform
Science and to change Society

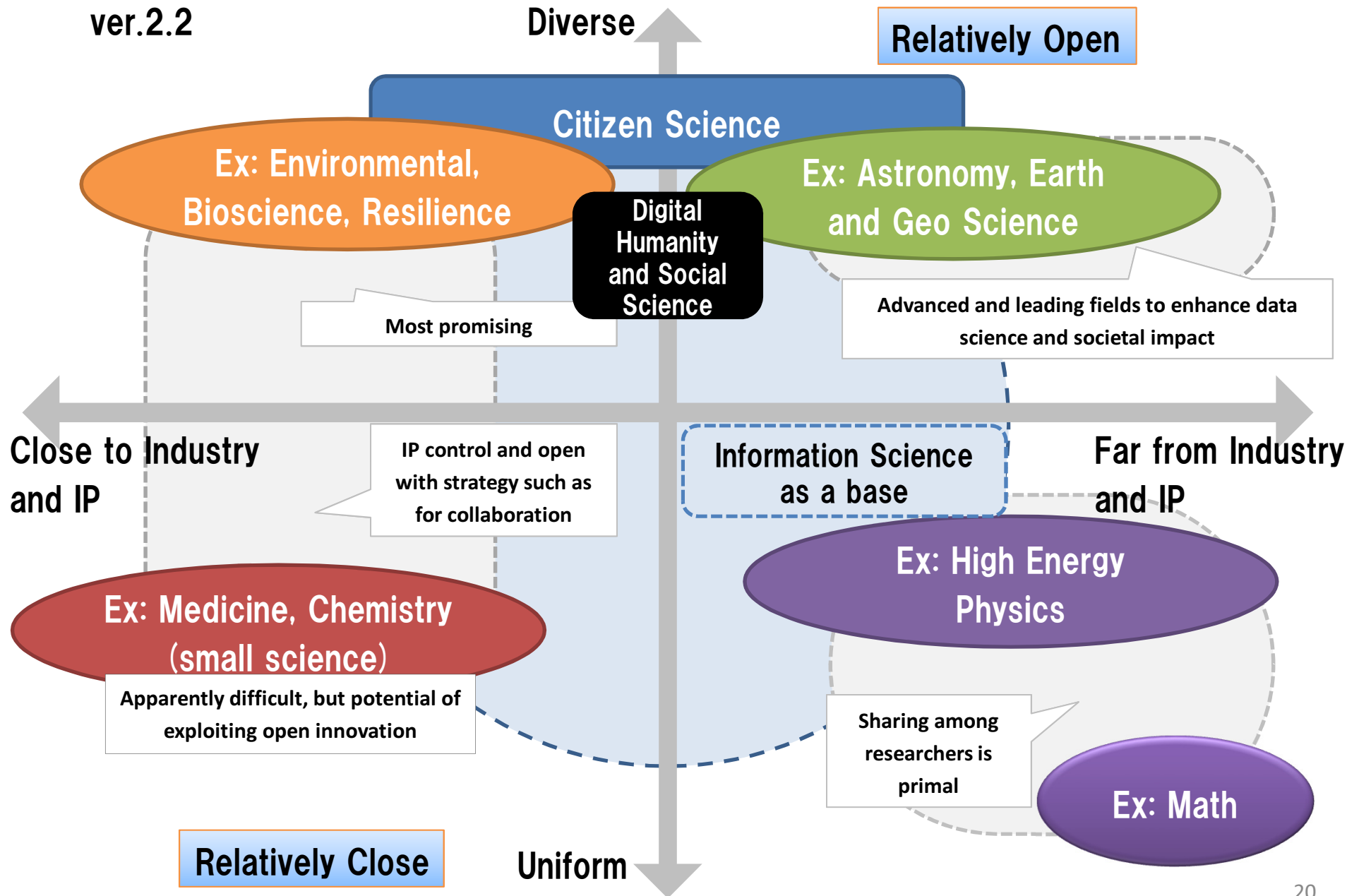
Planning to enhance researchers'
voluntary and proactive action

Research Organizations, Universities
Established Learned Society and
New Initiatives

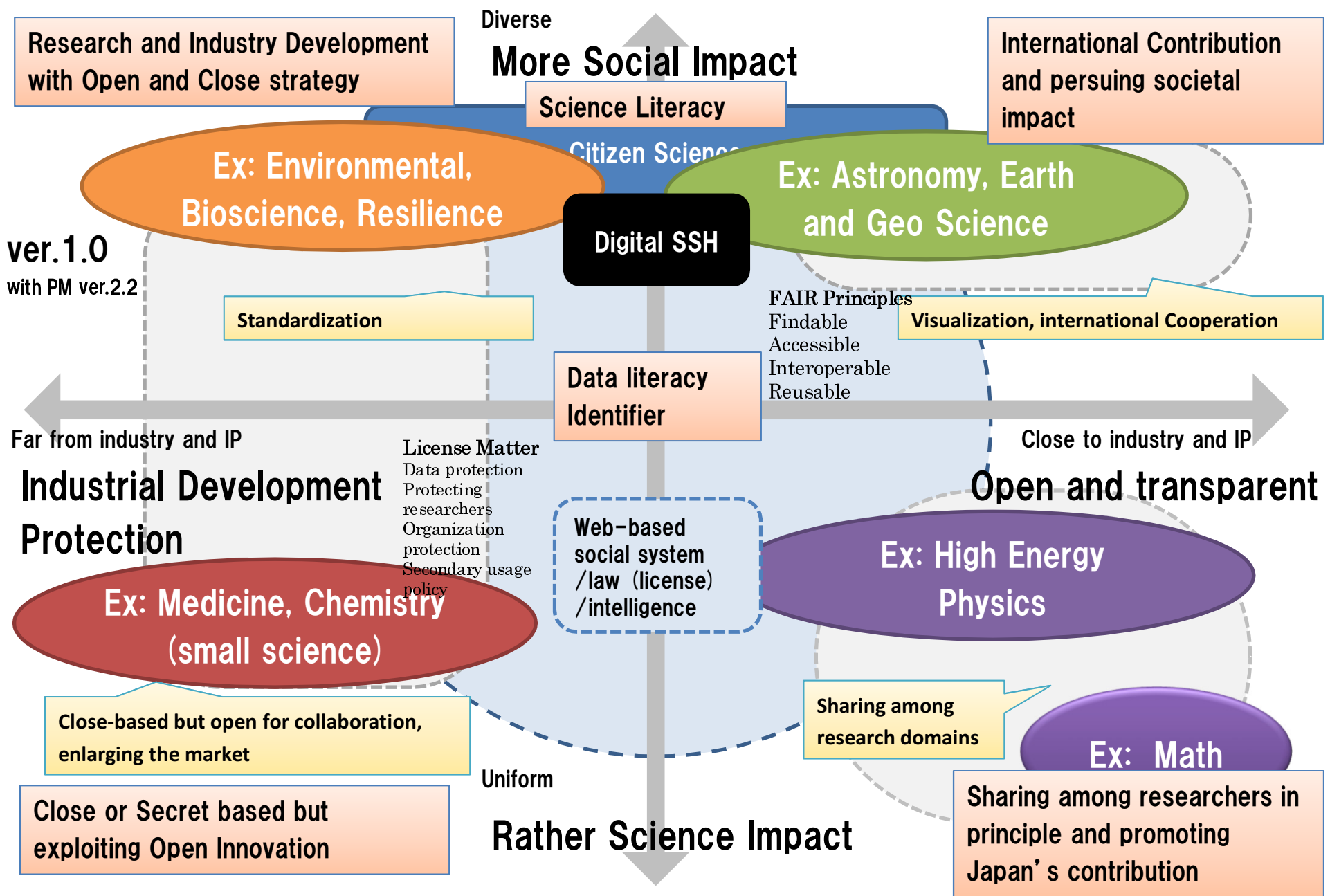
Voluntary and Personal Activities

Relative Mapping of Open Science by Research Domain

ver.2.2



Priority examples

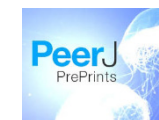


Open Science is casting



Questions to the significance of

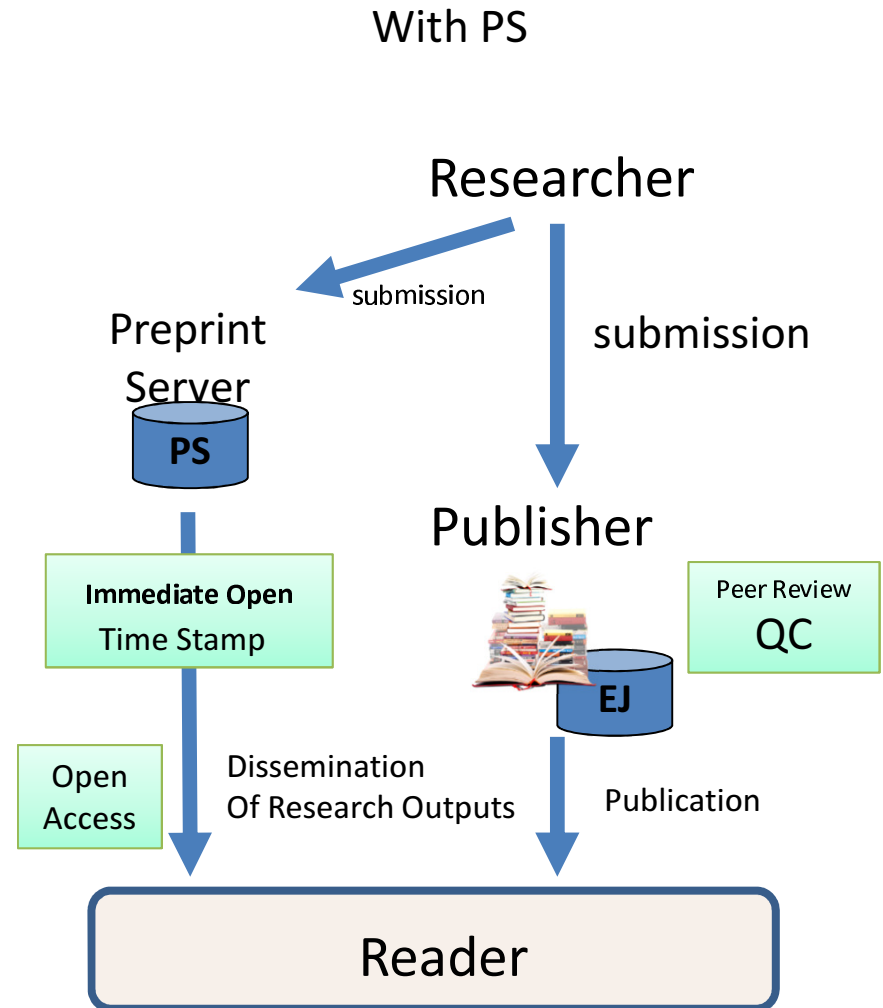
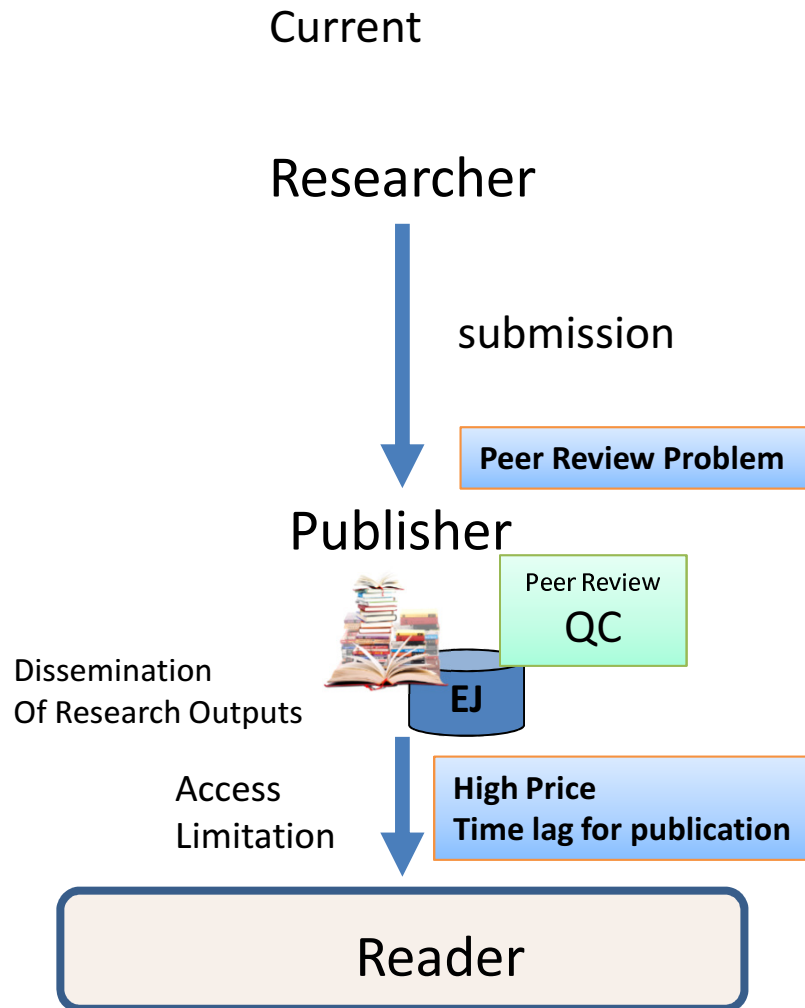
- Journal 「雑誌」の意義
- Peer Review 「査読」の意義
- Evaluation 「評価」の在り方
- Research Outputs 「研究成果」の在り方
- Reuse of Outputs 「成果の再利用」の在り方
- Research itself 「研究」の在り方



GitHub

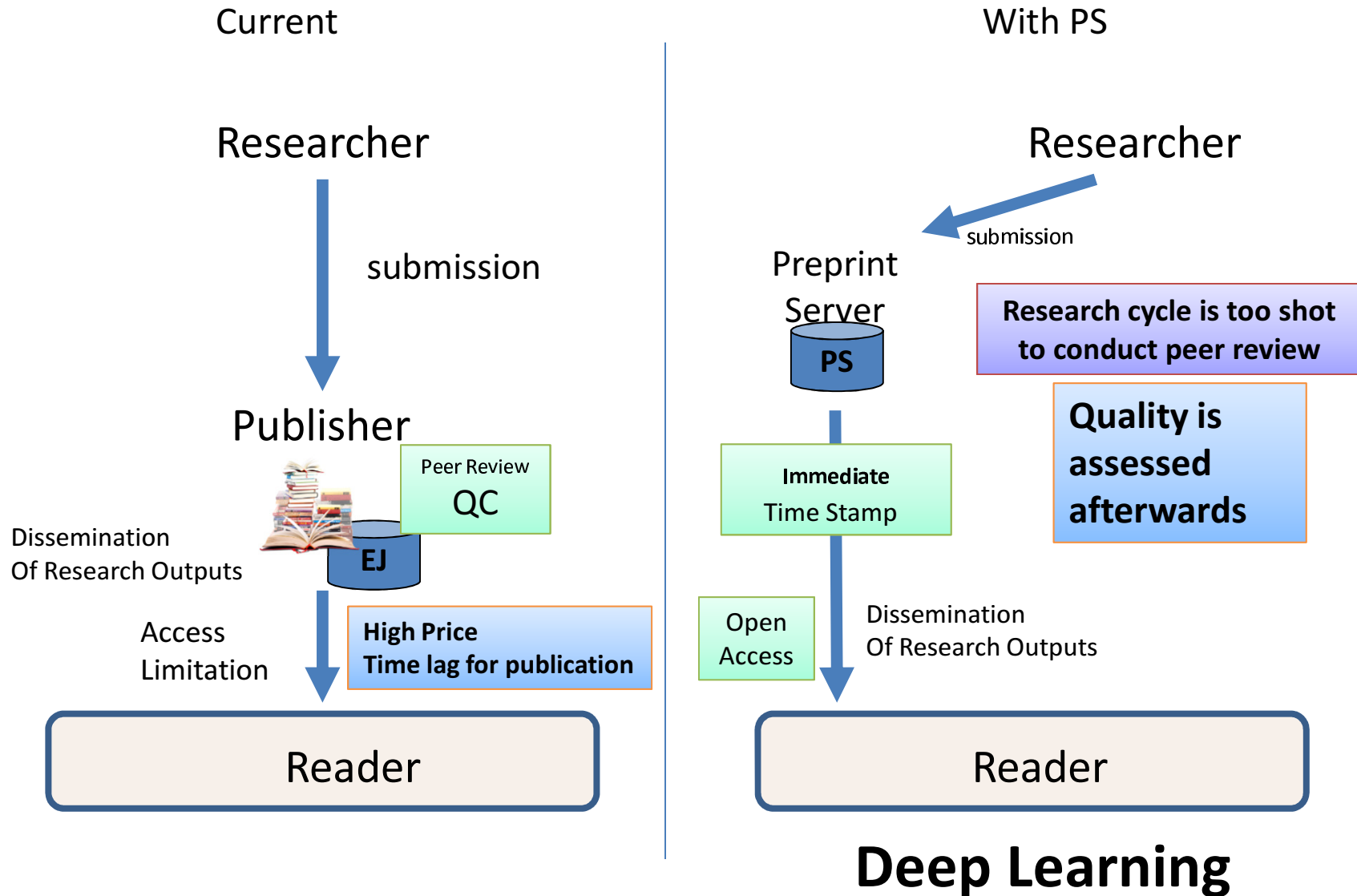


Preprint Server (PS) as a signal for change

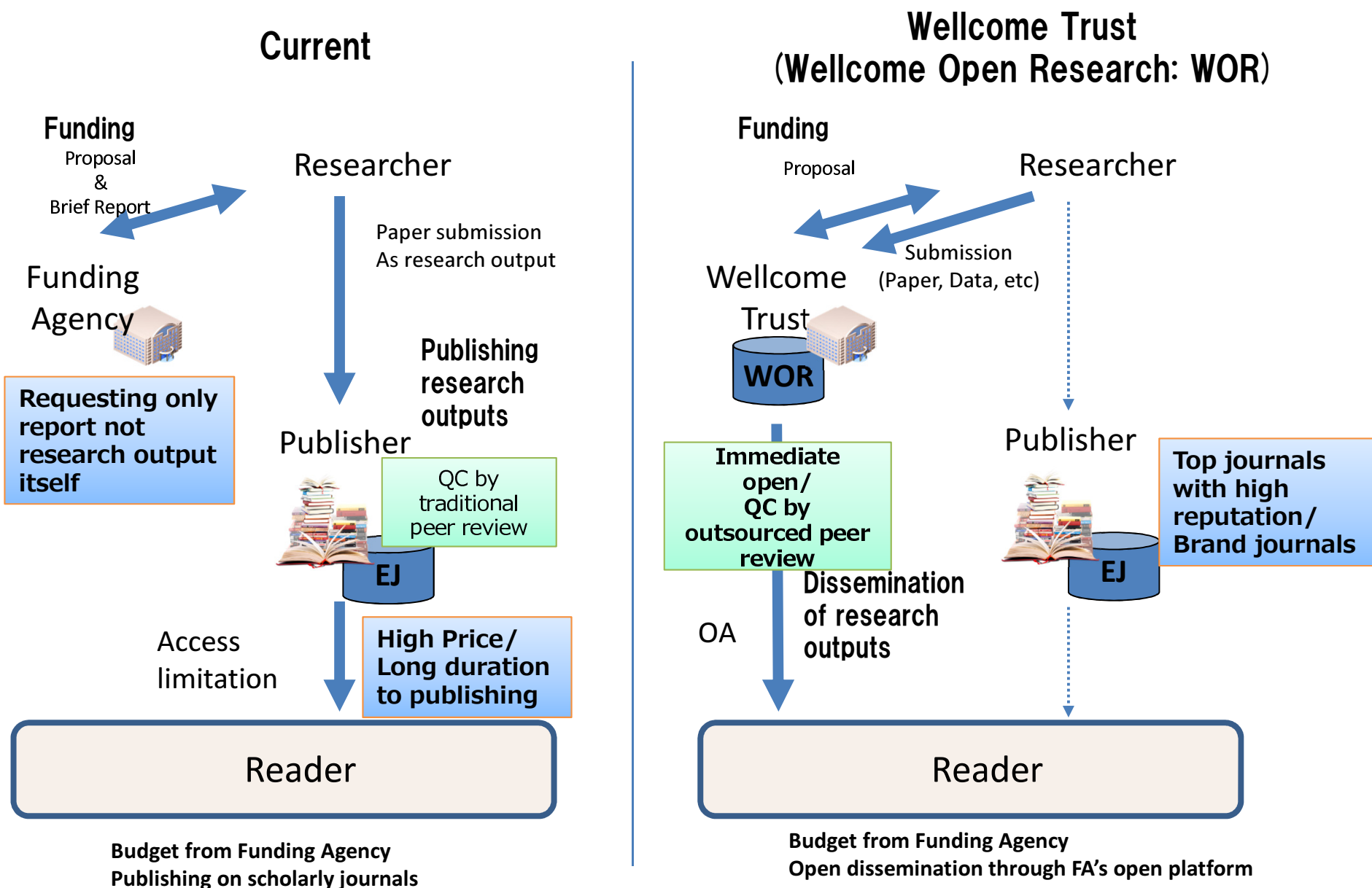


Physics

Preprint Server (PS) as a main media



Open publishing platform by Funding Agency



Which journal do you wish to submit with your best results?

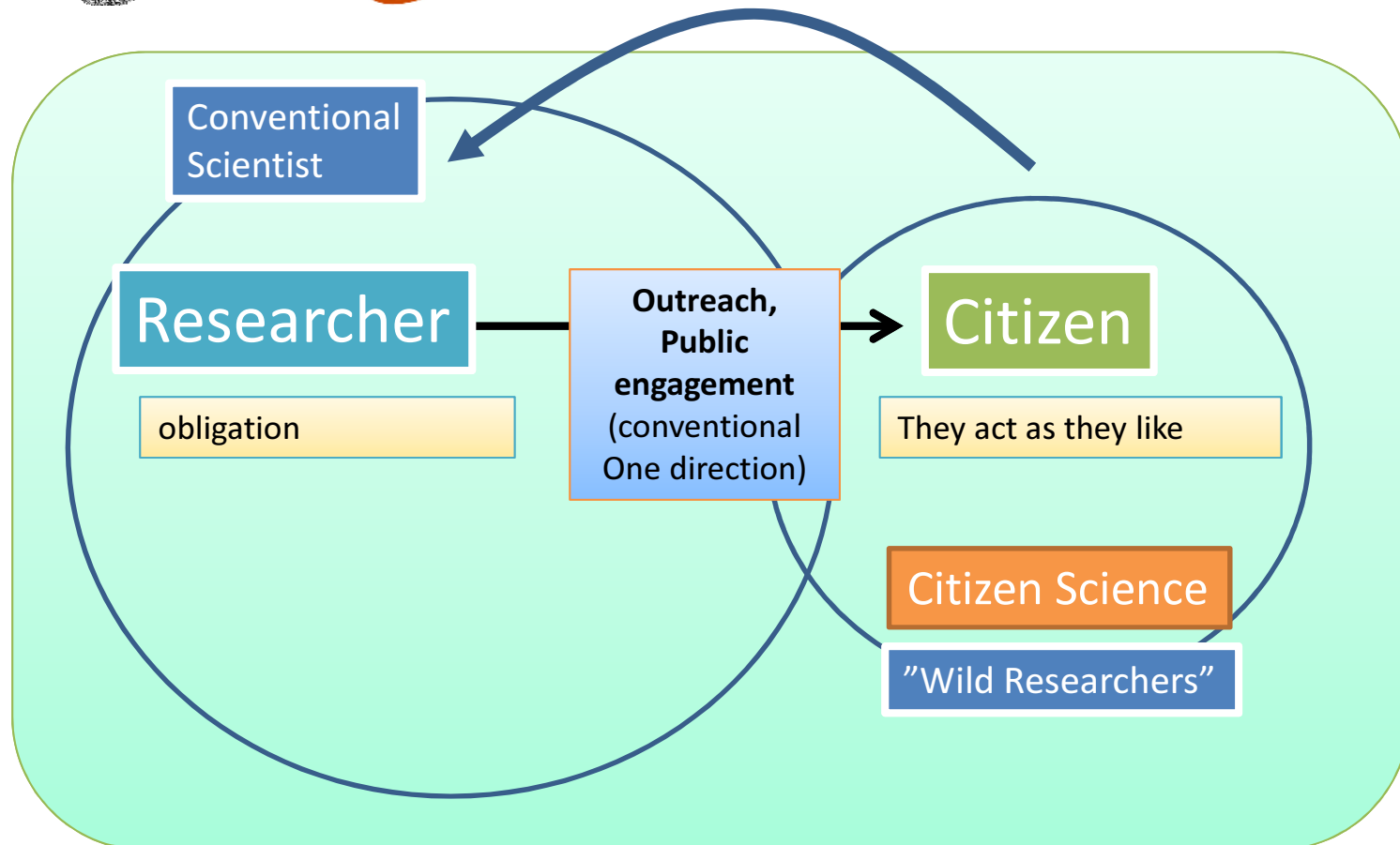
宇宙、天文		回答数	生物	回答数	化学	回答数	地球、環境	回答数	
1	SCIENCE	44	NATURE	1162	J AM CHEM SOC	264	SCIENCE	149	1
2	ASTROPHYS J	43	SCIENCE	1124	ANGEW CHEM INT EDIT	230	NATURE	146	2
3	ASTRON ASTROPHYS	41	P NATL ACAD SCI USA	868	SCIENCE	221	NAT GEOSCI	125	3
4	NATURE	40	CELL	734	NAT CHEM	215	GEOPHYS RES LETT	87	4
5	ASTRON J	35	PLOS BIOL	497	NATURE	197	EARTH PLANET SC LETT	77	5
6	MON NOT R ASTRON SOC	35	NAT CELL BIOL	331	CHEM COMMUN	148	GEOLOGY	73	6
7	ICARUS	19	EMBO J	319	J ORG CHEM	116	J GEOPHYS RES	67	7
8	J GEOPHYS RES	13	J BIOL CHEM	315	CHEM-EUR J	109	P NATL ACAD SCI USA	61	8
9	GEOPHYS RES LETT	12	NAT MED	309	ORG LETT	107	J CLIMATE	33	9
10	NAT PHYS	10	NAT GENET	264	P NATL ACAD SCI USA	85	GEOCHIM COSMOCHIM AC	31	10
	総回答数	375	総回答数	12075	総回答数	2901	総回答数	1588	
	回答者数	54	回答者数	1521	回答者数	380	回答者数	216	
工学		回答数	材料科学	回答数	医学	回答数	物理	回答数	
1	SCIENCE	93	NAT MATER	142	NEW ENGL J MED	719	PHYS REV LETT	257	1
2	NATURE	87	ADV MATER	112	LANCET	638	SCIENCE	201	2
3	PHYS REV LETT	40	NATURE	110	JAMA-J AM MED ASSOC	445	NAT PHYS	201	3
4	P NATL ACAD SCI USA	40	SCIENCE	106	BRIT MED J	299	NATURE	192	4
5	error_2(複数候補があり特定できず)	38	NANO LETT	83	PLOS MED	256	PHYS REV B	110	5
6	APPL PHYS LETT	36	NAT NANOTECHNOL	74	CIRCULATION	187	APPL PHYS LETT	94	6
7	NAT NANOTECHNOL	31	PHYS REV LETT	62	J CLIN ONCOL	167	P NATL ACAD SCI USA	71	7
8	NANO LETT	31	ADV FUNCT MATER	60	LANCET ONCOL	145	NAT MATER	70	8
9	NAT MATER	30	APPL PHYS LETT	55	ANN INTERN MED	143	NAT PHOTONICS	62	9
10	NAT PHYS	24	J AM CHEM SOC	50	BLOOD	121	NEW J PHYS	60	10
	総回答数	1188	総回答数	1521	PEDIATRICS	121	総回答数	2236	
	回答者数	169	回答者数	195	総回答数	7509	回答者数	301	
					回答者数	1065			

Asymmetric structure

- Public fund by Country (citizens) via tax
 - Outreach, public engagement is likely to be one direction
- There are already “Wild Researchers”

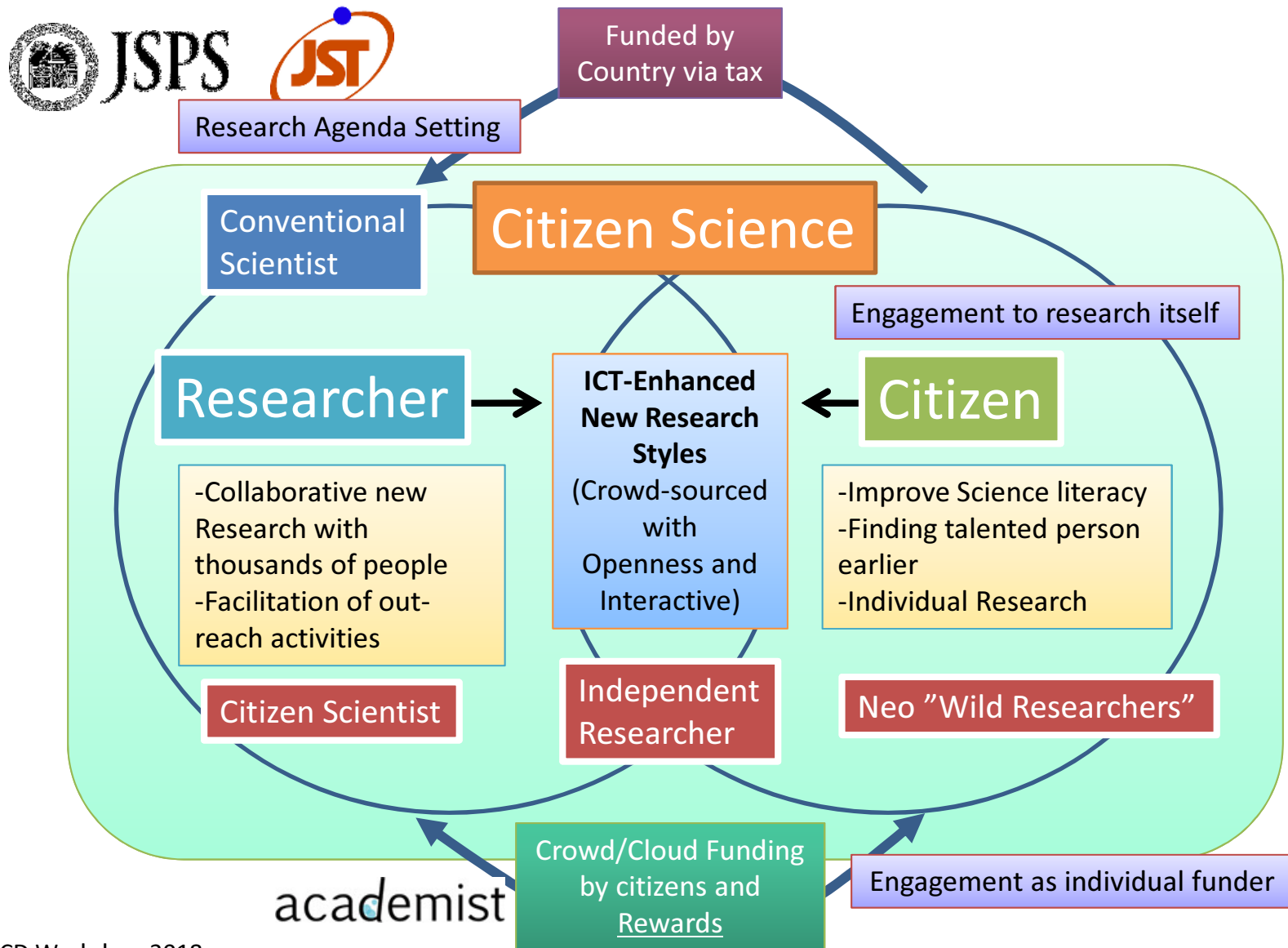


Funded by
Country via tax



More Symmetric structure

- utilizing ICT-Enhanced research with an interactive scheme
- Adding crowd/cloud funding to public fund





JAPAN OPEN SCIENCE SUMMIT 2018



JAPAN OPEN SCIENCE
SUMMIT 2018

—— 日本最大のオープンサイエンスのカンファレンス ——

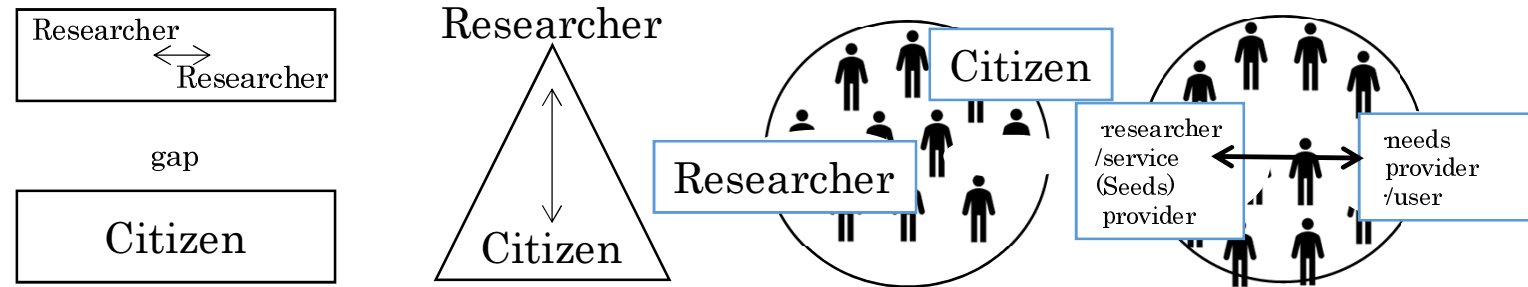
Japan Open Science Summit2018 Session C5
Open Workshop
Next Step from Citizen Science to Co-creative Innovation



June 18, 2018

Hitotsubashi Conference Hall (Jimbo-cho)

Type of Co-creative Research transforming Citizen Science



Type	Conventional	Typical Citizen Science	Collaborative Knowledge-based	Co-creative-based
Structure		Hierarchical (Outreach)	Flat	Flat and Co-creative
Main actor	Researcher	Researcher	Citizen, Researcher	Participants
Output	paper	Paper for researcher Education or Fun for Citizen	Paper, sharing fun new behavior	Social Change(New service, Community building, Field creation, Common good)
Impact	Scientific Impact	Mainly Scientific Impact	Scientific Impact Societal Impact	Mainly Societal Impact
Research Field	Current all Science	Areas other than scientists who have fans, semi-professionals Areas that are easy to participate, do not require special skills, need extensive area collection	High interest in society / Areas closely related to daily life(Town planning, environmental science, humanities sociology, etc.)	Driven mainly by Information Science, Arts, Architecture but various fields could participate

What is Open Science?

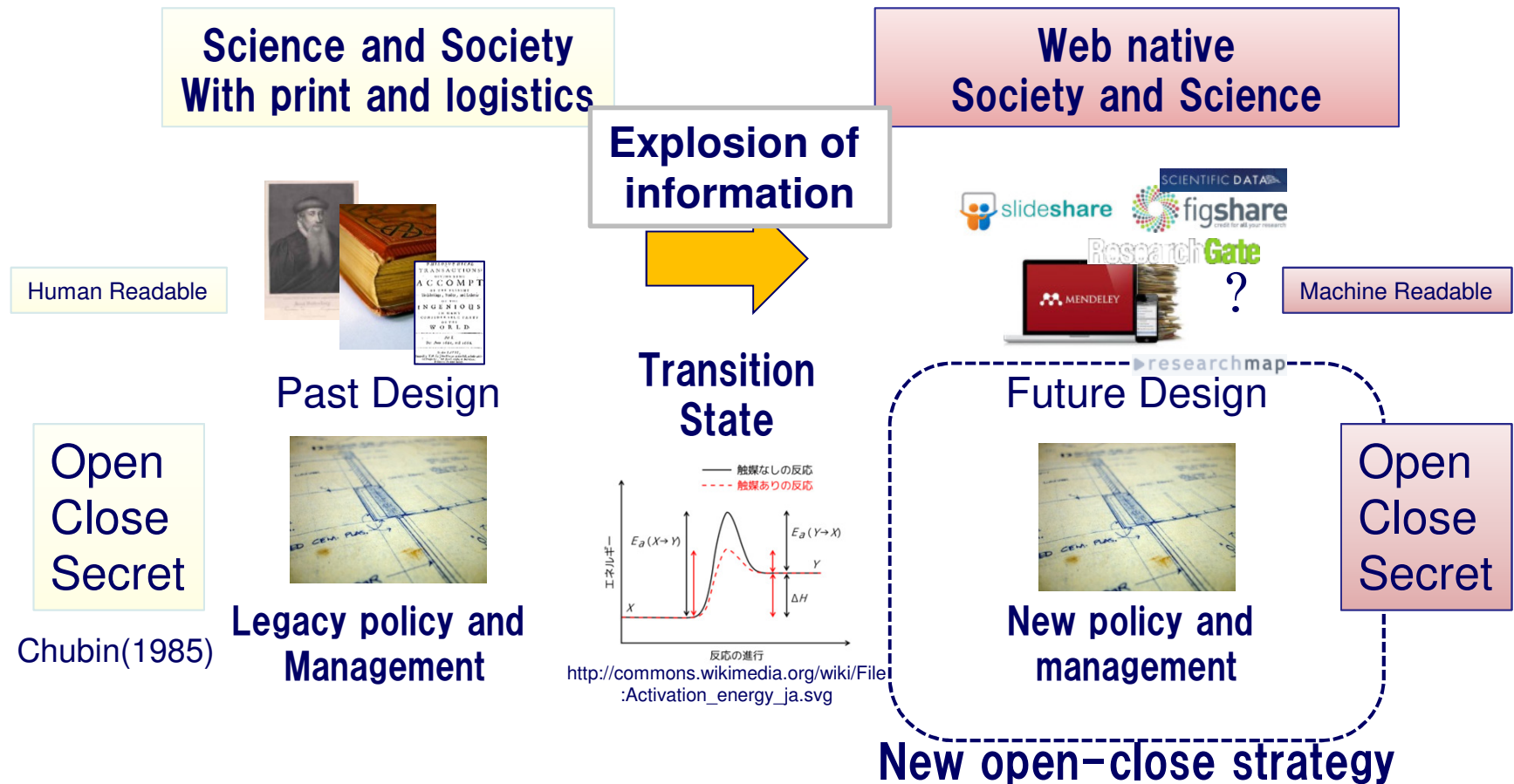


- Open Science is an activity
 - to transform Science, Society including Industry, and relationship between Science and Society,
 - exploiting Open Infrastructure and its huge and various information
 - on the digital and networked system
 - driven by ICT.

Re-framing of social framework



- We partially digitalized society but not fully especially in the context of social framework including laws and customs





Thank you for your attention

Twitter : hayashi_kaz

Facebook, LinkedIn, Mendeley

Kazuhiro Hayashi (with a picture)