

FOSTERING OPEN SCIENCE AT FRAUNHOFER



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CRIS2018 -14/6/2018 Umeå



AGENDA



■ **Fraunhofer Facts & Figures**

■ **The academic side**

– university relations, education, dissemination

■ **The RTO side**

– applied research, industry relations and IP

■ **Introducing a CRIS**

– corporate responsibility and scientific integrity

■ **The Open Science journey**

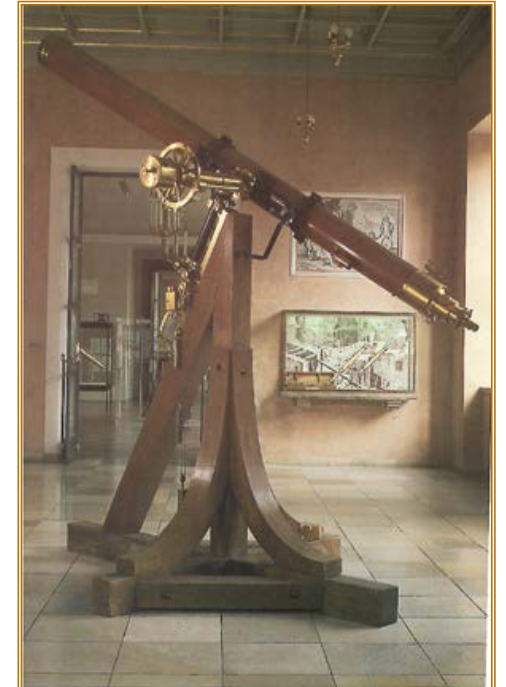
– policies, infrastructure, accompanying research

■ **Conclusions**

FRAUNHOFER FACTS & FIGURES

Josef von Fraunhofer (1787 – 1826)

- **Researcher**
Discovery of “Fraunhofer Lines”
fundamentals in optics & spectral analysis
- **Inventor**
New methods of lens processing
- **Entrepreneur**
Head of royal glass factory



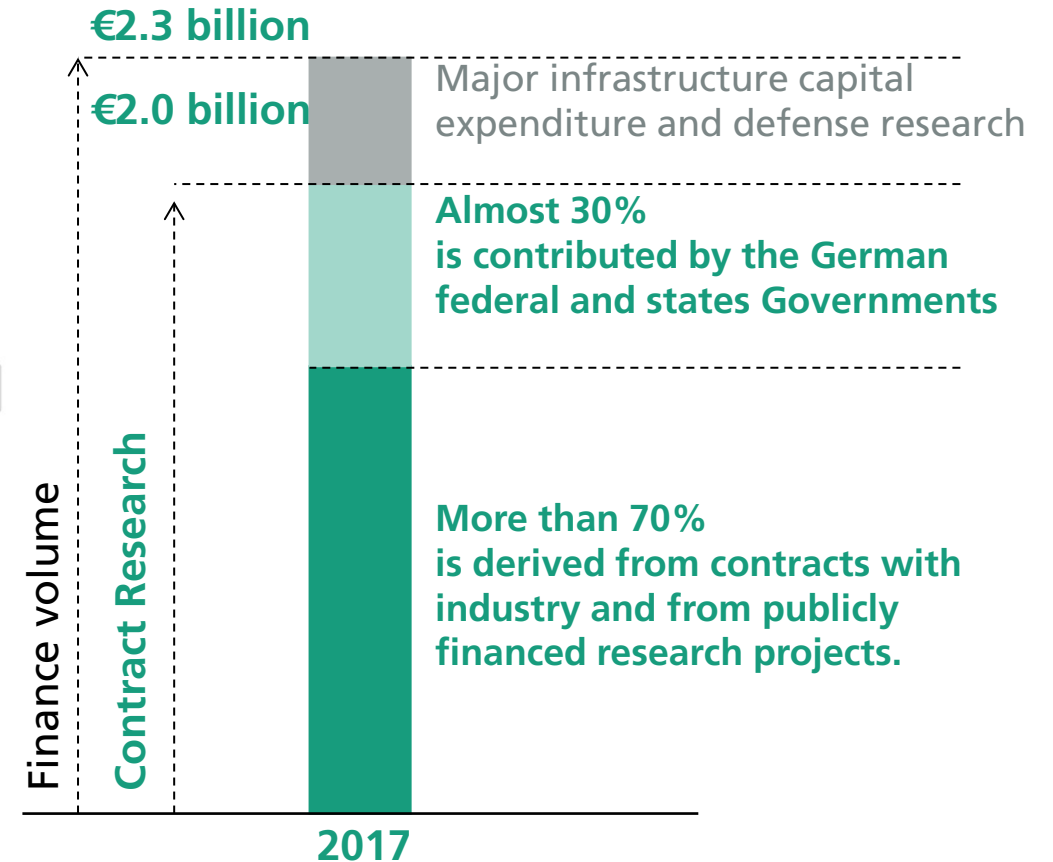
The "missing colors" of the sun

Fraunhofer Lines: absorption lines in the solar atmosphere caused by chemical elements

Fraunhofer today at a glance


25,327 staff

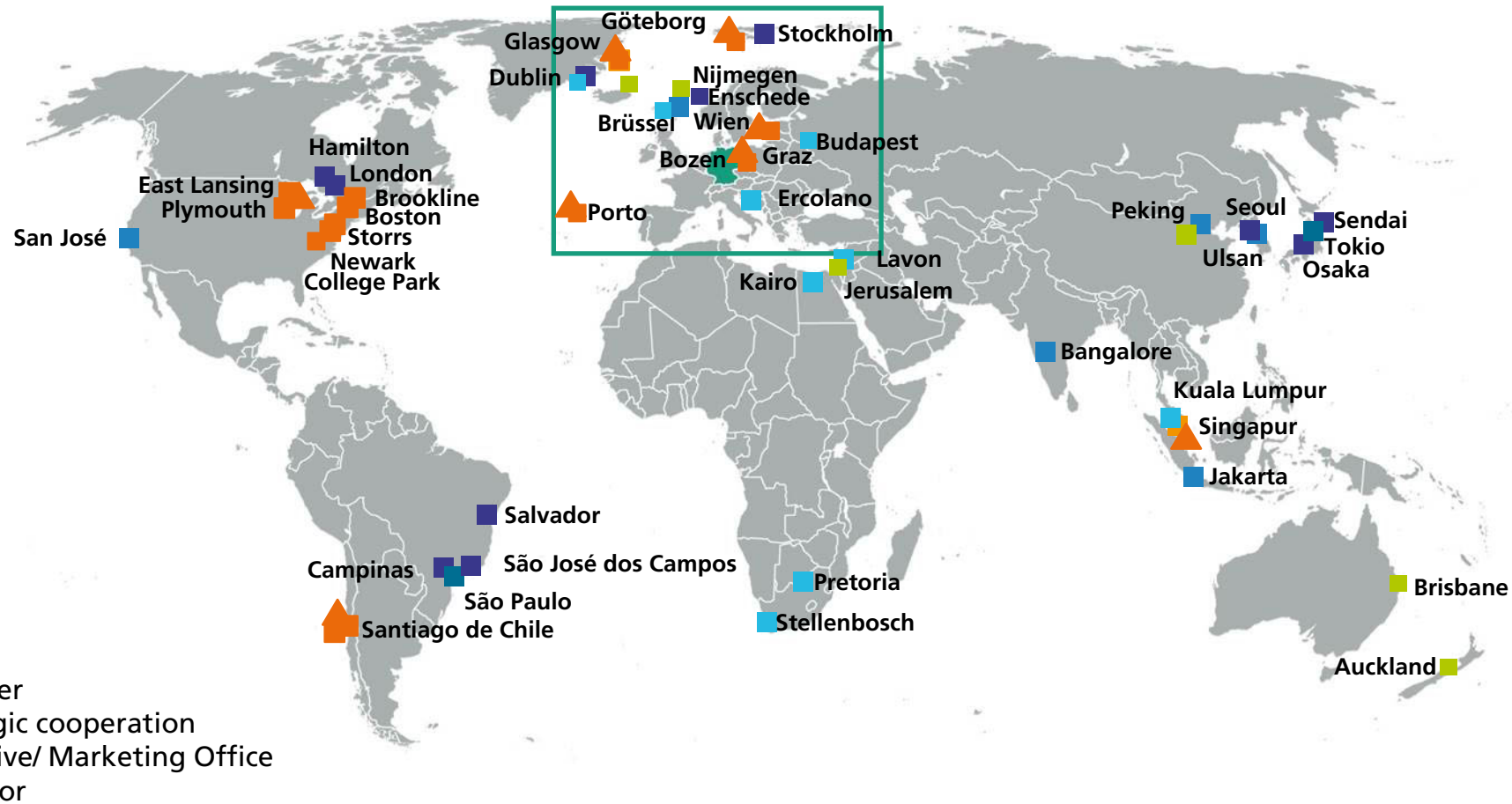

72 institutes and research units



Fraunhofer worldwide



Fraunhofer worldwide



Fraunhofer research networks



Innovation Research

IAO, IMW, INT, IRB, ISI



Microelectronics

EMFT, ENAS, FHR, HHI, IAF, IIS, IISB, IMS, IPMS, ISIT, IZM
Guests: AISEC, ESK, FOKUS, IDMT, IKTS, IMWS, IZFP



Information and Communication Technology

AISEC, ESK, FIT, FKIE, FOKUS, IAIS, IDMT, IESE, IGD, IOSB, ISST, ITWM, IVI, MEVIS, SCAI, SIT
Guests: HHI, IIS, IAO



Production

IAPT, IEM, IFF, IGCV, IGP, IML, IPA, IPK, IPT, IWU, UMSICHT



Life Sciences

EMB, IBMT, IGB, IME, ITEM, IVV, IZI



Defense and Security

EMI, FHR, FKIE, IAF, ICT, INT, IOSB
Guests: HHI, IIS, ISI



Light & Surfaces

FEP, ILT, IOF, IPM, IST, IWS



Materials and Components – MATERIALS

EMI, IAP, IBP, ICT, IEE, IFAM, IKTS, IMM, IMWS, ISC, ISE, IWES, IWM, IZFP, LBF, WKI
Guests: IGB, IIS, ISI, ITWM

[1]

Academic research structures

72

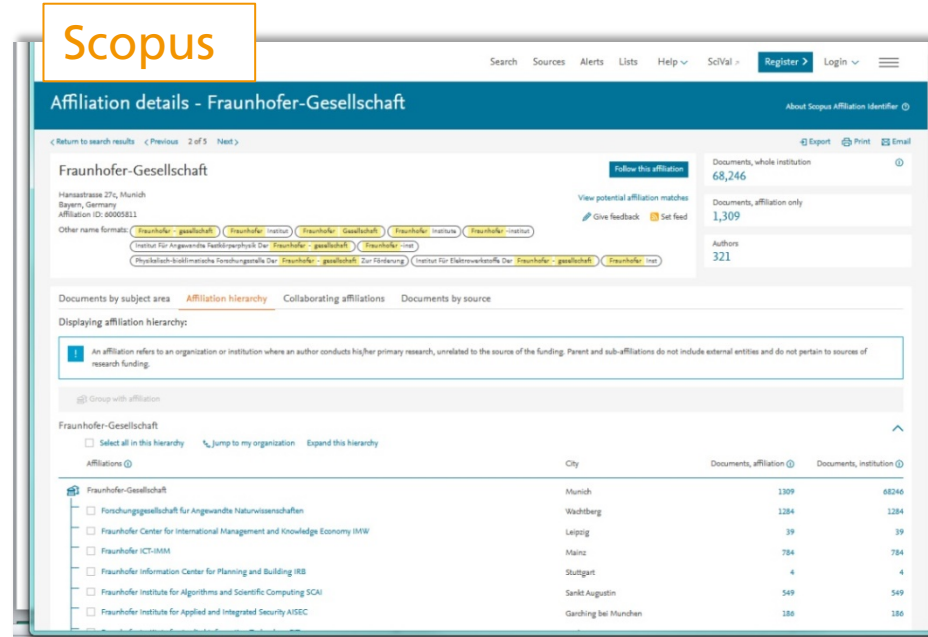


∞ 64 Universities

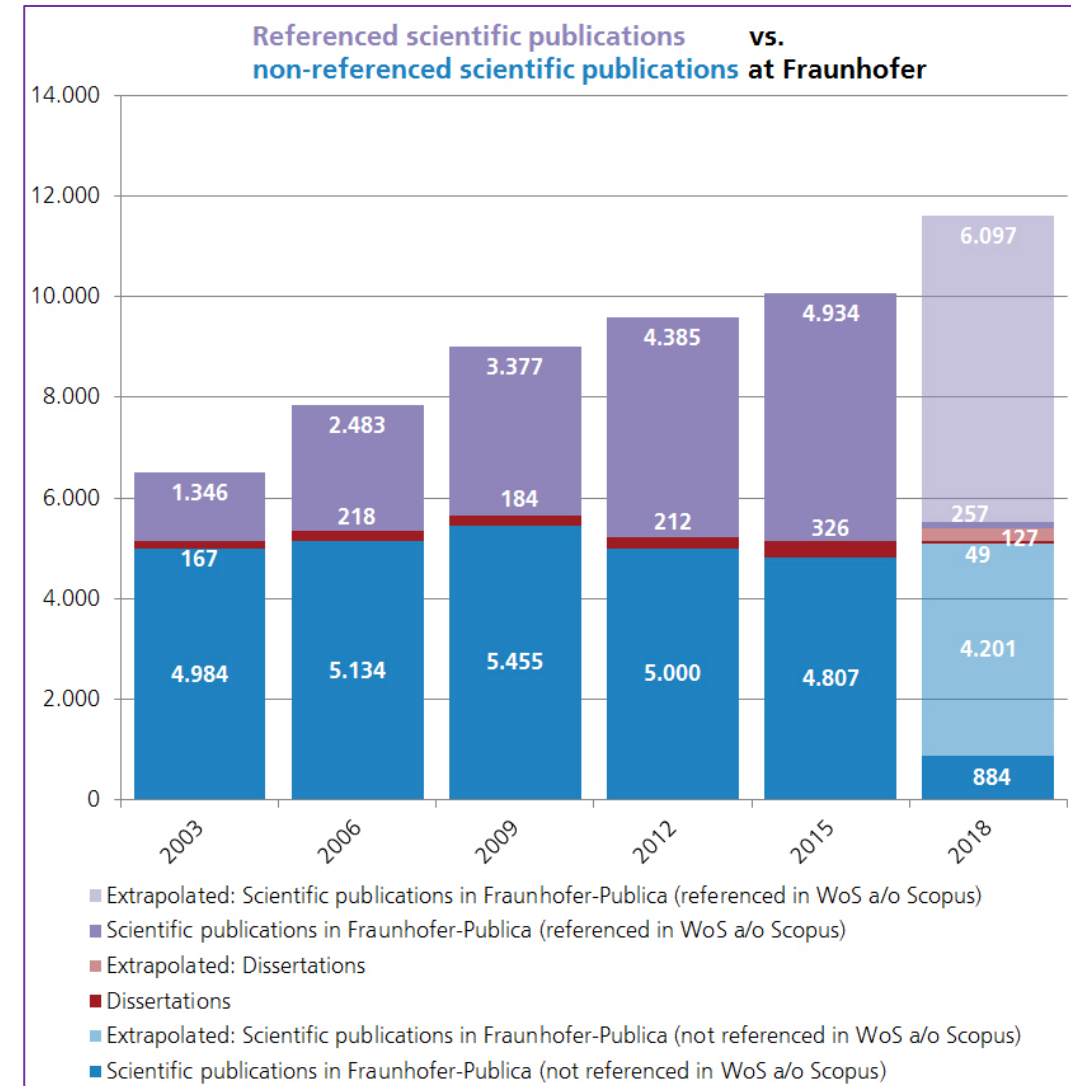
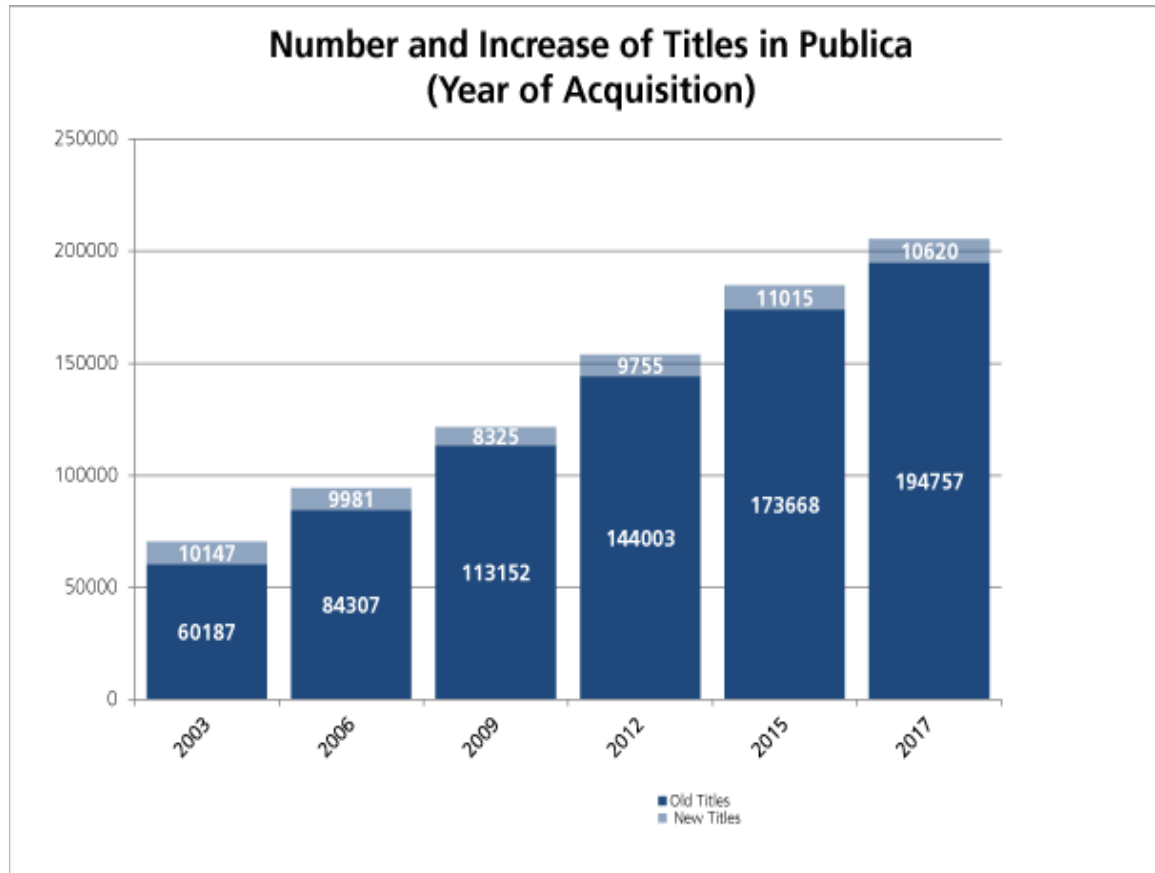
48 Univ. of Applied Science

- Extensive interrelations with Universities
- 80 Fraunhofer Directors hold chairs at universities
- Direct involvement into academic lecture content
- Fraunhofer Institutes offer PhDs **2016** > **2053** dissertations, **2853** ongoing
- x72: all institutes have own library and personel (scientific information manager)
- x1: central institutional repository, library and publication support services (at IRB)

Academic research structures



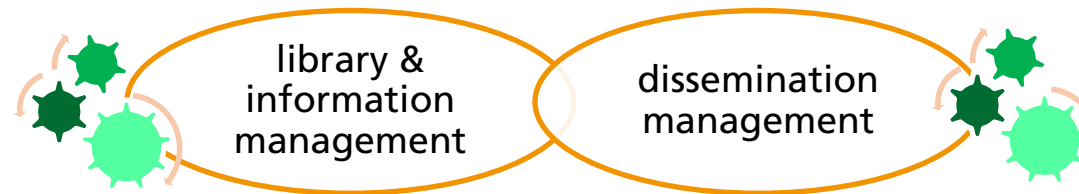
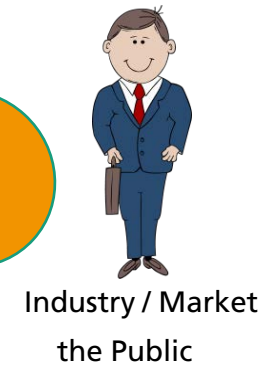
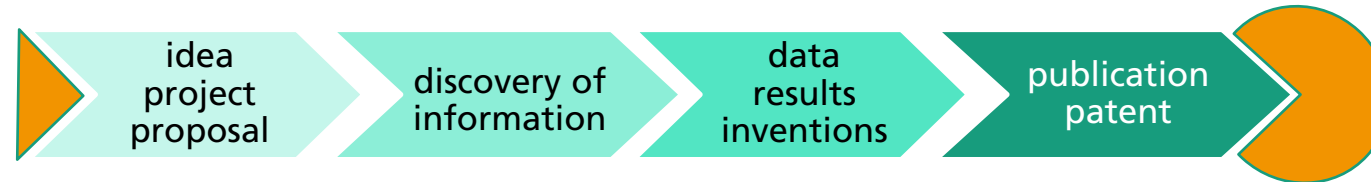
Academic research structures



Academic research structures



Research Process at Fraunhofer



FRAUNHOFER's RTO SIDE

Research and Technology Organisations of Europe (EARTO)



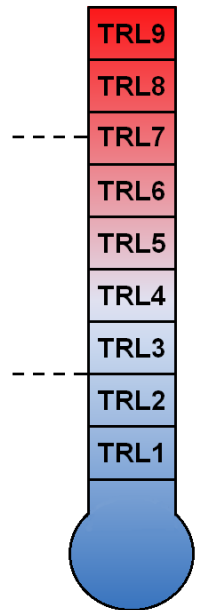
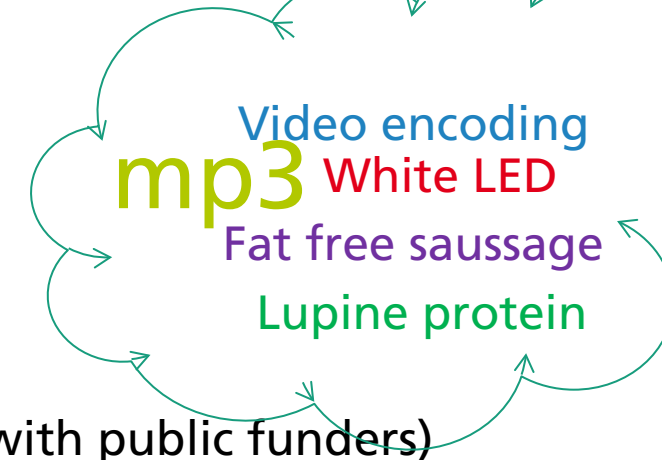
Patenting, IP and industry relations

- RTOs are bridging the gap between basic research and market
2017: 11,000 projects of applied research with industry partners (7,500 with public funders)
- RTO Mission is about adapting inventions to industry use and to innovations
Among »Top 100 Global Innovators« (3 other German companies: BASF, Bayer, Merck)*²
- Collaborations with industry mostly confidential, exploitation interests
- Different Stakeholders and their requirements: Industry, Science, Society, Politics
- Tension field between open and closing –
high obligation to succeed economically and innovate with industry,
vs. transferring knowledge to society, politics and science

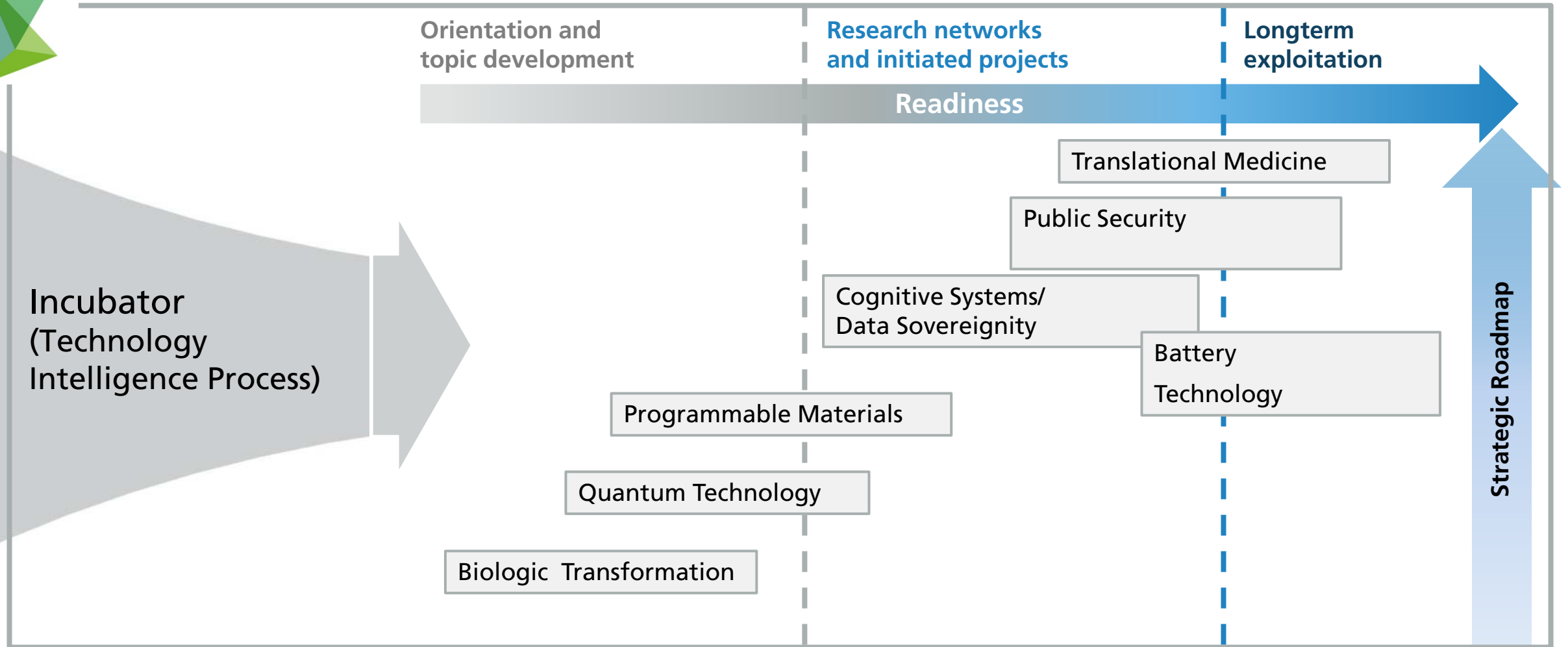
	2015	2016	2017
Active patent families at year end*	6573	6762	7036
Invention disclosures reports per year	670	798	756
Patent applications per year	506	608	600

* Portfolio of active rights (patents and utility models) and patent applications at year end.

*² Clarivate Analytics, 2017 [2]



RTO view of recent strategic research areas

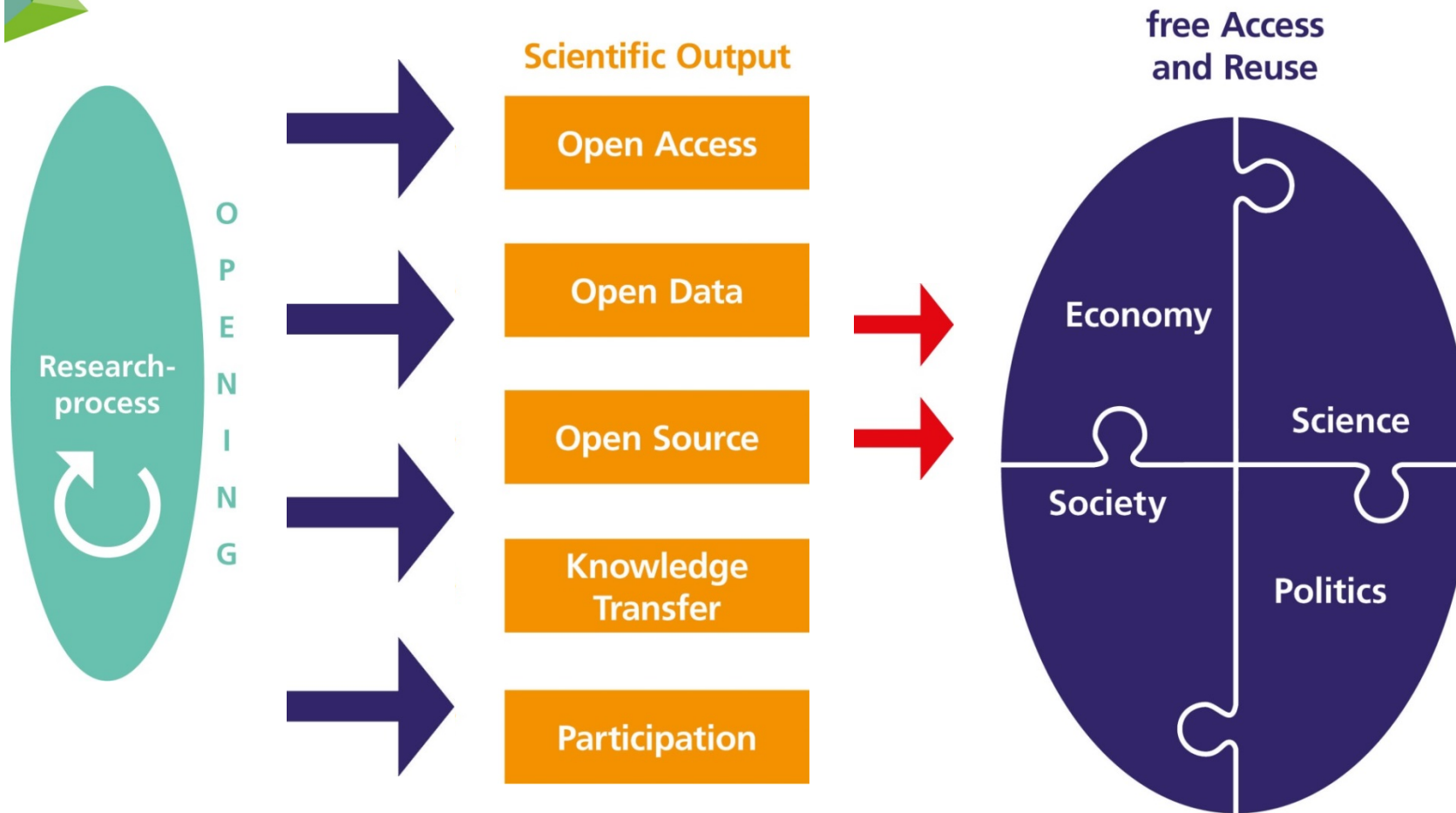


Benefits of opening research for RTOs and it's stakeholders

- **SCIENCE**
Contributing to scientific communities, accelerating scientific progress, claiming scientific results
- **INDUSTRY**
Input for open innovation processes – shorten innovation cycles
- **SOCIETY**
Transfer of scientific results to society, create participation opportunities, societal engagement
- **POLITICS**
Support agenda setting processes through scientific knowledge
- **FUNDERS**
Compliance with open strategies and requirements
- **ECONOMY**
Fostering economic progress

OPEN SCIENCE VISION

Vision for Open Science at Fraunhofer



- 
- **efficient knowledge transfer**
 - **shorter innovation cycles**
 - **accelerate scientific progress**
 - **interdisciplinary reuse**
 - **new business models**
 - **democratisation of knowledge**
 - **transparency of science**
 - **enhance research quality**
 - **ensure research integrity**



INTRODUCING A CRIS

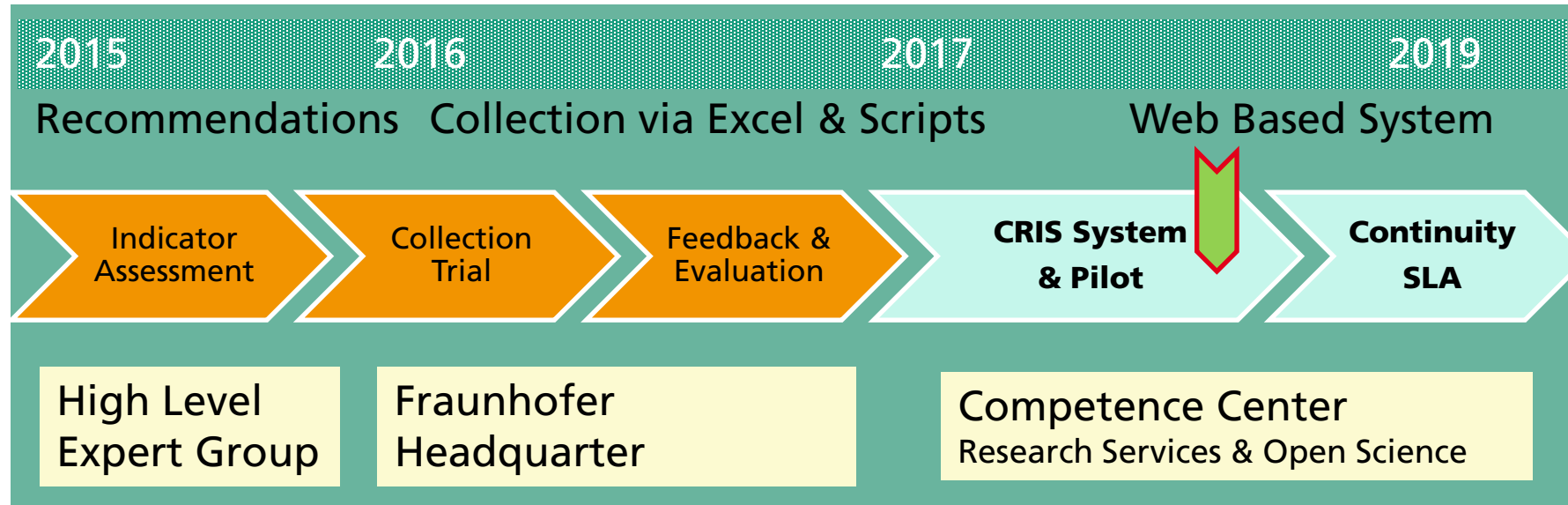
Motivators & Goal setting

- Fraunhofer-Modell: complex benchmark system in place but so far “freedom of science”
- Corporate responsibility: safeguarding scientific integrity
Company **directive** scientific integrity | **Ombudsman** in every institute | ethics **commission**
- Since 2012 implementation of a measuring system scientific indicators = **CRIS**
enable comparability | **introduce** new collection process | **analyze** research processes

SCIENTIFIC INDICATORS

- **SCIENTIFIC OUTPUT:**
Scientific publications, intern. co-publications, citations/excellence rates, patents
- **ACADEMIC QUALIFICATION**
Doctoral theses, master theses
- **SCHOLARLY ACKNOWLEDGEMENT & ACADEMIC NETWORKING**
High-level awards, spokespersonships, projects of excellence

Implementation process



- Structure follows strategy: CRIS tool & software came late in the project
- DSpace-CRIS was selected and is implemented with external support
5 pilot institutes response to data validation, data collection and support requirements
- More technical info on DINI-FIS-Blog : „DSpace-CRIS @ Fraunhofer“ [3]
<http://blogs.tib.eu/wp/fis> (German only)

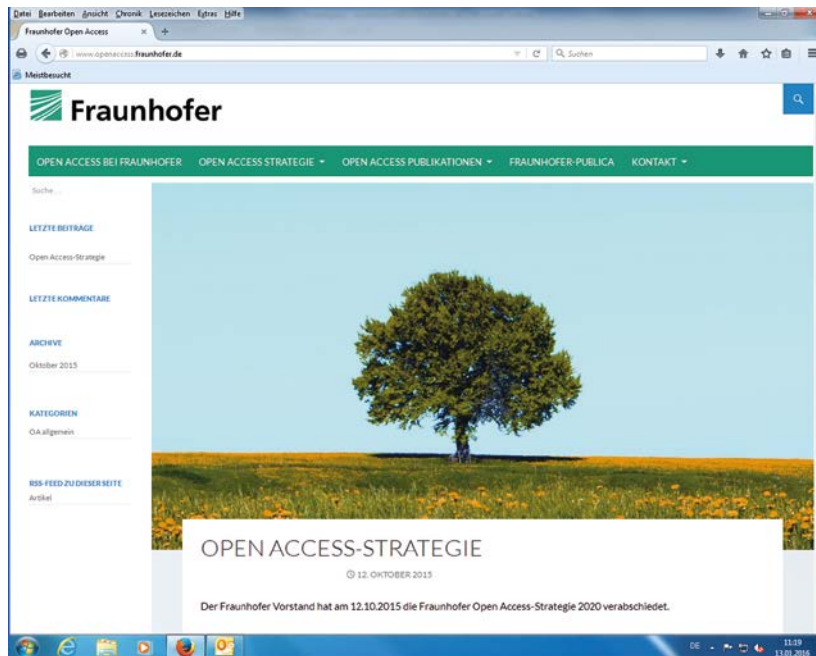
Accompanying factors and effects of a CRIS - our findings so far

- Have corporate responsibility be the driver, not infrastructure governance
make compromises to data collection processes rather than scientific integrity
- Academic administrative data are very heterogeneous and difficult to collect
all data should be standardized | embrace initiatives like <cerif> and KDSF [4]
- Our existing ERP systems are long standing, vast and highly regulated
CRIS implementation needs to compromise and accept a slow BI-adaptation process
- Does CRIS implementation invite long-term socio-scientific aspects?
Are we creating a self referential system or a structure for linear process improvement?
 - We notice a higher attention to valid publication data and processes
 - Authors start to look more into their academic profile and want to perfect it
 - Endanger freedom of science: scientists may begin to feel patronized and controlled
 - Would a merit system positively support the scientific indicators?

Open Access

- 2003: among first signatories of Berlin declaration
early phase of information and community engagement, stakeholder assessment...
- 2006: Fraunhofer-Publica: Open Access view »Fraunhofer-ePrints« [5]
DINI-certificate, first steps of an Open Access infrastructure, communication concept...
- 2009: Open Access Policy, introduction of a central support team
Company wide wiki, brochures, information talks & workshops, congresses...
- 2012: Extended publication support, deposit workflows, community engagement
H2020, OA-publication analysis (top ten journals per institute)...
- 2015: Open Access Strategy and Goals: 2020->50% OA, OA Rate is reported to Ministry
publication process as a business process, dissemination strategies... [6]
- 2018: Consolidation of OA- management, own OA-research projects
project „OA- Transformation“, central publication fund, ORCID, Open APC...[7]

Open Access development

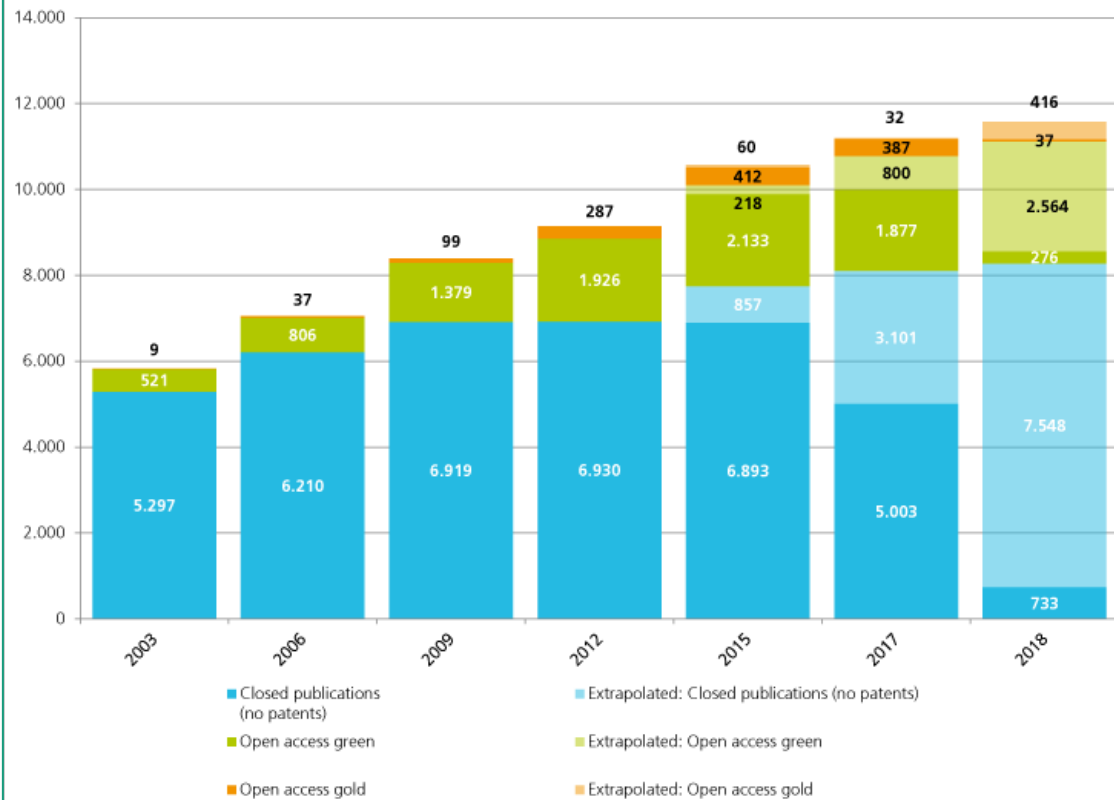


www.openaccess.fraunhofer.de

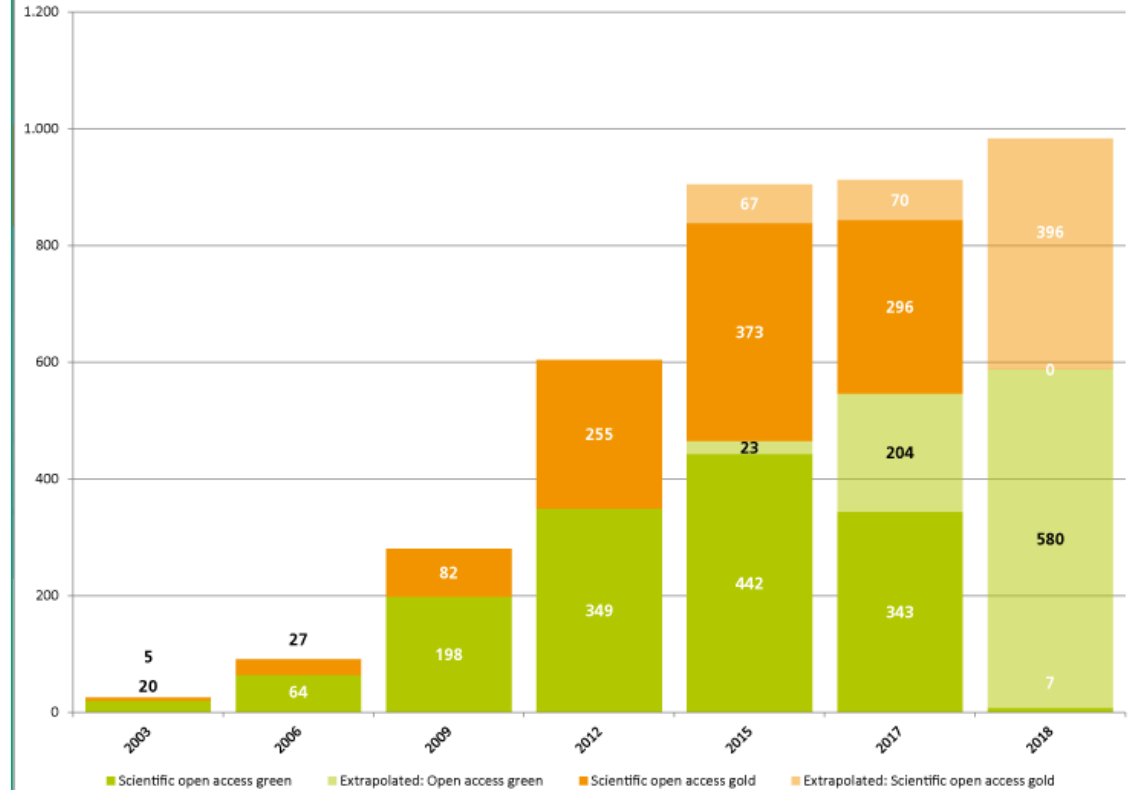


Open Access development

Open and Closed Publication Output at Fraunhofer
(Publication Year)



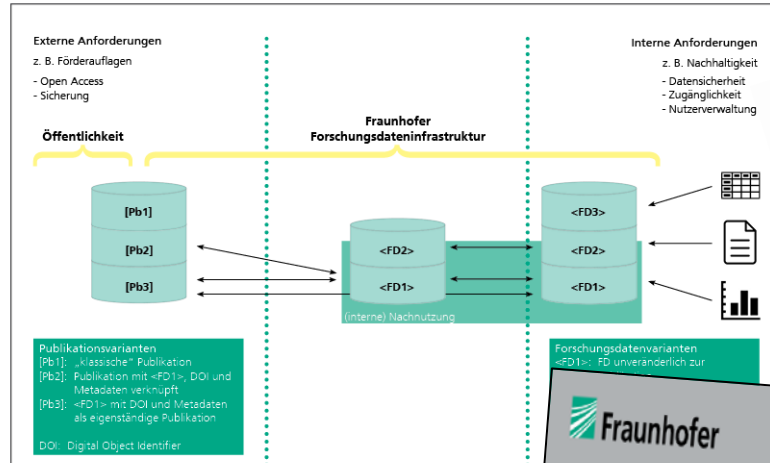
Open Access Publications Scientific
(Referenced in WoS a/o Scopus)



Open Data

- 2014: H2020 Open data pilot | DFG Guidelines on the Handling of Research Data [8]:
infrastructure expansion plan, information and community engagement...
- 2015: Evaluation project research data management
FODRATIS concept and internal fundraising...
- 2016: FORDATIS project gets a go along with H2020 Research Project JERRI
information & support structures, first aid kit DMP, Fraunhofer wide survey [9] ...
- 2017: Extended publication support, deposit workflows, community engagement
Implementation preparations for expansion of repository infrastructure...
- 2018: Information workshops and training on research data management
DSpace Implementation ongoing, JERRI results will help with institutionalization...

Open Data



FORDATIS – Speicherraum für Fraunhofer-Forschungsdaten

Immer häufiger wird es bei öffentlich geförderten Projekten zur Pflicht, nicht nur die Publikationen, sondern auch die dazugehörigen Forschungsdaten (Open Data). So fordert die Europäische Kommission seit 2017 für alle Horizon-2020-Projekte, die Forschungsdaten, welche Publikationen zugrunde liegen, in einem freizugänglichen Repository (Speicherungsraum) zu veröffentlichen. Zusätzlich müssen im Vorfeld »Datenmanagementpläne« angefertigt werden. Diese beschreiben, welche Daten im Verlauf eines Forschungsprojekts erhoben werden, wie mit diesen umgegangen wird und wer welche Verantwortung trägt.

Das Fraunhofer Competence Center »Research Services & Open Science« (Fraunhofer IRB) unterstützt alle Fraunhofer-Forschenden und -Forscher dabei, diesen Anforderungen nachzukommen. Um den Bedarf im Forschungsdatenmanagement zu ermitteln, richtete sich eine Fraunhofer-weite Umfrage im März 2017 an wissenschaftliche Kräfte, IT-Verantwortliche und Personen aus dem Fachinformationsmanagement (Auswertung unter: s.fhg.de/41722).

Das Ergebnis macht deutlich, dass das Thema an vielen Instituten angekommen ist, aber einheitliche Nachweise und Unterstützungsmöglichkeiten noch fehlen. FORDATIS (Forschungsdateninfrastruktur) wird durch das IRB nun bereits seit 2016 ein Forschungsdatenrepository für veröffentlichte und zu veröffentlichende Forschungsdaten aufgebaut. Dieser Speicher soll langfristig mit Fraunhofer-Infrastruktur mit Fraunhofer-Prints (http://publications.fraunhofer.de) und Fraunhofer-Prints (http://prints.fraunhofer.de) verknüpft werden. Zudem erarbeitet das Competence Center am IRB Schulungs- und Beratungsangebote zum Datenmanagement. Diese richten sich an Wissenschaftler, PM-Verantwortliche, Erste Ergebnisse und Verantwortliche in Forschungsdatenmanagement.

Wie bleiben Daten für lange Zeit verfügbar?

Langzeitarchivierung von wissenschaftlichen Daten ist ein Thema, das bereits die gute wissenschaftliche Praxis sieht vor. Daten zehn Jahre zu sichern und dabei zu dokumentieren, wie sie entstanden sind, hinaus: Hier geht es um Zeiträume von 30 oder mehr Jahren. Das erfordert eigene IT-Lösungen und Zuständigkeiten. Fachleute sprechen vom »Data Curator«.

Eine Umfrage zum Bedarf der Institute präsentierte Ingo Mohr aus der Abteilung Kommunikationsmanagement (C7). Danach müssen die archivierten Daten nicht nur dauerhaft lesbar und nutzbar bleiben, sondern auch entsprechende Zugriffs- und Berechtigungskonzepte wurden als besonders wichtig genannt. Etwa ein Viertel der Institute hat bereits eine technische Langzeitarchivierung eingeführt und bestimmten Lösungsszenarien gesetzt werden kann. p.de/31528

Langzeitdatenarchivierung erfordert eigene IT-Systeme. p.de/31528

Data Management Plan

Allgemeine Informationen	
Projektname:	
Projekt-ID:	
Kontakt/Koordinator:	
Kontakt:	
ID-Forscher (z.B. ORCID):	
Datum:	

Datensatzname und -referenz:	
Folgende Datensätze werden im Rahmen des Projektes neu erhoben:	
	mit der ID
	mit der ID
Grund für die Neuerhebung:	



FORDATIS APPLICATION PROFILE	
Pflichtfelder	
Version 1.0	
Identifier	
Definition	The Identifier is a unique string that identifies a resource.
Commentary	Use Subfield „Normen“ of field „NUM“ in Publica.
Occurrence	Min:1; Max:1
IdentifierType	
Definition	The Identifier is a unique string that identifies a resource.
Commentary	Use Subfield „Kennung: Art“ of field „NUM“ in Publica.
Occurrence	Min:1; Max:1
Creator	
Definition	The main researchers involved in producing the data, or the authors of the publication, in priority order.
Commentary	Use field „AU“ in Publica.
Occurrence	Min:1; Max:n
creatorName	
Definition	The name of the creator.
Commentary	Use field „AU“ in Publica.
Occurrence	Min:1; Max:1
familyName	
Definition	The family name of the creator.
Commentary	Use field „AU“ in Publica.
Occurrence	Min:0; Max:1

Fraunhofer-Gesellschaft, erstellt von Andrea Wachner, CC Research Services & Open Science
Zur internen Verwendung

INPUT

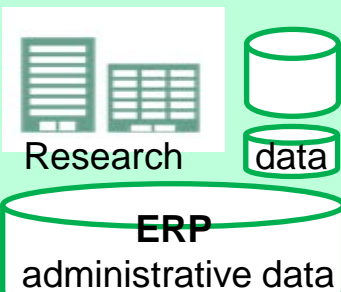
Fraunhofer Open Science Infrastructure

OUTPUT

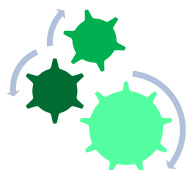
Lifecycle & Processes

1 2 3
controlling >>>
collection >>>
curation >>>

Fraunhofer Dataspace

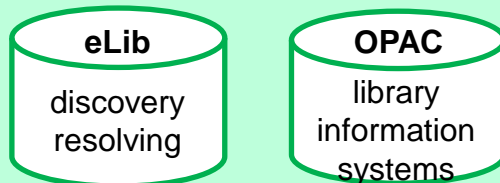


Deposit & Submission

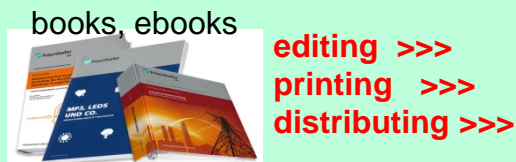


aided >>>
automated >>>
authorized >>>

Library Services @ Fraunhofer

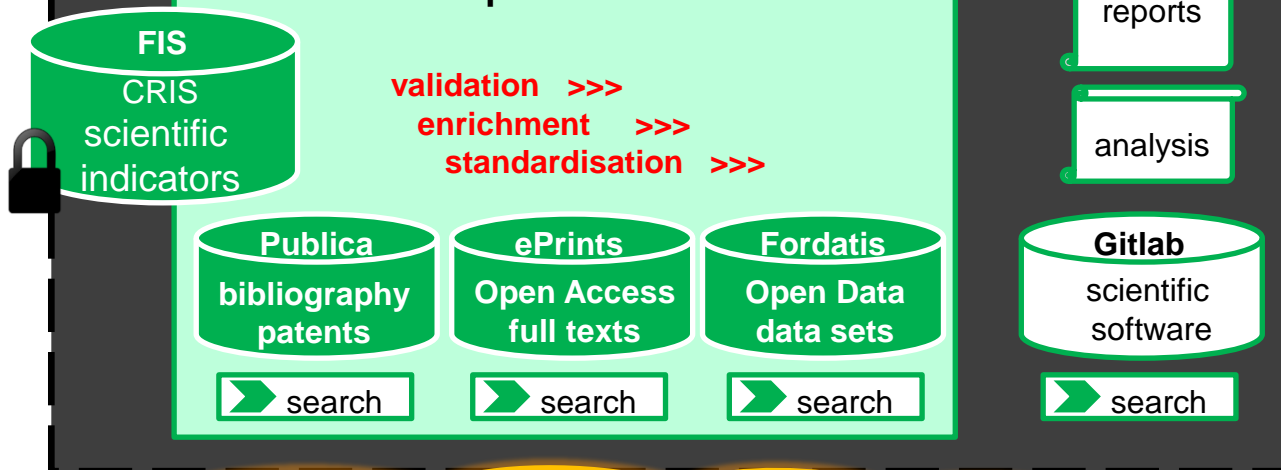


Fraunhofer Publishing House

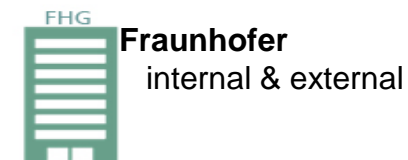


Fraunhofer virtual private cloud

DSpace farm



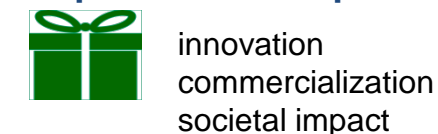
Reports & Analysis



Distribution & Marketing



Exploitation & Impact



Fraunhofer Open Science Space

FAIR

search / discover
scientific results

Google
BASE

OpenAIRE
ORCID

Open Science as a research topic

- 2017: new Fraunhofer Group for Innovation Research socioeconomic and sociotechnical research, providing guidance to decision-makers in politics and industry [10]
- JERRI (H2020 Project): www.jerri-project.eu (together with TNO) aims to contribute to deeply institutionalizing practices and attitudes of Responsible Research and Innovation (RRI) in 5 key dimensions (dimension 3: Open Access / Open Data), focus on RTOs needs extensive reports on our deliverables online [10]
- HEFE Project (funded by German Ministry of Education and Research) aims to develop data governance for analytic, planning and real time data
- Citizen Sensor (funded by German Ministry of Education and Research) aims to develop a white book of citizen science [11]

Development areas and accompanying research disciplines



computer science

library information science

communication science

science of science

sociology

economics

legal norms

bibliometrics

psychology

Political science



CONCLUSIONS

- RTOs have very specific needs and perspectives to implement Open Science
The benefits start to become clearer but the change at RTOs is just beginning
Our Motto will be: „AS OPEN AS POSSIBLE AND AS CLOSED AS NECESSARY!“
- Our academic side pushes us to quickly realize Open Science
with infrastructure uptake, the process will accelerate even more
- Open Access and Open Data mechanics are not yet fully understood by our scientists
we need to start over explaining and not cease to explain and support our scientist
- The need for research intelligence information to support management is growing
CRIS systems have multiple uses, can aid both CR, BI and research marketing
- Open Science development is too scattered and lacks overall plan
many local initiatives, no central steering, no true stakeholder engagement
- Open Science merit system is missing but would help (OA rate per institute, author, ...)
The scholarly world is still running on the old merit system (bibliometric factors)

CONTACT

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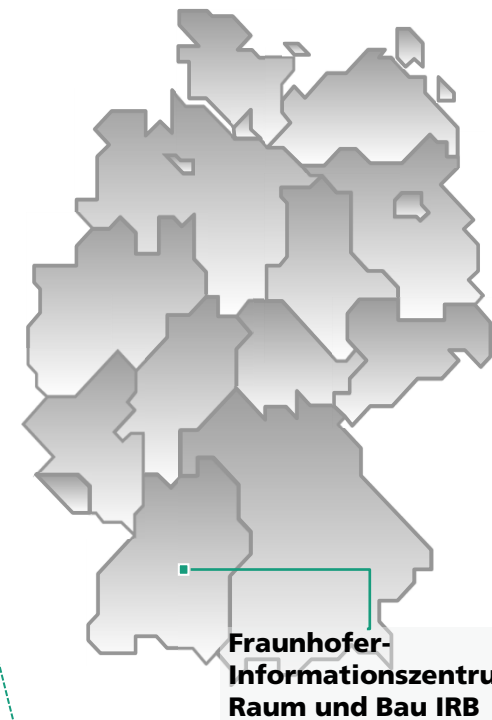
Tel: +49 (0)711 / 970-2561

CC Research Services & Open Science



Expertise:

- Open Science @ Fraunhofer
- Indicators
- Dissemination-strategies
- Publication Support
- Repository Managment
- Community Engagement



Fraunhofer-
Informationszentrum
Raum und Bau IRB

Fraunhofer IRB





THANK YOU!
Tack så mycket!
Danke!



References

- [1] <http://www.standortkarte.fraunhofer.de/main.jsp?lang=en&topic=institutes&topicvalue=&focus=germany&focusvalue=>
- [2] <https://clarivate.com/wp-content/uploads/2018/01/Clarivate-Analytics-2017-Top-100-Global-Innovators.pdf>
- [3] <http://blogs.tib.eu/wp/fis/2018/06/18/forschungsinformationssystemfraunhofer-gesellschaft/#more-277>
- [4] <https://kerndatensatz-forschung.de>
- [5] <http://eprints.fraunhofer.de>
- [6] <http://www.openaccess.fraunhofer.de>
- [7] <https://treemaps.intact-project.org/apcdata/fraunhofer-publishing-fund/>
<https://openapc.github.io/general/openapc/2018/05/23/fraunhofer/>
- [8] http://www.dfg.de/en/research_funding/proposal_review_decision/applicants/research_data/index.html
- [9] https://www.jerri-project.eu/jerri-wAssets/docs/deliverables/wp-2/JERRI_Deliverable_D2_2_Description-of-specified-RRI-goals-at-Fraunhofer.pdf
- [10] <https://www.innovationsforschung.fraunhofer.de>
- [11] https://www.emft.fraunhofer.de/de/mediathek/Presse_und_Medien/CitizenSensor.html