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N.C.BANERJEE CENTRE FOR IPR STUDIES
NALSAR UNIVERSITY OF LAW, HYDERABAD



Patent Cooperation Treaty

Procedural Aspects & Recent Trends

Advanced Diploma In Patent Law
NALSAR University of Law, Hyderabad
Contact Class; March 2023.

ANINDYA SIRCAR



The Patent Cooperation Treaty is an agreement for international cooperation in the field of patents.

It is a treaty for rationalization and cooperation with regard to the filing, searching and examination of patent applications and the dissemination of the technical information contained therein.

The PCT does not provide for the grant of “international patents”: the task of and responsibility for granting patents remains exclusively in the hands of the patent Offices of, or acting for, the countries where protection is sought (the “designated Offices”).



The Patent Cooperation Treaty or “PCT” entered into force on **24 January 1978**, and became operational on **01 June 1978**, with an initial **18** Contracting States.

Presently **157** Contracting States had adhered to the PCT.

Came into force for India on
07 December, 1998.

Filing and not granting.



PCT Contracting States (157)



Regional Protection

EA Eurasian Patent

AM Armenia
AZ Azerbaijan
BY Belarus
KG Kyrgyzstan
KZ Kazakhstan
RU Russian Federation
TJ Tajikistan
TM Turkmenistan

EP European Patent

AL Albania¹
AT Austria
* BE Belgium
BG Bulgaria
CH Switzerland
* CY Cyprus
CZ Czech Republic
DE Germany
DK Denmark
EE Estonia
ES Spain
FI Finland
* FR France
* GB United Kingdom
* GR Greece
HR Croatia¹
HU Hungary
* IE Ireland
IS Iceland
* IT Italy

LI Liechtenstein
* LT Lithuania
LU Luxembourg
* LV Latvia
* MC Monaco
MK The former Yugoslav
Republic of Macedonia¹
* MT Malta
* NL Netherlands
NO Norway
PL Poland
PT Portugal
RO Romania
RS Serbia¹
SE Sweden
* SI Slovenia
SK Slovakia
SM San Marino
TR Turkey



European
Patent
Office

Regional patent only

Extension agreement continues to apply to applications filed before 1 January 2008
(for HR), 1 January 2009 (for MK), 1 May 2010 (for AL) or 1 October 2010 (for RS)

PCT Contracting States (157)

AP ARIPO Patent

BW	Botswana
GH	Ghana
GM	Gambia
KE	Kenya
LR	Liberia
LS	Lesotho
MW	Malawi
MZ	Mozambique
NA	Namibia
RW	Rwanda
SD	Sudan
SL	Sierra Leone
ST	Sao Tome and Principe
* SZ	Swaziland
TZ	United Republic of Tanzania
UG	Uganda
ZM	Zambia
ZW	Zimbabwe

OA OAPI Patent

* BF	Burkina Faso
* BJ	Benin
* CF	Central African Republic
* CG	Congo
* CI	Côte d'Ivoire
* CM	Cameroon
* GA	Gabon
* GN	Guinea
* GQ	Equatorial Guinea
* GW	Guinea-Bissau
* KM	Comoros
* ML	Mali
* MR	Mauritania
* NE	Niger
* SN	Senegal
* TD	Chad
* TG	Togo



Regional Protection



* Regional patent only

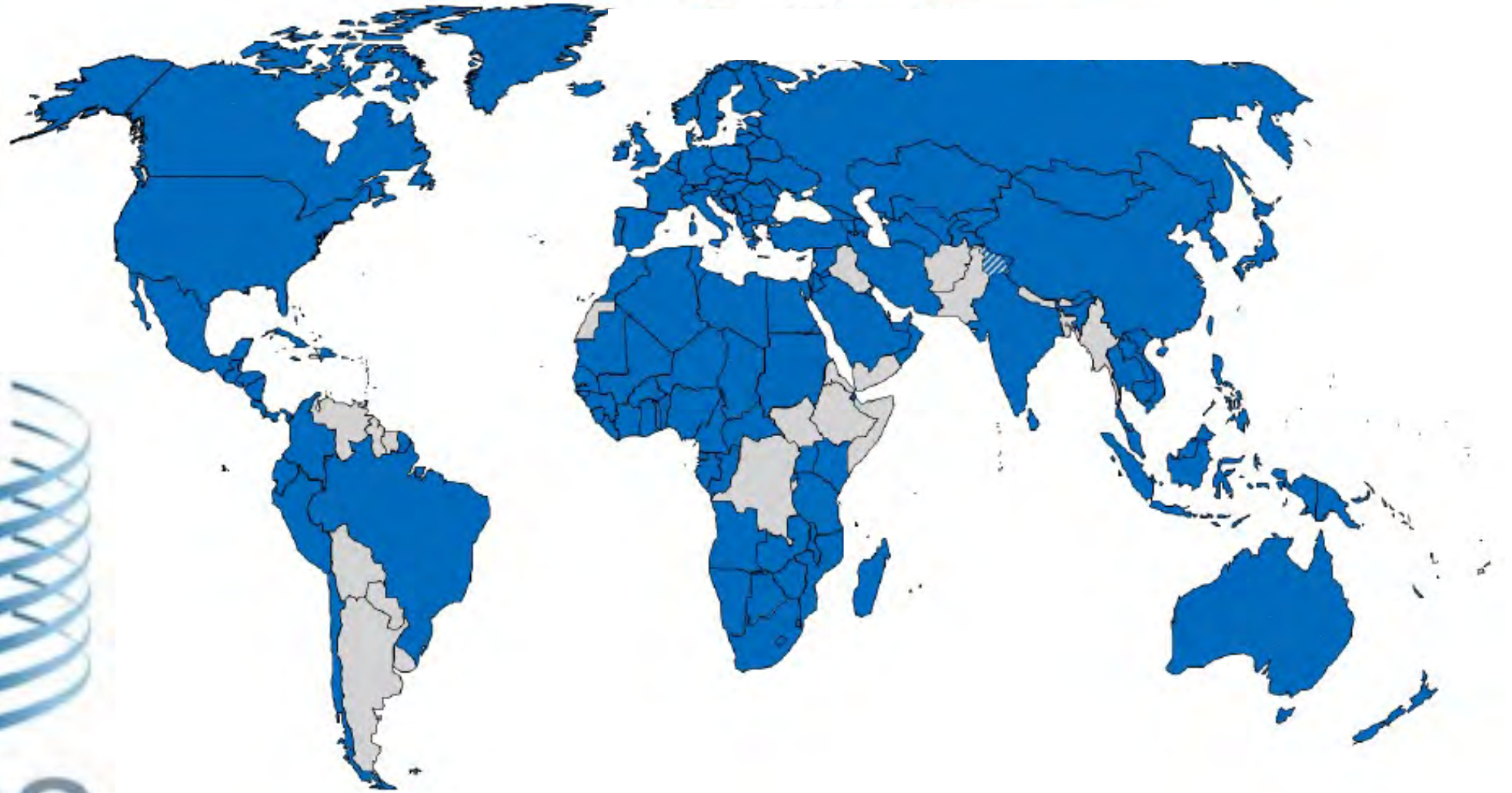
PCT Contracting States (157)

AE United Arab Emirates	HN Honduras	NG Nigeria
AG Antigua and Barbuda	ID Indonesia	NI Nicaragua
AO Angola	IL Israel	NZ New Zealand
AU Australia	IN India	OM Oman
BA Bosnia and Herzegovina	IR Islamic Republic of Iran	PA Panama
BB Barbados	JP Japan	PE Peru
BH Bahrain	KH CAMBODIA (as from 8 Dec. 2016)	PG Papua New Guinea
BN Brunei Darussalam	KM Union of the Comoros	PH Philippines
BR Brazil	KN Saint Kitts and Nevis	QA Qatar
BZ Belize	KP Democratic People's Republic of Korea	SA Saudi Arabia
CA Canada	KR Republic of Korea	SC Seychelles
CL Chile	KW Kuwait	SG Singapore
CN China	LA Lao People's Democratic Republic	ST Sao Tome and Principe
CO Colombia	LC Saint Lucia	SV El Salvador
CR Costa Rica	LK Sri Lanka	SY Syrian Arab Republic
CU Cuba	LY Libya	TH Thailand
DJ Djibouti	** MA Morocco	TN Tunisia
DM Dominica	** MD Republic of Moldova	TT Trinidad and Tobago
DO Dominican Republic	* ME Montenegro	UA Ukraine
DZ Algeria	MG Madagascar	US United States of America
EC Ecuador	MN Mongolia	UZ Uzbekistan
EG Egypt	MX Mexico	VC Saint Vincent and the Grenadines
GD Grenada	MY Malaysia	VN Viet Nam
GE Georgia		ZA South Africa
GT Guatemala		

* Extension of European patent possible
 ** Validation of European patent possible

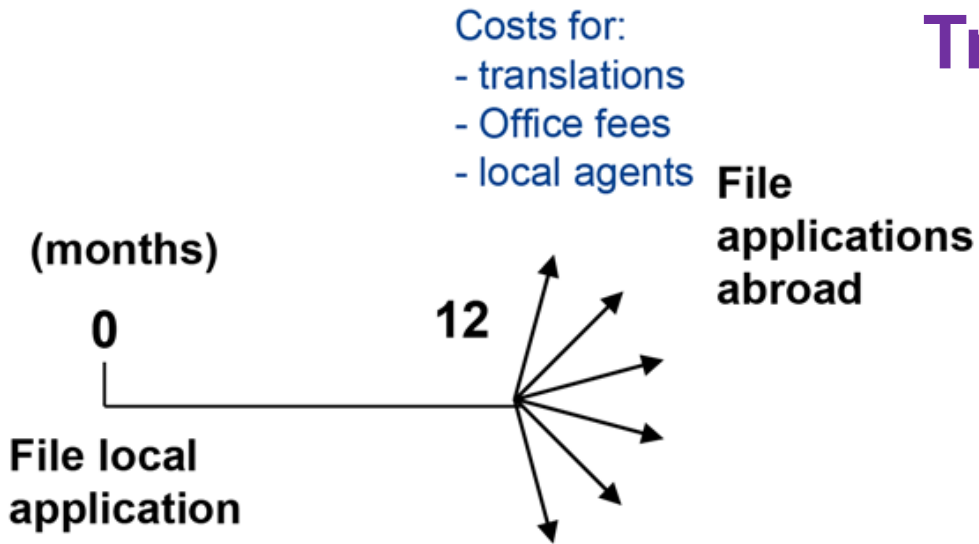
National Protection

PCT Contracting States

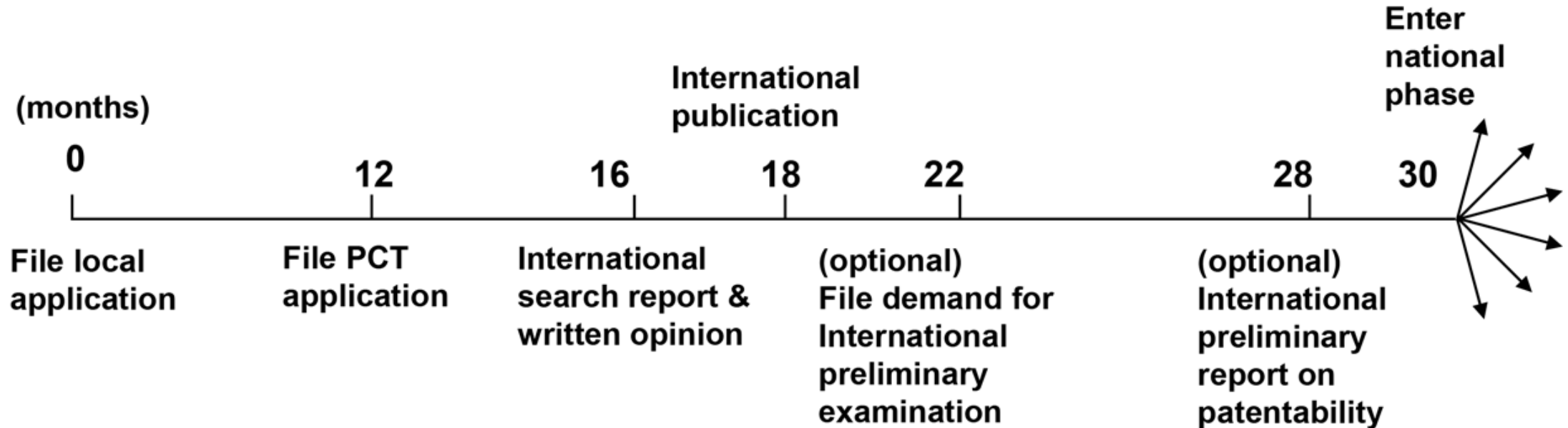


Traditional v PCT System

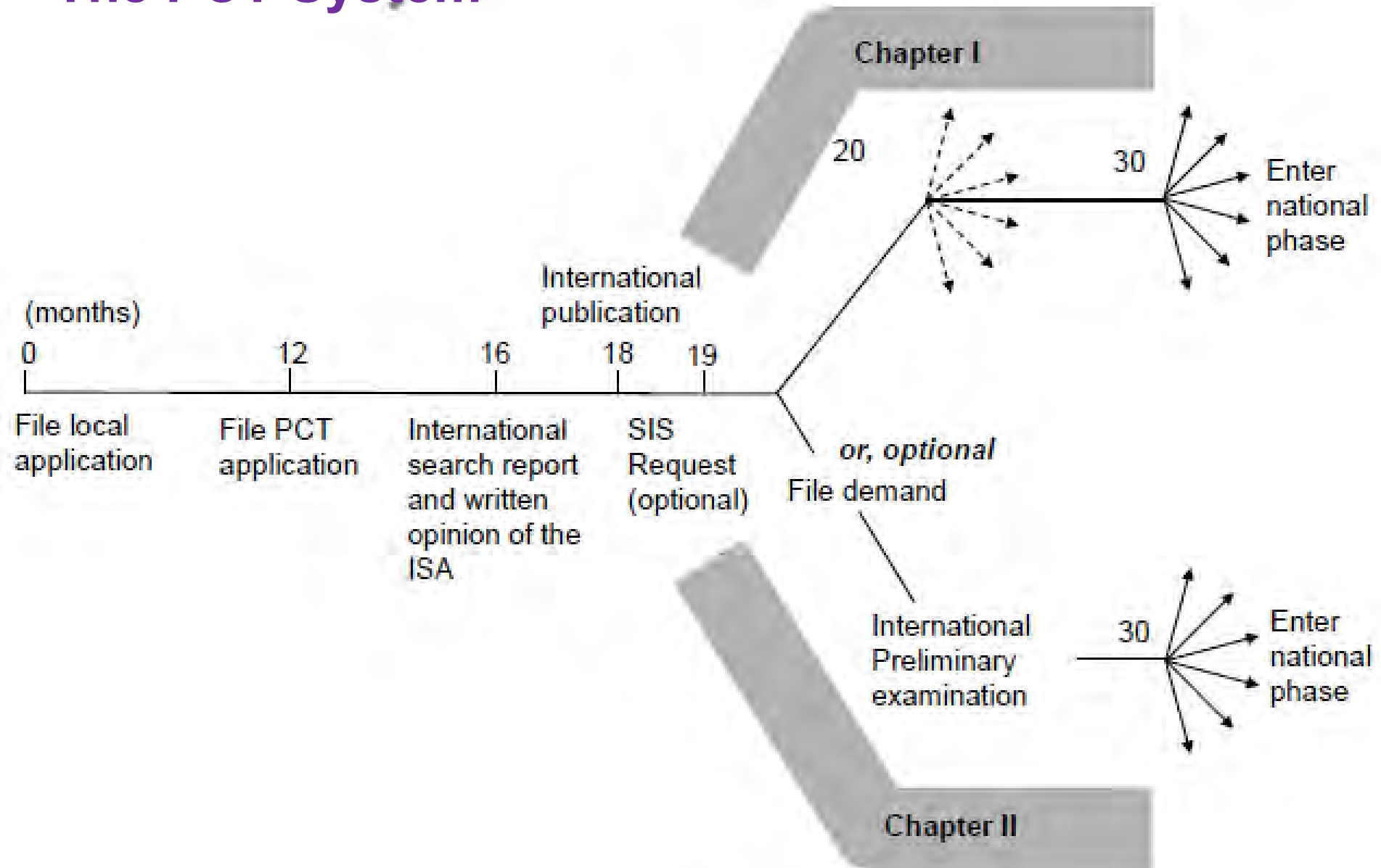
Paris



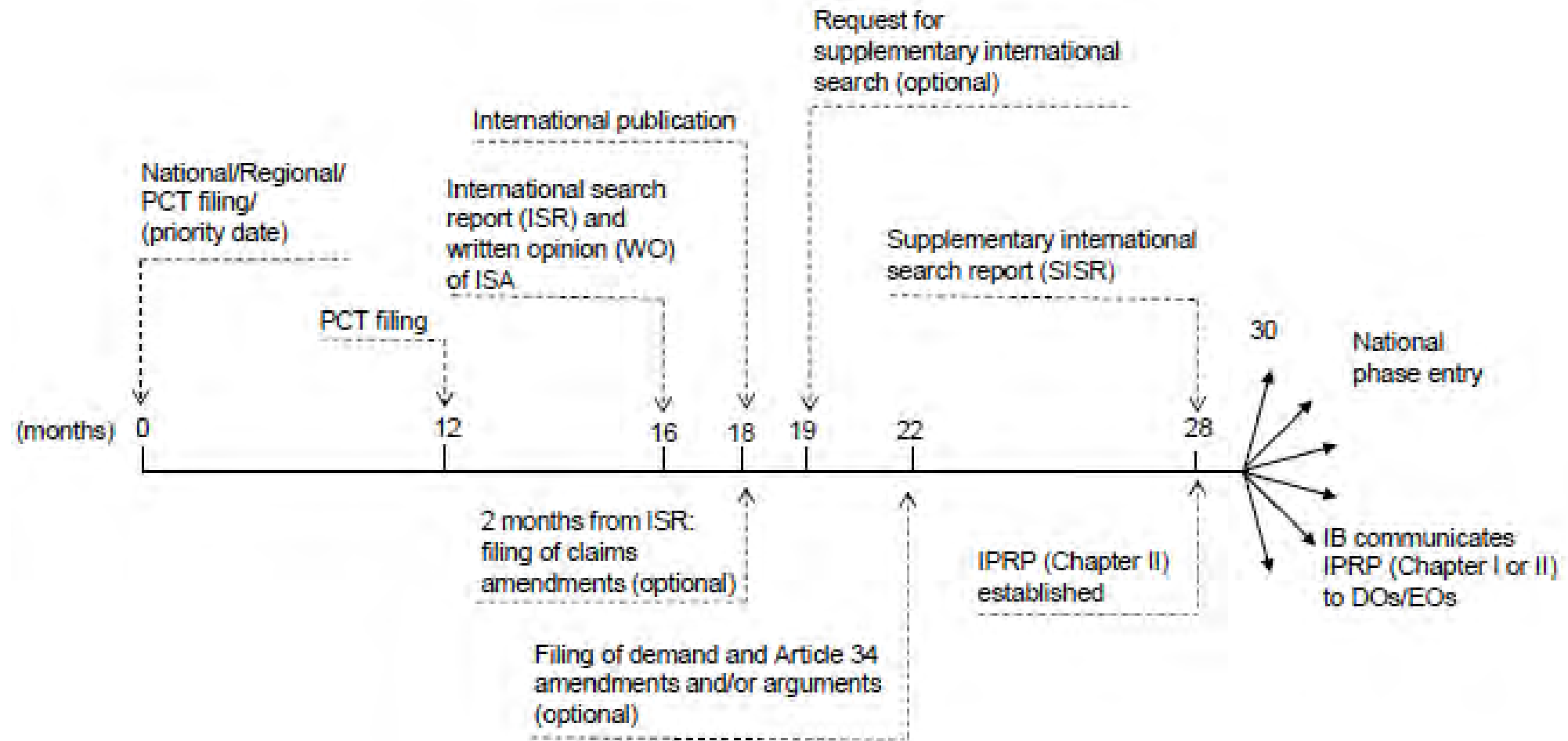
PCT



The PCT System



The PCT Timeline



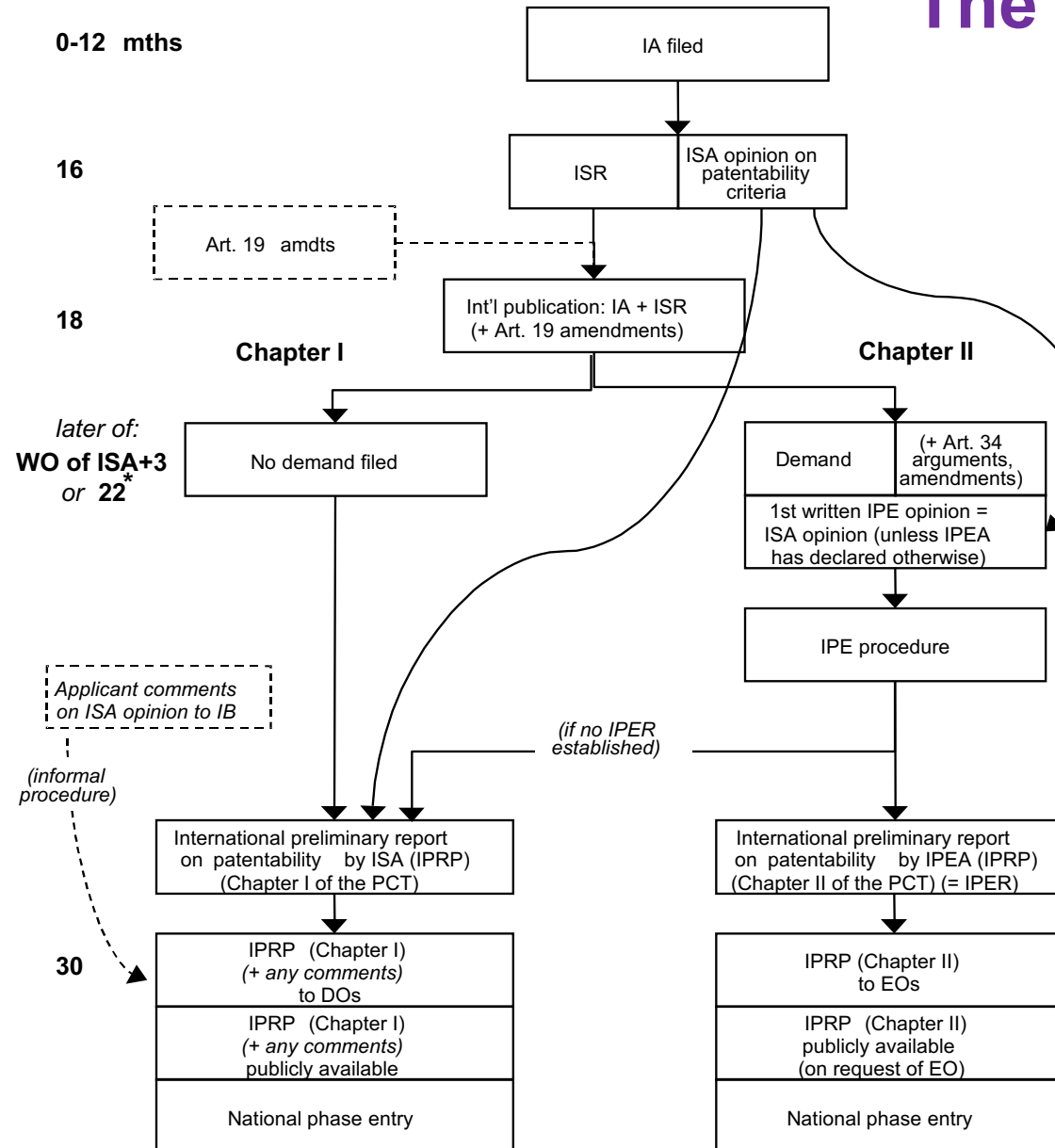
Non-applicability of time limit of 30 months under Article 22(1)

- The Offices of the following States have notified the International Bureau that they will not apply the 30 month time limit under Chapter I, as of 1 April 2002, for as long as modified Article 22(1) is not compatible with their national law:

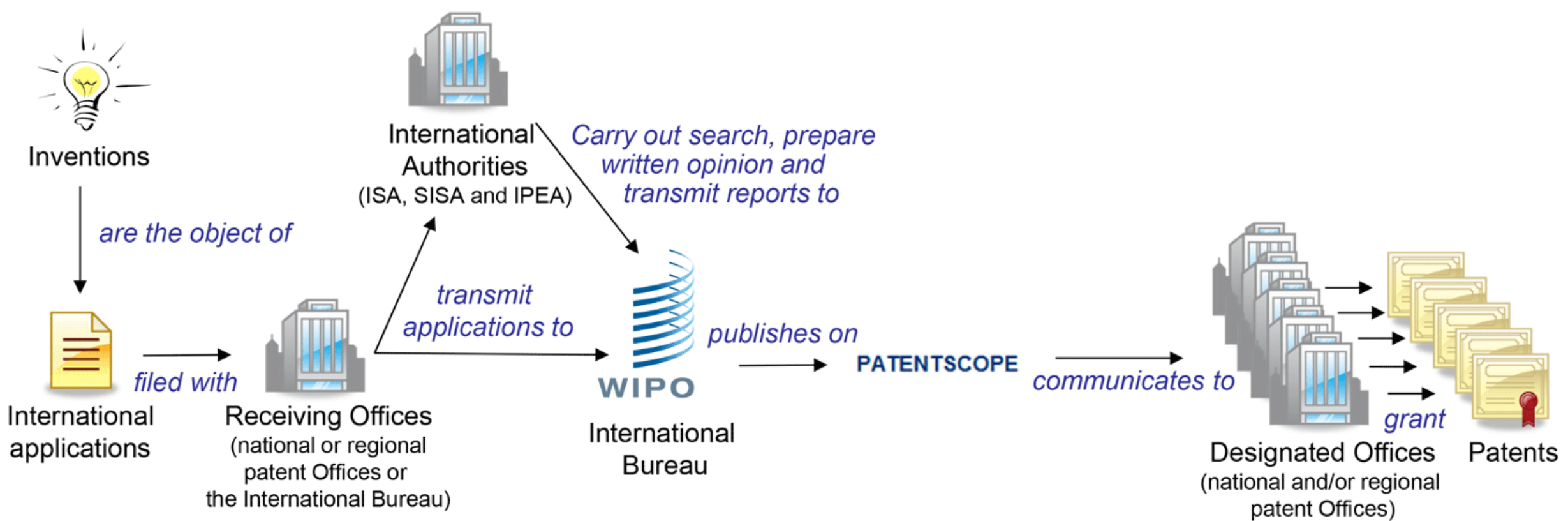
LU	Luxembourg
TZ	United Republic of Tanzania

- Where one of these States has been designated for the purposes of a regional patent, the applicable time limit is 31 months
- If no demand for international preliminary examination is filed before the expiration of 19 months in respect of above States, the national phase will have to be entered before the expiration of 20 or 21 months from the priority date

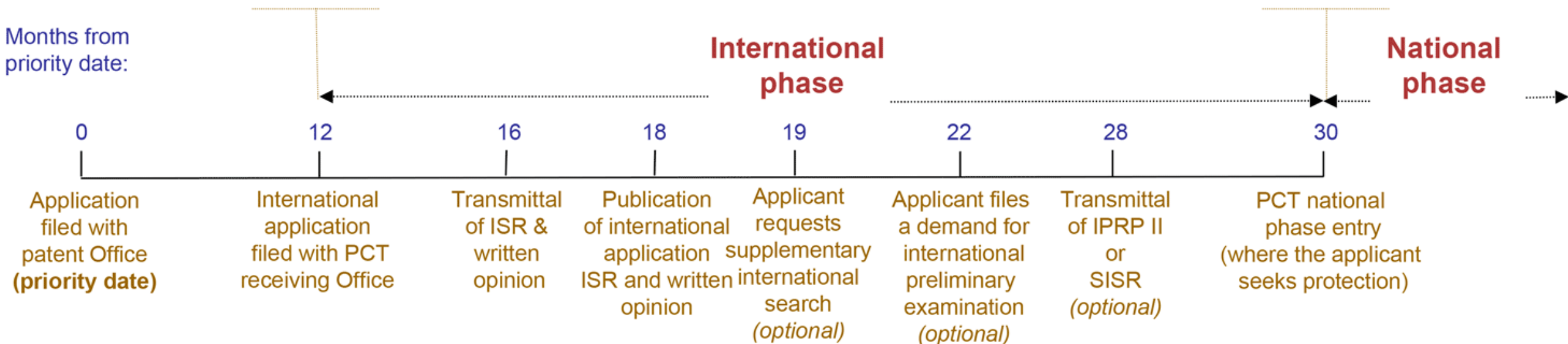
The PCT System



* must in practice file demand by 19 months for Article 22 transitional reservation countries



Months from priority date:



ISA / IPEA

- | | |
|------------------|---|
| ■ AT – Austria | ■ KR – Republic of Korea |
| ■ AU – Australia | ■ RU – Russian Federation |
| ■ BR – Brazil | ■ SE – Sweden |
| ■ CA – Canada | ■ SG – Singapore |
| ■ CL – Chile | ■ TR – Turkey |
| ■ CN – China | ■ UA – Ukraine |
| ■ EG – Egypt | ■ US – United States of America |
| ■ ES – Spain | ■ EP – European Patent Office |
| ■ FI – Finland | ■ XN – Nordic Patent Institute
(Denmark, Iceland, Norway) |
| ■ IL – Israel | ■ XV – Visegrad Patent Institute (VPI)
(Czech Republic, Hungary, Poland, Slovakia) |
| ■ IN – India | |
| ■ JP – Japan | |

ISA - Functions

- Checks unity of invention (Rule 40)
- Checks title (Rule 37); checks abstract (Rule 38)
- Searches claimed invention (Article 15(3), Rule 33.3)
- Authorizes rectification of obvious errors if the error is:
 - in any part of the international application other than the request or
 - in any paper submitted to that Authority (Rule 91.1(e))
- Establishes international search report (ISR) (Rules 42 and 43) and written opinion (WO) (Rule 43*bis*) and /or declaration that no international search report will be established (Article 17(2))



ISR – International Search Report

It contains:

- IPC (International Patent Classification) symbols
- Indications of the technical areas searched
- Indications relating to any finding of lack of unity
- A list of the relevant prior art documents
- Indications relating to any finding that a meaningful search could not be carried out in respect of certain (but not all) claims



Prior Art

- Made available to public
- Anywhere in the world
- By written disclosure
- Assisting in determining the claimed invention is new and involves an inventive step
- Prior to international filing date

Written Opinion of the ISA

Non binding opinion on:

- Novelty
- Inventive Step
- Industrial Applicability

Sent to the applicant with the ISR

Not published with the application

No provision of formal response



Demand not filed - IPRP established on the basis of WO of ISA

Demand Filed - WO of ISA treated as the first WO of the IPEA

International Preliminary Examination

- ❑ The purpose of the international preliminary examination is to provide a preliminary non-binding opinion on
 - novelty (not anticipated) (Article 33(2) and Rule 64)
 - inventive step (not obvious) (Article 33(3) and Rule 65)
 - industrial applicability (Article 33(4))
- ❑ Relevant prior art: absolute novelty (Rule 64, see also Rule 33)
- ❑ Only claims relating to the invention(s) searched by the ISA will be examined by the IPEA (Rule 66.1(e) and 66.2(a)(vi))
- ❑ Finding of lack of unity of invention (Rule 68)
 - Same criteria as for international search (Rule 13 and Annex B of the Administrative Instructions)
 - Invitation by the IPEA to restrict the claims or to pay additional fees (which can be paid under protest)
 - Applicant can select invention as “main invention” and those inventions for which additional fees are paid

IPRP - International Preliminary Report on Patentability

- ❑ Must be established by the IPEA within:
 - 28 months from the priority date
 - 6 months from date of payment of fees
 - 6 months from date of receipt by IPEA of translation under Rule 55.2, whichever expires last (Rule 69.2)
- ❑ May contain “annexes” which comprise all sheets containing amendments or rectifications (that is, rectifications of obvious errors authorized under Rule 91 by the IPEA) which have been used as a basis for the report (Rule 70.16)
- ❑ Correspondence (such as letters) or copies of amendments superseded by later amendments are not annexed to the report (Rule 70.16)

IPRP - International Preliminary Report on Patentability

- ☐ No provisions for appeal or further proceedings during the international phase before the International Authorities
- ☐ Sent to the applicant and the IB (Rule 71.1)
- ☐ IB forwards copies of the report, and any required translation of the report into English (prepared by the IB), to the elected Offices (Article 36(3)(a) and Rule 72.1)
- ☐ The annexes are not translated by the IB (Article 36(3)(b))

PCT System – The Extra Edge

- Control Cost - Delay filing decision
- Growing geographical interests
- Finalize/develop the market
- Study probable competition

EXTRA

COST
Filing
Issuing
#Attorney
#Maintenance

**Cost of Obtaining & Maintaining
Patents in 40+ major countries is
> US\$ 700,000**

PCT System - Benefits

- ☐ Single filing procedure for all countries
- ☐ Sufficient time for translations
- ☐ Drafted in accordance to PCT is valid everywhere
- ☐ Flexibility of payment of fees
- ☐ Advantage of maximum designation
- ☐ Transmittal of Priority needn't be monitored
- ☐ Provision for withdrawals
- ☐ Quality ISR and IPRP
- ☐ Provision of amendments
- ☐ Last minute foreign filings



PCT System - Challenges

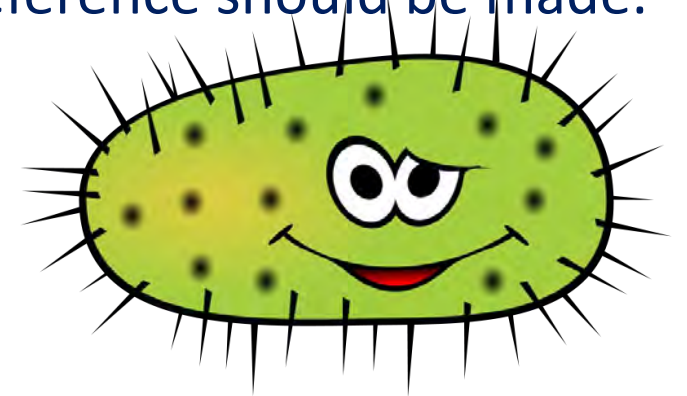
- ❑ The prosecution needs to be known
- ❑ Fully time line depended
- ❑ Often calls for clarifications and reminders



Docketing should be an habit

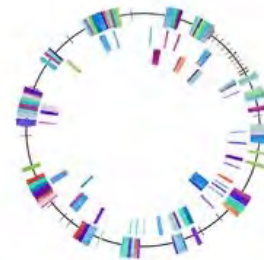
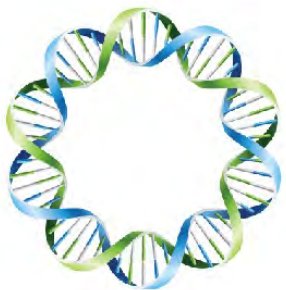
Reference to Deposited Microorganism or Other Biological Material

- ❑ Required in a PCT application only when the national law of a designated State provides for it. Usually needed for full disclosure of the invention.
- ❑ Annex L of Volume I of the *PCT Applicant's Guide* contains the list of the designated States whose national law provides for a reference to deposited microorganisms or other biological material and indicates when and how such reference should be made.
- ❑ The reference must indicate:
 - the name and address of the depositary institution
 - the date of deposit of the microorganism/biological material with that institution
 - the accession number given to the deposit by that institution
 - any additional indication, if applicable (see Annex L)



Reference to Deposited Microorganism or Other Biological Material

- ☐ The indications may be made in the description or on form PCT/RO/134.
- ☐ Certain designated Offices require that such indications be part of the description. In such a case, if form PCT/RO/134 is used, it should be numbered as a sheet of the description.
- ☐ In respect of certain designated Offices, the applicant is entitled to request that a sample be issued only to an expert nominated by the requester (a space is provided in form PCT/RO/134 to make such indication).



IDA Status

39

Authorities

AU (NMI)

BE (BCCM)

BG (NBIMCC)

CA (NMLHC)

CL (CChRGM)

CN (CCTCC; CGMCC)

CZ (CCM)

DE (DSMZ)

ES (BNA; CECT)

FI (VTTCC)

FR (CNCM)

IN (MTCC)

HU (NCAIM)

IT (ABC; DBVPG)

JP (IPOD; AIST)

KR (KCLRF; KCTC; KCCM)

LV (MSCL)

NL (CBS)

PL (IAFB; PCM)

RU (NRCA; VKM; VKPM)

SK (CCY)

UK (CCAP; ECACC; IMI;
NIBSC; NCTC; NCYC; NCIMB)

US (NRRL; ATCC)

23

Countries



PCT Sequence Listing Standard

❑ Where the sequence listing is filed together with the international application, it:

- must be presented as a separate “Sequence Listing Part” of the description
- must be placed at the end of the application
- must begin on a new page
- should preferably have independent page numbering

❑ The Standard provides further details as to:

- the symbols and the format which must be used for the presentation of nucleotide and/or amino acid sequences
- with regard to other available information to be included in the sequence listing, the mandatory items which must, and the optional item which may, be included, and the order in which those items must appear
- the presentation of features of sequences
- the presentation of “free text”

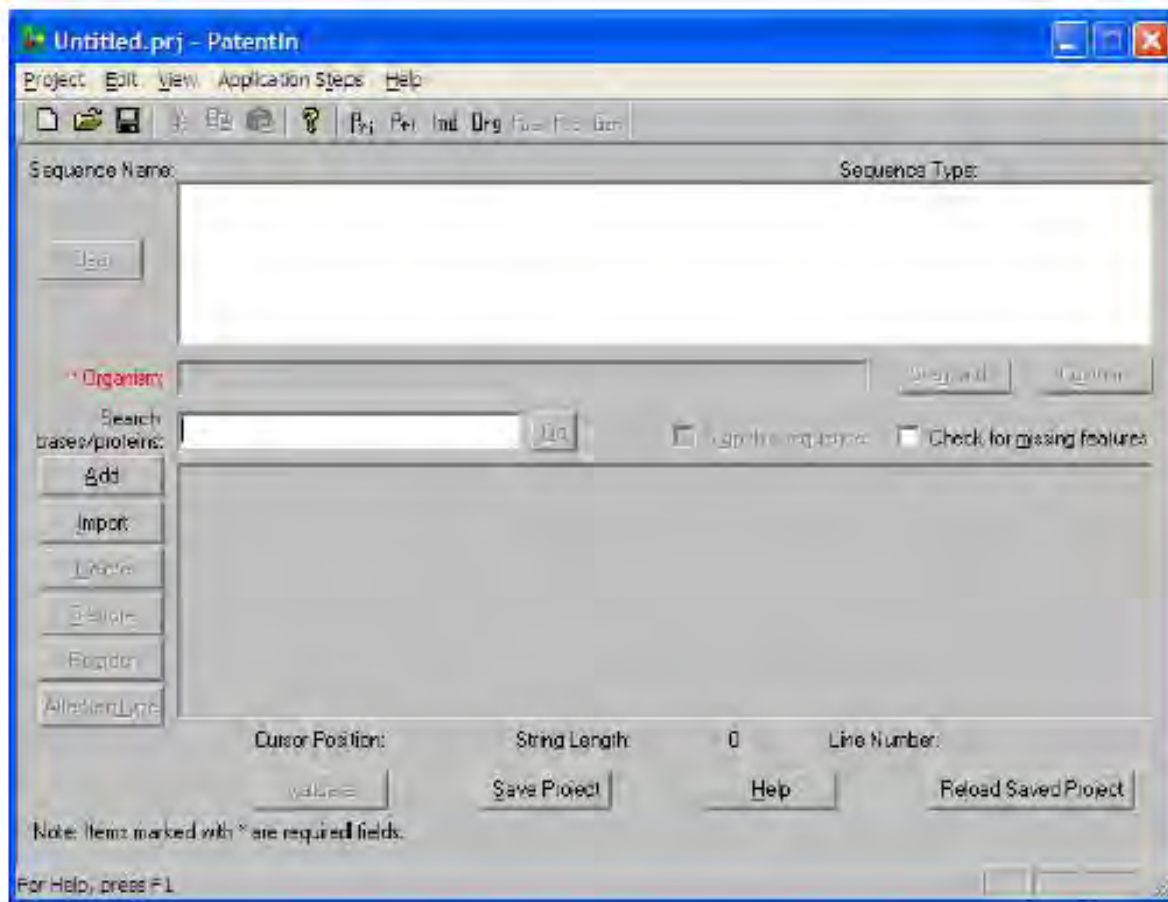
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```

PCT Sequence Listing Standard

Presentation of Free Text

- ❑ The Standard defines “free text” as a wording describing characteristics of the sequence which does not use “language neutral vocabulary”, that is, controlled vocabulary used in the sequence listing that represents scientific terms as prescribed by sequence database providers (including scientific names, qualifiers and their controlled vocabulary values, the symbols and the feature keys appearing in the Appendices to the Standard).
- ❑ Where the sequence listing part of the international application contains free text, that free text:
 - may, and preferably should, be in English (irrespective of the language of the main part of the description) (Rule 12.1(d))
 - must be repeated in the main part of the description (“Sequence Listing Free Text”) in the language thereof (ISA invites to furnish correction if not contained in main part of description as filed) (Rules 5.2(b) and 13*ter*.1(d))
- ❑ For the purposes of the national phase (Rule 49.5(a-*bis*)), no designated Office is entitled to require the applicant to furnish to it a translation of any text matter contained in the sequence listing part of the description if such text matter:
 - is presented in accordance with the Standard
 - is repeated in the main part of the description (and hence in any translation thereof)

PatentIn Software



- ❑ Windows-based version (available free of charge from the JPO, the USPTO and the EPO) designed to expedite the process of preparing sequence listings in a standardized computer readable format complying with the PCT Sequence Listing Standard
- ❑ Helps in creating a database of patent-disclosed sequences
- ❑ Supports the exchange of published sequence data between the European Patent Office, the Japan Patent Office and the United States Patent and Trademark Office in a Trilateral Sequence Exchange Project

PCT – SAFE

Secured Application Filed Electronically

PCT-RO-101 Electronic Request - ol.p008pv

File Edit View Tools Help

Check List

Type of filing: ☒ PCT-EASY ☐ Fully electronic

Document	Details	Pages	Electronic File	Val.
Request (including declaration sheets)		3		✓
Description		1		✓
Claims		1		✓
Abstract		1		✓
Drawings		3		?

Document	Details	Pages	Electronic File	Val.
Application body		6	application-body.xml	✓

Open

Recalculate total: 9 pages

International Application Accompanying Items

In total: 7 documents 3 files

PCT-SAFE: two options

Fully electronic filing of application:

- ☐ entire application in electronic form (image or character-coded), electronically signed
- ☐ transmitted via secure internet connection or on physical media

Preparing request in "PCT-EASY mode"

- ☐ entire application in paper form (legal copy) including the PCT-EASY request form printout
- ☐ plus physical medium with electronic request form and

PCT-SAFE: fee reductions

- "PCT-EASY" type of filing (on paper + request and abstract on physical medium)
CHF 100 (EUR 66 or equivalent amount)
- Fully electronic type of filing with application body in image format (for example PDF, TIFF attachments) and only the request in character coded format (XML)
CHF 200 (EUR 132 or equivalent amount)
- Fully electronic type of filing with application body and request in character coded format (XML)
CHF 300 (EUR 198 or equivalent amount)

ePCT Filing



- ❑ Web-based filing of PCT applications available to all PCT applicants
- ❑ Available with **43** receiving Offices
 - Direct: AT, AU, AZ, BG, BN, BR, CL, CO, CU, CZ, DK, DZ, EA, EE, EP, FI, HU, IB, ID, IN, IR, IS, KR, LV, MX, MY, NO, NZ, OM, PH, PL, PT, QA, RU, SA, SE, SG, SK, TR and ZA **(40)**
 - Upload package: CA, IL, US **(3)**
- ❑ Real-time online payment to the International Bureau of filing fees by credit card or by debiting a WIPO Current Account (only for filings with RO/IB)
 - Visa, MasterCard/Eurocard, American Express, Diners Club
 - Payment can be made at or after the time of filing

eOLF / CMS Filing

European Patent Office



The International Patent System

WORLD INTELLECTUAL PROPERTY ORGANIZATION

DEMO

Current time in Geneva, Switzerland  Wednesday, 19 February 2014, 11:16 CET

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International Application Number * :

International Filing Date * :

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only for unpublished IAs :

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for use at the time of filing a new application [Request Code](#)

List of PCT Fees

At RO

- **transmittal fee**
- **international filing fee (for IB)**
- **search fee (for ISA)**
- **supplement per sheet in excess of 30 (for IB)**
- *fee for priority document*
- *late payment fee*
- *late furnishing fee (translation of international application)*
- *fee for requesting restoration of the right of priority*
- *fee for copies of documents*

At ISA

- *additional search fee*
- *protest fee (where applicable)*
- *fee for copies of documents*
- *late furnishing fee (furnishing of a sequence listing)*

Fees indicated in italics are payable only in certain circumstances



At IB

- *fee for early publication (before issuance of ISR)*
- *fee for publication of refused request for rectification of obvious mistake*
- *fee for publication of late request for correction/addition of priority claim*
- *fee for copies of documents*
- *supplementary search fee (for the SISA)*
- *supplementary search handling fee*

At IPEA

- **preliminary examination fee**
- **handling fee (for IB)**
- *late payment fee*
- *additional examination fee*
- *protest fee (where applicable)*
- *fee for copies of documents*
- *late furnishing fee (furnishing of a sequence listing)*

Cost Considerations



February, 2023

EXAMPLE OF PCT FEES TO BE PAID BY CORPORATE APPLICANTS FROM INDIA

• Transmittal fee:	US\$	101 (RO/IB)	INR 17,600 (RO/INp)	INR 0 (RO/INe)
• International Filing fee:	US\$	1,346		
• Less PCT-SAFE (Max.):	US \$	(324)		
• Less 75% Reduction:	US\$	0		
• Search fee:	US\$.	2,180	(ISA=US)	
• Examination fee:	US\$	640	(IPEA=US)	
• Handling fee:	US\$	216		

TOTAL PCT FEE (Ch.I):	US\$	3,303	INR 17,600 (RO/INp)	INR 0 (RO/INe)
TOTAL PCT FEE (Ch.II):	US\$	4,159		

- *Not exceeding 30 pages + US\$ 16/page*
- *Applicant not Small or Micro entity*

Benefits from using the PCT – Unique Procedure

- ❑ One application, in one language, filed with one Office, replaces multiple foreign filings until entry into the national phase
- ❑ Permits last minute foreign filing (before expiration of priority year)
- ❑ International filing date has the effect of national filing date in all designated Offices
- ❑ Uniform formal requirements accepted by all designated Offices
- ❑ Greater home control of the prosecution
- ❑ Decision on foreign filings can be postponed up to 30 months from the priority date at minimal cost
- ❑ Enables assessment of economic value of the invention and the chances of obtaining a patent before entering national phase



Benefits from using the PCT – Greater Flexibility

- ❑ Keep options open by making multiple designations
- ❑ Various possibilities for withdrawal
- ❑ International publication can be prevented or postponed until as late as 15 days before the actual publication date – conditional withdrawal possible
- ❑ Further expenses can be avoided simply by no longer prosecuting the application or not entering the national phase
- ❑ Amendments made during the international phase have effect in all designated/elected States
- ❑ More time for better quality translation for the national phase
- ❑ Better planning of the expenditures for the national phase



Benefits from using the PCT – Further Features

- ❑ Postponing national filings costs earns interest on capital
- ❑ Fee reductions in national phase in certain national Offices
- ❑ More straightforward and rapid national patent granting
- ❑ Less restrictive unity of invention requirements permit a reduced number of applications in the US
- ❑ Provisional protection after publication at 18 months from the priority date (in countries which afford such protection)
- ❑ 75% reduction in PCT fees for applicants from certain Contracting States



Evolution of Practice

- Carefully comply with all formal requirements
- Select ISA and IPEA for maximum benefits
- Reserve all market options - designate all
- Docket & track all events
- File early Demands
- Respond to Written Opinions
- Integrate PCT into Portfolio Management Program
- Make final decisions using all information
- Allow your agents sufficient time



Decisions

- Is filing a PCT application right?
- Where is the market of the invention?
- Who are the customers?
- Who is the competition?
- How easy (or difficult) would it be to design around the claims?
- Is there an incentive to copy in unprotected countries?
- What is the marketing strategy?
- What is important - exclusivity, freedom to practice or both?
- What is your budget?



PCT Statistics - 2021

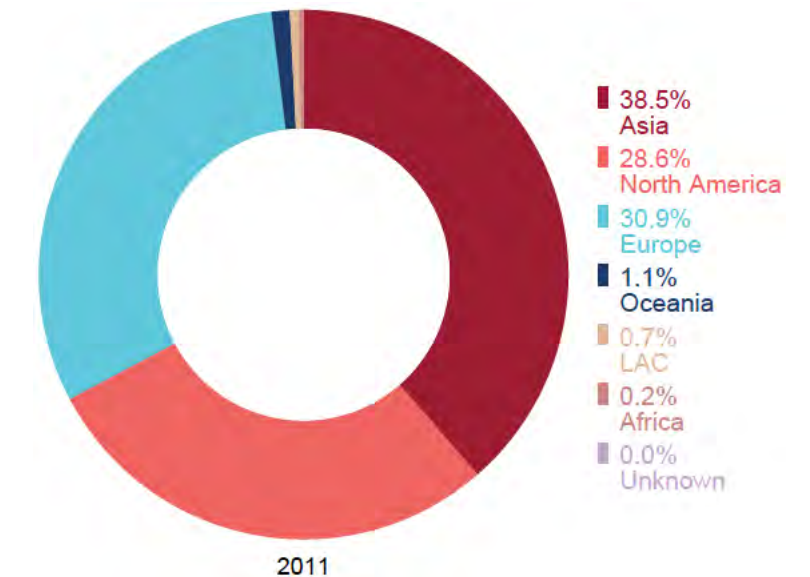
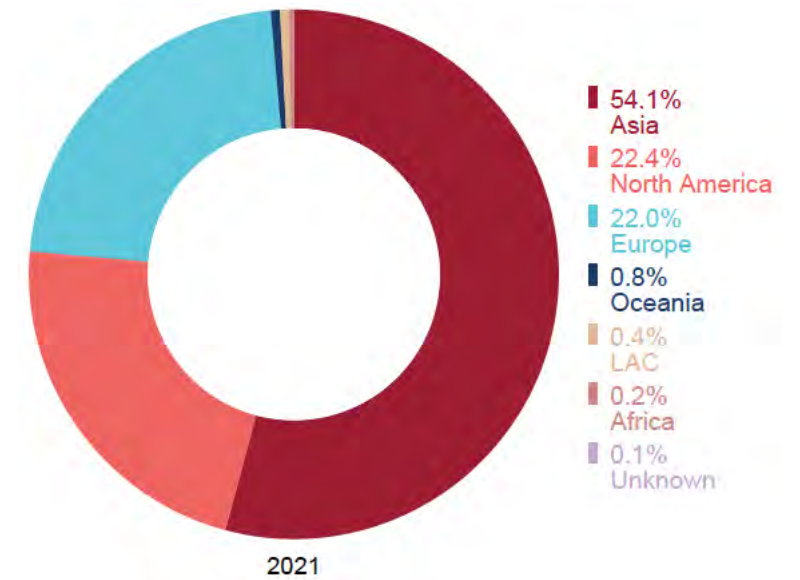
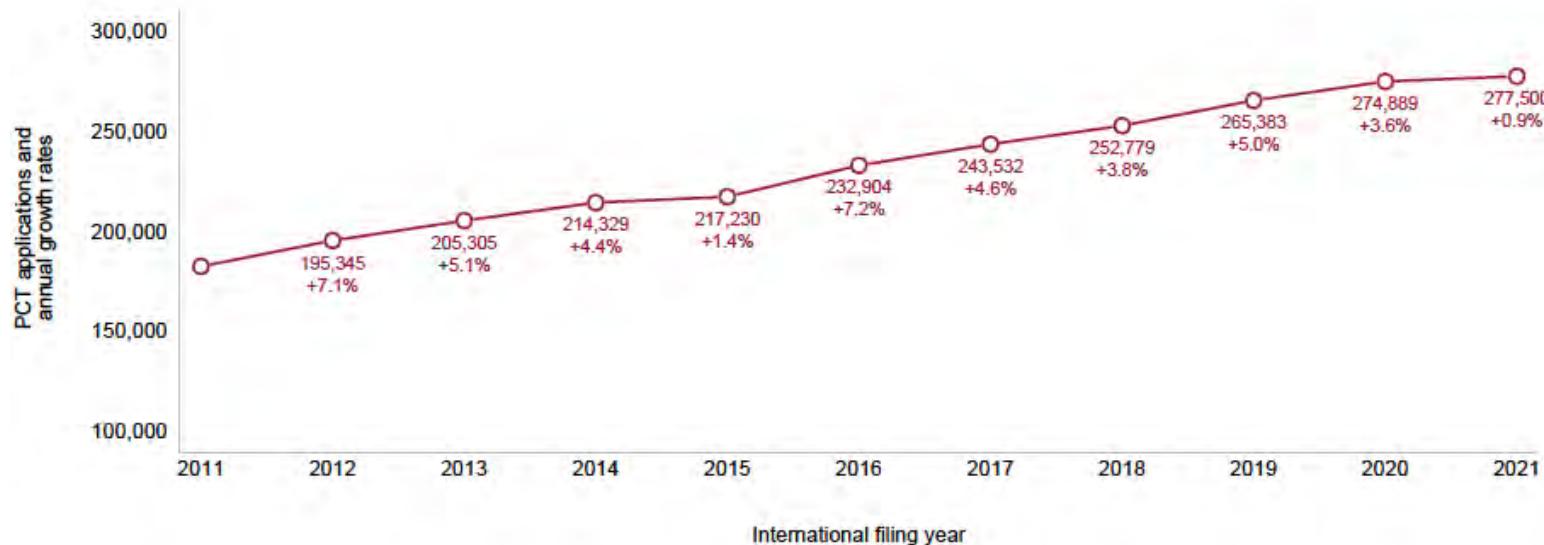
664,700 (-1.7%)
PCT national phase entries

277,500 (+0.9%)
PCT applications filed

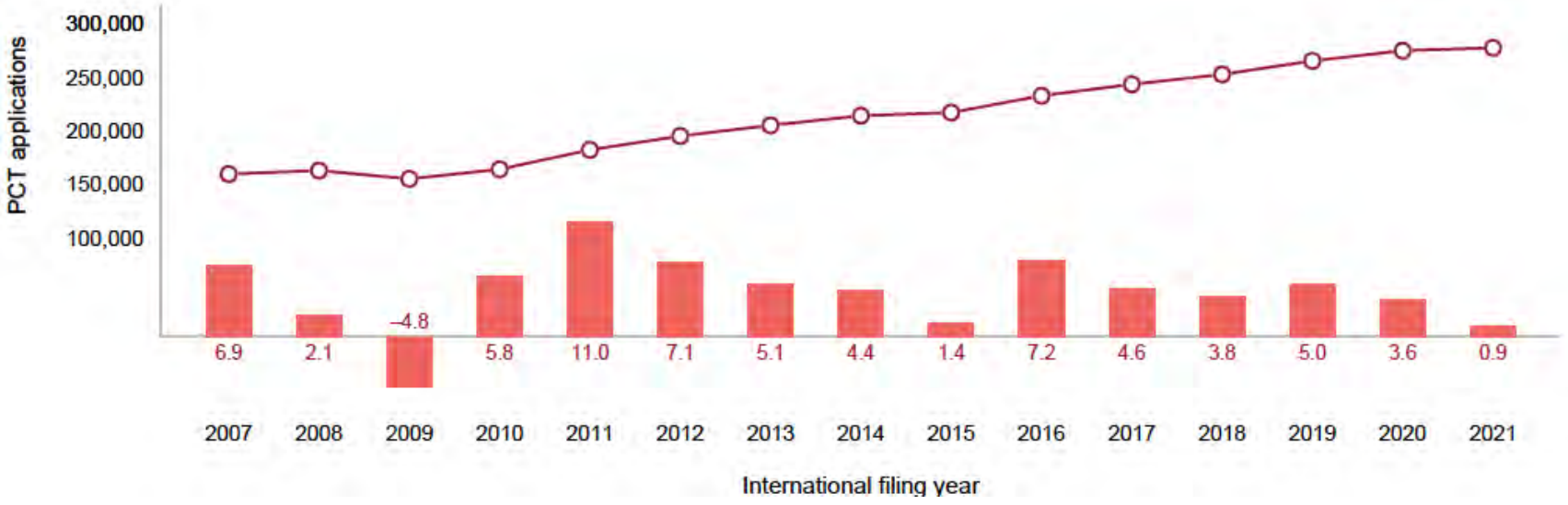
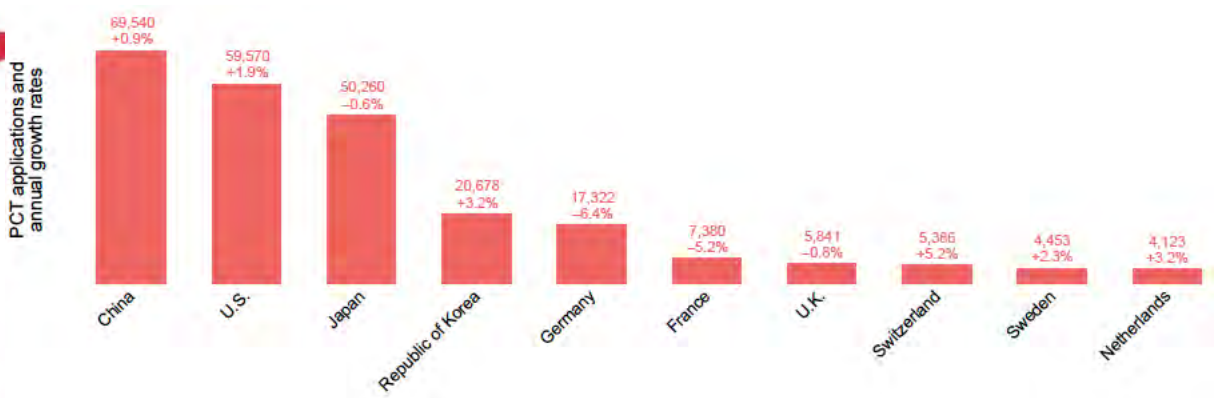
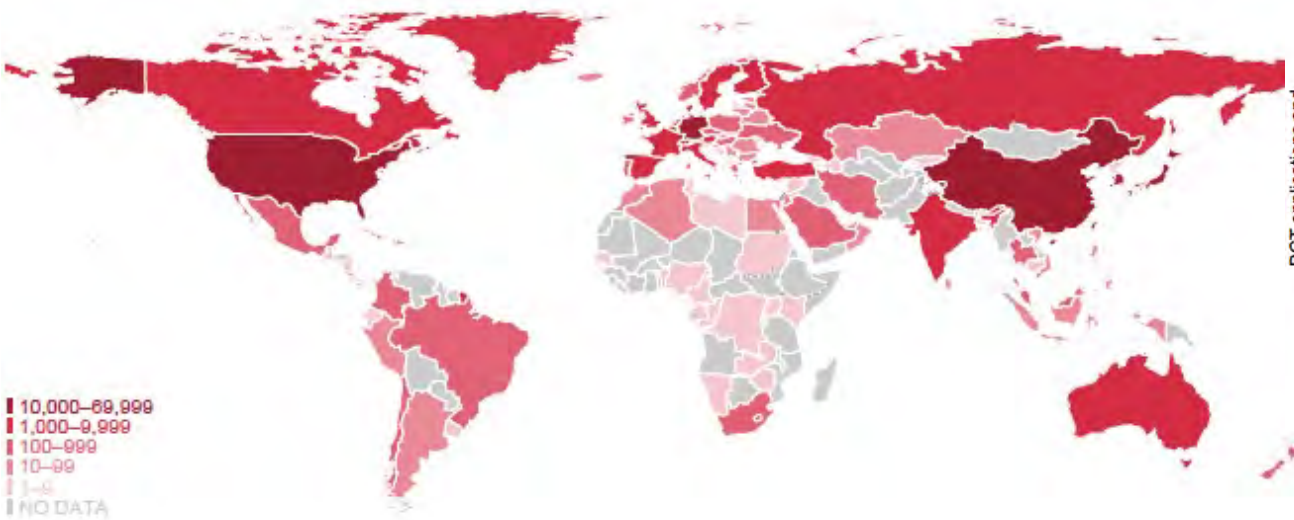
129 (+5)
Countries in which PCT applications were filed

56.9% (+0.1 percentage point)
Share of PCT national phase entries in worldwide non-resident patent application filings

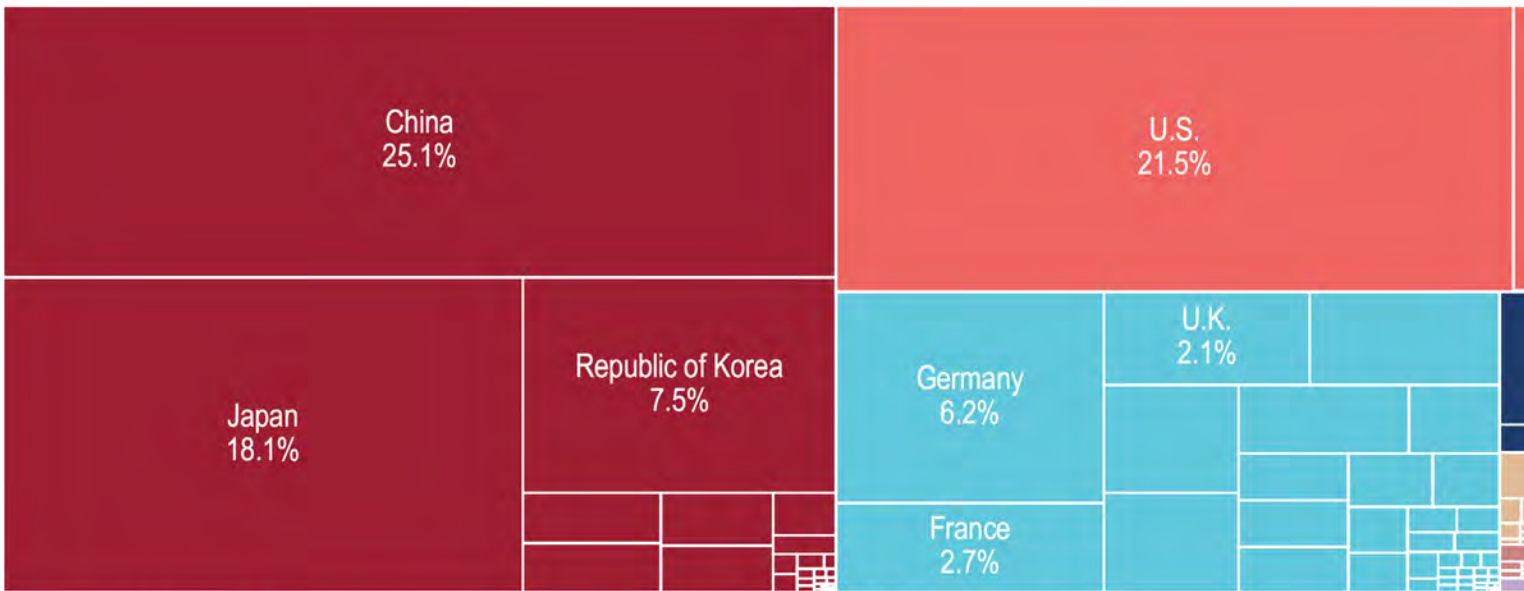
16.5% (+1 percentage point)
Share of women among PCT inventors



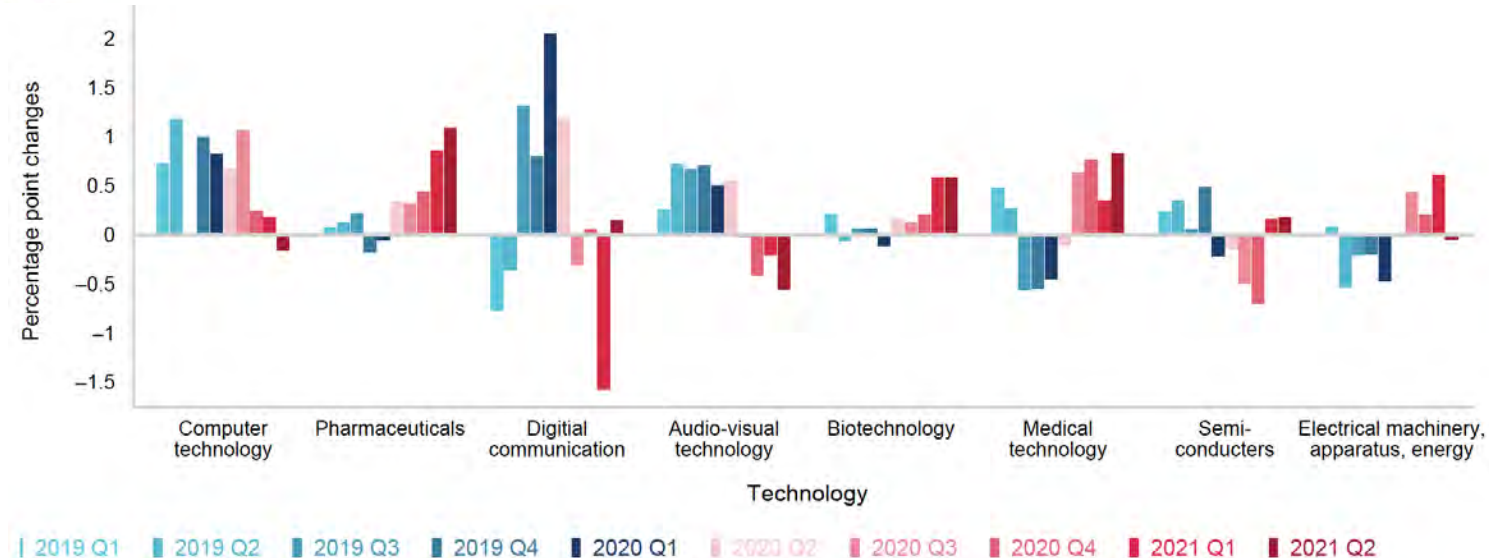
PCT Trends - 2021



Top Applicants - 2021



■ Asia, 54.1% ■ North America, 22.4% ■ Europe, 22.0% ■ Oceania, 0.8%
 ■ Latin America and the Caribbean, 0.4% ■ Africa, 0.2% ■ Unknown, 0.1%



Top Applicants (Corporates) - 2021

Overall ranking	Change in position from 2020	Applicant	Origin	Published PCT applications		
				2019	2020	2021
1	0	HUAWEI TECHNOLOGIES CO., LTD.	China	4,411	5,464	6,952
2	3	QUALCOMM INCORPORATED	U.S.	2,127	2,173	3,931
3	-1	SAMSUNG ELECTRONICS CO., LTD.	Republic of Korea	2,334	3,093	3,041
4	0	LG ELECTRONICS INC.	Republic of Korea	1,646	2,759	2,885
5	-2	mitsubishi electric corporation	Japan	2,661	2,810	2,673
6	2	GUANG DONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD	China	1,927	1,801	2,208
7	0	BOE TECHNOLOGY GROUP CO.,LTD	China	1,864	1,892	1,980
8	-2	TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)	Sweden	1,698	1,989	1,877
9	0	SONY GROUP CORPORATION	Japan	1,566	1,793	1,789
10	0	PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.	Japan	1,567	1,611	1,741
11	6	PING AN TECHNOLOGY (SHENZHEN) CO., LTD.	China	1,691	1,304	1,564
12	3	NIPPON TELEGRAPH AND TELEPHONE CORPORATION	Japan	703	1,372	1,508
13	3	ZTE CORPORATION	China	1,085	1,316	1,493
14	-3	HEWLETT-PACKARD DEVELOPMENT COMPANY, L. P.	U.S.	1,510	1,595	1,485
15	5	NEC CORPORATION	Japan	1,024	1,121	1,350
16	7	VIVO MOBILE COMMUNICATION CO., LTD.	China	603	955	1,336
17	-5	MICROSOFT TECHNOLOGY LICENSING, LLC	U.S.	1,370	1,529	1,303
18	-5	ROBERT BOSCH CORPORATION	Germany	1,687	1,375	1,213
19	0	FUJIFILM CORPORATION	Japan	1,158	1,128	1,095
20	1	SZ DJI TECHNOLOGY CO., LTD	China	875	1,075	1,042
21	1	DENSO CORPORATION	Japan	1,026	1,062	915

Top Applicants (Universities) - 2021

Overall ranking	Change in position from 2020	Applicant	Origin	Published PCT applications		
				2019	2020	2021
39	5	UNIVERSITY OF CALIFORNIA	U.S.	470	559	551
72	64	ZHEJIANG UNIVERSITY	China	69	209	306
103	-4	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	U.S.	230	269	227
125	-7	TSINGHUA UNIVERSITY	China	265	231	201
132	58	LELAND STANFORD JUNIOR UNIVERSITY	U.S.	132	154	194
149	5	BOARD OF REGENTS OF THE UNIVERSITY OF TEXAS SYSTEM	U.S.	161	184	177
161	22	SOUTH CHINA UNIVERSITY OF TECHNOLOGY	China	165	157	169
170	138	NATIONAL UNIVERSITY OF SINGAPORE	Singapore	79	96	163
185	420	SUZHOU UNIVERSITY	China	33	46	153
187	15	UNIVERSITY OF TOKYO	Japan	119	149	150
192	-15	DALIAN UNIVERSITY OF TECHNOLOGY	China	141	159	146
202	-95	SHENZHEN UNIVERSITY	China	247	252	142
207	224	QINGDAO TECHNOLOGICAL UNIVERSITY	China	14	69	139
211	37	KOREA UNIVERSITY	Republic of Korea	93	118	138
224	22	JOHNS HOPKINS UNIVERSITY	U.S.	87	121	129
239	27	YONSEI UNIVERSITY	Republic of Korea	48	109	122
242	-17	JIANGNAN UNIVERSITY	China	118	131	121
242	-2	HANYANG UNIVERSITY	Republic of Korea	113	124	121
255	53	UNIVERSITY OF MICHIGAN	U.S.	107	96	113
265	-33	OSAKA UNIVERSITY	Japan	105	128	111
267	67	UNIVERSITY OF FLORIDA	U.S.	94	86	110
267	-61	SEOUL NATIONAL UNIVERSITY	Republic of Korea	136	146	110
283	78	SHANDONG UNIVERSITY	China	71	80	105
284	-36	HARVARD UNIVERSITY	U.S.	140	118	104

Top Applicants (Govt. / Research Institutes) - 2021

Overall ranking	Change in position from 2020	Applicant	Origin	Published PCT applications		
				2019	2020	2021
53	17	SHENZHEN INSTITUTE OF ADVANCED TECHNOLOGY	China	152	362	396
60	1	FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V.	Germany	331	428	343
143	-6	COMMISSARIAT À L'ÉNERGIE ATOMIQUE ET AUX ÉNERGIES ALTERNATIVES	France	229	208	182
196	-26	INSTITUT NATIONAL DE LA SANTÉ ET DE LA RECHERCHE MÉDICALE (INSERM)	France	122	167	144
250	-4	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)	France	130	121	116
284	-73	AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH	Singapore	135	142	104
343	-43	NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY	Japan	121	98	87
384	0	NEDERLANDSE ORGANISATIE VOOR TOEGEPAST-NATUURWETENSCHAPPELIJK ONDERZOEK TNO	Netherlands	70	76	78
392	-44	KOREA ELECTRONICS TECHNOLOGY INSTITUTE	Republic of Korea	70	83	74
400	48	CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS (CSIC)	Spain	56	66	72
440	98	SLOAN-KETTERING INSTITUTE FOR CANCER RESEARCH	U.S.	60	54	66
449	135	U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES	U.S.	103	48	65
482	-8	MIMOS BERHAD	Malaysia	15	62	60
482	-78	MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH	U.S.	88	73	60
500	32	MAX-PLANCK-GESELLSCHAFT ZUR FÖRDERUNG DER WISSENSCHAFTEN E.V.	Germany	47	55	57
587	115	RIKEN (THE INSTITUTE OF PHYSICAL AND CHEMICAL RESEARCH)	Japan	47	39	49
597	-82	KOREA RESEARCH INSTITUTE OF CHEMICAL TECHNOLOGY	Republic of Korea	54	58	48
597	105	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION	Australia	28	39	48
607	-59	BATTELLE MEMORIAL INSTITUTE	U.S.	30	52	47
675	165	INSTITUTE OF MICROELECTRONICS OF THE CHINESE ACADEMY OF SCIENCES	China	16	33	42
696	372	KOREA ELECTROTECHNOLOGY RESEARCH INSTITUTE	Republic of Korea	28	26	40
696	257	SHANGHAI INSTITUTE OF MATERIA MEDICA, CHINESE ACADEMY OF SCIENCES	China	30	29	40
740	249	NATIONAL RESEARCH COUNCIL OF CANADA	Canada	34	28	37
788	6	KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY	Republic of Korea	36	35	35
788	353	CEDARS-SINAI MEDICAL CENTER	U.S.	34	24	35
788	-98	KOREA INSTITUTE OF INDUSTRIAL TECHNOLOGY	Republic of Korea	45	40	35
788	-183	COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGN. OF SOC. ACT (ACT XXI OF 1860)	India	45	46	35
809	259	DEUTSCHES ZENTRUM FÜR LUFT- UND RAUMFAHRT E.V.	Germany	34	26	34
838	544	CITY OF HOPE	U.S.	33	20	33
872	917	U.S. GOVERNMENT AS REPRESENTED BY THE DEPARTMENT OF VETERANS AFFAIRS	U.S.	15	15	32
872	196	KOREA RESEARCH INSTITUTE OF BIOSCIENCE AND BIOTECHNOLOGY	Republic of Korea	28	26	32

-1-



LOW TEMPERATURE SYNTHESIS OF VITREOUS
BODIES AND THEIR INTERMEDIATES

FIELD OF THE INVENTION

This invention relates to a novel method for making a
5 vitreous body and its intermediates. More particularly, the
method relates to a low temperature production of a vitreous body
via synthesis of a self-supporting body by solution deposition.

DESCRIPTION OF THE PRIOR ART

In recent years, the most commonly employed commercial
10 process for the manufacture of glass is the direct melting
process. This process is somewhat tedious and has not been very
successful in the melting of easily devitrifiable and high refrac-
tory glass. Many of the latest technological advances demand
glass to be in a state of high purity which is seldom met in a



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WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : D01D 5/42, F16J 15/22, D01F 6/12	A1	(11) International Publication Number: WO 99/60191 (43) International Publication Date: 25 November 1999 (25.11.99)
(21) International Application Number: PCT/IN98/00001 (22) International Filing Date: 29 December 1998 (29.12.98) (30) Priority Data: 318/Bom/98 20 May 1998 (20.05.98) IN (71)(72) Applicant and Inventor: PANDEY, Raj, Kumar [IN/IN]; Plot No. A/465, Road No. 28, Wagle Industrial Estate, Thane 400 604, Mumbai, Maharashtra (IN). (74) Agent: BHATNAGAR, Mahendra, Prasad; Lall Lahiri & Salhotra, N-128, Panchsheel Park, New Delhi 110 017 (IN).		(81) Designated States: US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>With amended claims and statement.</i>
(54) Title: EXPANDED SINGLE MOLECULAR ALIGNED TEMPERATURE TREATED YARN		



When to use PCT?



- Ease of filing
- Gain additional time to make final filing decisions
- To get information, licensees, capital, partners
- Preserve the right to continue prosecution in any PCT member country
- Get global publicity for your invention via PCT publication
- Delay costs
- Receive a single search report and written opinion

- I know I need foreign patent protection
- I think I may need foreign patent protection
- I have no idea whether or not I need foreign patent protection
- I think I may be on to something big, but....
- I want an active filing strategy but need to spread my costs

When Not to use PCT?



- I have no interest in obtaining foreign patent rights
- I know I only want protection in *X* countries, and
- Those countries allow me to file in English or
- I am prepared to produce the necessary translations by 12 months
- I am prepared to pay national filing fees right away
- I have received sufficient information to give me confidence to proceed
- I have designated foreign counsel who are able to prosecute the application
- I need protection in a non-PCT country

thank
you



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