Delft University of Technology

Ministry of Communications Israel

Cultural Factors Shaping Radio Frequency Spectrum Governance

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The Research

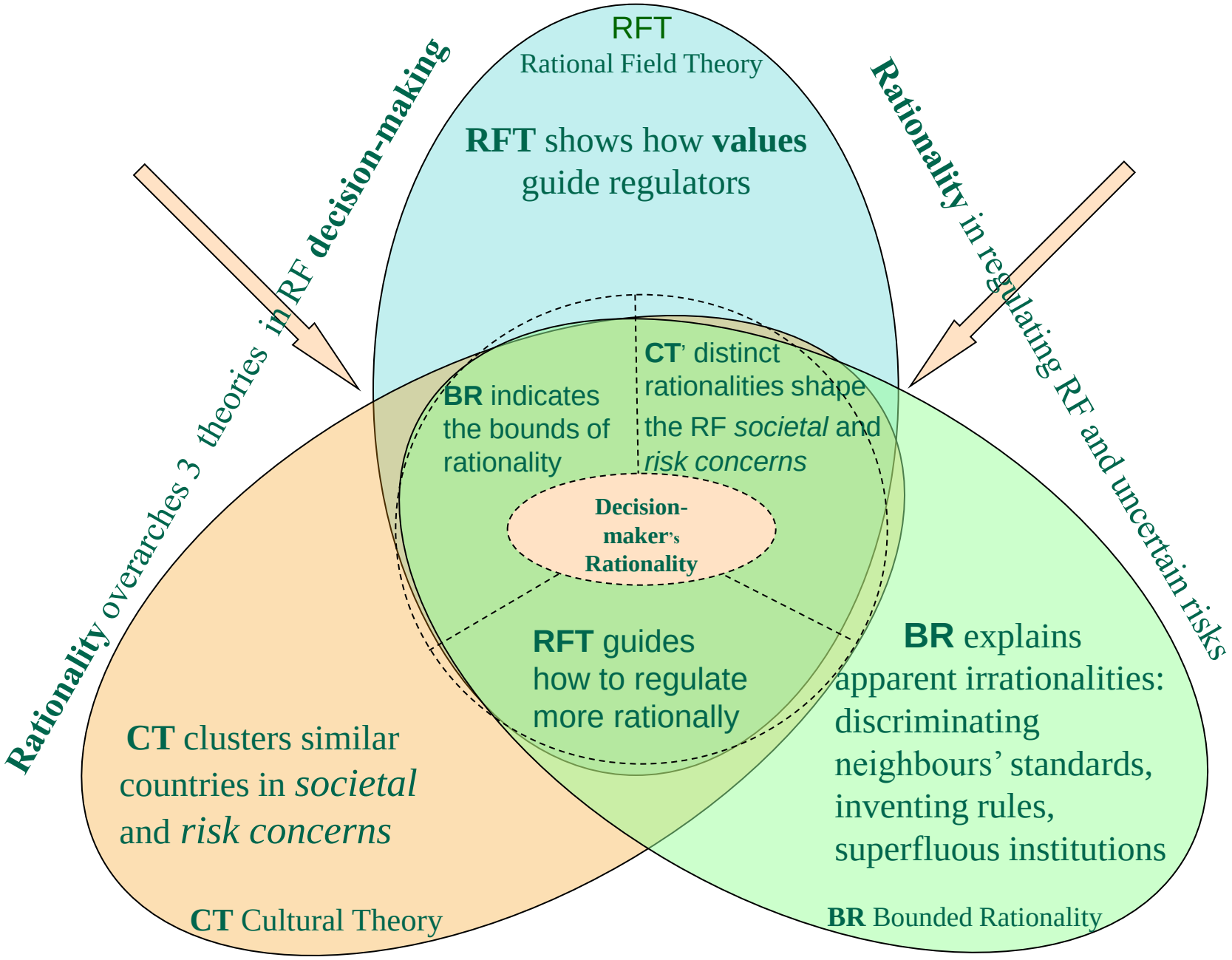
1. RF is a society's resource, an ethereal medium carrying wireless e-Communications: a networked service of general economic interest
2. Spectrum governance is mostly the domain of engineering, economic and legal analysts
3. Multidisciplinary , multi-theoretical and multi-rationality approach: societal, cultural, geographical and historical aspects
4. The role of culture; Why? How? culture, geography, history and bounded rationality influence infrastructure related topics, spectrum governance and regulatory frameworks

Policies of Developed Countries

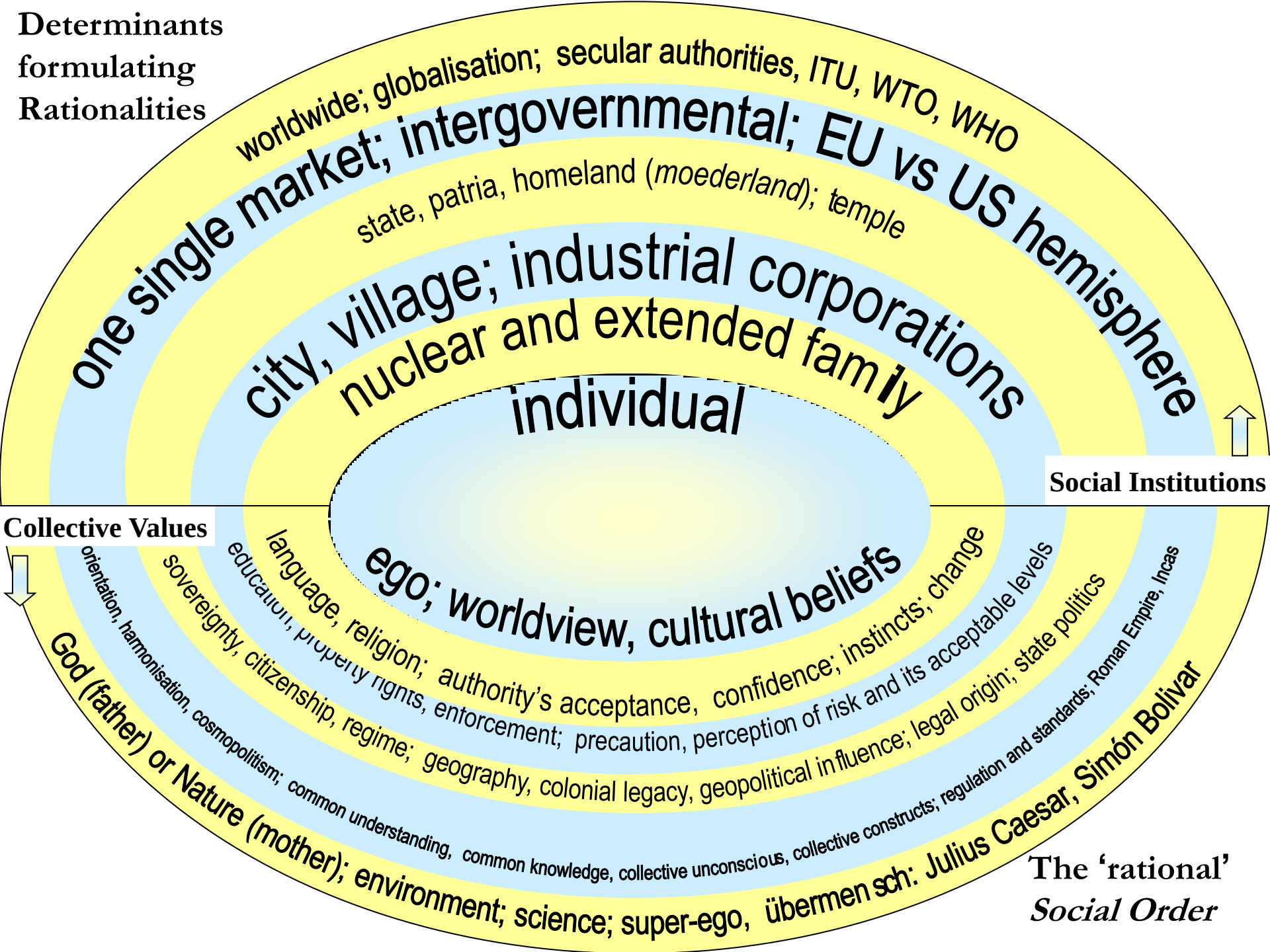
1. So begins Leo Tolstoy's Anna Karenina : ‘All happy families are alike; each unhappy family is unhappy in its own way’
2. Between 2 points in planar geometry there is only one simple line, but indefinite curves
3. 'Great minds think alike' (Michaelian)
4. ‘Stand on the shoulders of giants‘ (also I. Newton)
5. 'Okham’s Razor': ‘if you have to choose between competing theories, choose the simplest theory- it is most likely to be true’

Some Results and Possible Generalisation

1. The regional and national regulation and standards reflect cultural factors: ***Divided We Stand***- Michiel Schwarz and Michael Thompson 1990
2. The British Ofcom is managed mainly by economists, the French ANFR by engineers and the FCC by lawyers
3. Developed countries are characterised by: economies of scale, one free market, minimal intervention, transparency, industry support, public consultation process and centrality of the individual
4. Colonialism: Spanish, French and English inheritance affects regulation and adoption of standards
5. The common attribute differing them from tropical countries is the ***change*** *in seasons* (and religion, e.g. PROTESTantism)
6. The GSM top-down Leviathan and bottom-up Wi-Fi reveal how central-planning and market-based approaches have thrived
7. Most RF is unused (higher RF, less power, better modulations and immunity, using Cables and Satellites comms).
8. RF is a national limited resource, much like water, land, gas and minerals. RF is scarce; but renewable and not nearing exhaustion; if RF is not used it's an economic waste of a national resource
9. Rationalisation of governance by understanding self-imposed cultural boundaries
10. Generalisation of the findings towards other governance areas: do same patterns (EU versus US) appear in other scarce resources (water, land, and gas) and other services of economic interest (transport and energy)?



3 theories explore RF ***societal and risk concerns*** and **explain** the empirical results


Determinants formulating Rationalities
worldwide; globalisation; secular authorities, ITU, WTO, WHO
one single market; intergovernmental; EU vs US hemisphere
state, patria, homeland (moederland); temple
city, village; industrial corporations
nuclear and extended family
individual
ego; worldview, cultural beliefs
Social Institutions
Collective Values
language, religion; authority's acceptance, confidence; instincts; change
education, property rights, enforcement; precaution, perception of risk and its acceptable levels
sovereignty, citizenship, regime; geography, colonial legacy, geopolitical influence; legal origin; state politics
orientation, harmonisation, cosmopolitism; common understanding, common knowledge, collective unconscious, collective constructs; regulation and standards; Roman Empire, Incas
God (father) or Nature (mother); environment; science; super-ego, übermensch: Julius Caesar, Simón Bolivar
The 'rational' Social Order

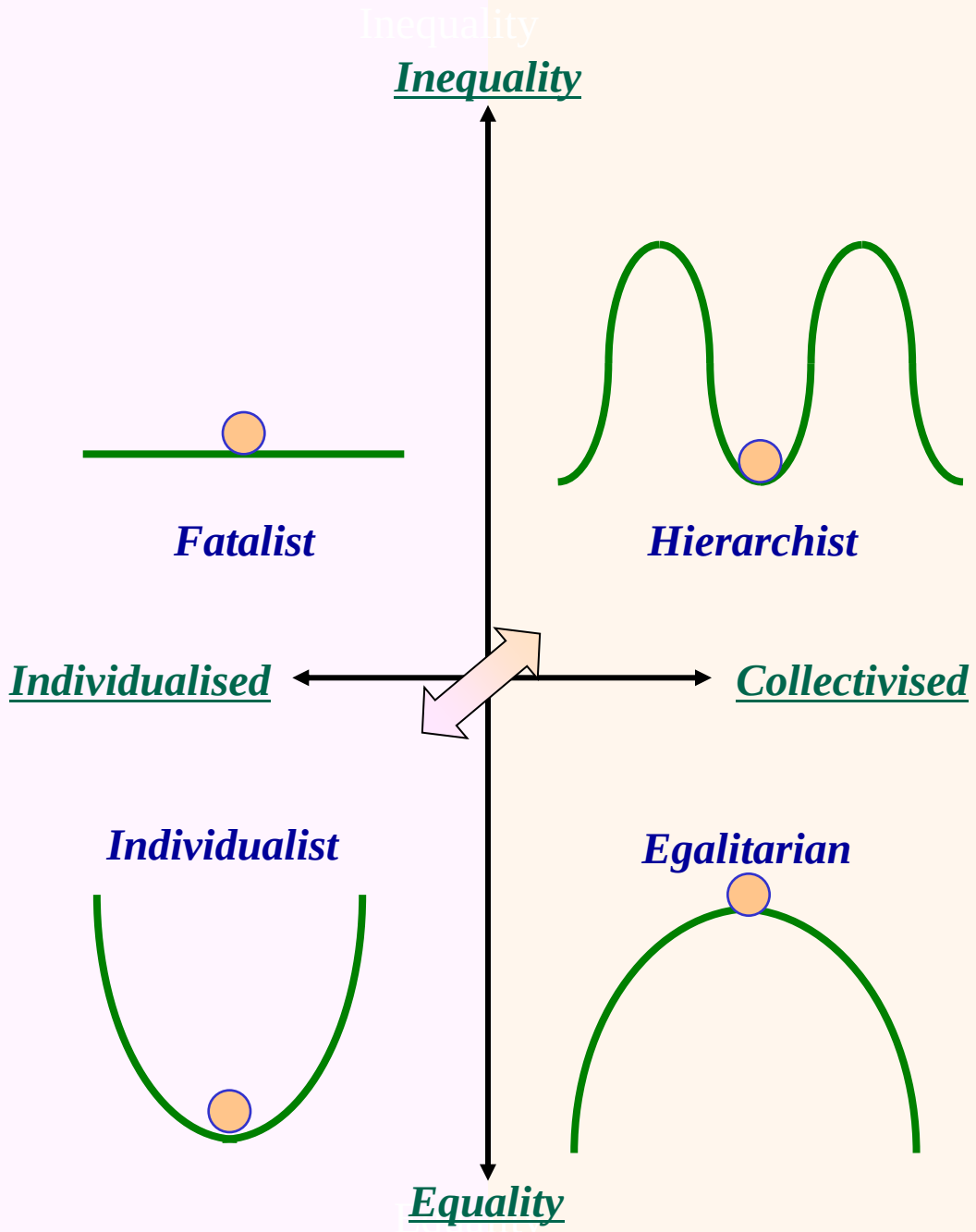
Market- Based

English speaking, Protestant, *Common Law*

Risk prone; innovation; change, renewal, reform, protest; freedom, deregulation; industry oriented; flexibility, competition; some interference; risks are 'innocent' until proven 'guilty'

Light touch, bottom-up, License Exempt; SDR, RF trading; Wi-Fi

US, Canada; AUS, NZL; UK



Central- Planning

French-Spanish speaking, Catholic, *Civil Law*

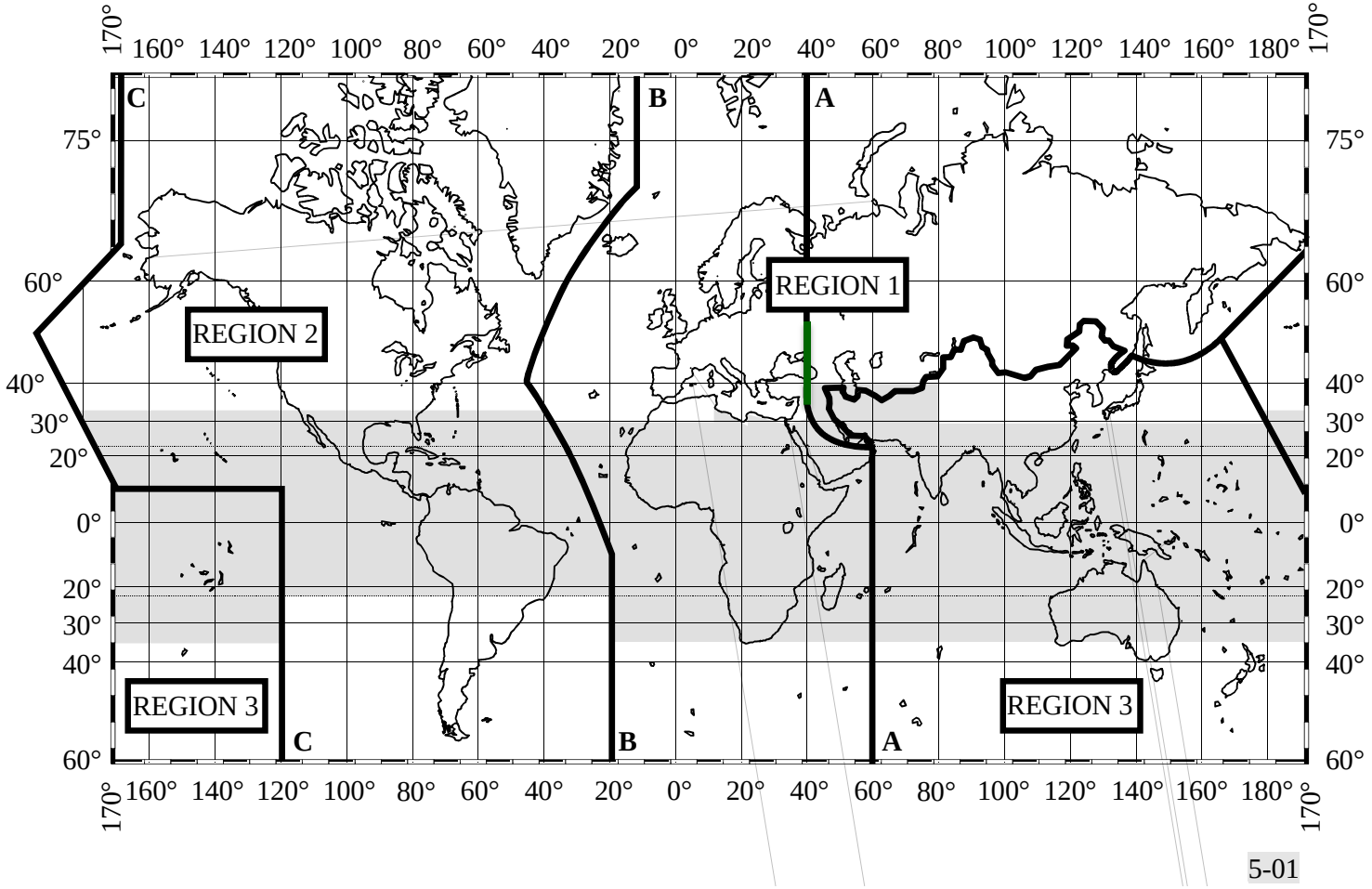
Risk averse, precautionary principle; long term; public interest; social justice, command and control; favours strong players; Quality of Service; worst-case assumptions

RF harmonisation, interoperability; centralised; licensing; top-down; **GSM, LTE**

France; Ecuador

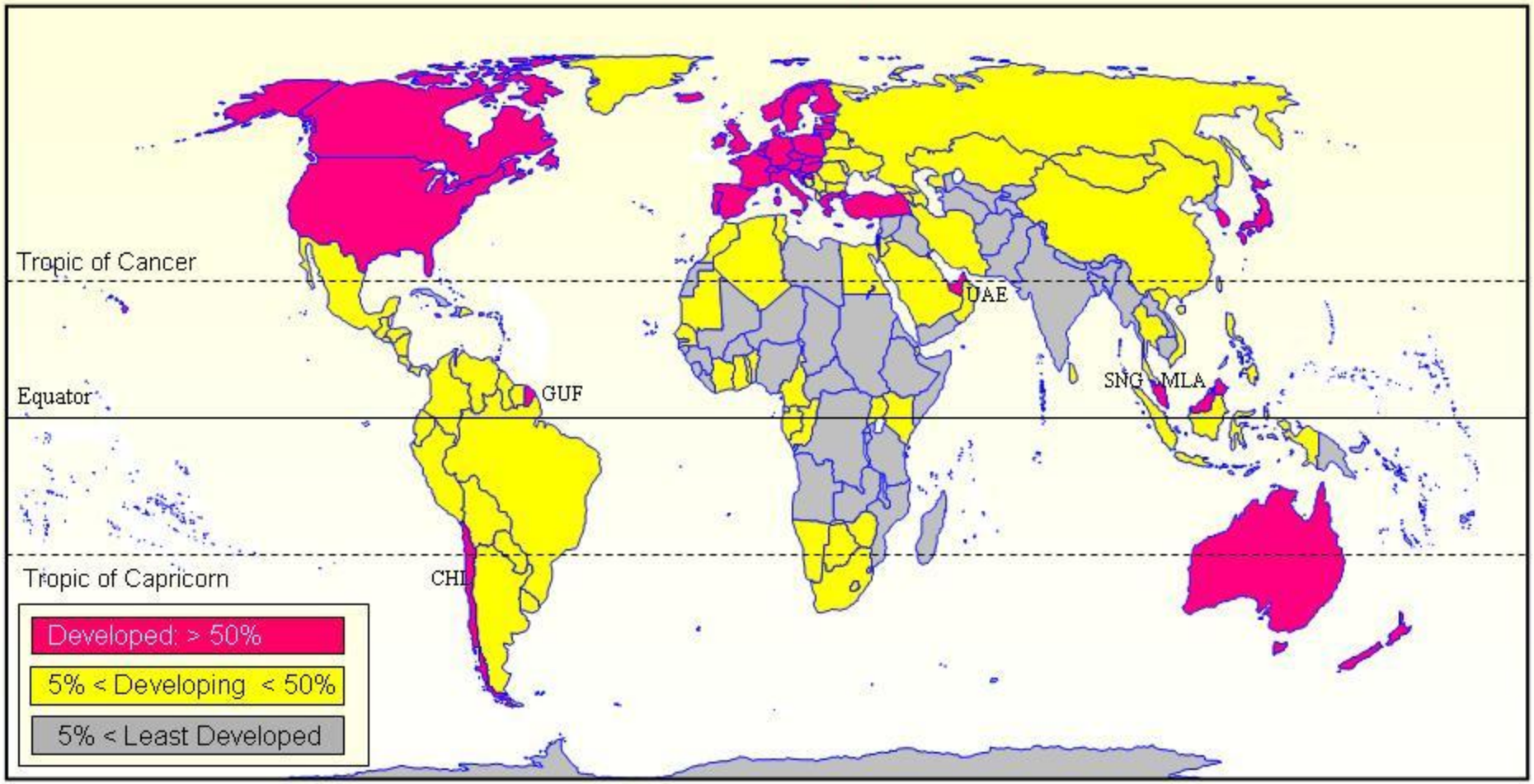
ITU 3 Regions (geographical influence)

longitude 40^0 , Limes of the Roman Empire



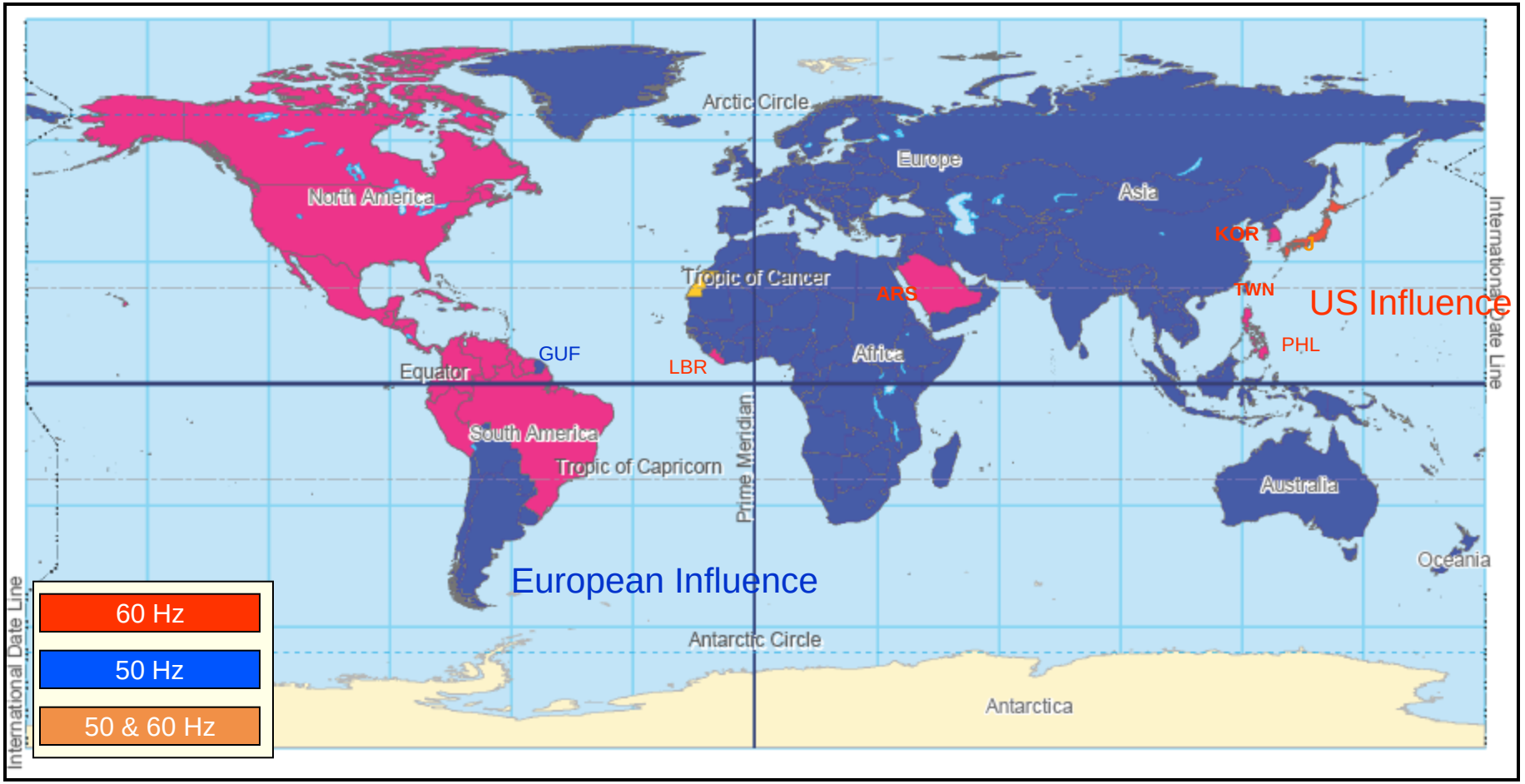
Cellular Penetration across the World

(anomalies) 2006



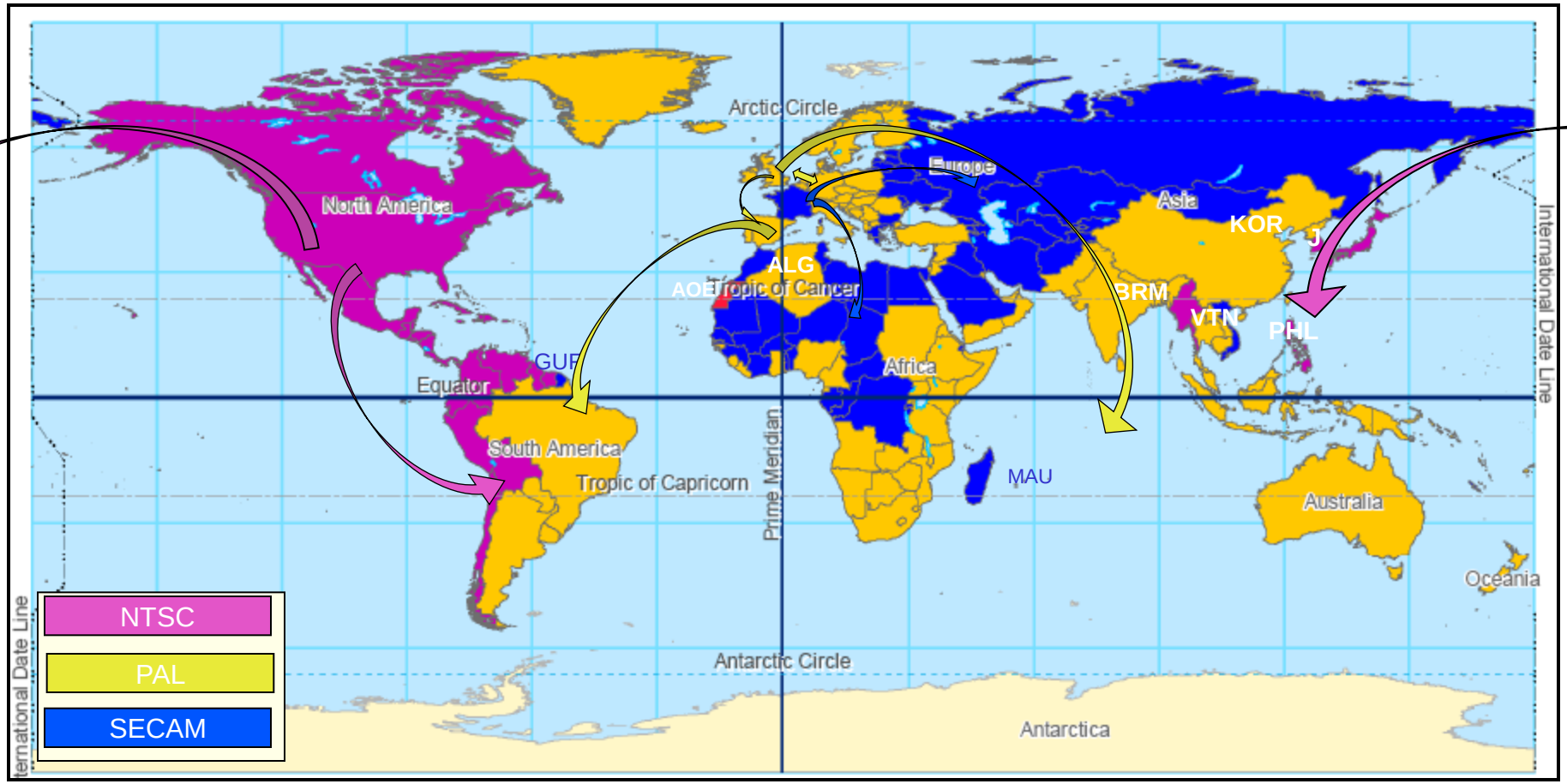
Electricity 50-60 Hz *(EU vs US, geopolitical influence)*

Influenced PAL-SECAM or NTSC analog TV

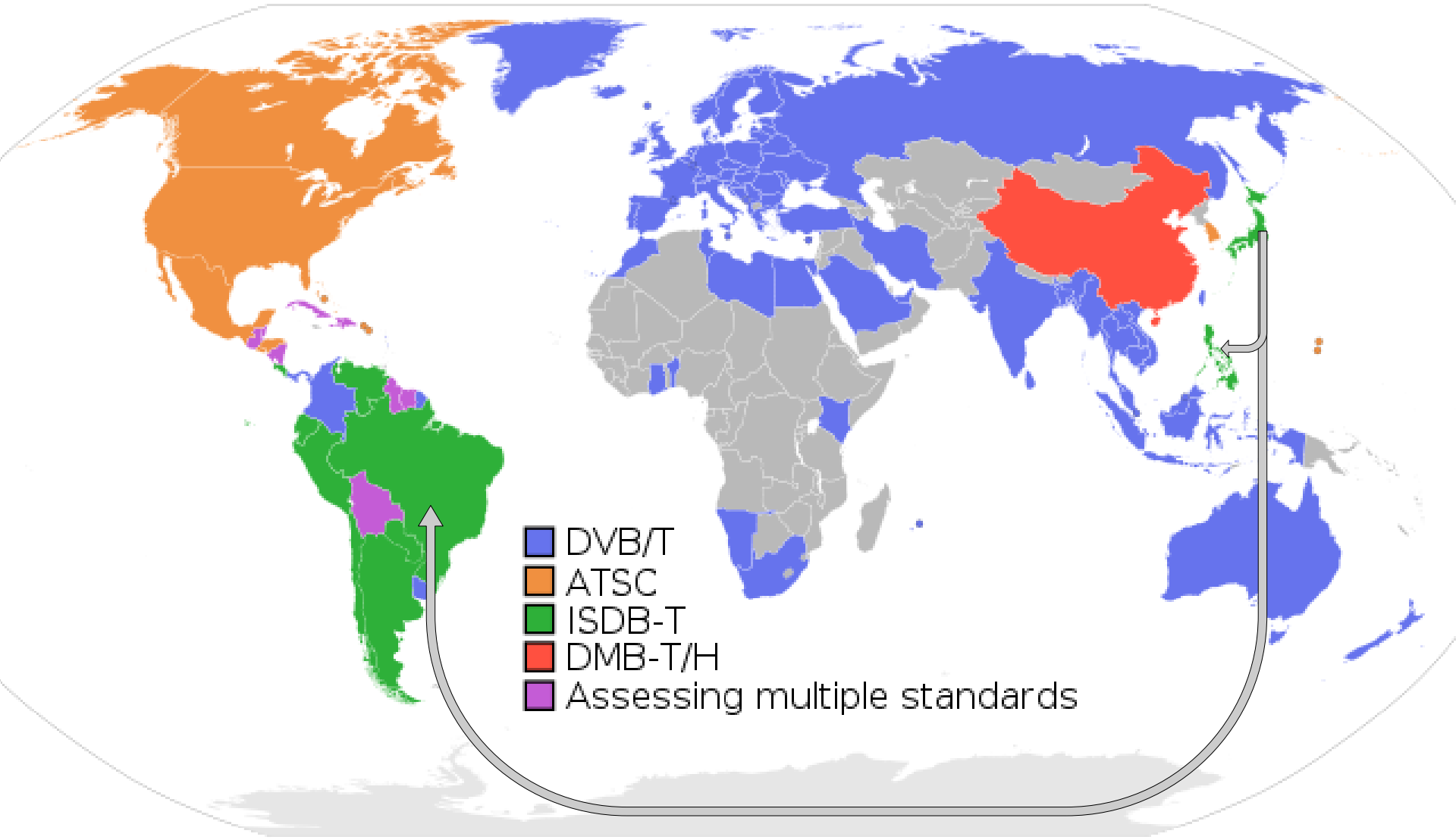


TV Colours: BR Exceptional Countries

(colonial and geopolitical influence)

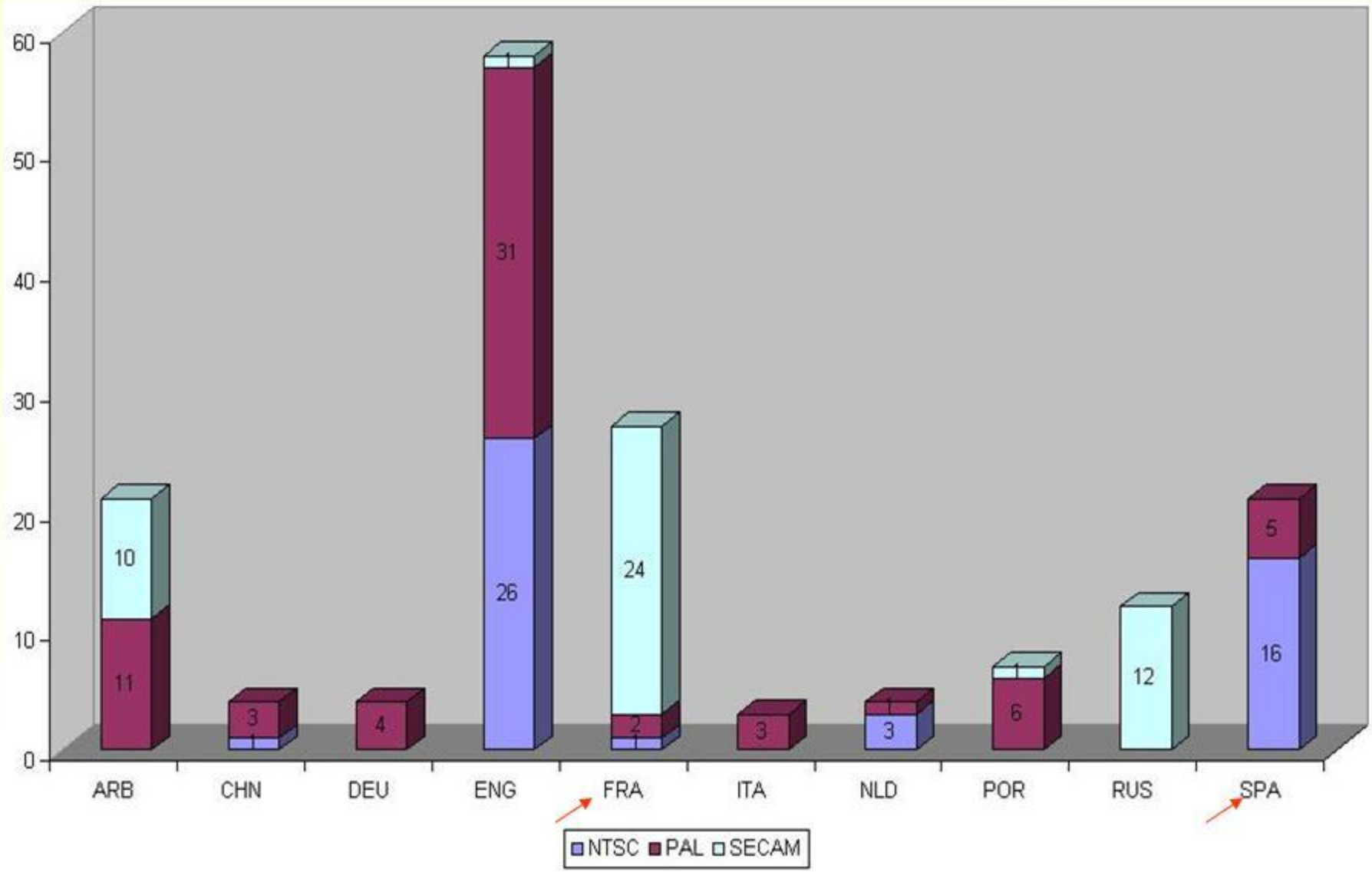


Digital Terrestrial Television (DTT) broadcasting systems by country

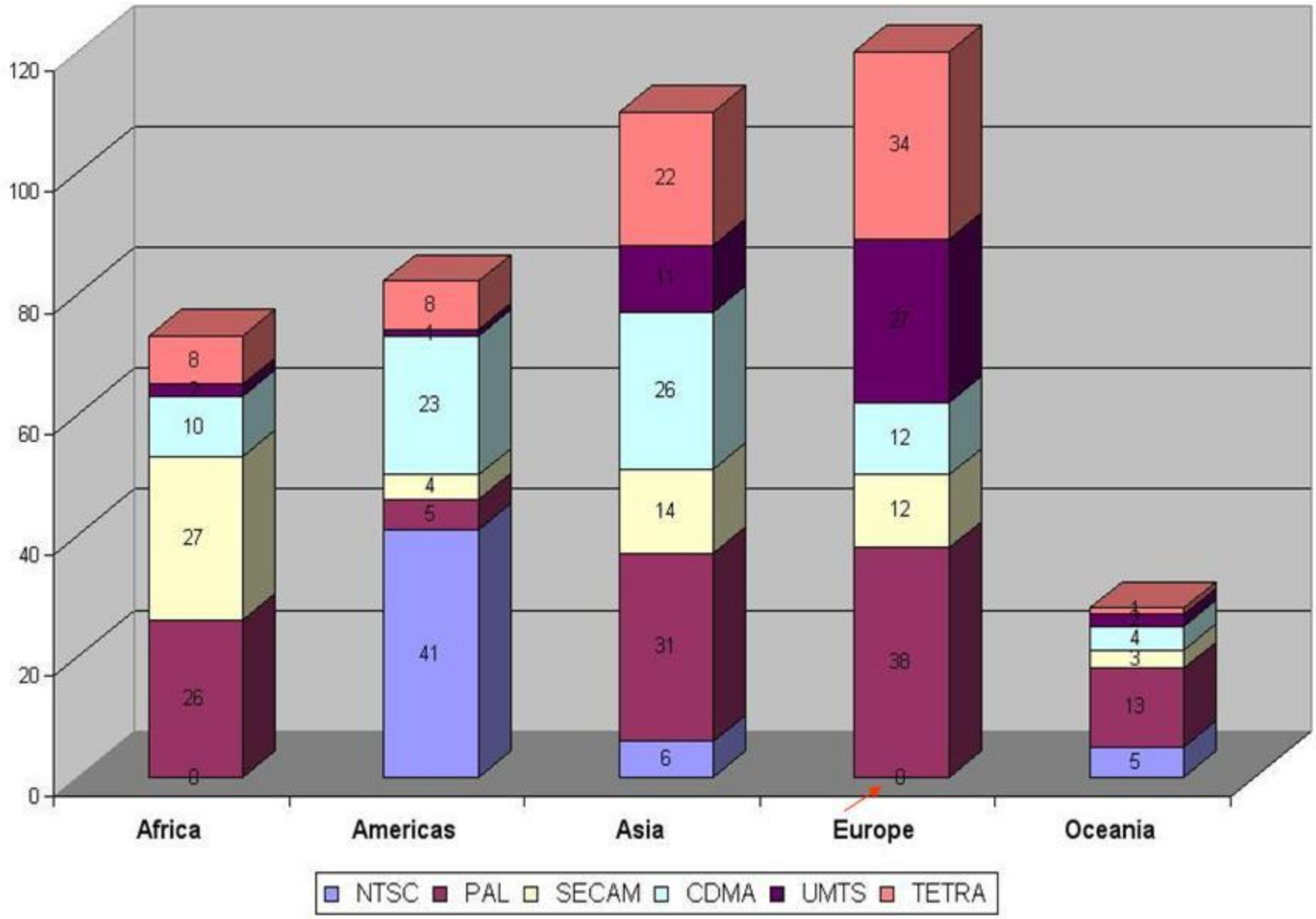


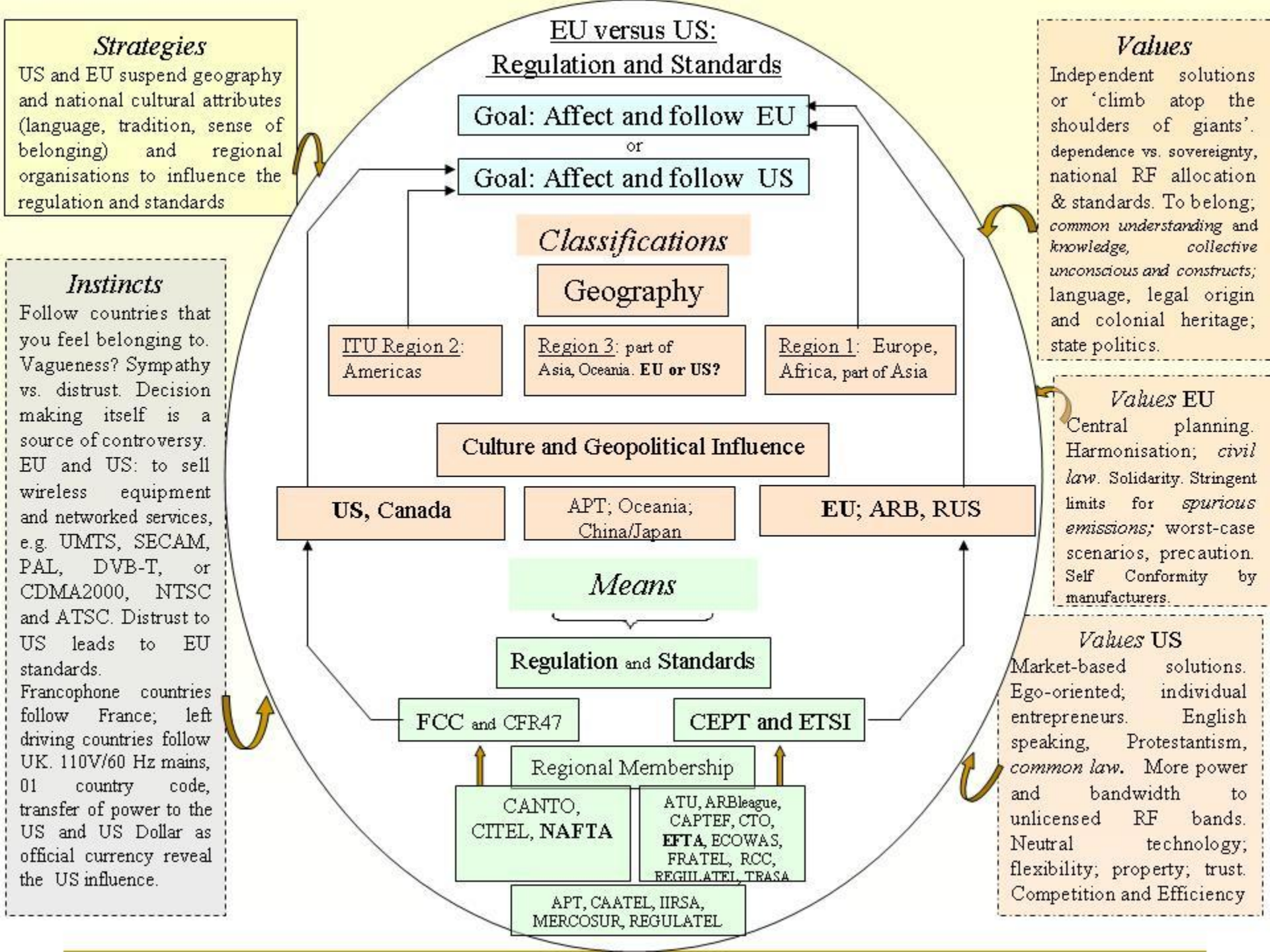
See http://en.wikipedia.org/wiki/File:Digital_broadcast_standards.svg 2 July 2010

Colour TV of 243 Countries versus Languages



RF Standards across the Continents




EU versus US:
Regulation and Standards
Strategies
US and EU suspend geography and national cultural attributes (language, tradition, sense of belonging) and regional organisations to influence the regulation and standards
Goal: Affect and follow EU
or
Goal: Affect and follow US
Classifications
Geography
ITU Region 2: Americas
Region 3: part of Asia, Oceania. EU or US?
Region 1: Europe, Africa, part of Asia
Culture and Geopolitical Influence
US, Canada
APT; Oceania; China/Japan
EU; ARB, RUS
Means
Regulation and Standards
FCC and CFR47
CEPT and ETSI
Regional Membership
CANTO, CITEL, NAFTA
ATU, ARBleague, CAPTEF, CTO, EFTA, ECOWAS, FRATEL, RCC, REGULATEL, TRASA
APT, CAATEL, IIRSA, MERCOSUR, REGULATEL
Values
Independent solutions or 'climb atop the shoulders of giants'. dependence vs. sovereignty, national RF allocation & standards. To belong; common understanding and knowledge, collective unconscious and constructs; language, legal origin and colonial heritage; state politics.
Values EU
Central planning. Harmonisation; civil law. Solidarity. Stringent limits for spurious emissions; worst-case scenarios, precaution. Self Conformity by manufacturers.
Values US
Market-based solutions. Ego-oriented; individual entrepreneurs. English speaking, Protestantism, common law. More power and bandwidth to unlicensed RF bands. Neutral technology; flexibility; property; trust. Competition and Efficiency
Instincts
Follow countries that you feel belonging to. Vagueness? Sympathy vs. distrust. Decision making itself is a source of controversy. EU and US: to sell wireless equipment and networked services, e.g. UMTS, SECAM, PAL, DVB-T, or CDMA2000, NTSC and ATSC. Distrust to US leads to EU standards.
Francophone countries follow France; left driving countries follow UK. 110V/60 Hz mains, 01 country code, transfer of power to the US and US Dollar as official currency reveal the US influence.

White Dominions

5 allies: AUS, CAN, NZL, UK, US same

1. Language (English); Individualism ('I' is capital letter only in English)
2. Religion: Protestant (state separated from religion)
3. Legal System: Common-Law
4. Non-tropical
5. All encourage technological innovation: RF auctions; neutral-technology
6. Prefer Beer and not Wine ☺

How Geography Influences?

1. The continent defines neighbourhood, topography, membership of the country in its communication alliances and its isolation
2. Country's longitude affects its proximity to Western Europe. Eastern Europe is economically less developed than the west
3. Latitude classifies North/South America (and Europe), tropical/ non-tropical countries and the density of population. Countries located far from the Equator are considered to be richer
4. Tropical countries are alike in their fruits and vegetables, agriculture; local markets and local tribes, trade; traditions, behaviour; poverty
5. **Change** in seasons may affect the spirit (toward movement and freedom; like the sea waves of Charles Baudelaire'), induce less resistance to change (in regulation), protests and reforms in religion (Protestants live outside the tropics, and N. of Roman Empire, North/East of the Rhine river in Germany and the Netherlands), the interchange of ideas, innovative regulation and new wireless technologies

Language is the first attribute of culture

1. The regulators are representative of their national majority culture: language, religion, tradition, worldview. They implement the 'right' policy, the *Common Understanding* (Kropotkin 1899)
2. The language reflects (and may influence) the way of thinking
3. A common language increases **confidence** among negotiators, openness among persons, institutions and states; speaking someone else's language shows respect for his/her culture
4. In EU, with no borders, a single harmonised market, (almost) 1 currency, with 1 dominant Christianity, the language is the national and sovereignty constituent
5. The origin of legislation (*common law* vs *civil-law)* provide explanatory attributes towards *central-planning* vs. *market-based* regulation

History

1. Is EU unification inspired by the **Roman Empire?** (*E Pluribus Unum*): one language (Latin), one religion (Christianity, since the time of Emperor Constantine), one law (*lex regia, ius civile*, and present *ius commune*), *Pax Romana,* networking (*Omnes viae Romam ducunt*). Julius Caesar is Nitche UberMensch ; is the Roman Empire the EU Super Ego and Ego Ideal?
2. **Colonialism**: Countries inherit language, religion, legislation; left-right hand driving, 220-110 50-60 Hz electricity; a sense of belonging, discipline, obedience, ethics, habits; arts, music, games, food, customs, dresses, tradition, folklore and lifestyle
3. USA influenced Euro. telecomms to deregulation and liberalisation
4. France and Germany are leading the EC engine; centralised for more than 1000 years (Karl der Große and Philippe Auguste); try to lead Europe; 400 & 170 persons involved in RF monitoring, very active in ITU and GE06
5. Developed countries whose economies have been centralised for centuries (like France, UK and Germany) and suffered the horrors of 20th WW II can afford to concede some of their sovereignty; this is not the case in South America and Africa

GSM Success

1. Reasons: the open and standardised interfaces (relative to the CDMA proprietary system), RF spectrum harmonisation and integration, interoperability, ubiquitous international roaming, top-down technology, economies of scale and the same units supplied by many manufacturers. Good timing (1st digital cellular on the market in Europe. GSM developed for export, interoperability and roaming
2. Protestant countries prefer not to intervene in the cellular technology; may explain the failure of the US CDMA cellular
3. Central-planning Europe forced administrations to allocate RF spectrum, to adopt the GSM technology and to license GSM for 15 years. In the US 'neutral licensing' (now in Europe) the FCC would never impose the use of any technology
4. Europe correlates the development and penetration of DVB-T to that of GSM

Any additional Qs?

Many Thanks for your kind attention

My PhD thesis is found at http://www.moc.gov.il/new/documents/frequences/MazarThesisOct08.pdf

You may get it thru http://www.amazon.com/Analysis-Regulatory-Frameworks-Wireless-Communications/dp/1599427109

You are welcome to visit at my website

http://people.itu.int/~mazar/

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