Marcus Spectrum Solutions

Sharing Federal Government Spectrum:

Practical Problems & An Alternative Approach

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11th ANNUAL INTERNATIONAL SYMPOSIUM ON ADVANCED RADIO TECHNOLOGIES
ISART – Spectrum Sharing Technologies

N3JMM/ 7J1AKO

Changing Spectrum Management

from

"Zero Sum Game" ➔ "Win-Win"

Alternative Title

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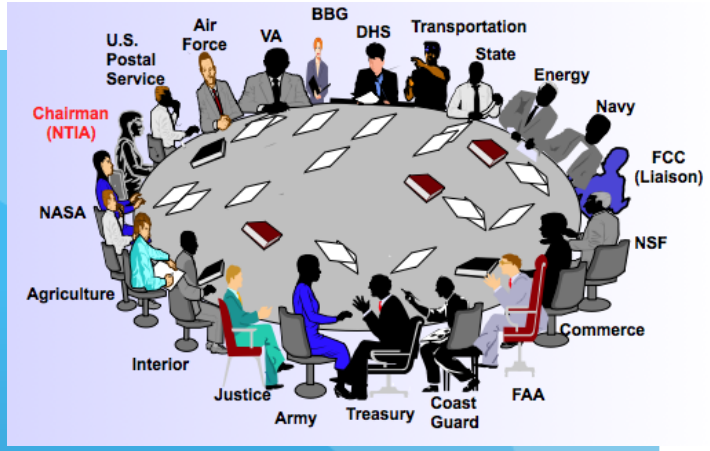
Key Points

- Federal spectrum management needs serious reform to make its official goals realistic – not hollow promises
- Under present regulatory processes DSA of federal spectrum using passive sensing does not lead to viable business plans
- Urge focusing on cooperative access to federal spectrum with
  - new federal systems designed for sharing
  - ***real*** Incentives and ***timely compensation*** for federal agencies to share spectrum
- Proceed on a parallel track with policy reform

IRAC: The *tatemae* and *honne*

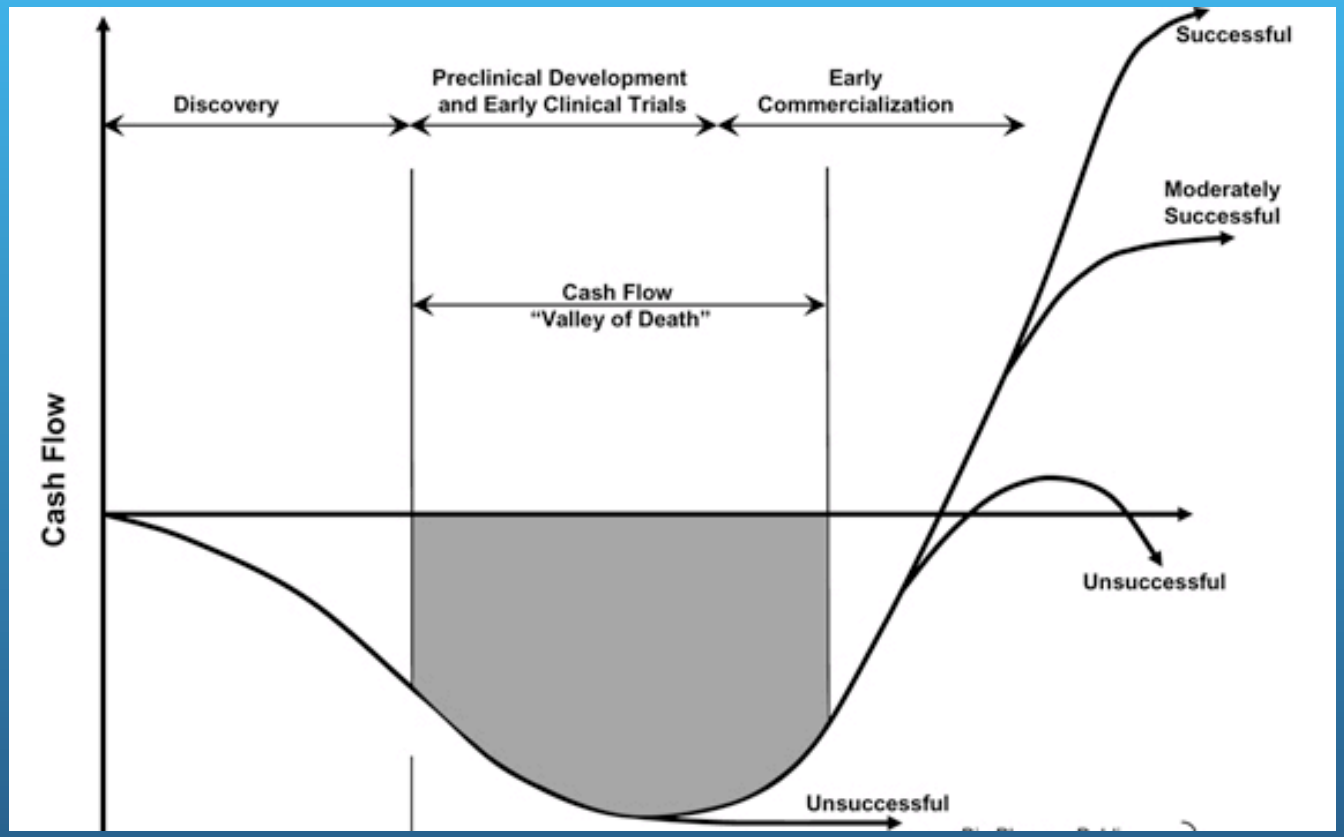


- In the near term the IRAC is the *de facto* major player in determining of whether a DSA proposal has an acceptable interference risk
  - IRAC members work for individual agencies and have primary loyalty to their employer
- In the near term the IRAC has major transparency problems and few incentives to accept DSA for federal bands
- Incumbents are a “tough audience” for DSA proposals

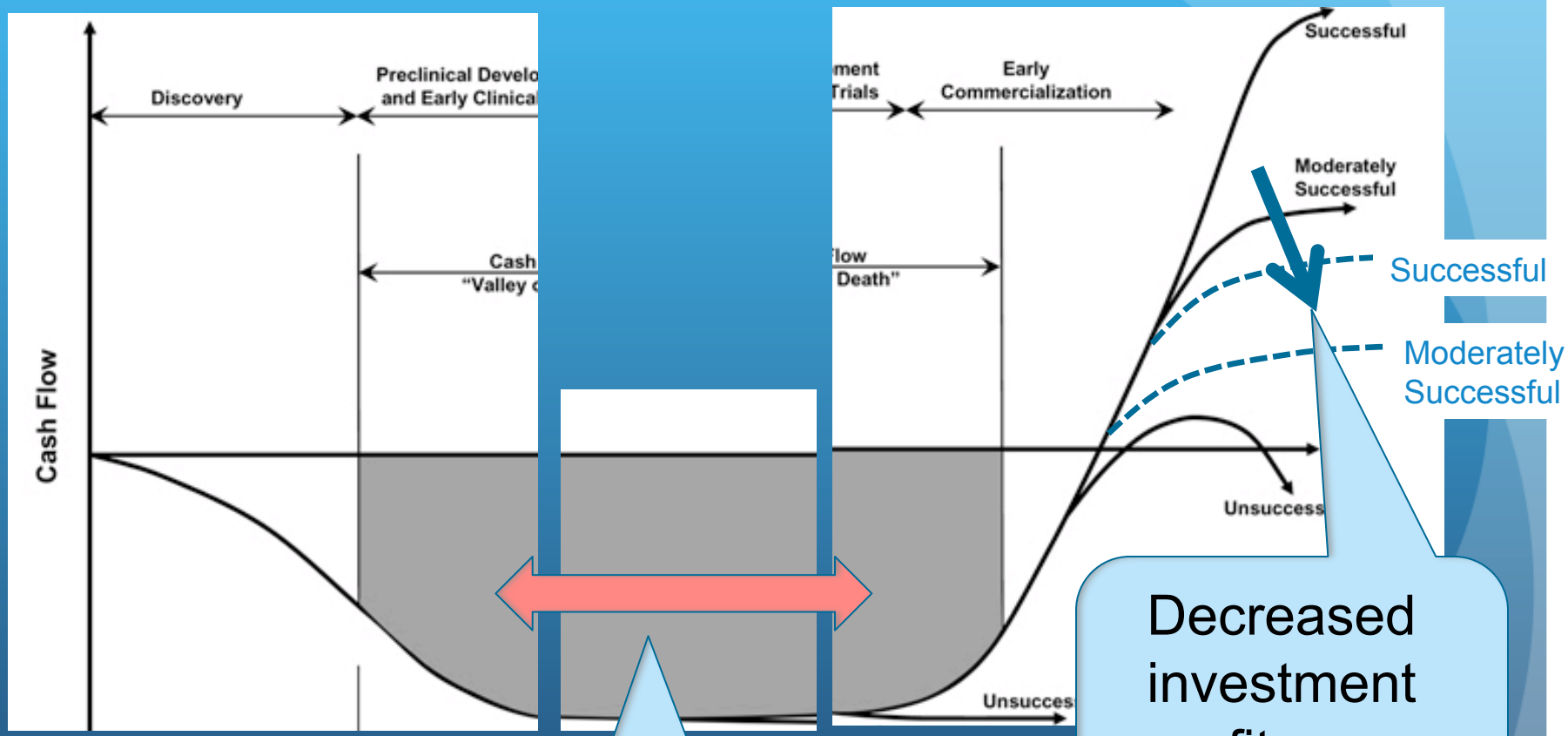
tatemae 建前 = the truth *as you want it to appear*

honne 本音 = the truth

Typical Cash Flow for New Product or Service



Impact of Spectrum Regulation on Innovation: "Classic" DSA May Not Have a Viable Business Plan at Present



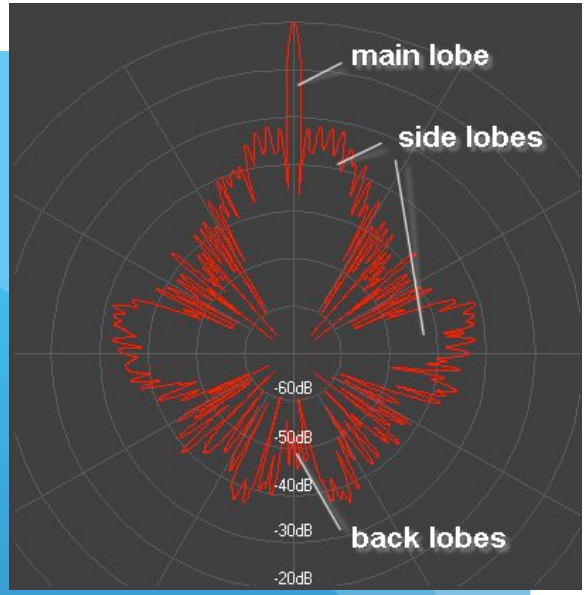
Need for New Commercial Spectrum

- CTIA requested 800 MHz based on studies that *might* be dated
- FCC, NTIA and White House seek 500 MHz
- Voice minutes are now actually ***decreasing***
- Major growth is in packetized data and is generally asymmetric
- Full duplex paired spectrum with continuous availability was necessary for cellular voice, but
- Much of today's growth *can* be handled with TDD and intermittent availability spectrum – not symmetric FDD

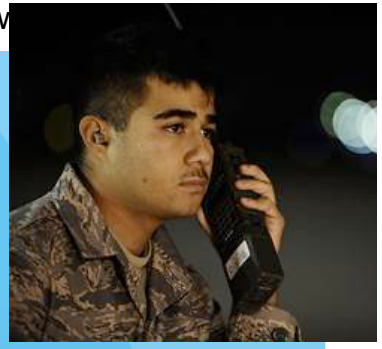
CR: Cooperative Radios

- Implements DSA by explicit communications with primary user so sensing errors are not a question
- Might use European-style CPC (cognitive pilot channel)
- Primary federal user must use new systems designed for sharing
  - Must retain absolute preemption in real time
  - Should be rewarded for new equipment investment as an incentive for cooperation – perhaps even cost+

CR: Cooperative Radios



- Case I: Radar spectrum
  - Major use of federal spectrum
  - Most radars rotate at a constant rate
  - Real radar antennas always have backlobes –
    - Better, usually larger, antennas have lower backlobes but most users have no incentive to decrease backlobes under present policy
  - GPS time distribution allow precise distributed timing and synchronization at low cost
  - Allow access to radar spectrum during part of rotation with new radars with improved backlobe performance
    - Such intermittent spectrum can be used for the growing commercial demand



CR: Cooperative Radios

- Case II Sharing Federal LM Spectrum
  - Maybe *even* Federal aeronautical spectrum (220-400 MHz)
- Treat as “interruptible spectrum” analogous to “interruptible electricity” – a standard practice in the power industry
- Trunked federal systems would enable commercial access to their spectrum on fail-safe basis as well as improved use of present spectrum and OPSEC
  - Protect channels currently in use plus safety margin of addition channels for near term (30-60 s) traffic increase
  - In effect an “unrealizable” sensing system that perfectly measures *both* the present and the near term future
  - Federal users should be compensated for increased cost + as incentive

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- Surf over to web site for more information
- Thanks for the invitation

Questions?