




OOS ≠ Only One Solution - The Big Picture -





- What? “OOS”?
- How to Get Started
- Potential Market?
- Issues
- Message



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What? OOS?

- Satellites & Applications: Efficiency? Yes! No!**
 - Failures & Lifetime
 - Orbit Infrastructure
- Space A&R is the Holy Grail?**
- Space Activities & Orbit Infrastructure?**
- Stakeholders?**
- Beneficiaries?: Public & Private Goods?**
- Policies & Economics?: Status & Future?**
- More? Who Knows?**
- Enthusiasm vs. Realism?**
- & ISS???**

No Homework
No Vision
No Strategy

Sat Mans Don't Want!


Sat Ops Don't Know!

Industry Waits 4 \$\$\$

Just Patchwork: What a Mess!

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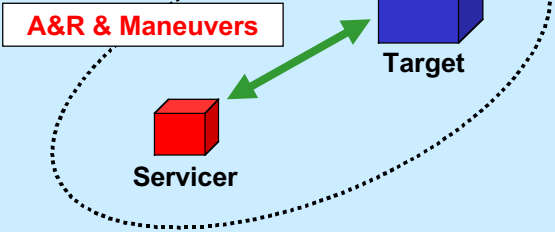
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Servicing?



The "Boffins"
 Servicing A&R
 Servicer
 Co-Op Design Target
 Logistics => Target



Launch & Satellite Failures
 Servicing Needs
 Customer Benefits
 Stakeholders
 Market Drivers

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All Elements in Place! So What?

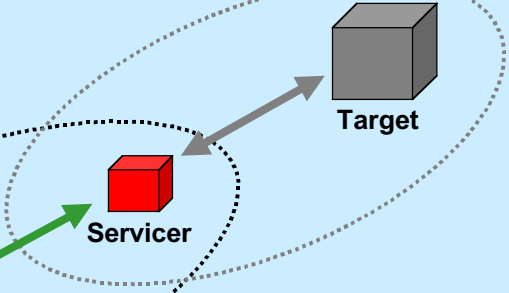
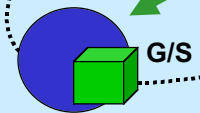
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Mission Architecture?



The "Navvies"
 Mission Architecture
 Servicer
 Logistics => Servicer
 Costs



Servicing Need
 Servicing Concepts
 Logistics
 Infrastructure

Transport & Maneuvers

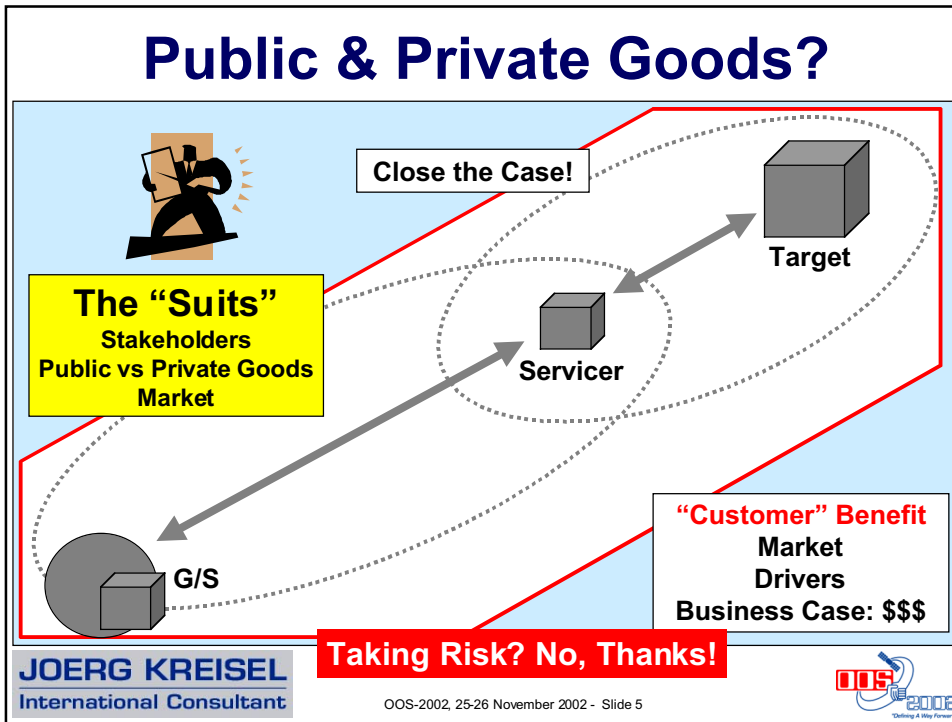
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Get-Set-Ready-Go: Build, Build!

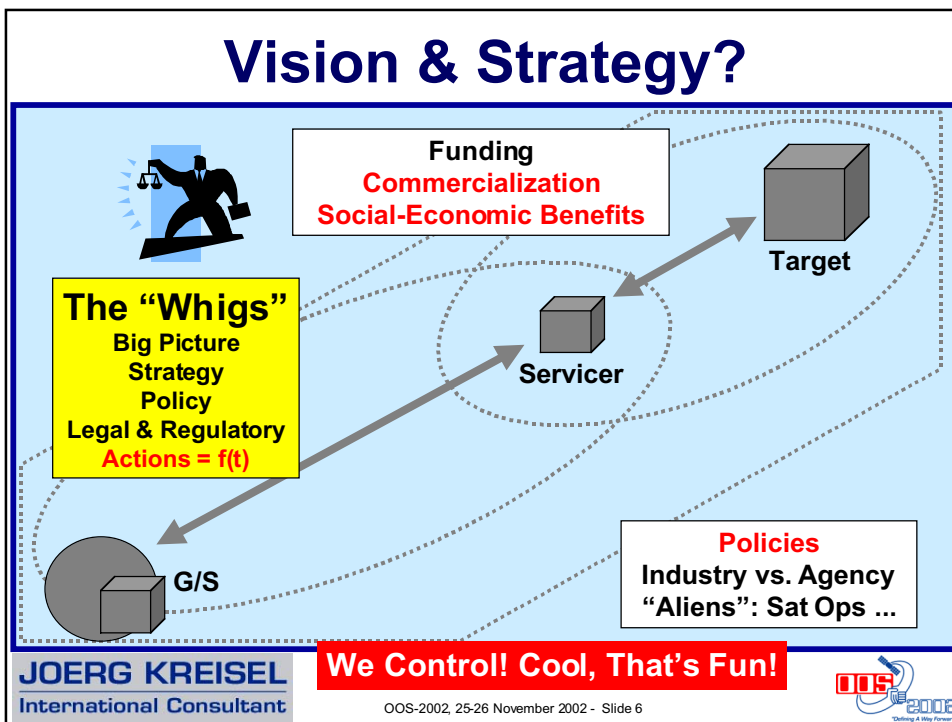
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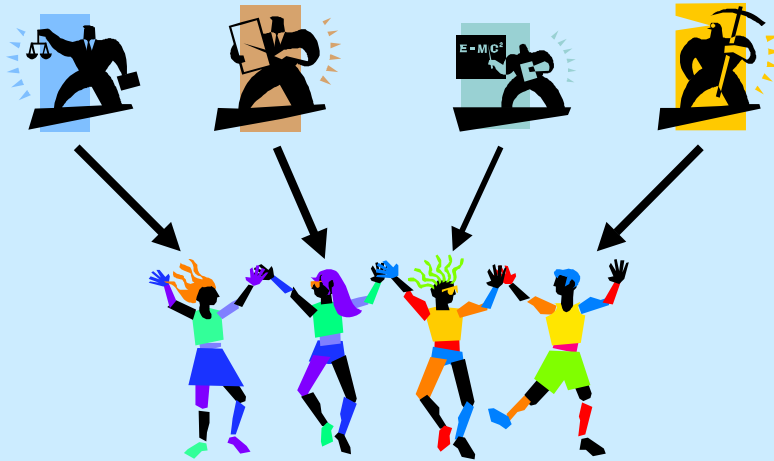
Public & Private Goods?



Vision & Strategy?



So, What to Do Now?



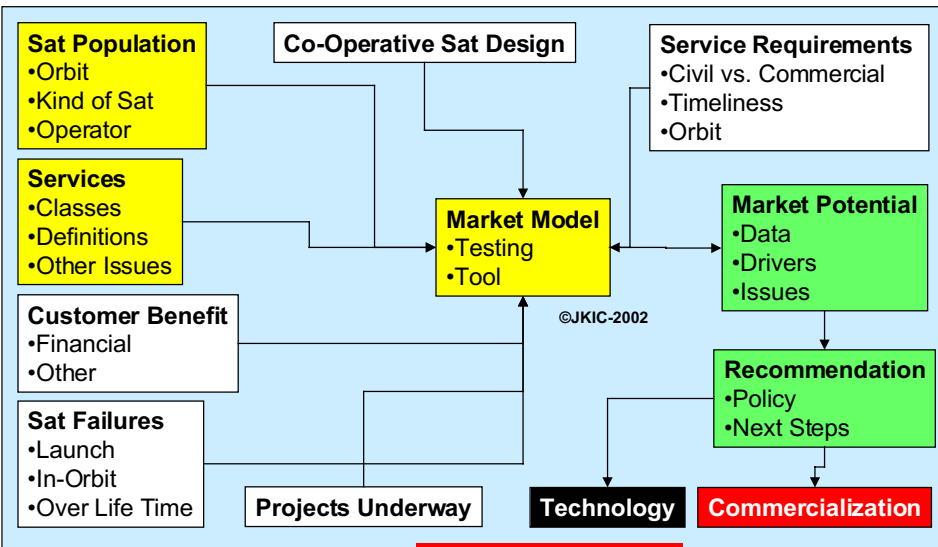
A Foursome? Woah! - But How?

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OOS Context



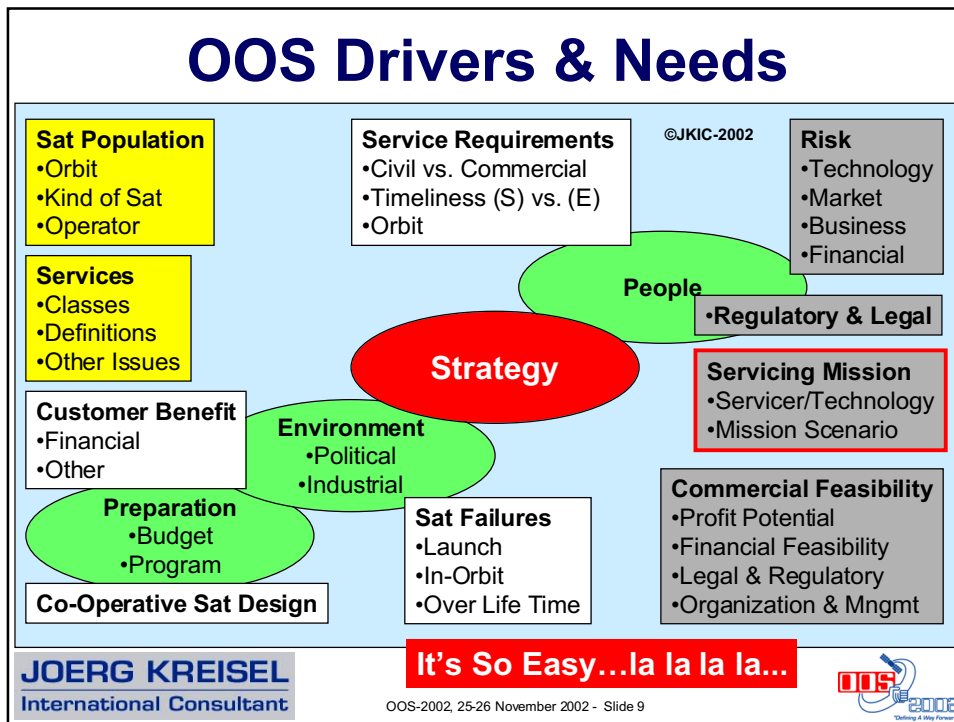
Where to Start?

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OOS Drivers & Needs



Sat 500+ Population™

- Which & Who's Satellites Where & When?
 - Period: 2000-2015
 - Satellites < 500 kg
 - No Military Satellites
 - 32 Segments of 4 Data Sets Each!
 - Orbits: GEO, MEO, LEO, LEO-SSO
 - Type of Satellite: Telco, Nav, E/O, Science
 - Civil, Commercial Satellites
- New Satellites 4 New Missions
 – New Satellites 4 Replenishment
 – Dying Satellites
 – Total Satellites

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Who Can Predict These Days?

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Unified Service Definition TM

Service Class	Kind of Service
"Motion"	Re-Orbiting De-Orbiting Salvage
"Manipulation"	Maintenance Repair Retrofit Docked Inspection
"Observation"	Remote Inspection

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A good Start, Isn't It!? - Agree!!!

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Service Parameters

- Classes of Service: 3
- Individual Services: 8
- Demand (t): "Responsiveness": 2
 - Emergency vs. Scheduled
- Service Availability: 2
 - General & Co-Operative Design
- Phase of Sat Life Time: 3 (min)
 - Injection, Early-Orbit (E-O), End-of-Life (E-O-L)
- Orbit: 4
- Customer Type: 2 (min)
- Type of Sat: 4

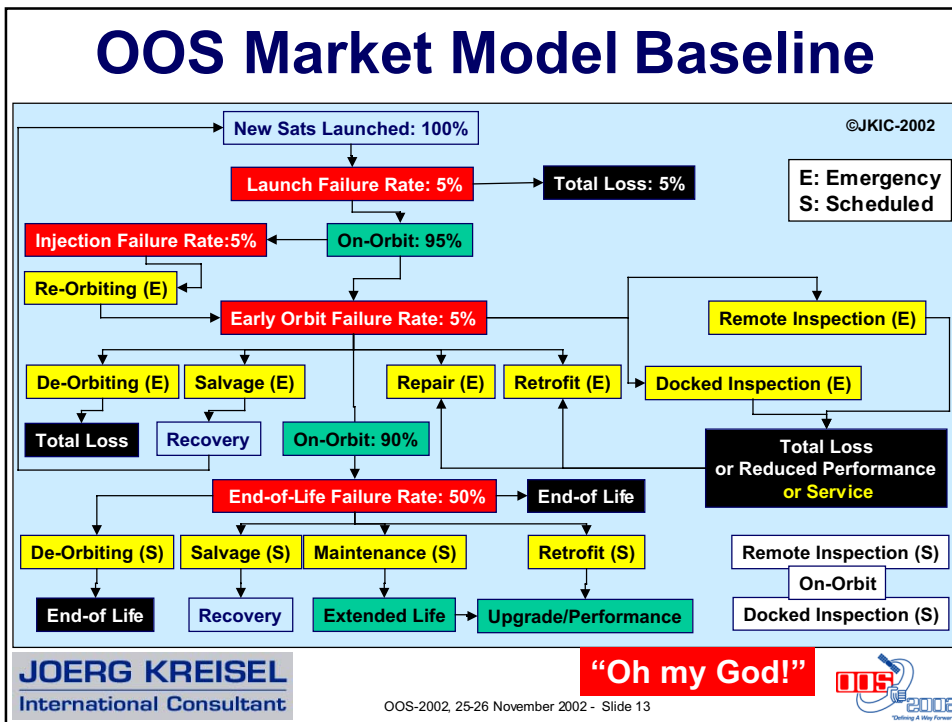
"Running Out of Dimensions!"

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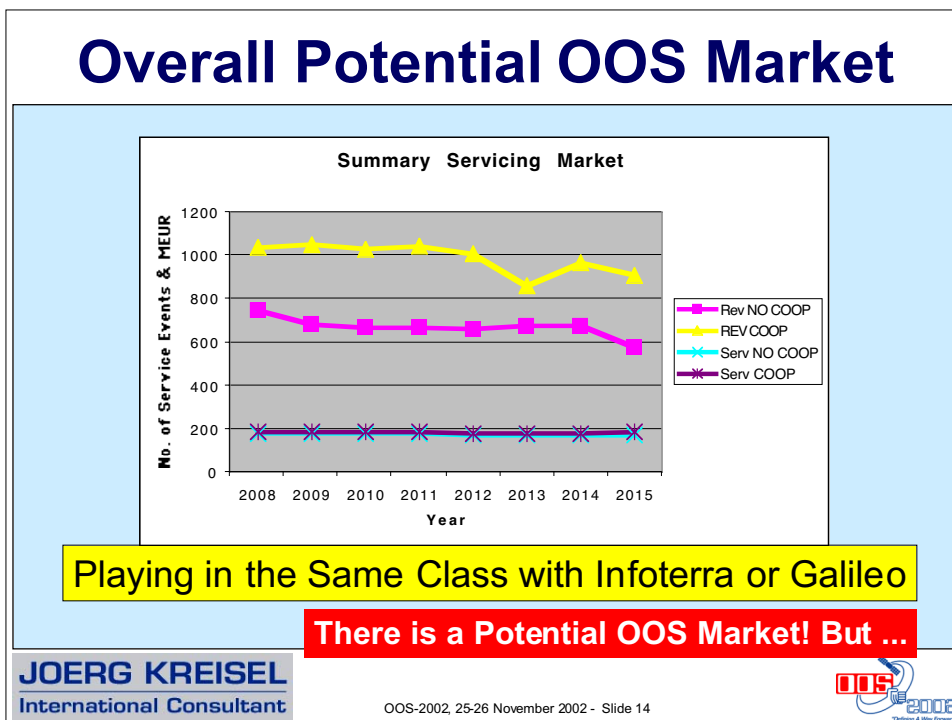
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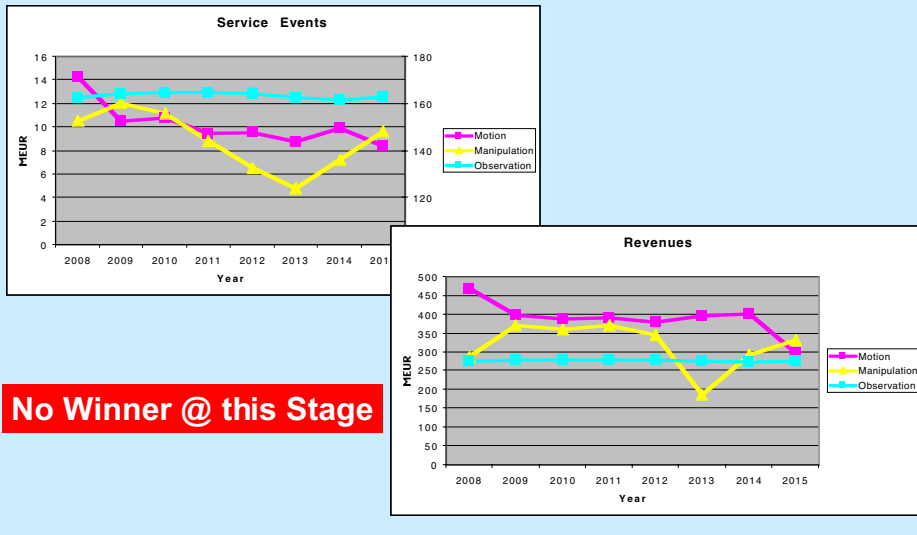
OOS Market Model Baseline



Overall Potential OOS Market



OOS Market by Service Class

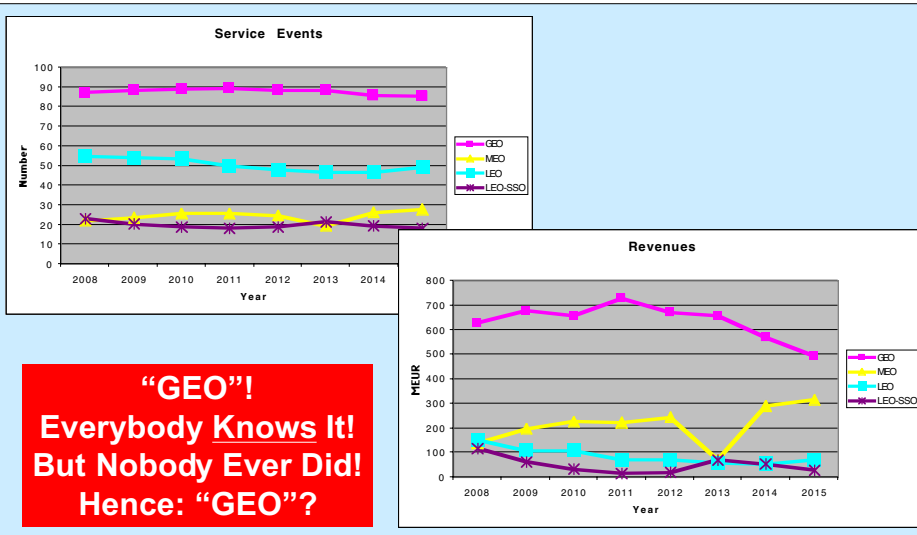


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OOS Market by Orbit



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Impact

- Satellite Operation: **New Feature & Trade-Off**
- **Debris Removal & Orbital Clean-Up**
- **Standardization**
- **Co-Operative Design (Satellites)**
- Mission Architecture & Logistics
- Orbit Infrastructure & Assembly
- Commercial Bias & Stakeholder Teaming
- **Total "Re-Thinking": "FANTASY-CASES!"**
- Potential Impact on **ALL** Space Business!

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"OOS" a Ticking Bomb!

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Issues

- Where in the Past Could OOS have Helped?
- Very **Complex & Sensitive** Market: €1 bill p.a.
- Market Potential **Driven by Servicing Concepts** rather than by Customers, Orbits or Individual Services (& by Policy!!!): **Any Use 4 ISS???**
- Context Barely Understood & **Weak Homework**
- **Profit Drives Commerce - Not Cost Savings**
- **Move From Technology Focus to Realism?**
- No Sound Commercial Case Yet: **Nursery!**
- Appropriate Policies & Strategies? **2 Come!!!**

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Quite a Few!

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Message

- Nobody Can Tell **Yet!**
- Current Activities Lacking Big Picture!
- Not an Easy One! (Complexity)
- **The Ingredients for the Recipe are There!**
- Challenging Technology & Mission Issues
- Systematic Approach Needed!
- Don't Talk! Get 2 Work & Demonstrate!
- Typical Space Agency Playground (INTL.!)
 - Space Business Core Activity vs. TelCo etc.
 - Political Issue & Social-Economic Effects
 - ISS Relevance?
- **Business?: Only After Homework!**

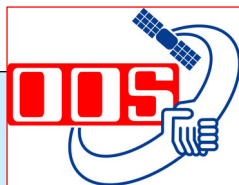
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A Way 2 Go! Only with Mom & Pop?

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And Now?



1



Andy

2



Alex

3



Marshall

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Enough!!! - Let's Have a Coffee!

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