

**Rural Next Generation
Networks**
Smart Rural ICT Infrastructure

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IN ASEAN MEMBER COUNTRIES (τ (tau)-Project)

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R-NGN Research Questions

1. What are the roots of rural communication problems particularly in Indonesia?
2. Are there feasible technology-based solutions for the problems?
3. If there are, what factors determining the success for the solution performance?
4. How to configure the factors to get optimal implementation ?
5. How to make these solutions economical, commercial, and able to build industry?
6. How to manage the research to strengthen the research institution?

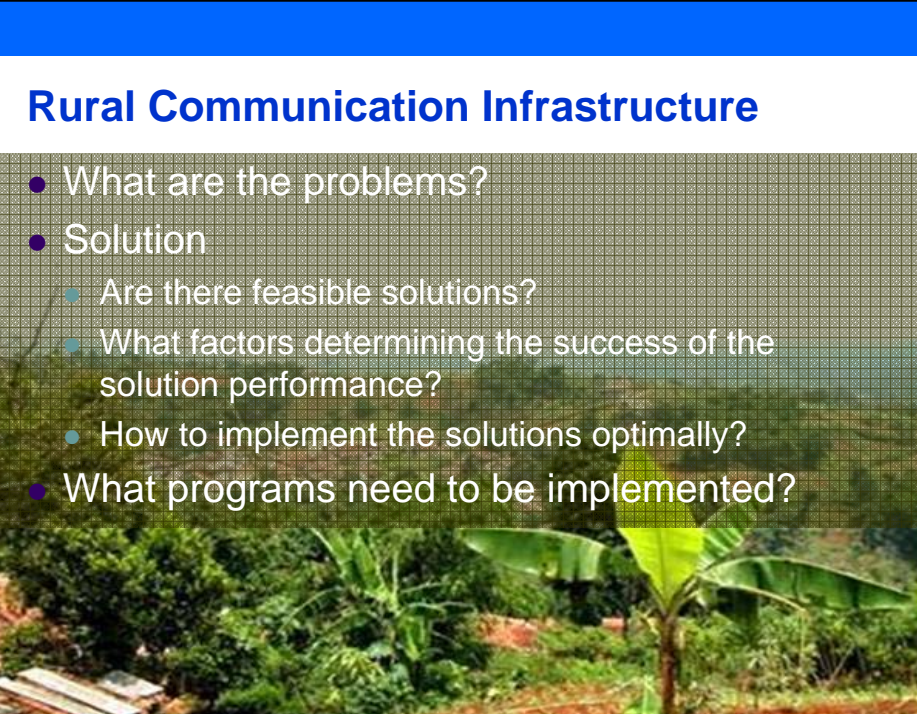
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Rural Communication Problems

What are the roots of rural communication problems particularly in Indonesia?

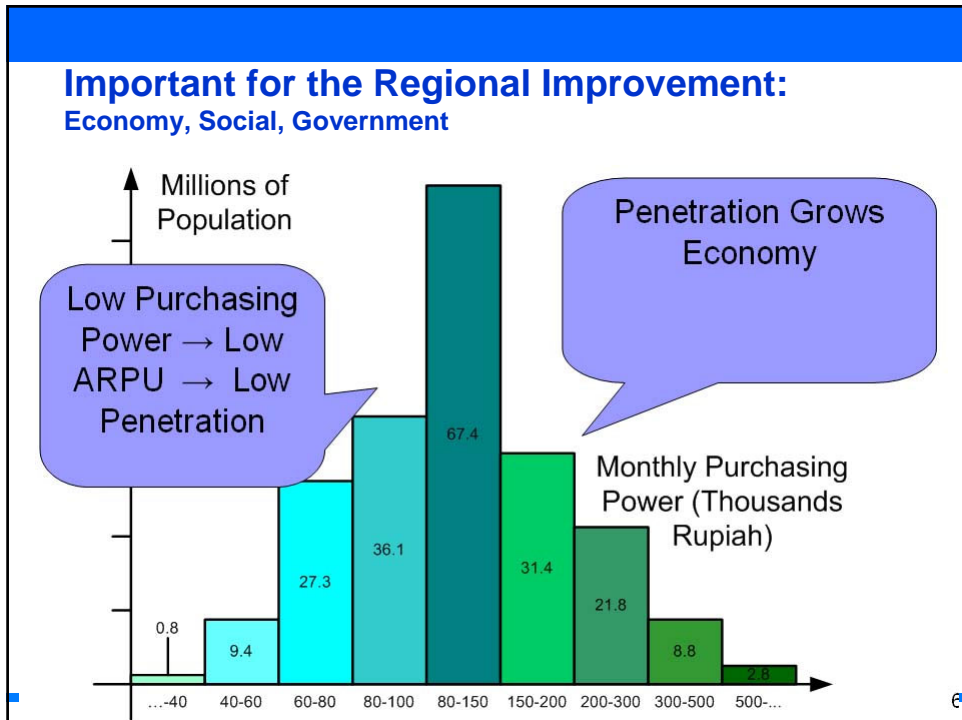
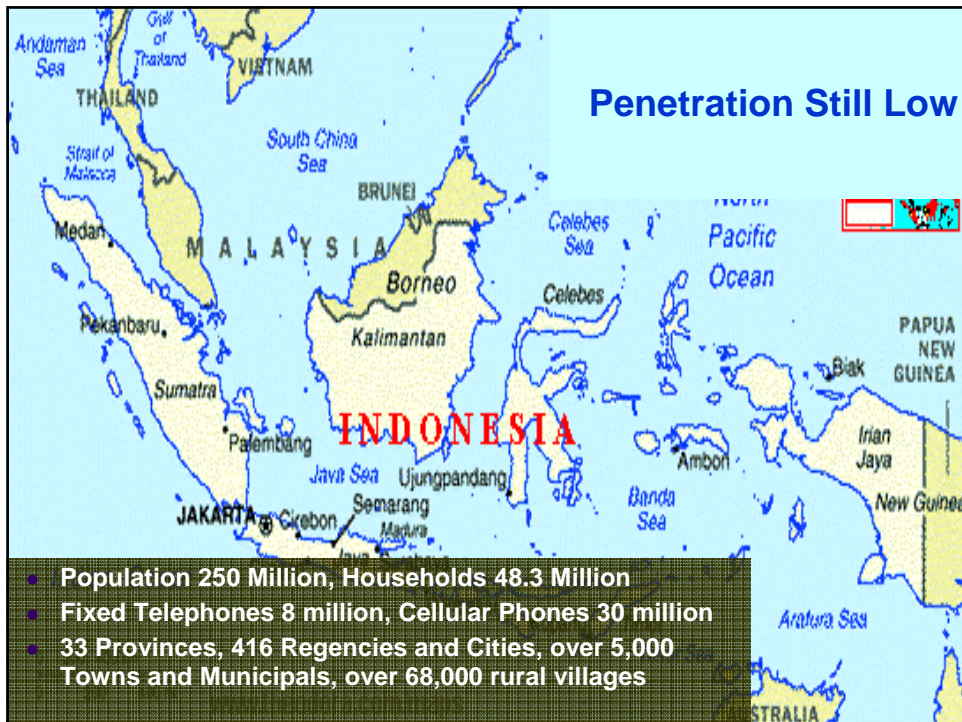
The image shows a rural village with several traditional houses with tiled roofs, surrounded by lush greenery and a hillside in the background. A tall antenna tower is visible in the distance.



Rural Communication Infrastructure

- What are the problems?
- Solution
 - Are there feasible solutions?
 - What factors determining the success of the solution performance?
 - How to implement the solutions optimally?
- What programs need to be implemented?

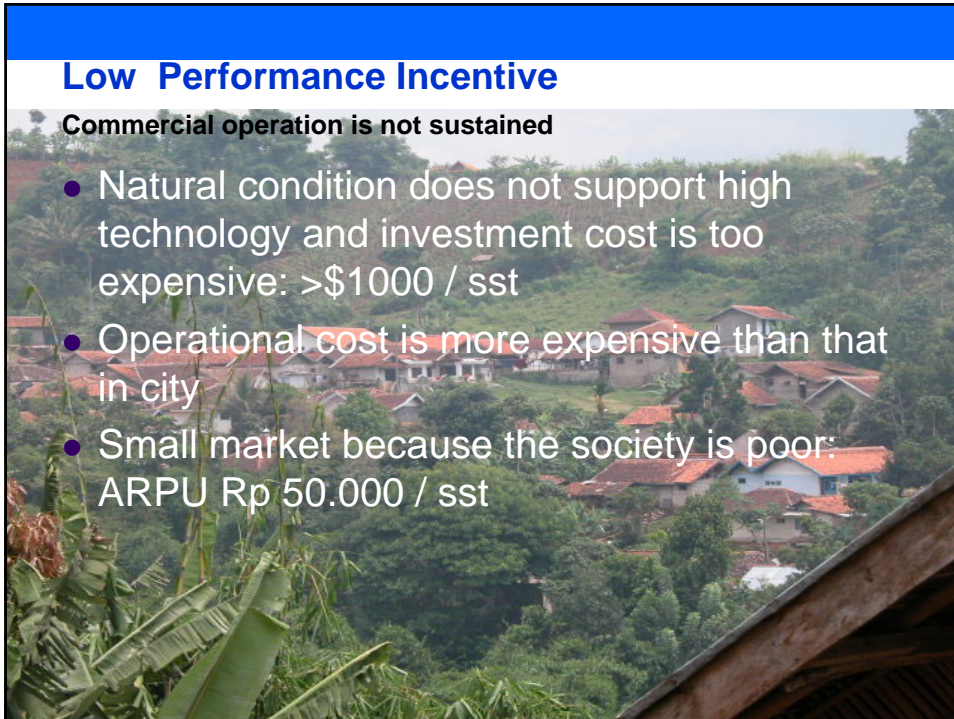
The image shows a rural landscape with a banana tree in the foreground, surrounded by lush greenery and a hillside in the background.



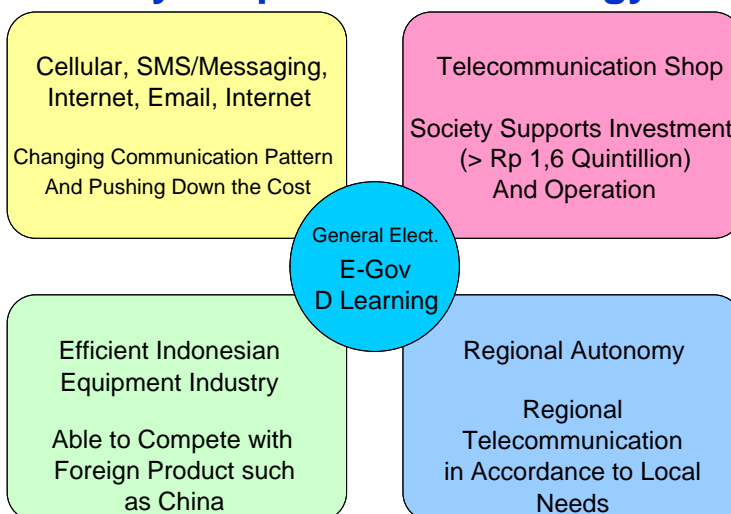
Low Performance Incentive

Commercial operation is not sustained

- Natural condition does not support high technology and investment cost is too expensive: >\$1000 / sst
- Operational cost is more expensive than that in city
- Small market because the society is poor: ARPU Rp 50.000 / sst



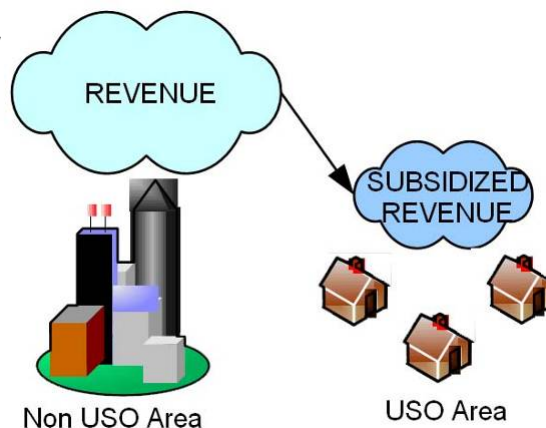
New Realty Requires New Strategy



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Handling Low Purchase Power

- Combination of low price product and Universal Service Obligation USO mechanism
- Business model that is suitable with the number of users
- Involving society investment



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Operational Cash Flow in Village

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Number of Users	16	16	16	16	16	16	16
Monthly ARPU (Rp Million)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Annual Revenue (Rp Million)	19.2	19.2	19.2	19.2	19.2	19.2	19.2
Monthly Salary Cost (Rp Million)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Monthly Operational Cost (Rp Million)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Annual Cost (Rp Million)	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Annual Profit (Rp Million)	13.2	13.2	13.2	13.2	13.2	13.2	13.2

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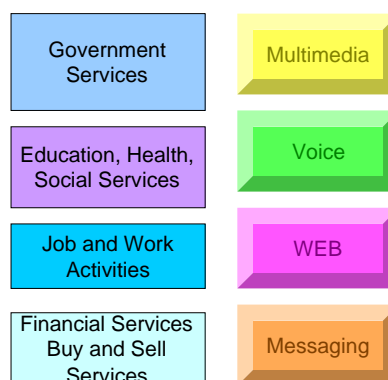
Rural Access Unit Cost of Rp 12 Million at Most

- Cost per customer in village (16 customers) < Rp. 1,875,000.00
 - NPV for seven years is Rp. 54.9 million.
 - BEP <= 3 years, so that early investment cost < Rp 30 million per village
 - For IRR > 30%, the early investment cost < Rp 37 million.
- RAU Cost (minus antenna tower) < Rp. 12 million
 - Variable cost = Rp. 500 thousands per customer
 - Fixed cost < 16 x Rp. 1,375,000.00 = Rp. 22 million
 - Antenna tower and installation cost < Rp. 10 million per villlage

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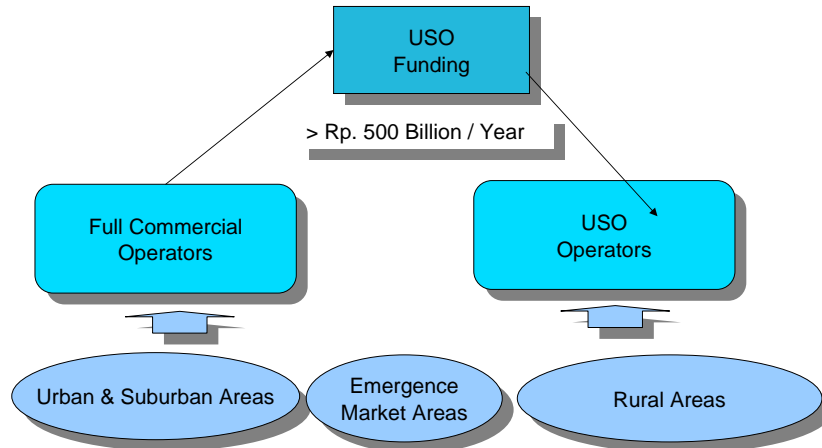
Improving Efficiency through Multiservice

- Multifeatures
 - Conference calls
 - Messaging, SMS, Email, Fax, Voicemail
- Innovative Pricing
 - Low cost basic services
- Community Benefits
 - Related to governmental service and program



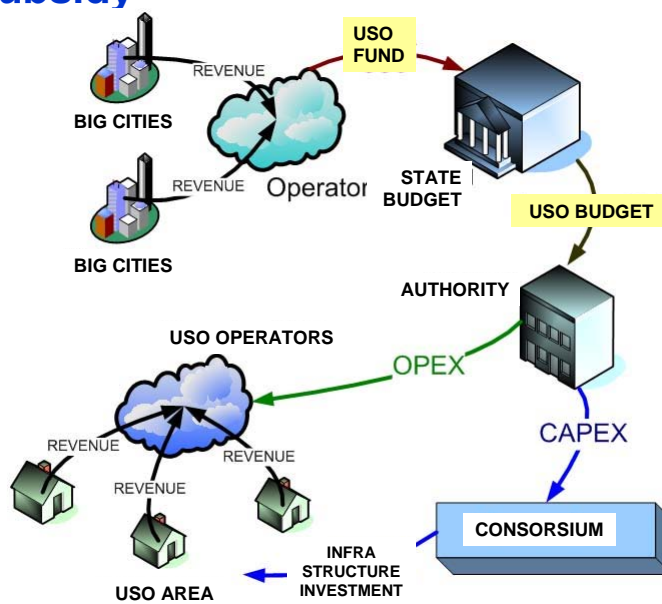
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USO and Emergence Market




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USO Subsidy

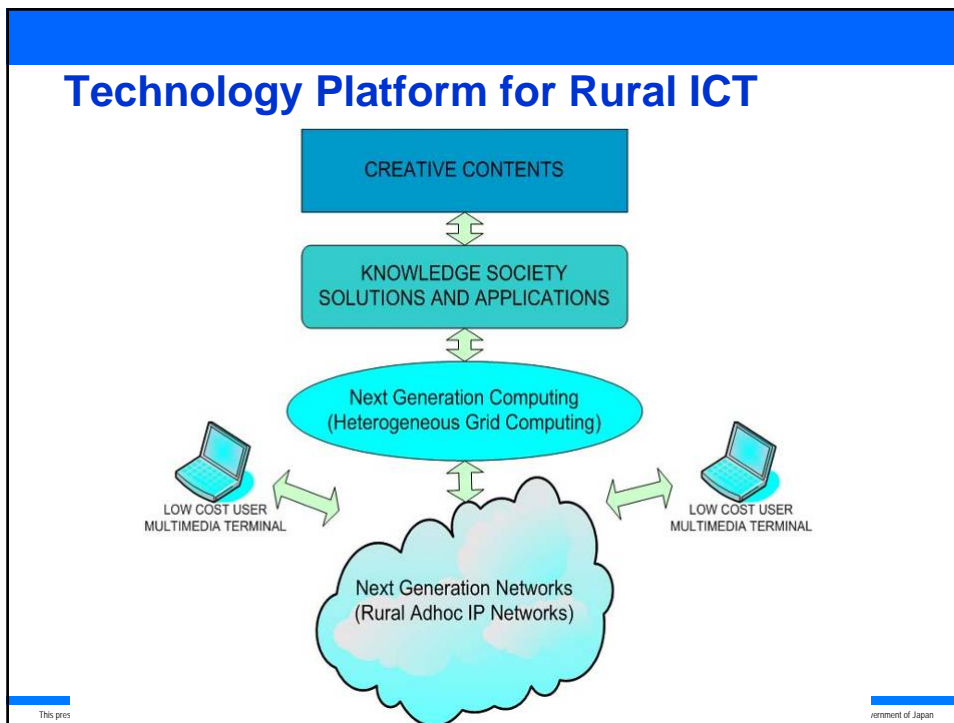


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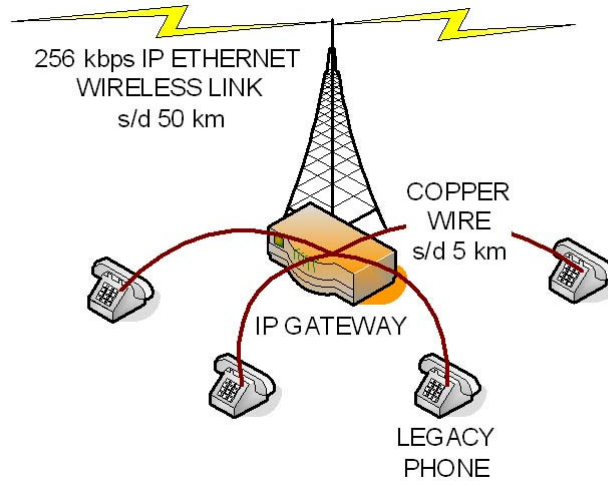


Technology and Product Problem

Are there any feasible technology-based solutions for the problems?

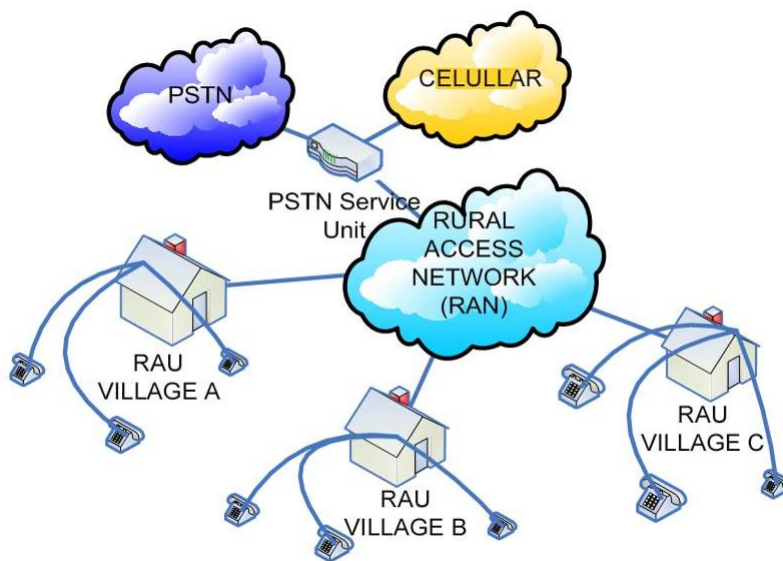


Rural Access Unit



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RAU for R-NGN



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pan

Multimedia Over IP

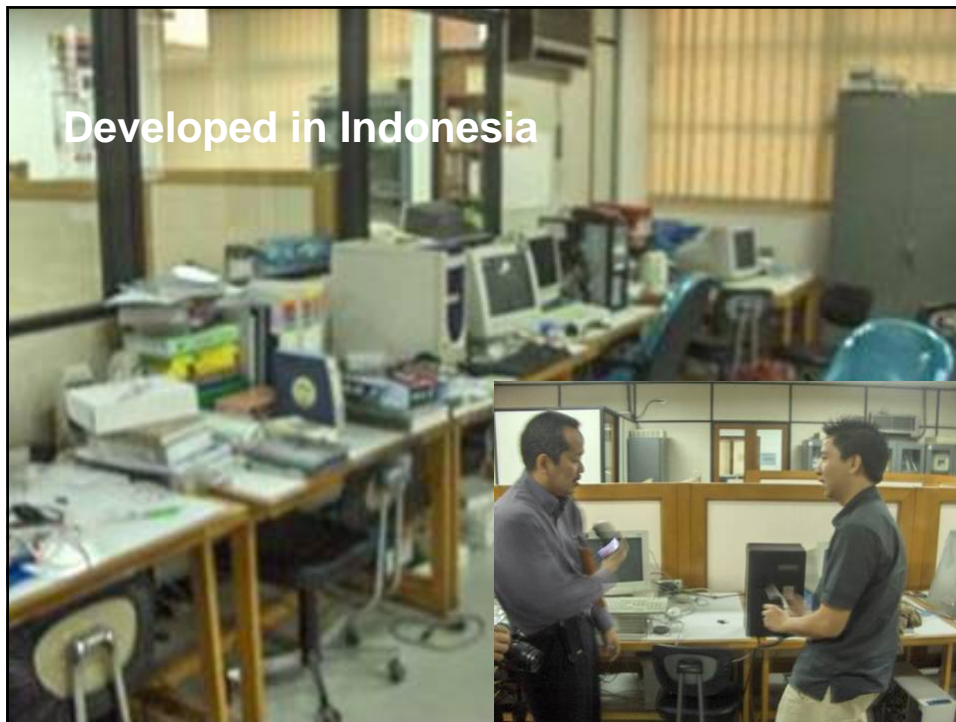


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Rural Access Unit

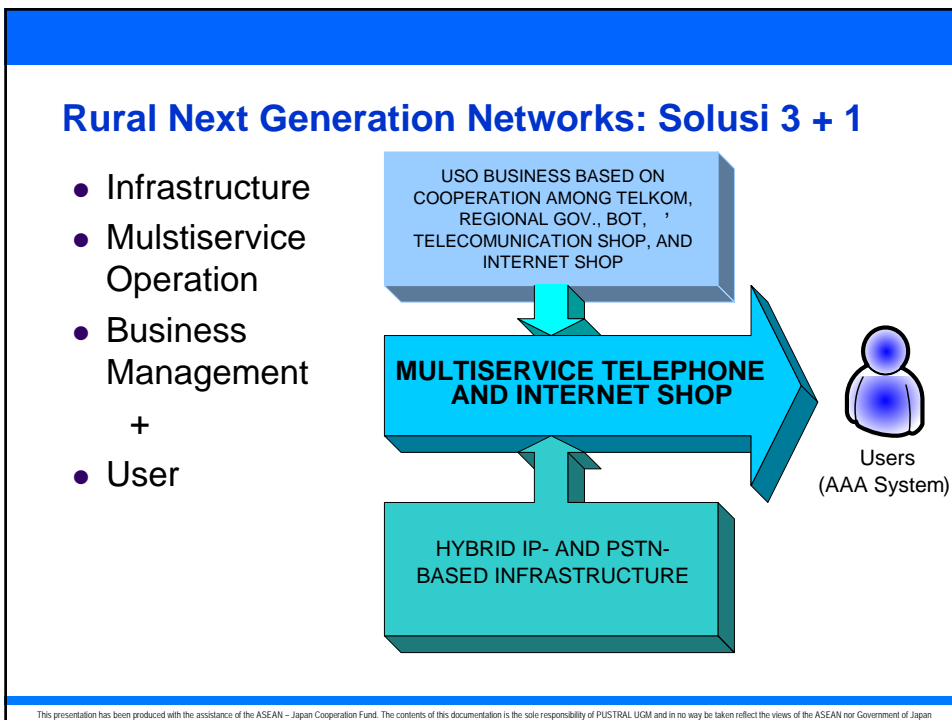
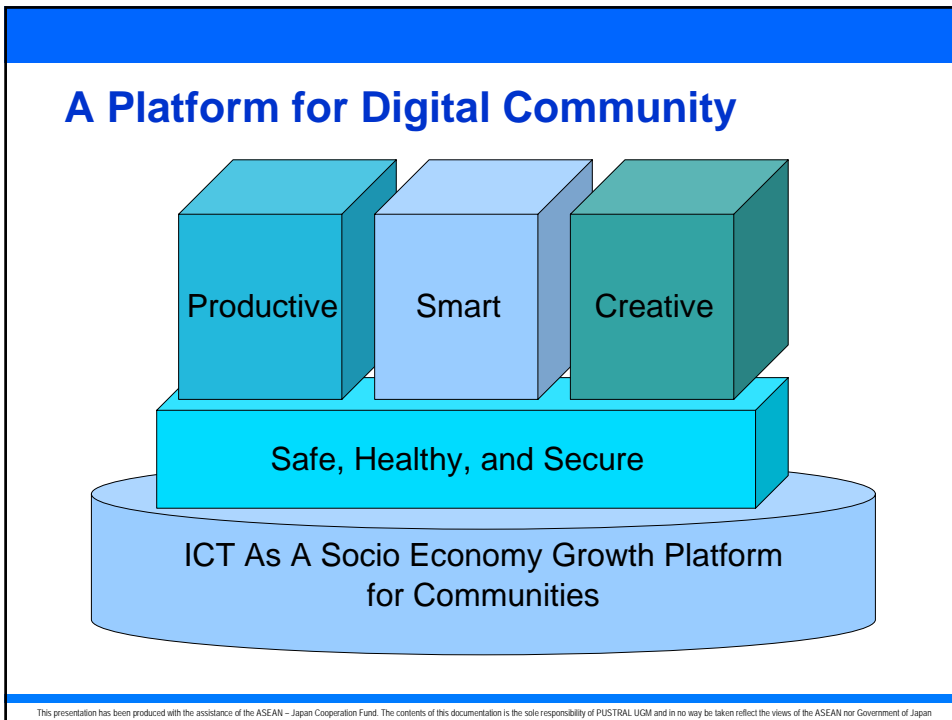


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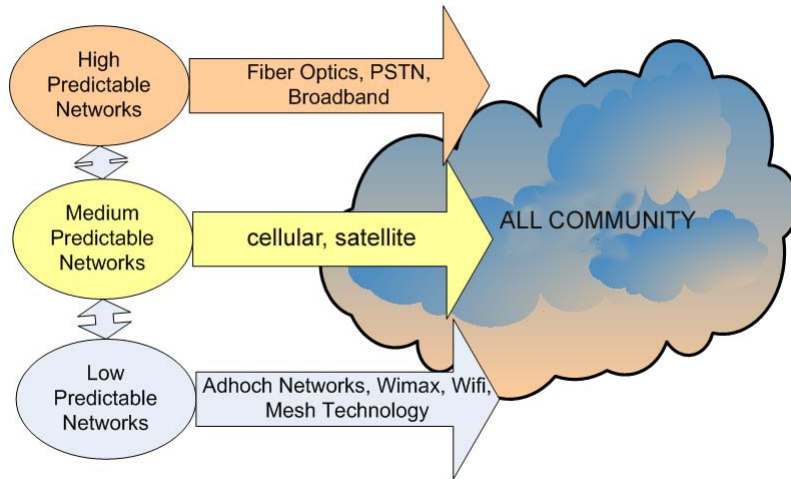


Factor Identification Problems

If the solutions do exist, what factors determining the successes of the solution performance?

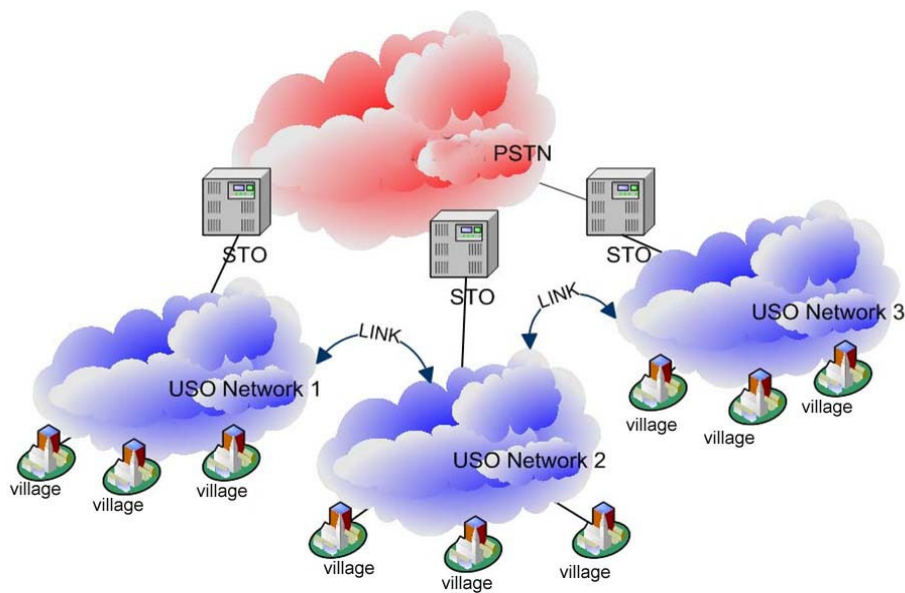


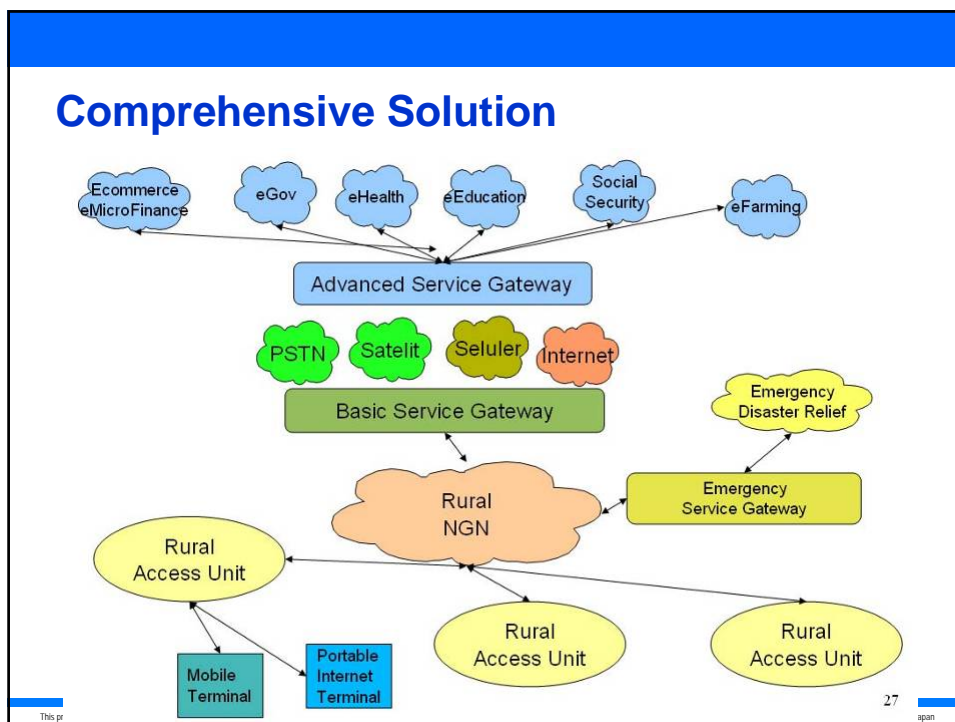
Toward Adhoc Networks



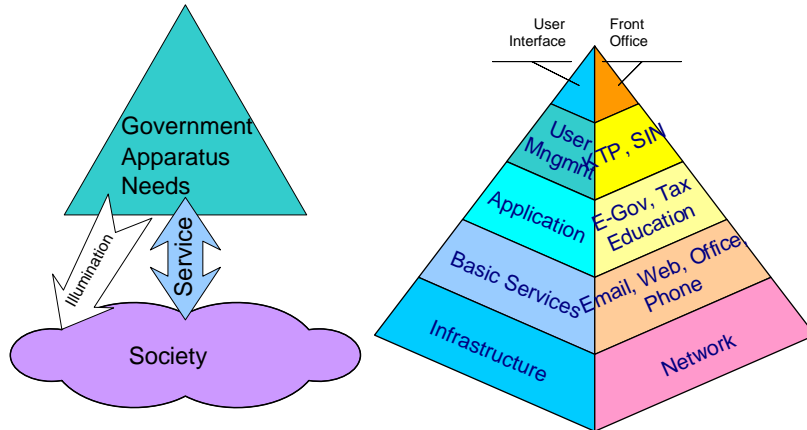
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R-NGN for USO





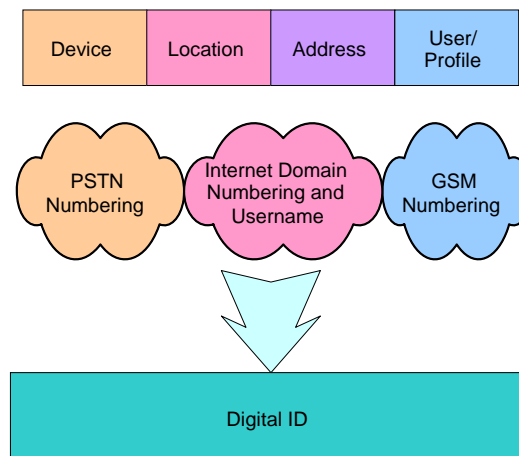
Government and Society Needs




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User Management With Heterogeneous Operators

- User management standard in heterogeneous operators pattern (in region)
- User-based numbering system
- Interoperability



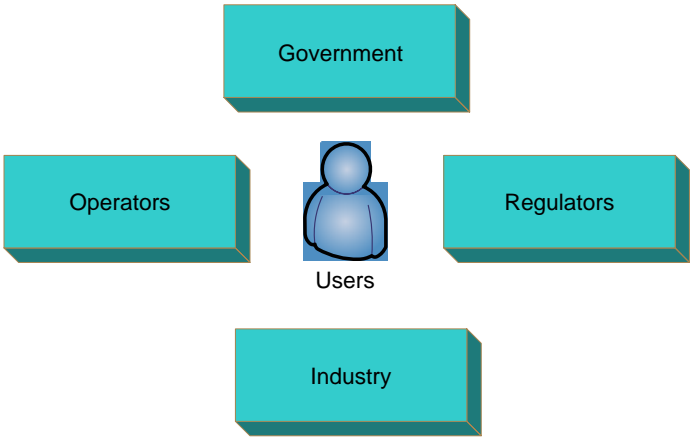
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Application Design Problems

How to configure the factors to get optimal implementation?

Balancing interests of stakeholders: users, operators, government, industry

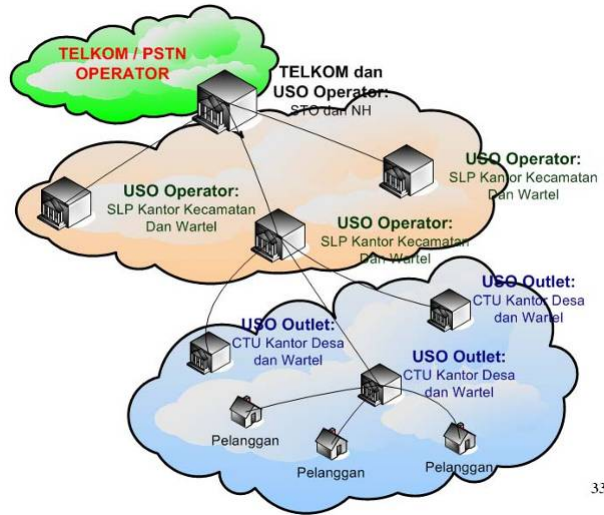


The diagram illustrates the balancing interests of stakeholders. It features five teal 3D rectangular boxes arranged around a central blue icon of a person. The boxes are labeled: Government (top), Operators (left), Regulators (right), Users (bottom), and Industry (bottom). The central icon is labeled 'Users'.

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RNGN-USO Operation License

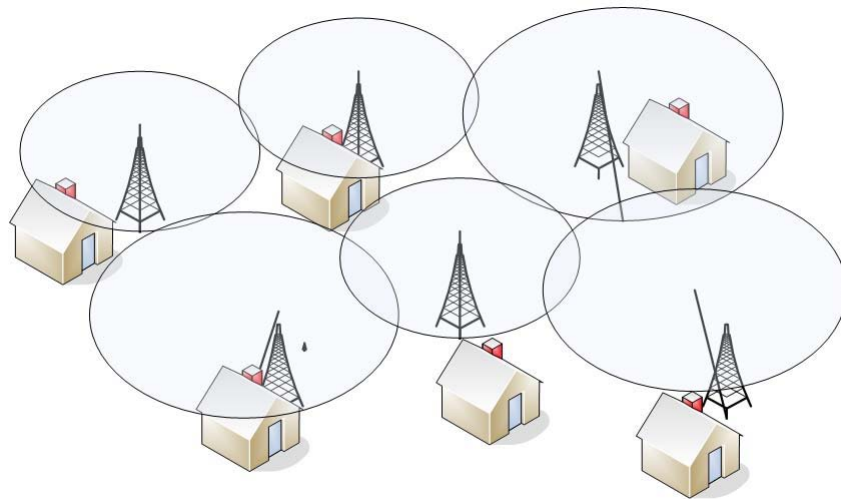
- **TELKOM / PSTN Operator (STO)**
- **RNGN Operator (Network Host and Service Landing Point)**
- **RNGN Outlet (Customer Terminating Unit and Last Mile Subscribers)**



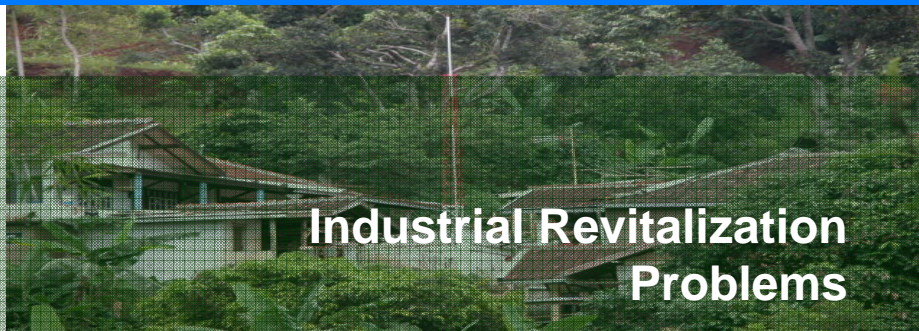
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Mesh Topology: Layer 3



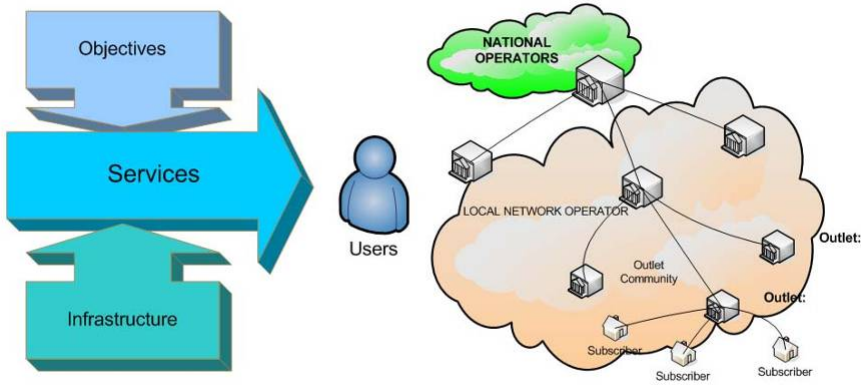
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Industrial Revitalization Problems

How to make these solutions economical, commercial, and able to build industry?

Operation, Business Model, Payment Systems for integrating rural (USO) systems into existing services



The diagram illustrates the integration of rural (USO) systems into existing services. On the left, three stacked blue arrows point right: 'Objectives' (top), 'Services' (middle), and 'Infrastructure' (bottom). These arrows point towards a central 'Users' icon (a person). To the right of the 'Users' icon is a network diagram. At the top is a green cloud labeled 'NATIONAL OPERATORS'. Below it is a larger orange cloud labeled 'LOCAL NETWORK OPERATOR'. Inside the orange cloud are several server icons connected to each other. Below the orange cloud are three 'Subscriber' icons, each connected to the orange cloud. To the right of the orange cloud are three 'Outlet' icons, each connected to the orange cloud.

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Trial Site: Punclut

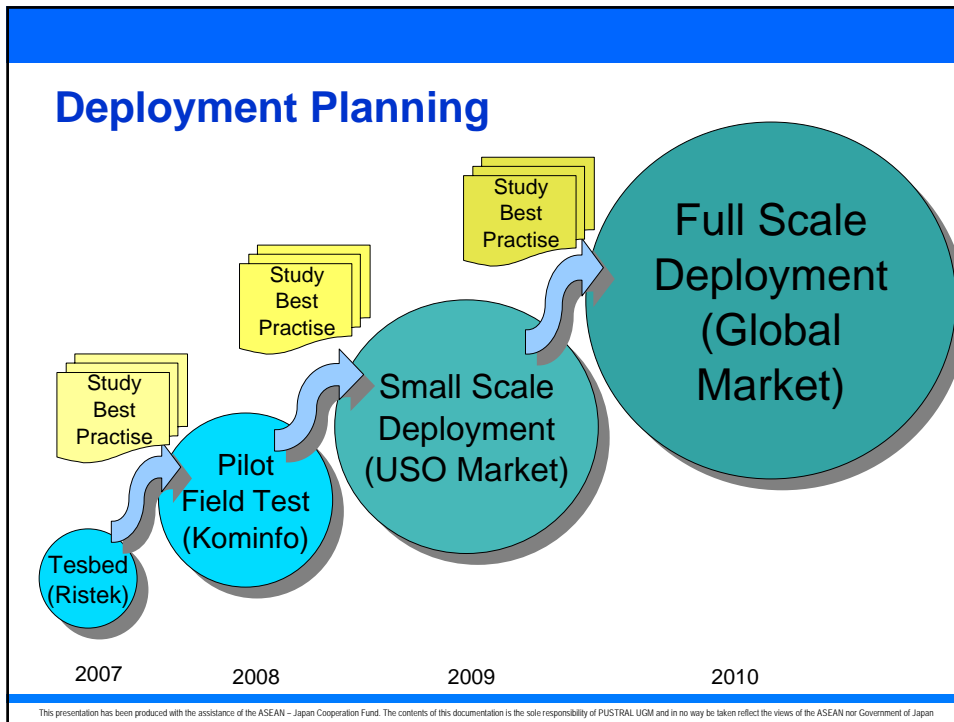


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Operating Since 2004 in Collaboration with ITB (Bandung Institute of Technology) Digital Telephone

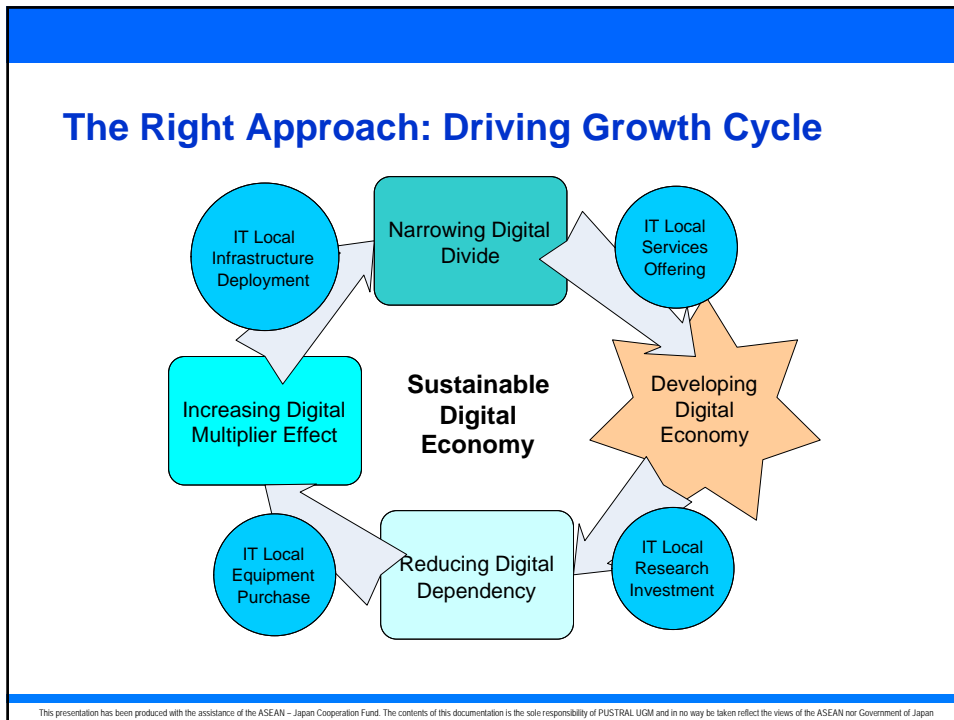


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Institutional Strengthening Problems

How to manage the research to strengthen the research institution?



Conclusions

- R-NGN is a strategic platform for rural ICT
 - Target Local (USO) and Global Market
- ICT Infrastructure is critical for regional development

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