# ICT ECOSYSTEMS for FISHERIES/AQUATIC RESOURCES in MINDANAO

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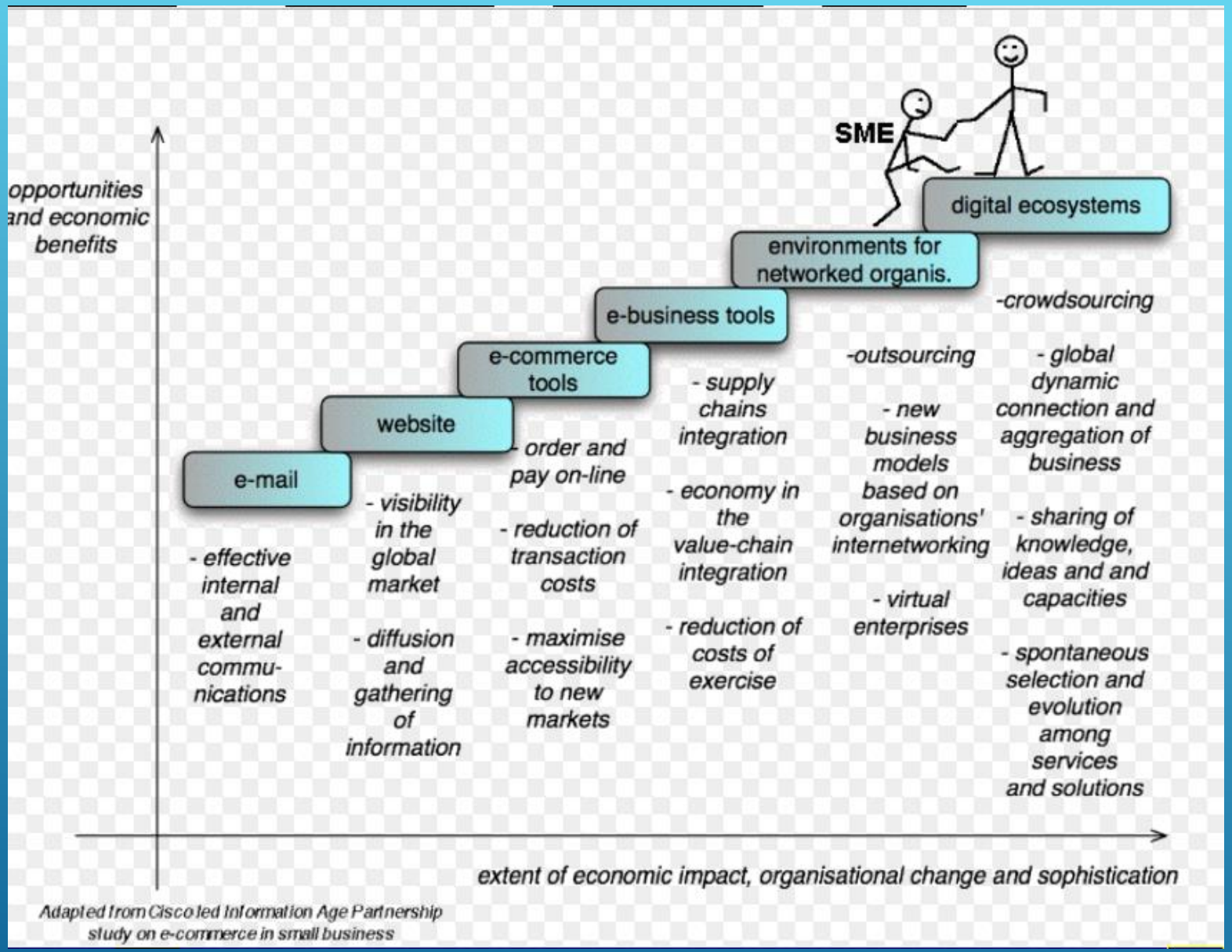
***Academician, NAST***

NAST Regional Scientific Meeting
Davao City
13 March 2017

# DIGITAL ECOSYSTEMS & ICT ECOSYSTEMS

*Both concepts are very current and very important*


SME
opportunities and economic benefits
digital ecosystems
environments for networked organis.
e-business tools
e-commerce tools
website
e-mail
-crowdsourcing
-outsourcing
- global dynamic connection and aggregation of business
- supply chains integration
- new business models based on organisations' internetworking
- sharing of knowledge, ideas and and capacities
- order and pay on-line
- economy in the value-chain integration
- virtual enterprises
- spontaneous selection and evolution among services and solutions
- visibility in the global market
- reduction of transaction costs
- reduction of costs of exercise
- effective internal and external commu-nications
- diffusion and gathering of information
- maximise accessibility to new markets
extent of economic impact, organisational change and sophistication
Adapted from Cisco led Information Age Partnership study on e-commerce in small business

**The Information Resource about the European approach on**

# Digital Ecosystem

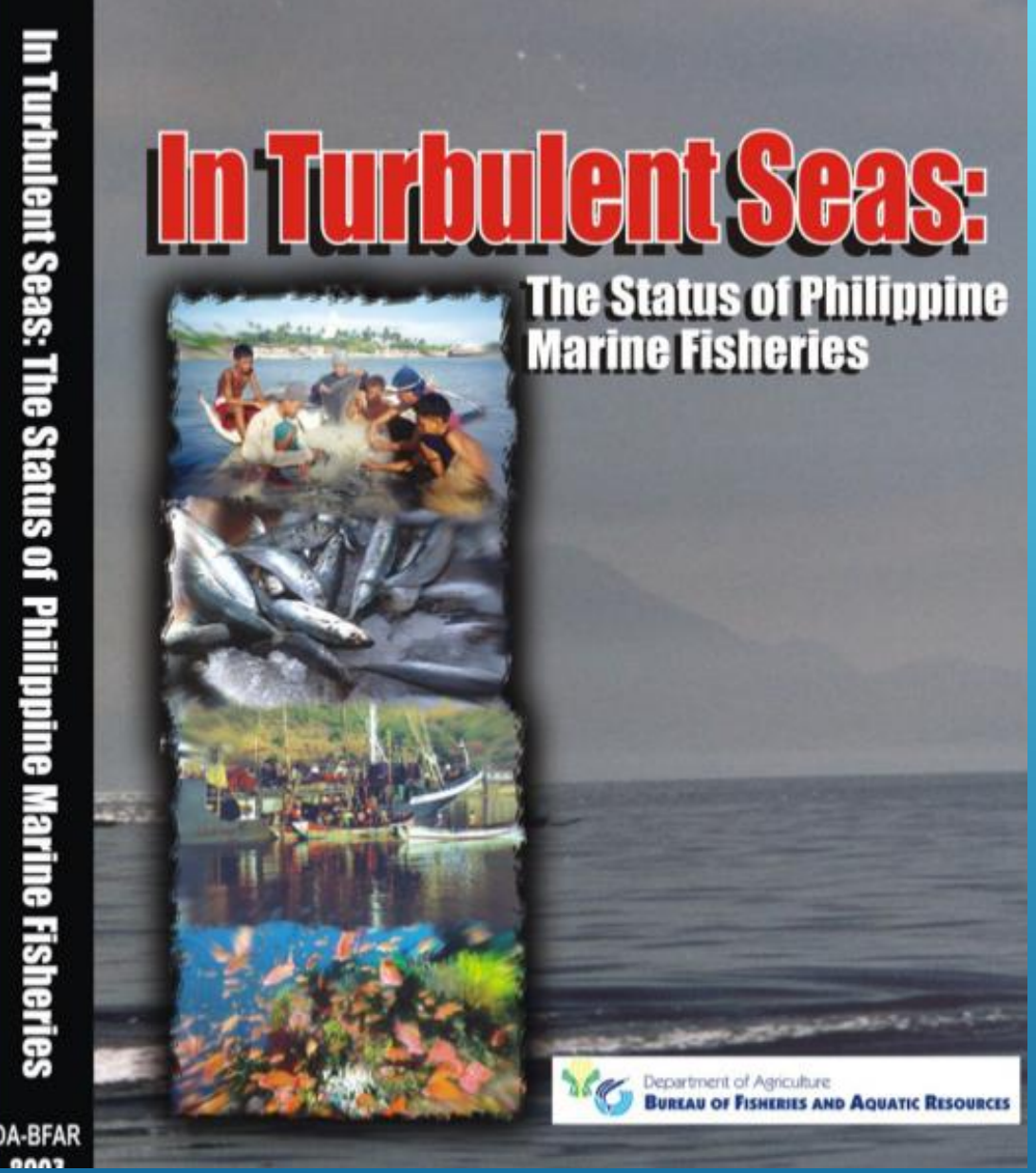
**(www.digital-ecosystem.org)**

**the enabling technologies and paradigms**
***for fostering endogenous local development, local capacity building and knowledge sharing processes***
**providing *tailored and personalized ICT services to citizens and business networks***

"An ***ICT ecosystem*** encompasses the *policies, strategies, processes, information, technologies, applications and stakeholders* that together make up a ***technology environment*** for a country, government or an enterprise. Most importantly, an ICT ecosystem includes people -– diverse individuals who create, buy, sell, regulate, manage and use technology."

***Open ePolicy Group***
***Berkman Center for Internet & Society***
***https://cyber.harvard.edu/epolicy/roadmap.pdf***

# A QUICK LOOK AT FISHERIES SOME 15 YEARS AGO




Publication Date 2004

# In Turbulent Seas:
# The Status of Philippine Marine Fisheries

Department of Agriculture-Bureau of Fisheries and Aquatic Resources

With assistance from:
Coastal Resource Management Project
of the
Department of Environment and Natural Resources
supported by the
United States Agency for International Development

Philippines

# Table of Contents

*Acknowledgments* v
*Foreword* vi
*Preface* vii

*Section I. General Introduction and Overview*

Profiling the status of Philippine marine fisheries: A general introduction and overview C.Z. LUNA, G.T. SILVESTRE, M.F. CARREON III, A.T. WHITE and S.J. GREEN 3

*Section II. Status of Marine Fisheries and Habitats*

A brief historical review of living marine resources research in the Philippines D. PAULY 16
Overview of Philippine marine fisheries N.C. BARUT, M.D. SANTOS and L.R. GARCES 22
Overview of the small pelagic fisheries E.C. ZARAGOZA, C.R. PAGDILAO and E.P. MORENO 32
Fisheries for tuna and other large pelagic fishes E.C. ZARAGOZA, C.R. PAGDILAO and E.P. MORENO 38
State of the demersal fisheries N.B. ARMADA 42
Status of the blue crab fisheries in the Philippines J.A. INGLES 47
The live reef food fish trade in the Philippines S. MAMAUAG 58
Status of the Philippine marine aquarium fish trade D. OCHAVILLO, G. HODGSON, C. SHUMAN and R. RUIZ 60
Philippine coral reef fisheries: Diversity in adversity P.M. ALIÑO, C. NAÑOLA, W. CAMPOS, V. HILOMEN, A. UYCHIAOCO and S. MAMAUAG 65
Capture fisheries for larval and juvenile fish R. HERMES 70
Fisheries in deep-water areas of the Philippines J.O. FLORES 72
The significance of coastal ecosystem stewardship to fisheries productivity P.M. ALIÑO, M.P. ATRIGENIO, M.C.C. QUIBILAN and M.G.J.P. TIQUIO 79
Mangrove resource decline in the Philippines: Government and community look for new solutions A.T. WHITE and R.O.D. DE LEON 84
Seagrass ecosystem of the Philippines: Status, problems and management directions M.D. FORTES and K.F. SANTOS 90
Status of water quality in Philippine coastal and marine waters M.L.S.D. MCGLONE, G. JACINTO, I. VELASQUEZ and D. PADAYAO 96
Marine protected species in the Philippines M.N.R. ALAVA and J.A.B. CANTOS 109
Philippine fishing boats G.D. AGUILAR 118
Trends and status of fish processing technology J. ESPEJO-HERMES 122
Economics of fisheries management in the Philippines R. TOWNSEND 127
Economics and environment in the fisheries sector D.C. ISRAEL 131
Poverty profile in Philippine fisheries R. SANTOS 133
Women in fisheries in the Philippines I.M. SIASON 144
Management of tropical coastal fisheries in Asia: An overview of key challenges and opportunities G. SILVESTRE and D. PAULY 150

*Section III. Fisheries Management, Policies and Tools*

The evolving role of national government agencies in coastal and fisheries management W.P. JATULAN 171
Equitable access and preferential use of municipal waters by municipal fisherfolk J.R. GARCIA 175
Local governance for municipal fisheries: Can local governments afford to have coastal resource management as a basic service responsibility? R.V. EISMA 180
The changing role of local governments: Bohol provincial government and fisheries management N.M. PINAT and S.J. GREEN 184



The Philippine tuna industry gets organized S.N. SWERDLOFF 189
Information management systems for Philippine fisheries M.F. CARREON III 192
Perspectives on a licensing system for municipal fisheries H. TRUDEAU 197
Commercial fisheries licensing system E.B. ALESNA, J.Q. DIZON-CORRALES and A. CABANGBANG 200
Size limits on fish caught N.B. ARMADA 202
Fisheries management and enforcement M.N. GUIDOTE 206
Evidence for fishery enhancement effects of marine reserves in Central Philippines A.C. ALCALA, G.R. RUSS and A.P. MAYPA 215
Marine protected areas P.M. ALIÑO, H.O. ARCEO and A.J. UYCHIAOCO 218
Marine protected areas: Urgent call for an offshore marine sanctuary under Republic Act 8550 R. HERMES 228
Management rating system for marine protected areas: An important tool to improve management A.T. WHITE, A.T. MENESES and M.F. OVENDEN 228
Multiple small-scale marine sanctuaries in municipal waters: The Magsaysay example W.R. ADAN 232
Artificial reefs and fish aggregating devices: Help or hindrance? R.P. BABARAN 237
Invertebrate stock enhancement M.A. JUINIO-MEÑEZ 241
The potential role of restocking and stock enhancement in the management of marine invertebrate fisheries in the Philippines J. BELL and L. GARCES 248
Olango birds and seascape tour: A people-oriented ecotourism venture M.M.M. FLORES 252
Challenging the status quo of marine capture fisheries management: The need for public education and policy advocacy programs R. PESTAÑO-SMITH 258
Waters of missed understanding V.B. SANTOS 261
Poaching in Philippine marine waters: Intrusion of Chinese fishing vessels in Palawan waters A.B. BENAVENTE-VILLENA and M.D. PIDO 265
Regional fisheries management planning: A work in progress J.Q. DIZON-CORRALES 269
Integration of fisheries into coastal area management R. HERMES 273
An overview of capture fisheries management in the context of integrated coastal management M.D. PIDO 277

*Section IV. Case Studies in Fisheries Assessment and Management*

Status of Lingayen Gulf fisheries: A brief update G.T. SILVESTRE and V.V. HILOMEN 286
Status of fisheries in San Miguel Bay G.T. SILVESTRE and V.V. HILOMEN 292
Bioeconomic modeling of fisheries policies in Lamon Bay, Philippines M.A. CAMPOS 300
Fisheries management in Honda Bay B.J. GONZALES 306
Overexploitation in the Visayan Sea: Designing a project solution R. HERMES, N.B. ARMADA, R.A. APARRI, E.C. ZARAGOZA and U. LOHMEYER 312
Danao Bay Community-based Coastal Resource Management Project: From top down to bottom up W.R. ADAN 318
Panguil Bay: Change over time in fisheries M.J. TUMANDA, JR. 322
A local government alliance approach to integrated coastal zone management: The Gingoog Bay Development Council experience W.R. ADAN 327
Fish resource assessment and management recommendations for Davao Gulf N.B. ARMADA 332
Ecoregion fisheries management: A new approach to address biodiversity loss caused by fisheries in the Sulu-Sulawesi Seas J.A. INGLES and R.B. TRONO 338

*Section V. Conclusion and Recommendations*

Sustaining Philippine marine fisheries beyond "turbulent seas": A synopsis of key management issues and opportunities C.Z. LUNA, G.T. SILVESTRE, M.F. CARREON III, A.T. WHITE and S.J. GREEN 345

*Appendix I. Directory of Contact Persons and Participants during the Profiling Process* 361

# Sustaining Philippine Marine Fisheries Beyond "Turbulent Seas": A Synopsis of Key Management Issues and Opportunities[1]

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*Philippines*

## Introduction

The preceding chapters provide detailed reviews covering various aspects of Philippine marine fisheries. Collectively, the contributions describe a wide range of issues and problems that impact the sector. Possibilities for remedial action are also suggested, particularly in the contributions covering policies and management tools. In this last section, we review the relevant facts from the various contributions and take an integrative view of coastal resources with a focus on marine fisheries. Our objective is to identify critical actions to steer the marine fisheries sector towards a path of sustainability.

In sketching the path towards sustainable marine fisheries, we begin by reviewing its status, focusing on the issues and opportunities in this sector. After describing Philippine marine fisheries at present, we point to where it needs to go and present the strategic objectives of fisheries management and thereby define what we mean by sustainable marine fisheries. Finally, we present six critical actions to achieve the fisheries management objectives.

## Key Issues in Philippine Marine Fisheries

The contributions in this profile are all fairly consistent in highlighting certain issues and trends in the coastal resource and fisheries sector. The consensus is that Philippine marine fisheries today are characterized by the following:

1. depleted fishery resources;
2. degraded coastal environment and critical fisheries habitats;
3. low catches/incomes and dissipated resource rents;
4. physical losses and/or reduced value of catches due to improper post-harvest practices and inefficient marketing;
5. inequitable distribution of benefits from resource use;
6. intersectoral and intrasectoral conflicts;
7. poverty among small-scale fishers; and
8. inadequate systems and structures for fisheries management.

The first 2 issues are biophysical impacts, issues 3-4 are economic in nature, issues 5-7 are social, and the last issue is institutional. Below we examine these characteristic issues.

### Depleted fishery resources

In general, the various types of marine fishery resources of the country—reef fishery resources, invertebrates, demersals and small pelagics—are

[1]This paper can be cited as follows: LUNA, C.Z., G.T. SILVESTRE, M.P. CARREON III, A.T. WHITE and S.J. GREEN. 2004. Sustaining Philippine marine fisheries beyond "turbulent seas": A synopsis of key management issues and opportunities, p. 345-358. In DA-BFAR (Department of Agriculture-Bureau of Fisheries and Aquatic Resources). In turbulent seas: The status of Philippine marine fisheries. Coastal Resource Management Project, Cebu City, Philippines. 378 p.

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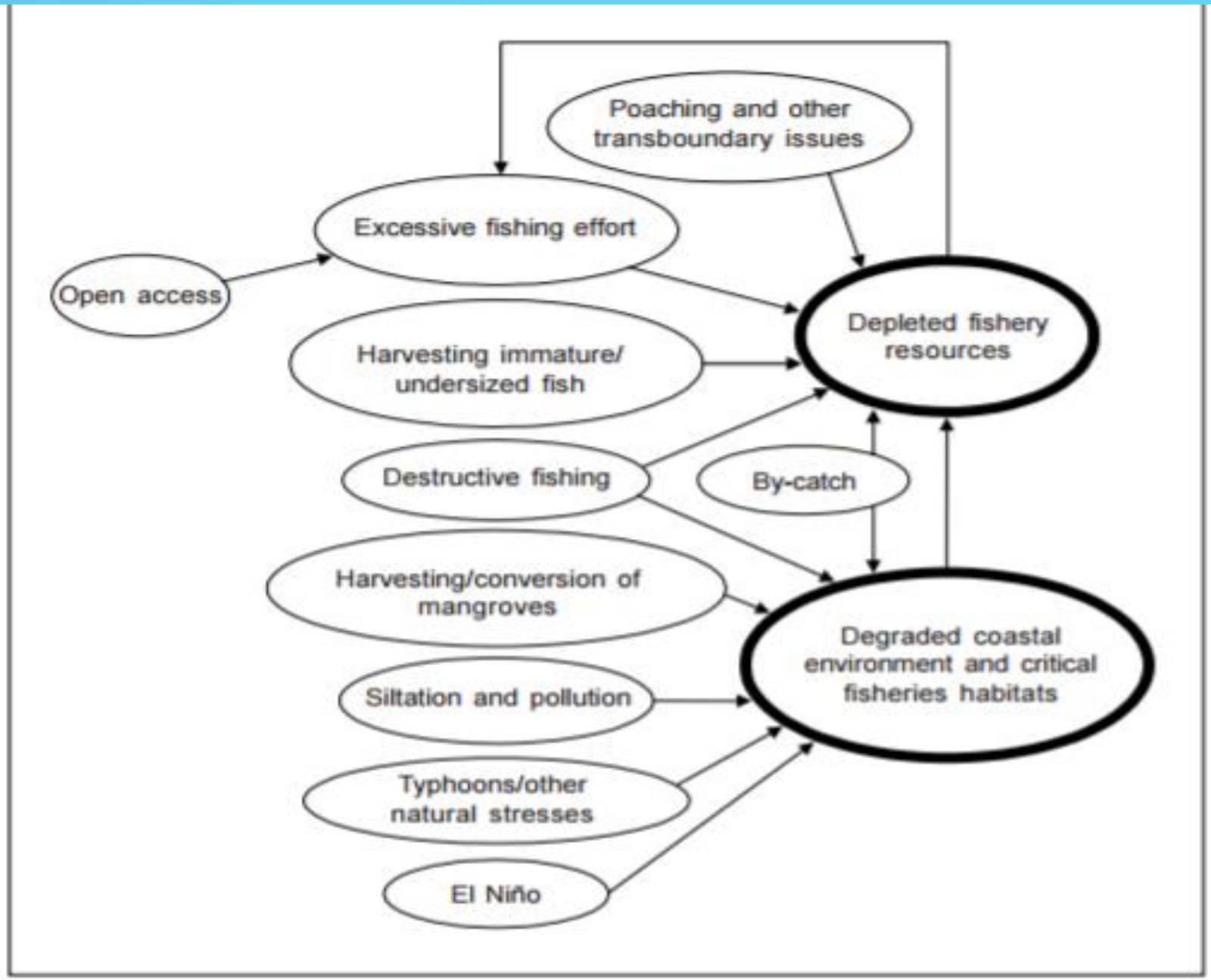



Figure 1. The factors leading to the depletion of fishery resources and the degradation of coastal environment and critical fisheries habitats.

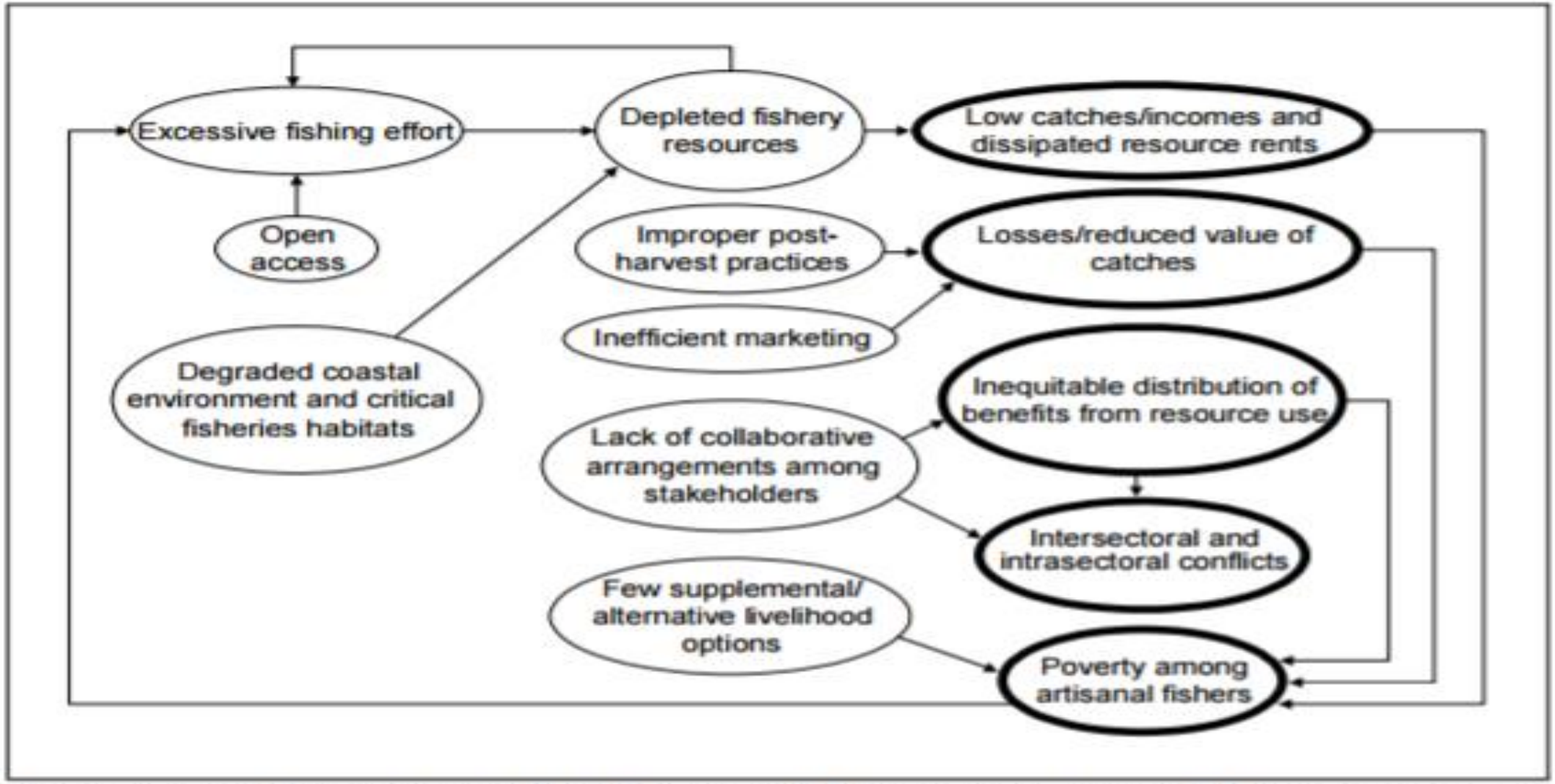



Figure 2. The economic and social issues in marine fisheries, which are driven in part by degraded coastal environment and depleted fishery resources. Note how most issues ultimately contribute to perpetuating poverty among artisanal fishers.

# HOW ARE THINGS NOW?

*Are they better or worse?*

*What have we done?*

*What have we not done?  And why not?*

# FISHFOREVER
## PHILIPPINES

### Why the Philippines?

**$3.32 billion**
in revenue generated by fisheries

**47%**
of fish caught in the Philippines by nearshore fishers

**85%**
of fishers are small-scale (1.4 million)

**56%**
of Filipinos' animal protein comes from fish

**91%**
of fish caught in-country are consumed by Filipinos

### The Opportunity

- Nearshore fishers used to catch 40 kg of fish per unit of effort in 1940; in 2008, they caught 3 kg per unit of effort.
- Twelve-hundred marine protected areas (approximately 25 percent of global total) are located in the Philippines.
- Ninety percent of these marine protected areas are ineffectively managed.
- Local communities have management authority of their coastal waters.

All Fish Forever countries have high marine biodiversity, important coral reefs and a strong community dependence on fisheries. The challenges and different fishery models specific to each will enable neighboring countries to more easily replicate Fish Forever successes.

Publication Date: **2014**


### Record of Success in the Philippines

- Since 2009, Rare has partnered with 26 coastal municipalities to implement fish recovery zones and community-based enforcement – critical Fish Forever components.
- Eighty-six local organizations applied to be part of Rare's second set of 15 nearshore fishery recovery projects in the Philippines.
- In 2015, Rare signed a memorandum of understanding with the Philippines Department of Environment and Natural Resources to help communities establish sustainable fishing practices in the Tañon Strait Protected Seascape.

**Across Rare's first 12 projects in the Philippines, the abundance of coastal fish species increased by an average of 47 percent within fish recovery zones in two years.**

In Cortes, Mindanao

- Fish biomass in the recovery zone increased 70 percent in two years.
- Guarding of community waters 24/7 contributed to the success; previously it was guarded only 15 days a month.
- Forty-two guards were trained; guarding now includes women and minorities.
- The campaign mascot, Rabia, the rabbit fish, both charmed and educated the community.
- A weekly radio program called "Sanglwanyo Alang Kinabuhi (The Sanctuary is our Life)" included fishers' reports of illegal activities.
- There were zero intrusions and illegal activities in and around the fish recovery zone, down from 44 the year prior to the campaign start.

**"The Fish Forever strategy is not simply for livelihood and economic opportunity; it connects communities to future generations of Filipinos and generates great pride in marine biodiversity."**
– Noric Acosta, Philippine Presidential Advisor for Environmental Protection

### The Future

Building on these successes, Fish Forever will achieve the following in the first five years:

- Reach 10 percent of coastal communities and establish exclusive access areas.
- Improve the management and protection of 140 fish recovery zones.
- Train 25 percent of coastal mayors or municipal delegates to build demand and political support for Fish Forever.
- Increase fish biomass, abundance and coral reef cover inside fish recovery zones at project sites.

FISHFOREVER
A partnership of:

EDF · Rare · SFG

Fish Forever seeks funding partners who share a vision and commitment to recover important coastal habitat at scale. Together, we will catalyze a global movement of nearshore fisheries reform in the developing tropics.
www.fishforever.org

February 2014

# Publication_Date: 2016


## INTRODUCTION

Business Intelligence (or simply 'BI' as it's more commonly known) is a term that's nudged its way into the English lexicon, and can be broadly defined as sharing a number of key characteristics, including:

- Software applications used to analyse an organisation's raw data
- A technology-driven process for analysing data and presenting actionable information to help individuals and organisations make more informed business decisions
- A report on data from any number of internal and external sources

FINNZ, an IT company focused on developing systems for organisations managing and protecting natural resources like fisheries, was faced with an opportunity to develop its expertise within these previously-unchartered waters when the South Pacific Regional Fisheries Management Organisation (SPRFMO) became a client of ours.

The initial focus was to build them a system into which vast amounts of data could be manually and automatically entered, and soon shifted to providing them tools with which to interpret and analyse the data collected. So it was that our first foray into the world of BI began.

The intent of this paper is to document that journey from FINNZ's viewpoint, and by doing so describe how our experience within the field evolved alongside Microsoft's emergent BI software tools during the same period. For anyone wishing to embark upon a similar path, I sincerely hope that what you're about to read is of value, even if it's just to highlight how satisfying the initiative of taking the BI-bull-by-the-horns can be, no matter how daunting it might first appear.

# WHAT CAN WE DO MOVING FORWARD?

*Do  we continue as before?*

*Are there better approaches?*


**Publication Date:**

**2015**

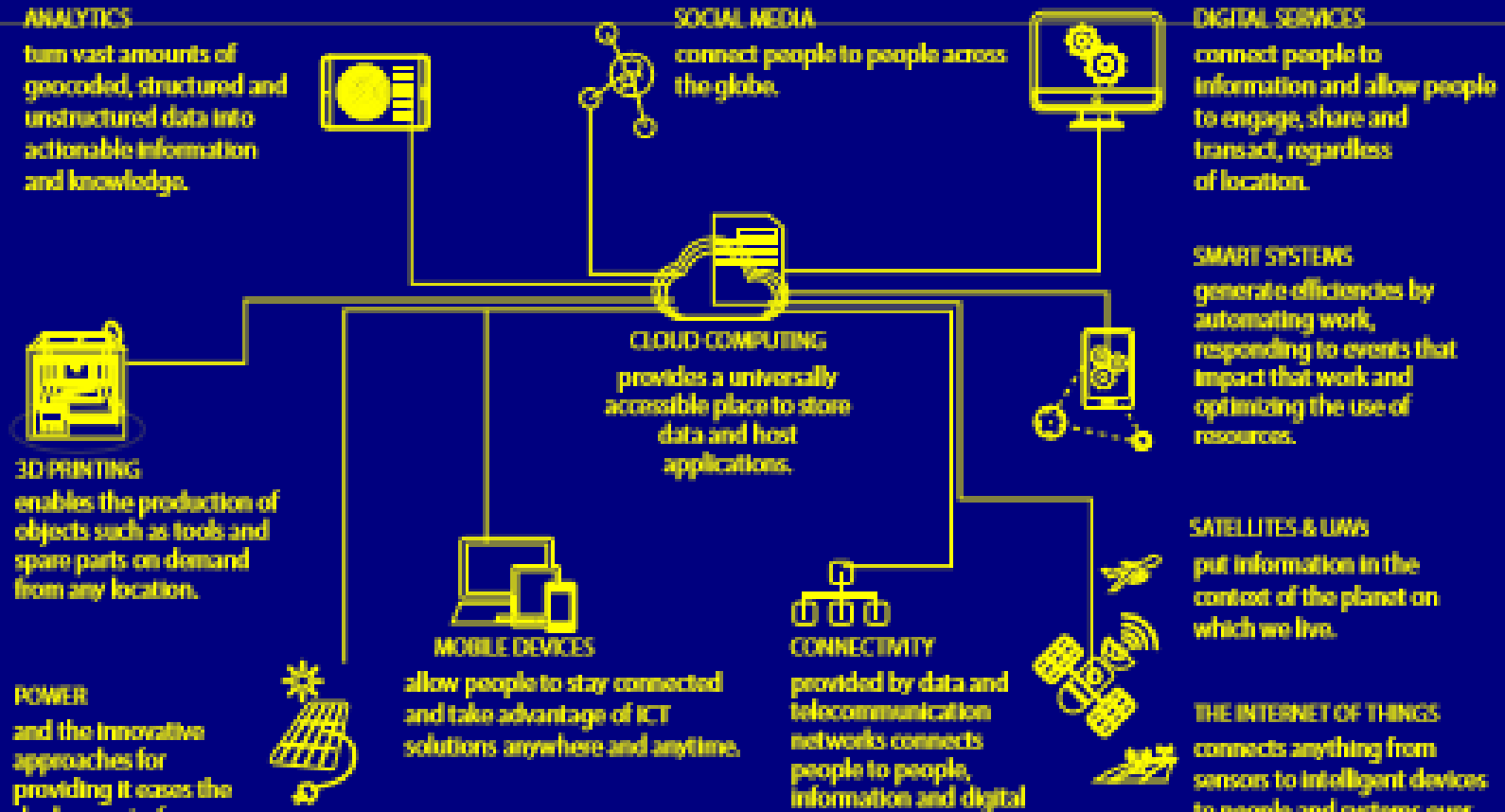
## SDGs by Development Sector

To achieve the SDGs, changes are required in the way public, private and civil society organizations function, the way they partner, the way they engage with individuals and communities and the way government policies influence their operations. The challenge facing organizational leaders is understanding the benefit of ICT in enabling such changes.

| Development Sector | Primary Related Goal | |
|---|---|---|
| Livelihoods | G1 | End poverty in all its forms everywhere. |
| | G8 | Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. |
| Agriculture | G2 | End hunger, achieve food security and improved nutrition and promote sustainable agriculture. |
| Health | G3 | Ensure healthy lives and promote well-being for all at all ages. |
| Education | G4 | Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. |
| Water, Sanitation & Power | G6 | Ensure availability and sustainable management of water and sanitation for all. |
| | G7 | Ensure access to affordable, reliable, sustainable and modern energy for all. |
| Infrastructure | G9 | Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.[2] |
| | G11 | Make cities and human settlements inclusive, safe, resilient and sustainable. |
| Disaster Relief | G11 | Make cities and human settlements inclusive, safe, resilient and sustainable. |
| Governance & Human Rights | G5 | Achieve gender equality and empower all women and girls. |
| | G10 | Reduce inequality within and among countries. |
| | G16 | Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels. |
| Environmental Protection | G12 | Ensure sustainable consumption and production patterns. |
| | G13 | Take urgent action to combat climate change and its impacts (taking note of agreements made by the UNFCCC forum). |
| | G14 | Conserve and sustainably use the oceans, seas and marine resources for sustainable development. |
| | G15 | Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss. |
| Cross Cutting | G17 | Strengthen the means of implementation and revitalize the global partnership for sustainable development. |

# ICT Portfolio

A core set of technologies have emerged that have great potential to improve development program impacts and empower communities. These are the building blocks that comprise many impactful ICT solutions. Some are in use in developing countries today. Others will take time to make their way into global use, but are essential to addressing complex development problems in the face of scarce resources. While new technologies inevitably will emerge, these are a good starting point for aligning an organization's ICT investments with its strategic goals.



Technology use in agriculture: end hunger, achieve food security and improved nutrition and promote sustainable agriculture (G2).

LIVELIHOODS | AGRICULTURE | HEALTH | EDUCATION | WASH & POWER | INFRASTRUCTURE | DISASTER RELIEF | GOVERNANCE | ENVIRONMENTAL PROTECTION

### ANALYTICS
provide capabilities needed to produce snapshots, analyze trends and make projections about weather, soil conditions, land use, diseases, markets and food security. This is done within time frames critical to the development and implementation of farm business plans, agriculture research and extension services, and agriculture development programming.

### SOCIAL MEDIA
connect farmers to an online social network that can provide insight about changing conditions, provide advice and support, and share best practices. Social media also allow governments and research organizations to collaborate on agriculture sector improvements.

### DIGITAL SERVICES
such as mobile money, micro-insurance, market information, weather information, advisory services and distance learning programs both help farmers to improve their livelihoods and allow governments to build extension agents' capacity, monitor their performance, and reduce the cost of extension and land management services. These may be delivered through ICT-enabled extension services, call centers, or directly to farmers' mobile devices.

### CLOUD COMPUTING
provides the capability to build trading, tendering and bartering platforms. Cloud computing also brings together and delivers high quality, timely information and services needed to improve farm businesses – anytime, anywhere.

### SMART SYSTEMS
are emerging that automate and control key farming operations such as irrigation, fertilization, and pest control and optimize agriculture supply chains.

### 3D PRINTING
offers opportunities to produce tools farmers require such as farm vehicle spare parts at a fraction of the cost and time required in the past.

### MOBILE DEVICES
allow farmers to access the information they need to improve farm business plans, acquire financial resources, manage production, link to

### CONNECTIVITY
connects farmers to information and services and allows farmers to form support networks and

### SATELLITES, UAVs & THE INTERNET OF THINGS
such as remote sensors, weather stations and RFID tags, generate rich sets of highly accurate georeferenced digital data about weather, soil conditions, crop conditions, land use, market locations, transport routes and even the location of

### POWER
solutions provide the

# Call to Action

ICT solutions have tremendous potential to change the way the world works, lives and interacts and thereby accelerate achievement of the Sustainable Development Goals. This potential is being driven by:

The convergence and integration of mobile and cloud technologies.

The emergence of new mainstream technologies for collecting and analyzing vast amounts of real-time data from a myriad of sources, producing high-quality information products to support decision-making.

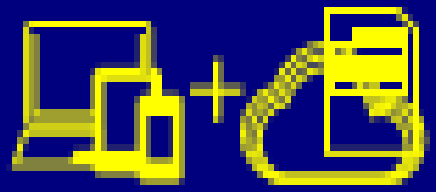
Growing adoption of these technologies by organizations, communities and individuals worldwide.

The systems and services that utilize these building blocks to optimize the use of natural resources, to amplify the voices of individuals and social networks and to generate new livelihoods.

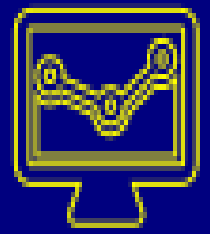
To realize that potential, leaders within governments, businesses and civil society organizations must be bold and look for every opportunity to foster local innovation, to assist local institutions in becoming part of the digital economy, and to expand local community and citizen access to ICT solutions and the benefits they provide.

The pace of ICT-enabled change will vary from region to region, country to country, community to community and one demographic group to the next. ICT plans must meet communities where they are today, but should not assume that each community will go through the same technology adoption cycle and at the same rate. ICT plans should consider opportunities to bypass or leap-frog older technologies altogether in favor of new, more beneficial ones. ICT plans must also balance investments in basic ICT solutions that provide immediate benefits to developing countries (such as existing power, connectivity, cloud computing, analytics, social media and digital services) with those that are necessary to grapple with access to scarce resources within changing economic, social and physical environments around the world.

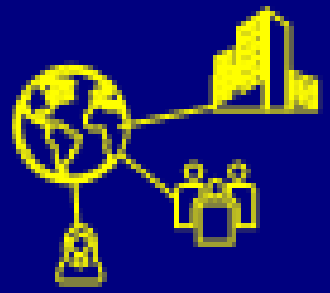
Each individual public, private and civil society organization has the responsibility to ensure that their strategic goals align with the SDGs and that their plans to invest in ICT enhance their ability to contribute to the SDGs. They also have the responsibility to identify and build the cross-sector partnerships that strengthen that contribution and to actively seek alignment at national, regional and global levels. This SDG ICT Playbook provides a good starting point from which to build ICT plans and target areas in which to build cross-sector partnerships and align efforts across sectors and geographies.



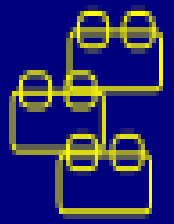
The convergence and integration of mobile and cloud technologies.



The emergence of new mainstream technologies for collecting and analyzing vast amounts of real-time data from a myriad of sources, producing high-quality information products to support decision-making.



Growing adoption of these technologies by organizations, communities and individuals worldwide.



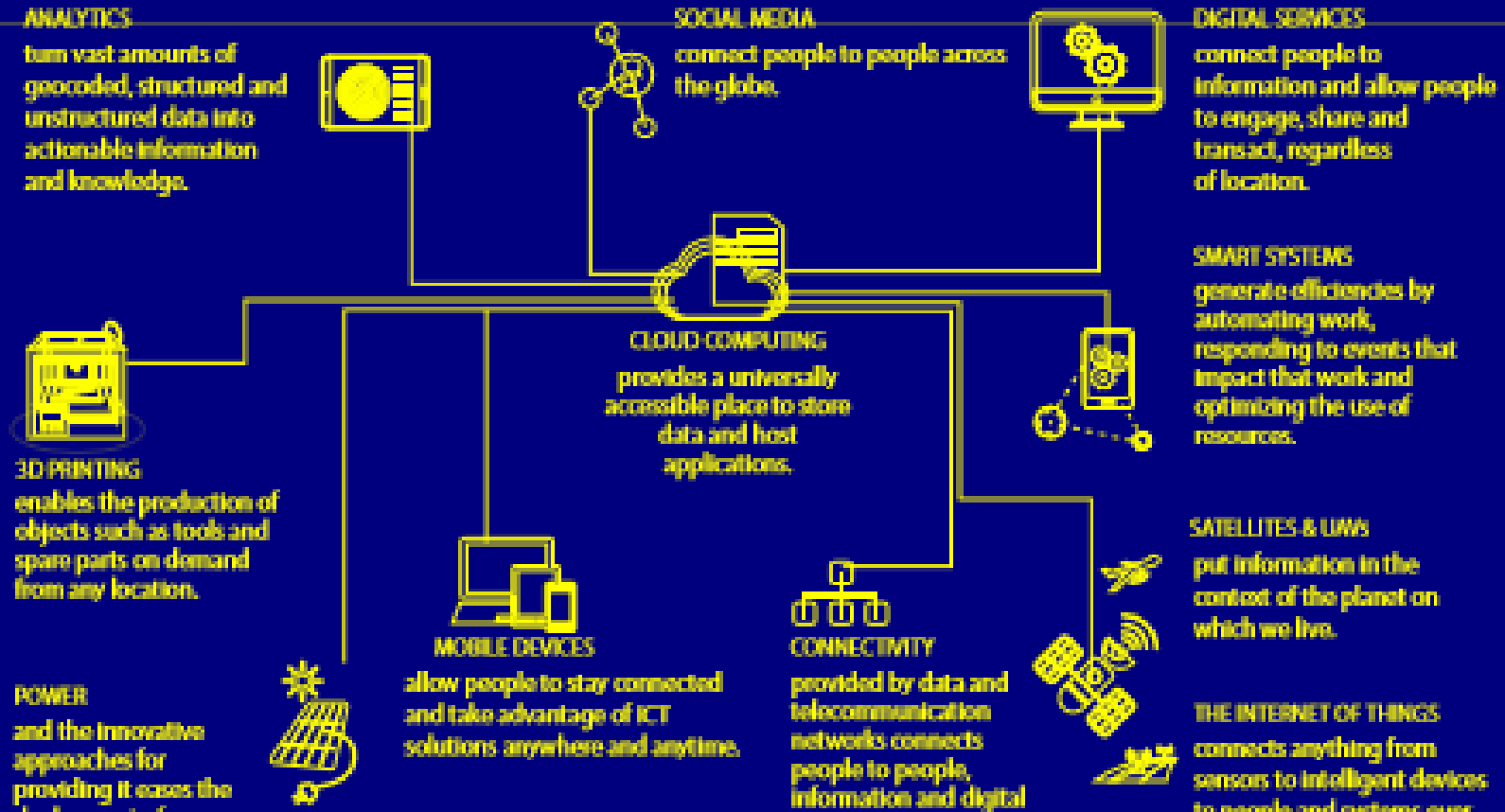
The systems and services that utilize these building blocks to optimize the use of natural resources, to amplify the voices of individuals and social networks and to generate new livelihoods.

# FOCUS ON ***ACTIONS*** ON FOR F.A.R.M.

An ***ICT ecosystem for F.AR.M.*** encompasses the *policies, strategies, processes, information, technologies, applications and stakeholders* that together make up a ***technology environment*** upon which the relevant ICT resources/services and applications are built for mutual benefit of all stakeholders.

# ICT Portfolio

A core set of technologies have emerged that have great potential to improve development program impacts and empower communities. These are the building blocks that comprise many impactful ICT solutions. Some are in use in developing countries today. Others will take time to make their way into global use, but are essential to addressing complex development problems in the face of scarce resources. While new technologies inevitably will emerge, these are a good starting point for aligning an organization's ICT investments with its strategic goals.



# ***Recommendation:***

1. ***Let us study/understand what an ICT Ecosystem for F.A.R.M. should be***

2. ***Undertake the formulatiom of a project proposal for the development and establishment of the ICT Ecosystem***