



## **MULTI DIMENSION IMPACT ACCOUNTING (MDIA)**

# **Core Concepts for Radical Reform of Metrics**

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### **Systemic reform**

There needs to be not one but a complete set of reforms to the present metrics and reporting. The new framework must make it possible:

1. to have rigorous data about money, impact on people and impact on planet ... the Triple Bottom Line and more;
2. to report summary information in a simple and meaningful manner for use by different stakeholders;
3. to drill down to granular information that will help all the social and economic actors make better decisions;
4. to be able to understand the methodology used; and,
5. to have efficient ways to acquire data from individuals via mobile apps and organization from existing data flows.

### **Huge complex systems**

Society is a complex system and the economy is a complex system, and every human being is a complex system. A better system of metrics is going to have to function in the real world that is a complex mix of these complex systems. The system of metrics needs to be suited to function rigorously in a situation where the systems are complex.

### **Building out from the existing accounting construct**

Accounting is built on top of a very powerful construct ... the double entry accounting construct that has served well for more than 400 years. Radical reform of the system of socio-economic metrics will be facilitated by using these concepts not only for money accounting, but also accounting for the impact of economic activity on everything else.

### **Respecting science, especially engineering thermodynamics**

The idea of the profit and loss account is similar to flow analysis and the idea of balance sheet accounts is similar to the idea of sinks in engineering thermodynamics. Conventional double entry account has a construct that reflects the characteristics of engineering thermodynamics.

### **Mathematics**

Mathematics shows that making reliable predictions about the future is impossible in a complex system. While in the short run, the predictions may be quite reliable, in the longer run the results vary in a completely unpredictable manner.

A reliable system of metrics may, however, be developed that will enable short term predictions and allow for data development to encourage change that is in the right direction.

## **Purpose of economic activity**

### **Producing goods and services to satisfy needs**

The core purpose of economic activity is to produce the goods and services that people need to live. This has an ancient history going back to the stone age where all activity centered around having enough food and shelter for an individual, a family and a community to survive.

The ideas of Adam Smith in the 18th century helped to clarify how economic activity gets organized in order to be most productive. He talks about specialization and he talks about the 'invisible hand' of an efficient market that enables the best allocation of resources to produce the goods and services that are needed.

### **Investors and owners are only one of many stakeholder groups**

In the modern era it has become commonplace for an organization to define its purpose as to optimize the performance for investors and the owners of the organization. This reflects a modern legalistic interpretation of responsibility rather than what Adam Smith might have written.

### **Purpose other than profit**

Many organizations that are important in a civilized society do not have the goal of profit. Religious organizations are one example of this.

*Though a church needs to have money to pay its expenses, the purpose of a church is ministry in its many forms. In conventional accounting there is not way to express the importance of the true purpose of the church and the truvalue delivered by a church.*

Organizations that are associated with culture in all its forms are in a similar situation. Music and art and dance have an importance that is not reflected at all in conventional money profit accounting, but are of immense value which should be included in an effective comprehensive system of metrics.

### **Money profit not enough**

Performance that is based only on money profit results and financial return on investment is not enough. There is also the impact on people and planet that should be taken into account. The system of metrics for impact on people and planet should be based on a system of value that is quantified

The traditional way of doing analysis has been to focus on an organization do money profit accounting for all of the organizations involved., packaging a set of activities to sell to the customer. The norm has been for there to be a big effort to engage customers with the products being offered with the goal of making customers happy while paying well and making the organization profitable, but totally ignoring impact issues within the formal process of numerical analysis.

### **'Triple Bottom Line' (TBL)**

A better way to assess performance of an entity is to include impact on people and planet as well as the money profit. The triple bottom line (TBL) has been helpful in starting to change the conversation about economic performance, corporate social responsibility (CSR) and sustainability.

For people, impact is change in quality of life. There are many complex interactions, but one of the most important is the wage earned from a job which in turn enables products which satisfy needs to be purchased. The money of wages subsequently feed into the place because of the local multiplier. The local multiplier is an important variable that can be changed as a result of people's buying behavior.

For planet, one impact is the depletion of resources. Money profit accounting ignores the depletion of resources (except for the money cost of buying access to resources, which is different from the issue of depleting the actual stock of resources on the planet). Some resources are finite and will run out. Some may be renewed, but the time and cost to do this must be accounted for.

For planet a second impact is the strain caused by waste whether it is solid waste, liquid waste or gaseous waste. The corporate world has a history of dumping all of these wastes outside the accountability boundary of the organization, and then ignoring the impact. The impact must be quantified, included within a relevant boundary and taken into account.

### **The Multiple Dimensions of MDIA**

The MDIA initiative puts money profit, impact on people and impact on planet into a single system where eight components are taken into consideration. This requires a system to quantify impact as rigorously as there is quantification of money transactions that result in profit. The rigor should be the same, but the method will be radically different.

MDIA has two units of measure:

1. Money that measures business profit, material value and wealth; and
2. TruValueUnits that measure TruCost, TruValue and TruWealth

The MDIA system enables accounting, analysis and reporting from various different perspectives:

1. Organization - Economic activity
2. People - Individual - Family - Friends - Community
3. Product - Supply chain - Use - Post Use Waste Chain
4. Place

Conventional money accounting has these activity components which result in money profit:

1. Money costs; and
2. Money revenues

MDIA has these activity components:

1. Value consumption; and
2. Value production

The MDIA activity components result in multiple impacts as follows:

1. Money surplus or deficit
2. People - impact on quality of life

3. Community - Place
4. Planet - Resource Depletion - Materials - Energy
5. Planet - Environmental Degradation - Land - Water - Air
6. Built Environment - Infrastructure, Buildings, Plant and equipment
7. Enabling Environment - Governance, Rule of Law, Taxation, Organizations
8. Knowledge - What we know

## **Information that is meaningful and simple**

### **Purpose of information**

There are several reasons for having information:

- to know whether or not there is progress or not;
- to know how good is the performance;
- to know what are the causes of the progress (good or bad) and what should be done to improve the situation; and
- To inform economic actors so that they may make better decisions ... to provide feedback related to decisions made.

### **How information may be summarized**

The metrics associated with all of these components may be summarized for different decision making purposes. These dimensions are:

1. Summary by organization ... for business management and capital markets, etc.
2. Summary by place ... for decision makers in a locality ... where profit is earned, people live and work, product is produced and bought and sold
3. Summary by person ... to help individuals, families and communities to make better decisions

### **Detail information that informs decisions**

Detail information will help to identify possible solutions that will improve performance.

Detail information may come from analysis of large amounts of data or simply from quite small amounts of very relevant data from simple observations. In many cases the latter can be very useful while also being very low cost.

### **Summary information that shows results**

A simple statement that shows change in 'state' serves as a very efficient way of reporting on progress. For the organization change in the financial balance sheet is the progress priority.

For a place it is the change in the 'state' of people, and the change in the 'state' of the planet. In both cases the change is partly a direct change and partly a change resulting from second level association.

## **Types of data**

One of the ways that data can be classified relates to the speed the data needs to change to reflect changes in the underlying fact. This has important implications for the design of data systems and the cost effectiveness.

### **Transaction data**

Using accountancy as the model, transaction data is high volume and changes very rapidly. The P&L accounts are used to aggregate all the detail transactions.

### **Balance sheet data**

Balance sheet information changes quite slowly. Many transactions may not change the balance sheet accounts by very much. It is very much easier to verify a balance sheet account that changes slowly than a P&L account that changes all the time.

### **Easy data**

A different category is something that can be described as 'easy data'. These data can be acquired with relatively little effort, while somewhat similar data may be much more difficult to acquire.

### **Sustainable data**

Data must be sustainable. This translates into the idea that data must have an absolute low cost, and also the data must have a meaningful value. One of the best ways to reduce improve the relationship between cost and value of data is to use the data over and over again, rather than compiling the data from scratch every time the data are needed.

## **State, progress and performance**

### **Balance sheet and operating statement**

In double entry accounting, one of the core concepts is (1) the nature of balance sheet accounts and the accounts that make up the operating statement or profit and loss account.; and (2) the fact that profit can be computed either by looking at the profit and loss accounts for the period OR by comparing the changes in the balance sheet from the beginning to the end of the period.

### **State**

State is similar to balance sheet. State is a summary of the state of value at a moment in time for the reporting entity. Values included in 'state' relate to all the values associated with quality of life of people and the values of everything associated with the planet in addition to values normally denominated in money units.

### **Progress**

Progress is the improvement in 'state' from the beginning of the period to the end of the period. Because 'state' is a function of many factor, the relationship between costs (or value depletion) incurred to pay for activities may be greater or less than the resulting progress.

### **Performance**

Performance is rather like the statistics in a professional team sport. There are many ways to assess performance for the many elements in the socio-economic system.

One important measure of performance is the relationship between progress overall and the consumption of value associated with planet

## **Meaningful metrics from incomplete data**

One of the realities of analysis is that data are almost always incomplete or inadequate. In spite of this, there is a need to do analysis and draw conclusions. In most cases, statistical methods are used to compensate for the lack of data, and this is better than nothing, but MDIA does it differently.

### **MDIA uses accounting methods associated with incomplete records**

In accountancy there are ways to create reliable financial reports from incomplete records. This is because, in double entry accounting, balance sheet change and operational profit are the same.

In the MDIA system it is change in 'state' that gives a reliable measure of progress without having to know anything about the transactions that resulted in the change.

Furthermore, where a component of 'state' does not change, there is no need to spend effort on assigning a value since it is the change that determines progress.

## **Cost, price and value**

### **More than just price**

In order to understand the state of society and the economy it is useful to be clear about the meanings of cost, price and value.

Most consumers understand price, and most consumers are concerned with price. They work hard to get 'the best price'. In recent years, the search for 'best price' has been facilitated by the Internet and ubiquitous data about prices.

Consumers are also concerned with value, but the concept of value is imprecise. Worse, the idea of value is heavily influenced by asymmetrical information delivered as advertising and brand PR.

The consuming public knows almost nothing about cost. Cost information is well known inside a corporate organization, but hardly ever leaks into the broader society.

Again, advertising and PR gets used to justify price increases because there have been 'cost' increases, but nothing in this is verifiable by consumers and the general public. Furthermore there is a big move to use social media and other information to relate prices and reviews for products.

### **Cost**

Cost is important for the organization because cost is part of the equation:

$$\text{Revenue minus Cost equals Profit}$$

Cost, and especially the behavior of cost is well understood inside the corporate organization, and there are continuous programs of improvement ... meaning cost reduction ... within every well managed organization.

Cost needs to be better understood by public at large. A cost is a hard fact associated with the history of the product and what has gone into its production. Many times the word price is attached to situations where cost is meant.

### **Price**

It is something of a myth that prices are determined by supply and demand in the market. In general, prices are determined within a marketing organization based on models that relate price and cost to optimize for maximum revenue and profit.

$$\text{Price times Quantity equals Revenue}$$

What is going on with price is very visible to the public. Consumers buy products and services and they are exposed to price all the time.

### **Value**

Value is pretty much ignored in money profit accounting and the models that optimize for profit. However, value should not be ignored, because it is value that drives the buy or not to buy decision. Because of this corporate advertising of products and brand PR puffs up the value of a product, but only with respect to its consumption characteristics.

Worse value is not quantified with the same clarity that cost and price are quantified. Because value is not quantified, value drops out of the conversation.

$$\text{Standard unit value times Quantity equals Value}$$

With MDIA , the metrics for value become mainstream and the quantification of value will get applied to every single value element including all aspects of impact on people and planet.

## **Profit and valuadd**

### **Profit**

Profit is the result of from economic activity that has more revenue than costs. It may be calculated in two quite different ways.

In the first way, all the revenues are added up, and all the expenses are added up, and the difference is the profit. This is the Profit and Loss Account in regular accountancy.

$$\text{Revenue minus Cost equals Profit}$$

In an alternative way, the profit may be calculated by looking at the change in the balance sheet of the organization from the beginning of the period to the end of the period. This is a technique that is very useful in business situations where there are 'incomplete records'.

$$\text{Net Balance Sheet EOP less Net Balance Sheet BOP equals Profit}$$

Where EOP and BOP are End of Period and Beginning of Period

### **Valuadd**

In MDIA valuadd is similar to profit, but valuadd takes into consideration all of the externalities that are routinely ignored in regular accounting.

$$\text{Value creation less Value consumption equals Valuadd}$$

It is almost impossible to computer valuadd by adding up all the value creation activities and all the value consumption activities, but it becomes easier using the balance sheet method described above.

$$\text{State EOP less State BOP equals Valuadd}$$

Where State EOP is the value balance sheet at the end of the period and State BOP is the value balance sheet at the beginning of the period.

## **Quantification of value**

### **Difficult, not impossible**

The quantification of value is very important. Without quantification the default is that it is zero which is always wrong. Value is different depending on the context and the individuals concerned, but this only means that the quantification must be built around this reality.

### **The concept of standard value**

In corporate cost accounting there is a concept of 'standard cost'. The same general idea needs to be applied to value in the form of a schedule of 'standard values'. This forms a baseline or norm for values against which other perceptions of value can be associated. The quantification is done to have a profile of relative values, rather than something that is absolute and measured in money terms.

### **Crowdsourcing to build the standard value dataset**

The standard value dataset is built using a data entry system that is accessible on the Internet and as a mobile app. The value set is built for an individual and aggregated according to some of the main characteristics of the individual. For example: (1) location; (2) age group; (3) gender; (4) interests.

As the datasets develop it will become apparent what other characteristics should be used to group the value profile.

## **Value chain analysis**

### **Important because of complexity**

Value chain analysis is important because of the incredible complexity of modern production and distribution both in terms of physical facilities but also the associated legal and regulatory structures. A product will flow through a value chain as long as all the activities in the chain are financially and operationally viable. When one link is broken, everything stops. Value chain analysis in the DMIA framework also identifies where impact on people and planet is compromised.

### **Time, place and organization**

Value chain analysis may be done in various ways: (1) over time; (2) over geographic places; and (3) between different organizations. Value chain is the set of economic activities that starts with raw inputs of various sorts and ends with the final disposition of the outputs in the form of waste impact on the planet.

### **The product value chain**

The product value chain is a special instance of the value chain. The value chain of a product starts with the beginning of the supply chain and runs through all the economic activities of the supply chain, then goes into a use phase, and finally enters the post use waste chain.

The value chain analysis of a product helps to inform consumers about the products and services they buy and may be used to influence the buy or not to buy decisions in the economy.

## **Organization, place and product**

### **Primary reporting entities**

Organization, place and product are the primary reporting entities. The same originating data from the individual economic activities are used for the aggregation into these three different entities.

### **Boundaries**

Boundaries are an important part of the regular accounting framework and determine how the reporting is done. In regular accounting it is normal for the reporting boundary to be drawn tightly around the organization taking into consideration its legal structure. This has the effect of excluding externalities in every way.

In MDIA there are multiple reporting boundaries to reflect the complex nature of the economic system and society. In MDIA there may be a tight boundary around an organization to reflect the performance of the organization, but the data are structured so that even in this situation the impact of external factors are brought into the individual organization's reporting.

### **Organization**

Most performance reporting in the modern economy has a focus on an organization. Inside an organization there are massive amounts of data and analysis all aimed at making the organization perform as profitably as possible. This is where almost all cutting edge data analytics are concentrated.

Rather little of the internal data analytics is dedicated to optimizing the organization's impact on people and impact on planet. These performance perspectives are almost totally ignored in most corporate organizations.

An organization is private, and as such data about its performance are only made public as a result of law and regulation, and in order to promote the image of the organization to the public.

### **Place**

Place is essentially public and not private. Place is also permanent ... it never moves or disappears.

It is possible to walk around a place, and observe things. Observation can be converted into data about the state of the place.

A place is where economic activities are located. The performance of individual economic activities in a place are the core components of the aggregate progress and performance of the place.

### **Product**

Goods and services ... product ... is the link between economic activity and individual and collective decision making about what to buy or not to buy.

Every product has a value chain that goes from the beginning of the supply chain, through various buy or not to buy decision points, through use and into a post use waste chain. A number of economic activities interact with products to change them in some way as they progress through this value chain.

Organizations make huge expenditures to promote products through advertising and brand PR, all aimed at getting a favorable outcome at the buy or not to buy decision point of the product. Organizations are funding the use of 'big data' analytics to provide product reviews to supplement and support the advertising and PR.

MDIA aims to add other information about 'product' so that the whole value chain impact of product is as fully understood at the time of the buy or not to buy decision as the price and the review information.

## **National level analysis**

### **Economic performance**

National level economic analysis has evolved over the past 200 years, and is quite sophisticated. It is used as the basis for policy choices at the national level.

National level analysis is better than nothing, but it is based on many analytical ideas that ensure a sub-optimization of socio-economic performance.

The dominant metrics is Gross Domestic Product (GDP), a measure that has been regarded as being inadequate for well over 50 years. It remains in use probably because GDP growth facilitates easy profit improvement for organizations and related stock price increases.

There are many sector level metrics at the national level. These metrics are good for tracking progress, but all of them are not well suited to decision making to improve performance.

### **Addressing deficiencies in national level metrics**

The MDIA initiative does not address the deficiencies of the national level data systems, but simply uses them to validate the effectiveness of the MDIA framework for optimizing socio-economic performance. MDIA is a complementary system, that will result in many of the national level performance indicators to improve.

### **Data for national security**

It should be noted that there are cutting edge data analytics in some national level organizations, notably organizations engaged in national security work, intelligence and defense. Not much is known publicly about these systems, but it is fairly common knowledge that they are as powerful or more powerful than the best analytical systems deployed in private sector organizations.

## **Individual, family and community**

### **Putting people at the center**

A healthy economy is going to be one where people are benefiting to the maximum from productivity improvement. This is a big change from what has prevailed since the early 1980s. Since that time most productivity improvement has been captured by the organization as profit, with less and less benefit flowing to people.

### **Individual**

Individuals have many different roles in society and the economy. They are investors, executives, workers, customers, suppliers, members of families, in circles of friends and members of communities.

Individuals are affected by the income they have, the wealth they have, their families, their friends, their communities, their health, their education, their opportunities ... and a whole lot more.

It is the improvement in the quality of life of an individual that is perhaps the most important measure of progress and performance of a society and the economy.

### **Family**

A family is an important aggregation of individuals. There may not be many money transactions that get recorded within the family unit, but there are very important value transactions that go on inside the family. These are incredibly important in the quality of life of every individual.

### **Community**

A community is an important aggregation of individuals, or families and all sorts of economic activities that are all connected in a myriad of complicated ways.

A community and a place have a lot in common. As a first approximation they may be considered to be the same, but they may not be. This will not be explored further at this time.

The impact of economic activity on a community or place depends on the local multiplier. The data should be granular enough so that this element of economic performance can be optimized as individual and business decisions are made.

### **Some other issues**

A modernized system of metrics should work for every type of organization: for profits, for not-for-profits, for governments, for religious organizations, for small entities and for multinationals, for entities in every sector, etc.

The system should be easy to operate, and yet be effective in everything it is trying to do. Part of this is going to be the idea that issues that are material should be obvious, and less material issues filtered so that they do not confuse.

The system should be able to include the quantification of risk in a way that is clear and does not confuse.

The system should be able to address the issue of present value and future value in a way that is clear and makes the issue of present and future easier to understand. The present widespread use of 'discounting the future' should be modernized in an appropriate way.

An effective modern system will be a uniform system that has applicability everywhere there is economic activity.

The power of modern technology not only has become a huge power for progress but also has a downside ... the capacity to blow up the world.

*The awesome power of technology became a matter of concern with the invention of the nuclear bomb about 70 years ago, and this was only the beginning.*

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Contact information for Peter Burgess: Founder / CEO ... TrueValueMetrics

Website: <http://truevaluemetrics.org>

Email: [peterbnyc@gmail.com](mailto:peterbnyc@gmail.com)

Skype: peterburgessnyc Twitter: @truevaluemetric

LinkedIn for Peter Burgess : [www.linkedin.com/in/peterburgess1/](http://www.linkedin.com/in/peterburgess1/)

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