Extracting business value at the product market intersection through Analytics
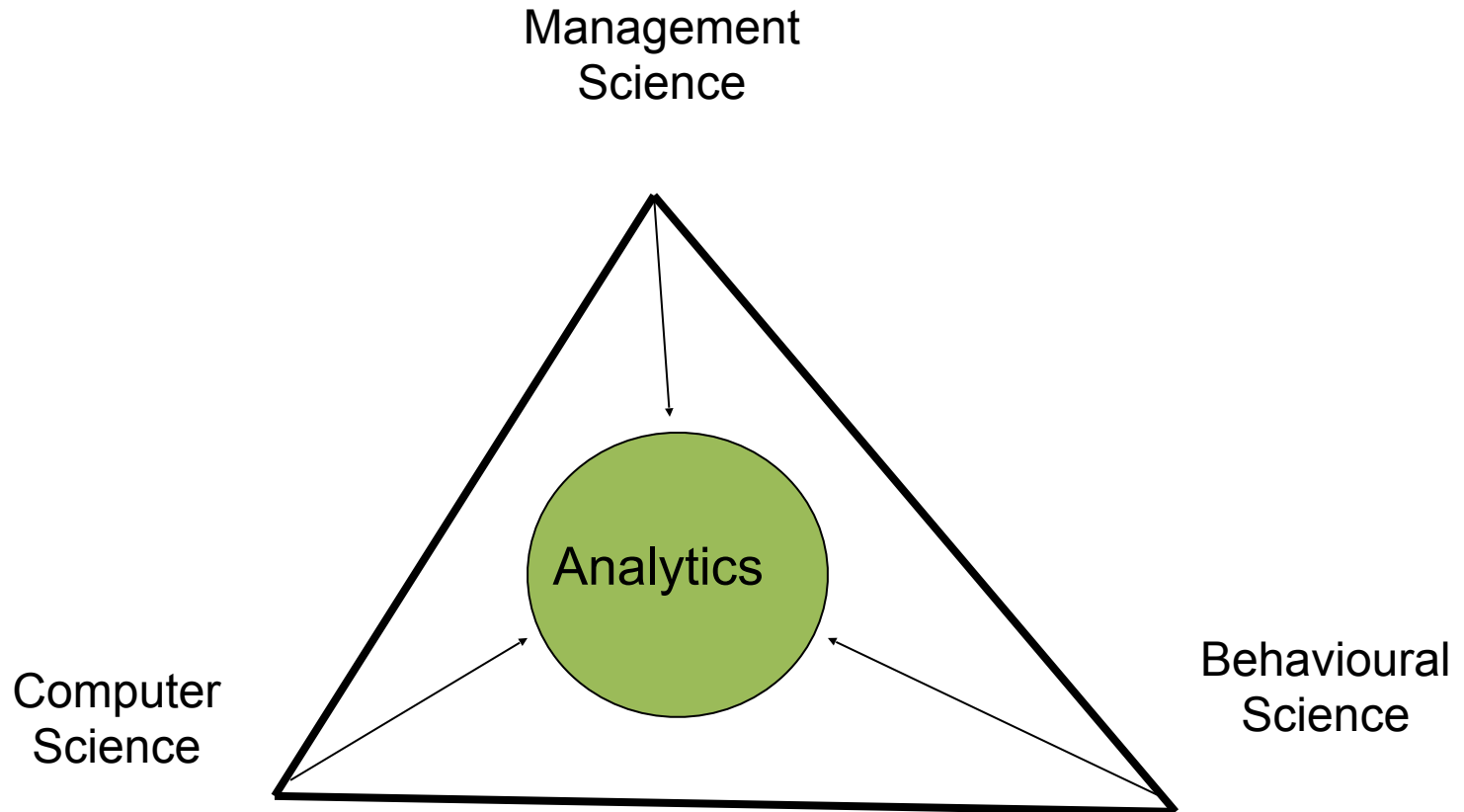
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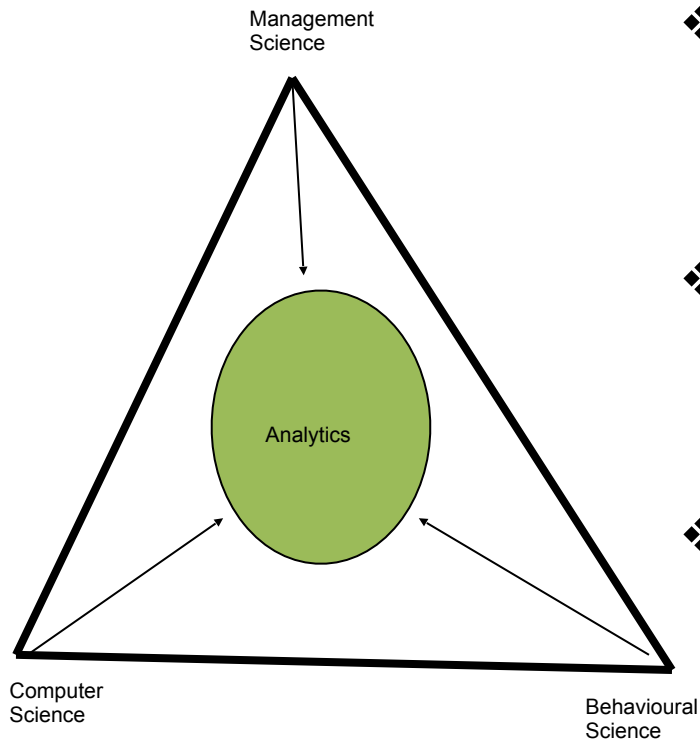
**Parasuram Balasubramanian Ph.D,
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Bangalore, India 560041**

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Power of Analytics

**Integrating the concepts and tools from the three sciences
we can extract the power of Analytics**

Management
Science

Analytics

Computer
Science

Behavioural
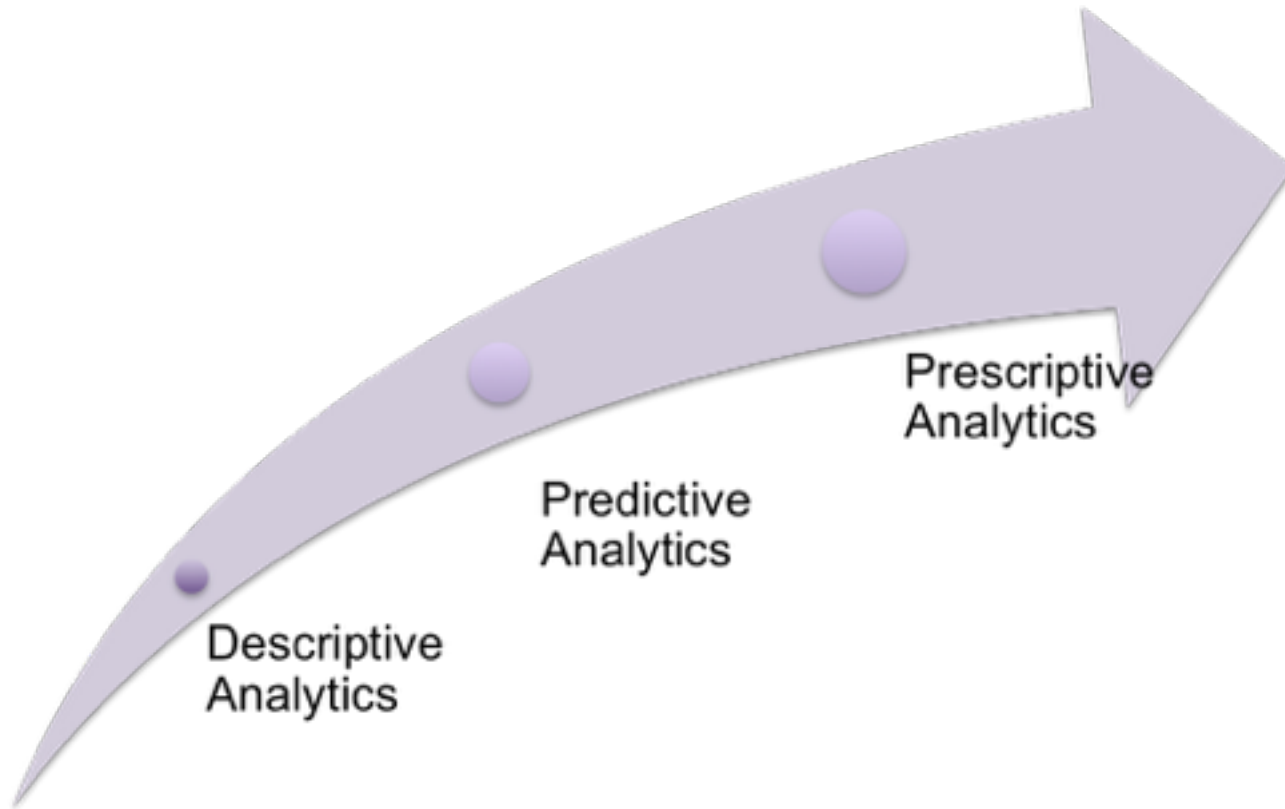Science

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Power of Analytics

❖ Management Science grew with the field of Operations Research. Data issues inhibited its growth till 1970s.

❖ Explosive growth of Computer Science till 2000 acted as a fodder for growth of Analytics.

❖ Internet, POS, Mobility, Big Data and Location Aware Technologies are fueling the embedding of Behavioural Science into Analytics.

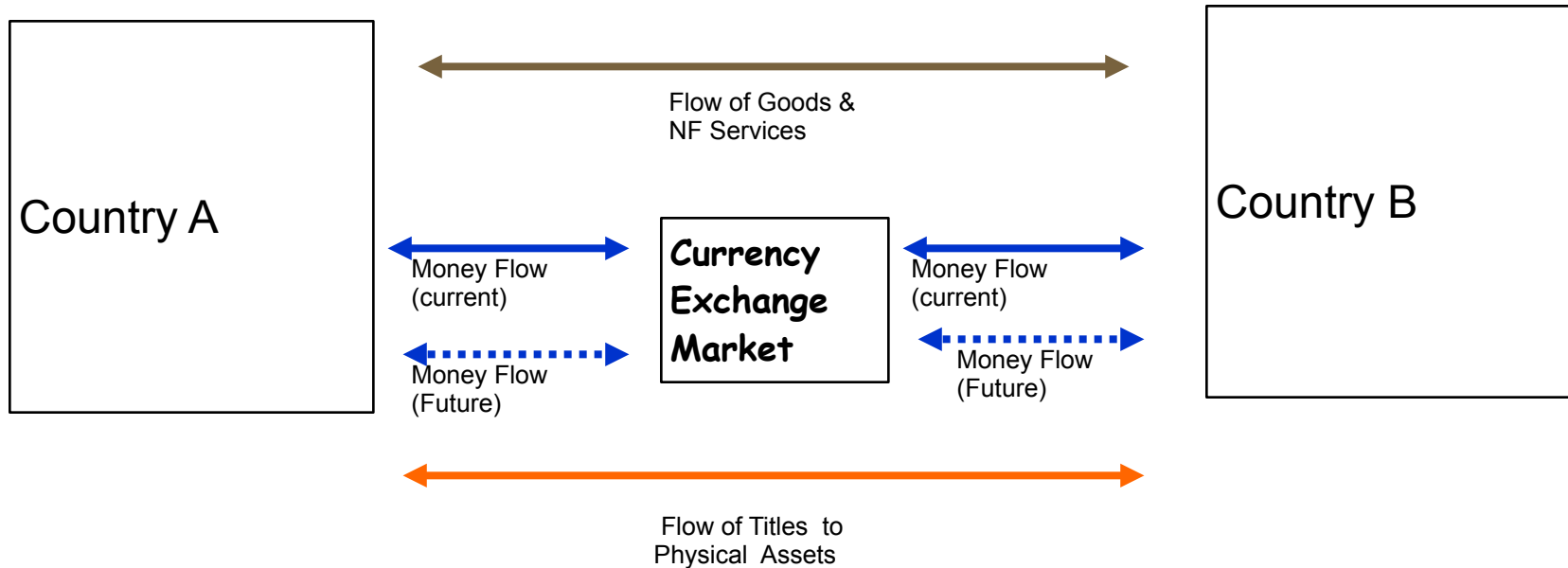Theme Work Analytics
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Delivering Business Value has to be the core objective of Analytics.

Prescriptive
Analytics

Predictive
Analytics

Descriptive
Analytics

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Power of Analytics

Two Countries Model (using different hard currencies)

Country A		Country B

Flow of Goods & NF Services

Currency Exchange Market

Money Flow (current)

Money Flow (Future)

Money Flow (current)

Money Flow (Future)

Flow of Titles to Physical Assets

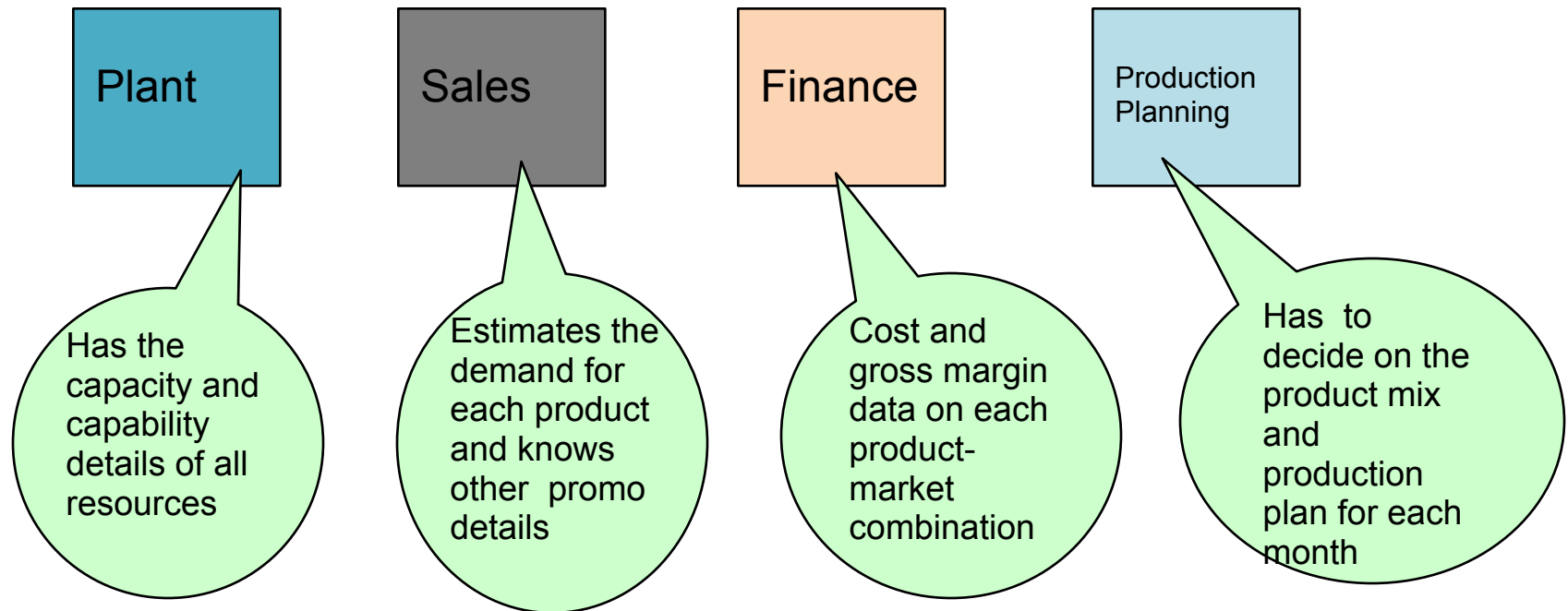A Descriptive Model used to visualize economic interaction between countries

Power of Analytics

Linking product data with customer, factory and supplier information yields rich dividends.

Returned Tyres Analysis:
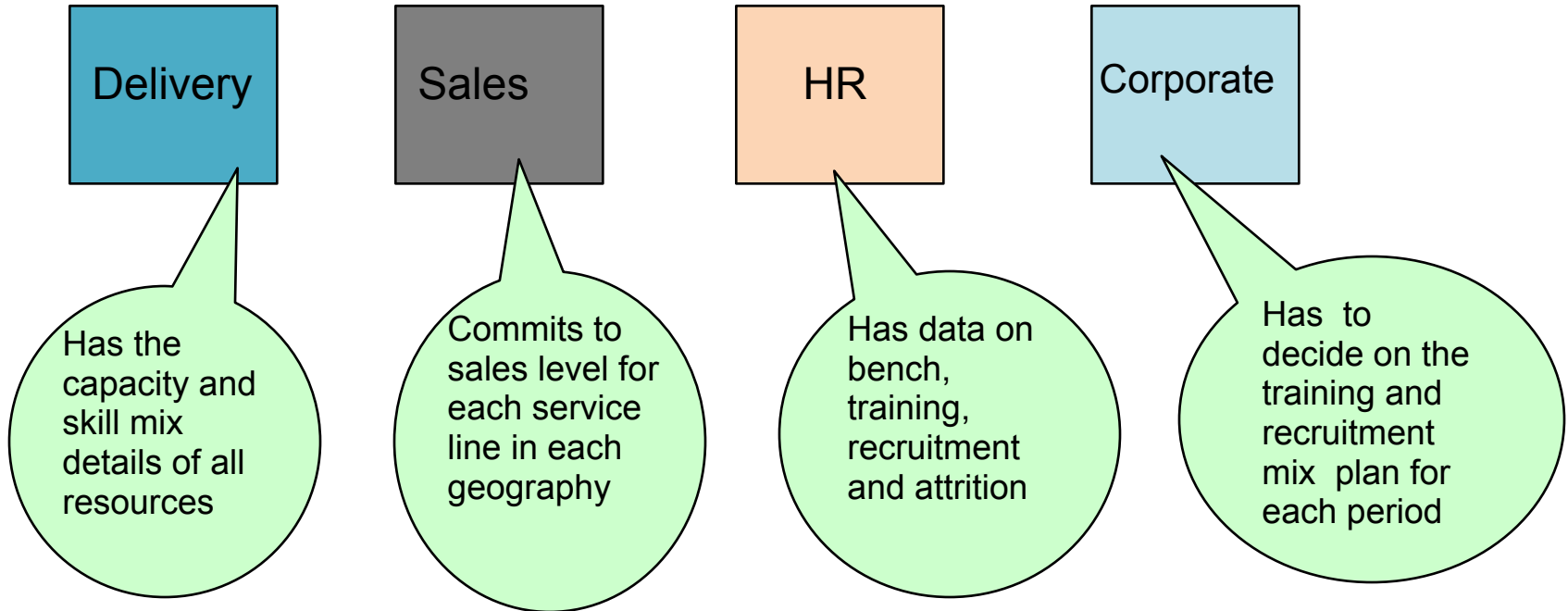

Apparent cause
Value Loss
Early failures

Usage
Behaviour
Track Record

Customer

Raw material composition.
Supplier.
Factory Mix.

Root cause
Lot wise analysis
Shift condition
etc

Factory

Laboratory
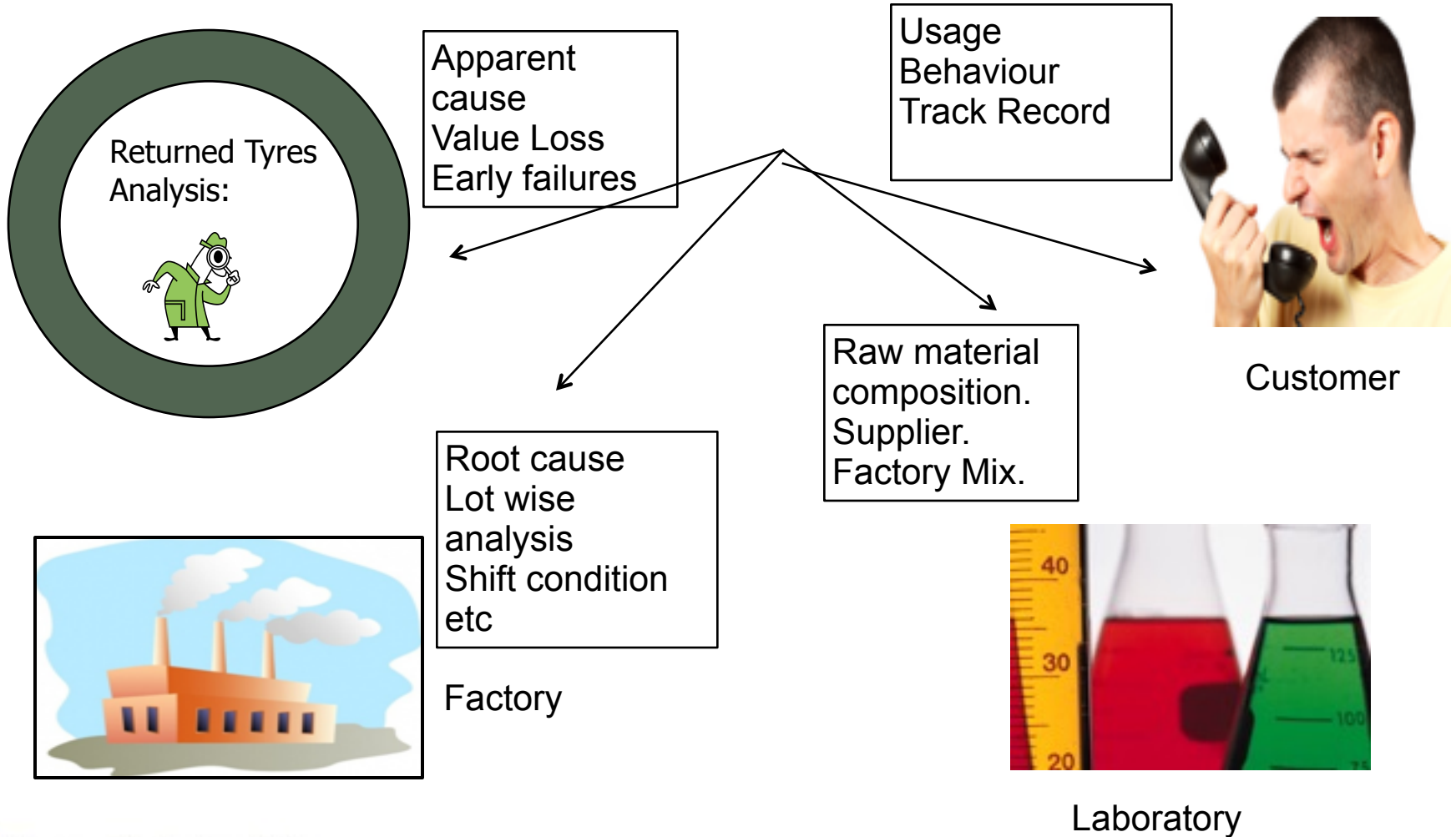
Power of Analytics

Data sits in departmental silos. They have to be pooled together to get the best Product Mix for the firm as a whole.

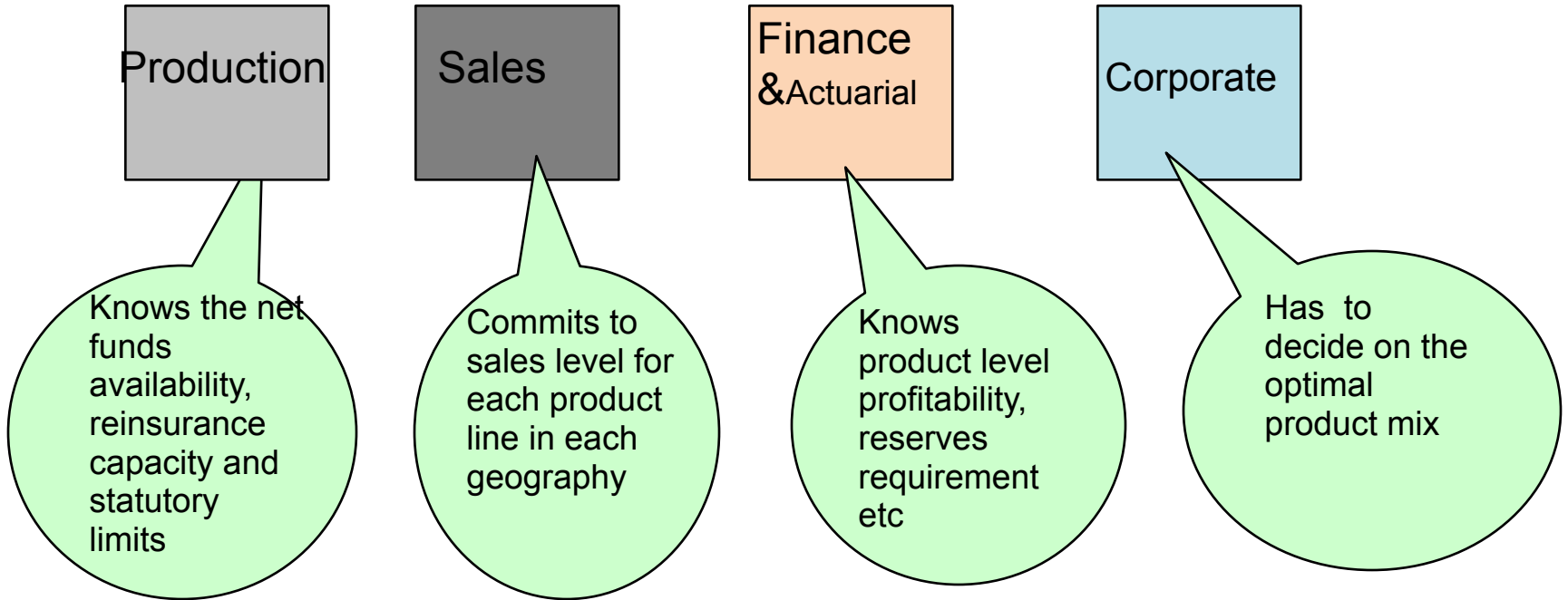| Plant	Sales	Finance	Production Planning
Has the capacity and capability details of all resources	Estimates the demand for each product and knows other promo details	Cost and gross margin data on each product-market combination	Has to decide on the product mix and production plan for each month

Product Mix Optimization Model

Every I.T. services firm has to optimize the allocation of staff to various training programs to minimize bench and the lost project opportunities.

Delivery	Sales	HR	Corporate
Has the capacity and skill mix details of all resources	Commits to sales level for each service line in each geography	Has data on bench, training, recruitment and attrition	Has to decide on the training and recruitment mix plan for each period

Product (Services) Mix Optimization Model

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Power of Analytics

Every Insurance (or financial services) firm has to optimize use of available funds
adhering to various statutory limits and reserve requirements.

Production — Knows the net funds availability, reinsurance capacity and statutory limits

Sales — Commits to sales level for each product line in each geography

Finance &Actuarial — Knows product level profitability, reserves requirement etc

Corporate — Has to decide on the optimal product mix

Product (Services) Mix Optimization Model

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Power of Analytics

Knowledge is found where unknowns are probed. The Firm's interaction with the Market (consisting of Customers and Vendors) is the fertile ground

Firm

Customer

Vendor

Knowledge Zone
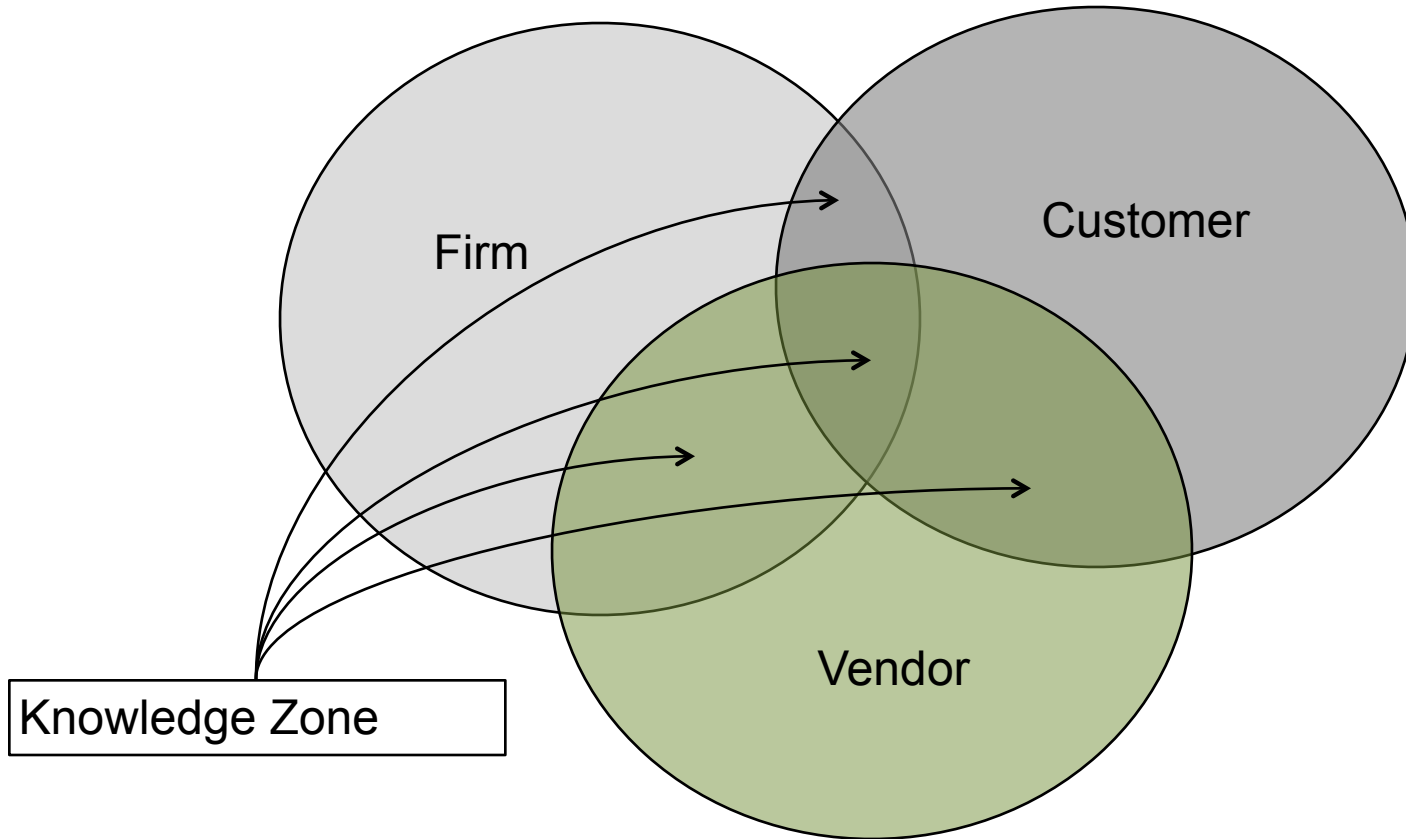
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Product functionality, pricing, promotion strategy etc need constant validation. So is product design.
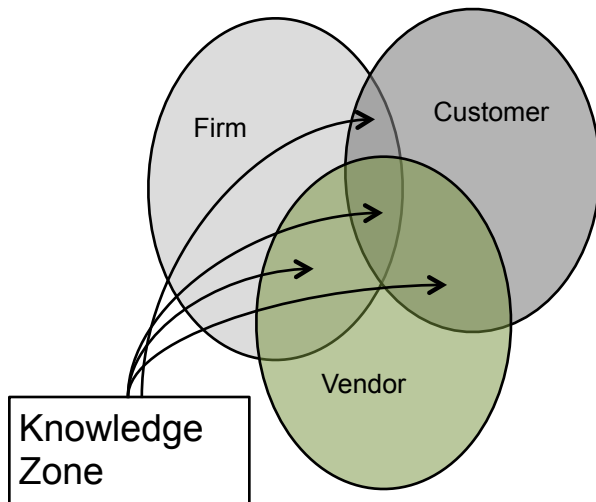
❖ Firm designs the product with many assumptions; Market place is where these assumptions are validated with the product release

❖ Firm can solve many factory and field issues of the product only by tapping the higher knowledge of the vendors

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ERP,CRM and SCM systems create (or capture) the data and generate usable information. Knowledge extraction however happens only by Overlapping these information in multiple layers.
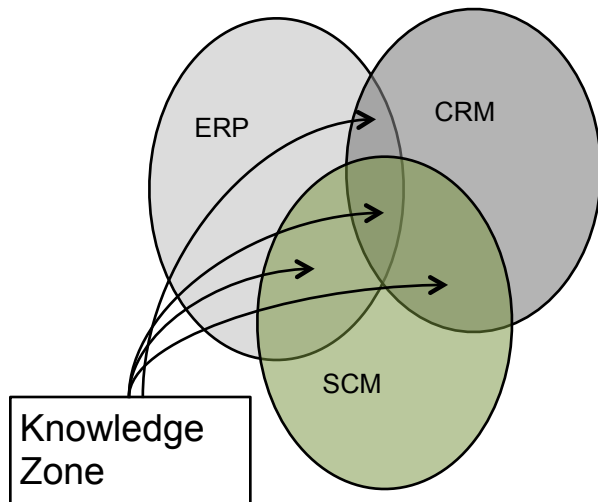
- ❖ Why does this product not appeal to the young affluent?

- ❖ Should our promotional tactics be different in this geography?

- ❖ How can our product be fine tuned for proper balance between price and functionality in every market segment

- ❖ Which vendor can work with us to effect significant product innovations?
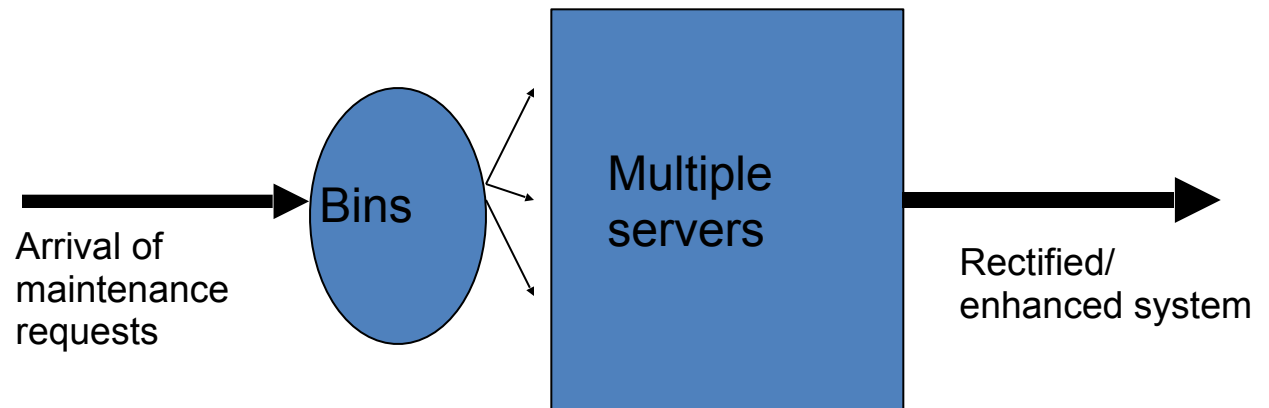
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Application software maintenance is still big business.

The Maintenance need arises due to

- Bugs undiscovered in initial implementation

- Lax data verification procedures and subsystems

- Changed data conditions

- Changing business needs

- Changes in environment; legislation etc

- Bugs injected during the Maintenance process

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Queuing Theory provides a relevant and usable model

Arrival of maintenance requests

Bins

Multiple servers

Rectified/ enhanced system

Improve server productivity and reducing arrival rate is the prime goal.

Both objectives can result in decrease in number of servers needed from time to time.
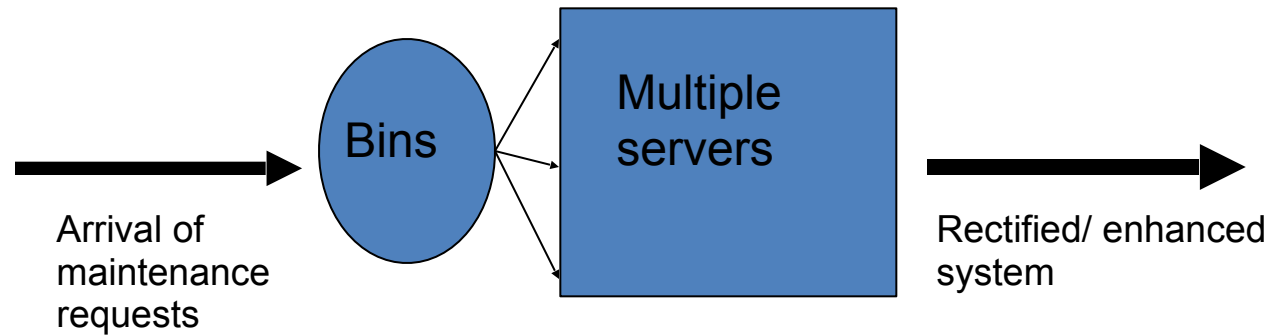
Queuing Theory provides a relevant and usable model

Arrival of maintenance requests

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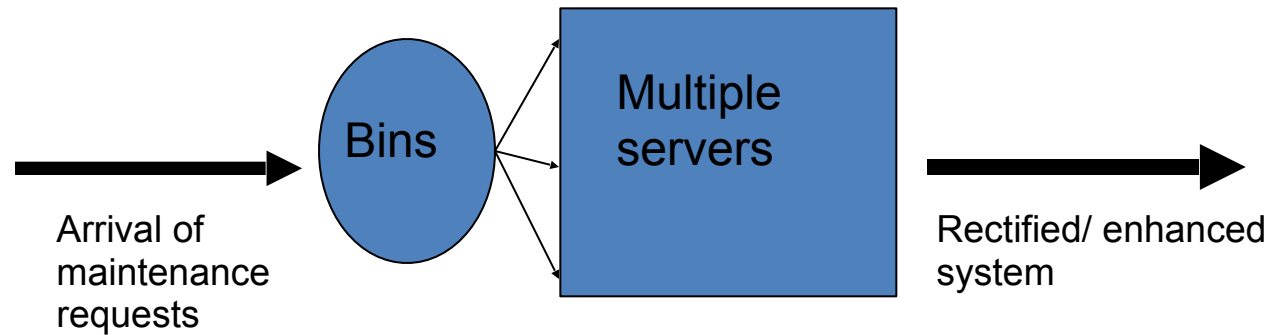
Server productivity can be improved by

- Building multiple skills in each server

- Bringing the documentation to-date

- Creating a shared knowledge data base for system based learning

- Creating standard procedures for error analysis, impact analysis, rectification and testing
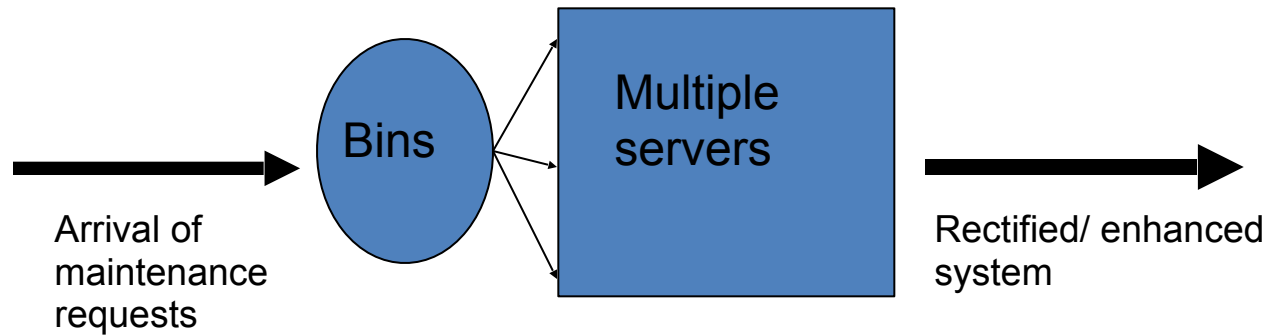
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Queuing Theory provides a relevant and usable model

Bins

Multiple servers

Arrival of maintenance requests

Rectified/ enhanced system

Server productivity can be improved by

- Use of domain experts as trainers and project resources

- Extensive use of metrics to measure and report productivity levels and service levels

- Restructuring the code periodically to improve its maintainability

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Queuing Theory provides a relevant and usable model

Arrival of maintenance requests → Bins → Multiple servers → Rectified/ enhanced system
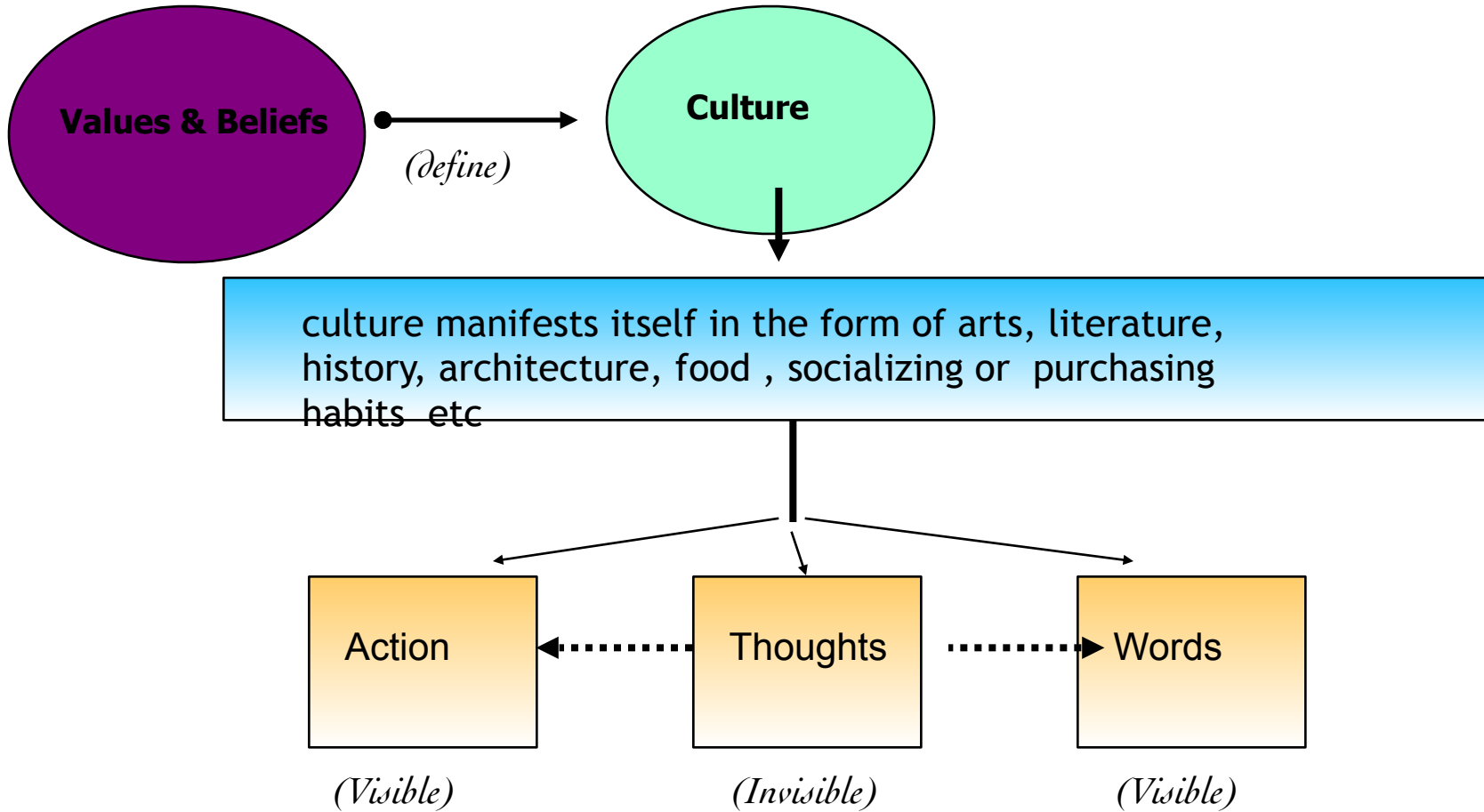
Arrival rate can be decreased by

- Periodic sub system level testing

- Restructuring the code periodically to improve its maintainability

- Tightening data validation procedures in preprocessing stage

This approach was fused into the Quality Assurance efforts. Hence continuous improvements were effected.

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Power of Analytics

Human intent can only be inferred. Words are ambiguous. Action is definitive.

Values & Beliefs → *(define)* → Culture

culture manifests itself in the form of arts, literature, history, architecture, food , socializing or purchasing habits etc

Action	Thoughts	Words
(Visible)	*(Invisible)*	*(Visible)*

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Power of Analytics

Big Data Analytics

Big data refers to large data sets exceeding the limits of normal data base management software.

Vast amounts of data in single or few data sets instead of collection of data from numerous sparsely related data sets
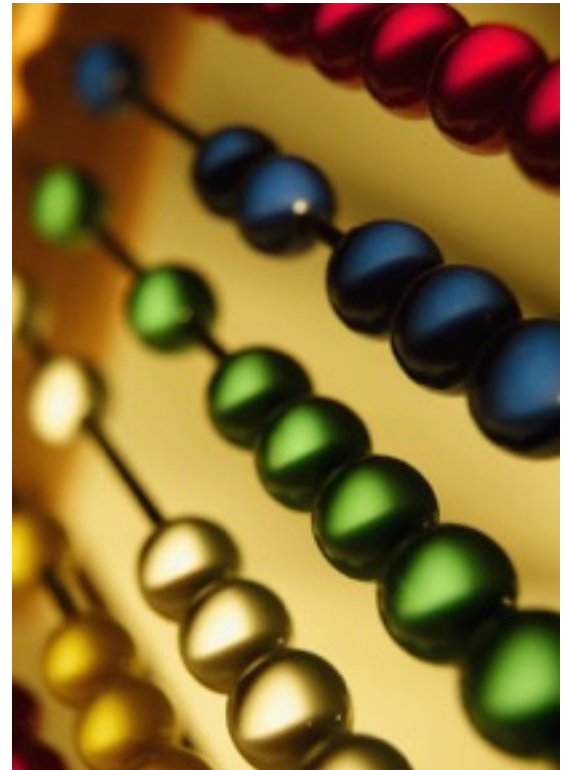
Data includes text, graphical, audio and video outputs.

Big Data Analytics

❖ Analytics and particularly the Model is the ship with which one can navigate through the ocean of Big Data.

❖ Model lends it a purpose and a focus.

❖ Provides reliable results in Predictive analysis

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Big Data Analytics: Tools such as Decision Tree, CART, Ensemble and Random Forests are available today.

How can prepayment or payment default be predicted ahead of time and timely preventive measures initiated?

How can churn be reduced?

How can insurance products be restructured to accurately reflect the risk in each segment?

Under what circumstances productivity initiatives yield significant gains in an I.T. Services firm?

How do we improve vendor performance?

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Power of Analytics

Social media lets us analyze the spoken/written word to peer into the human intent and validate action based intent deduced earlier.

While using data from Social Media, tread with caution

How representative of the population is the sample data? (This has to be established before projection)

How robust and reliable is the model that extracts beliefs from the Word. {Can it be validated?}

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The true challenge of delivering Analytics : The CIO's dilemma

❖ Designing and delivering Analytics call for higher order skills
In all three sciences. They have to be nurtured within the
CIO's ambit.

❖ Extracting the business benefits using Analytics however will
continue to be the responsibility of other functionaries.

❖ CIO has to play the role of trainer, mentor and enabler and
many a time the evangelist.

❖ In this process the specialist with analytical skills may also be
discouraged; hence retention becomes an issue.

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Words of wisdom

Even a strong correlation is no proof for cause-effect relationship

Neither simulation nor optimization offers validation for cause effect relationship

No model can be used to predict outcomes outside the range of the data set used to build the model

Every time before a model is used, we have to ascertain the data range validity

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E = MC²
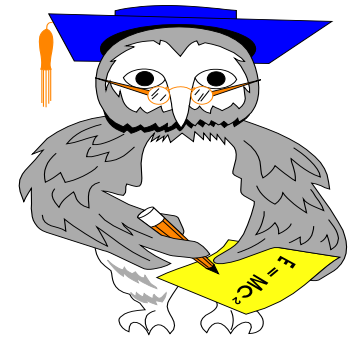
Words of wisdom

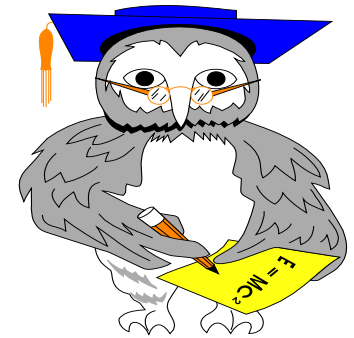Models need periodic validation too.

No model can be used to guide decisions at a level of granularity greater than the data used to build the model.

Models form the base of Analytic enquiry.

Knowledge resides at places where uncertainty exists.

Uncertainty is the result of diversity.

Diversity is the rule of nature.

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Thanks and Best Wishes

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