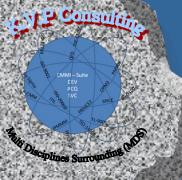


Agenda

- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
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How do we decide when we have little information?

Our focus is on the future – and there are no facts about the future. And not many facts about the past!

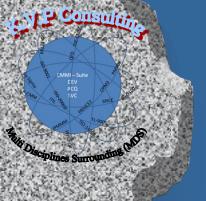
Decision making ("Decision Analysis"); making "rational" choices

Are you superstitious?

How are brain works?

Do you stereotype?

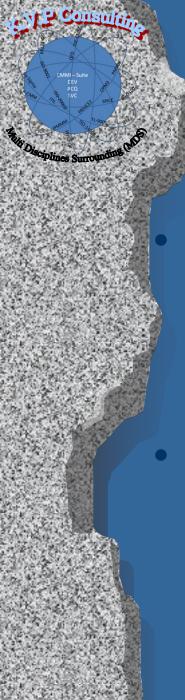
- The patterns of "irrationality"-Rules of Heuristics
 - Cognitive Biases
 - Limited in number??
- Cost/benefit
- Dangers in communication
- Behavior Economics
- How to manipulate others!



What is Heuristics?

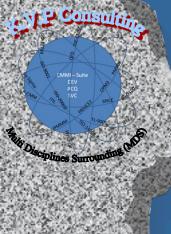
A rule of thumb is an easily learned and easily applied procedure for estimating, recalling some value, or making some determination.

In decision making, it is generally accepted that heuristics are simple, efficient rules of thumb that help people make decisions or judgments, and help them solve problems.



Heuristics, Cont'd

- Heuristics are typically used when decision makers face complex problems or incomplete information, or are short on time.
- In certain situations, however, rules of thumb or heuristics can lead to systematic cognitive biases and less-than-optimal decisions.



Hidden dangers in communication

What do the following phrases mean to you? Please assign a numerical probability to each phrase (using 0-100 percent).

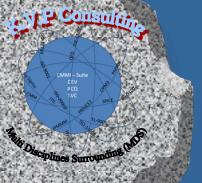
- Possible
- Very likely
- Improbable
- Good chance
- Fair chance

People have different understandings of the same words

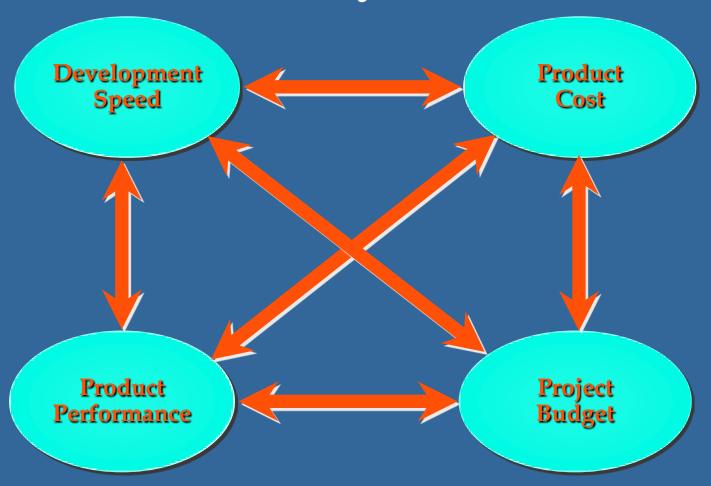
	Min	Mean	Max
Very likely	45	87	99
Good chance	25	74	96
Fair chance	20	51	85
Possible	01	37	99
Improbable	01	12	40

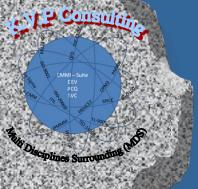
Lichtenstein & Newman, Psychonomic Science, 1967, Vol 9. (~180 responses per phrase)



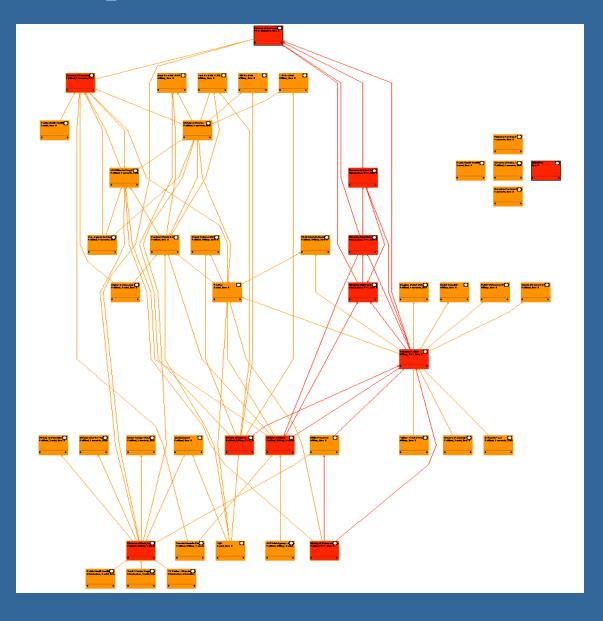


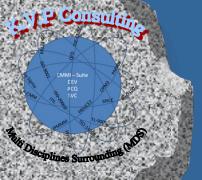
The Priority Balance



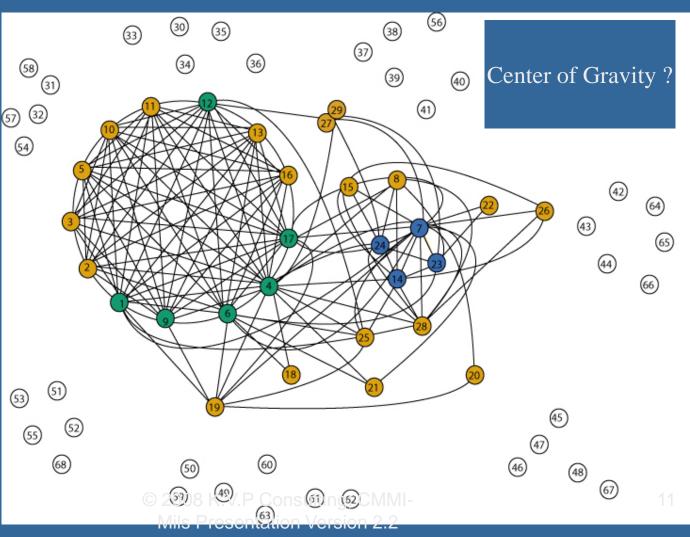


A Complex Effects-based Environment

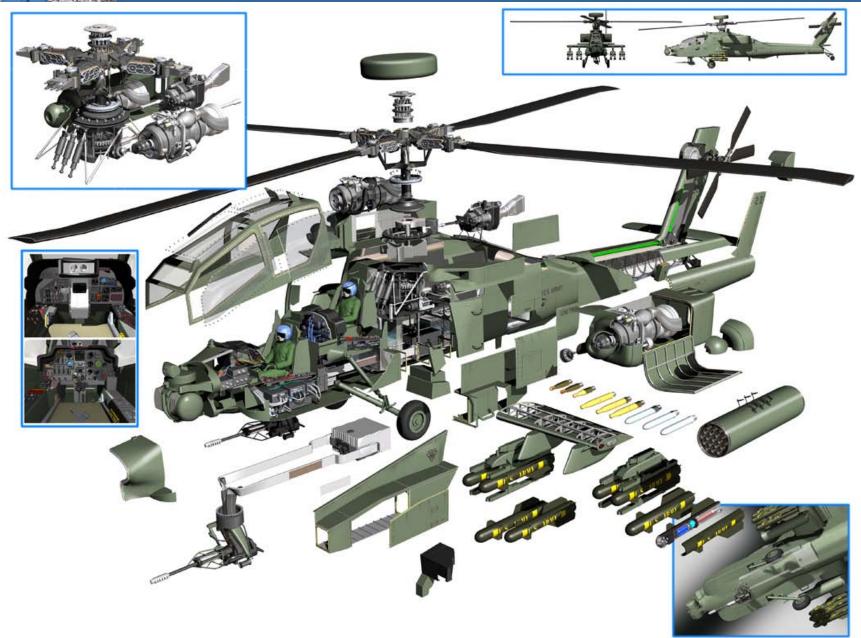


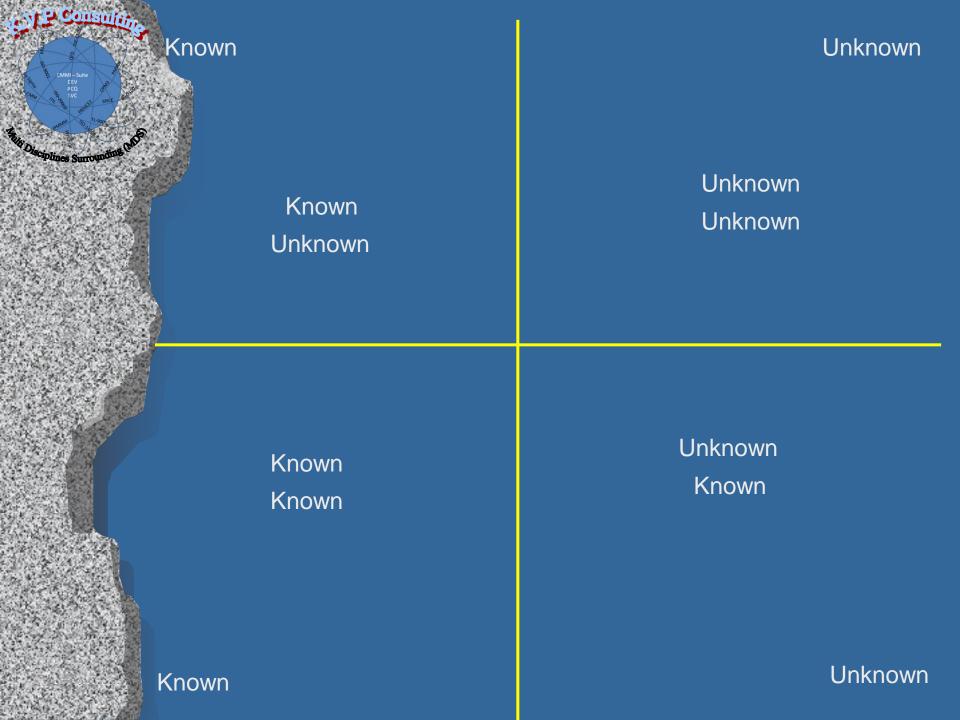


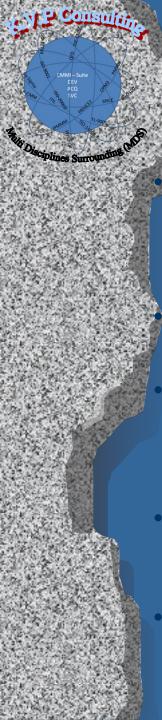
Product Services Support Challenges in the Operational Environment











Introduction

Two and a half years ago I Was asked to develop a method that will support the initiation of complicated projects with large number of overlapping stakeholders that influencing the system \ product \ program scope, time and end deliverables.

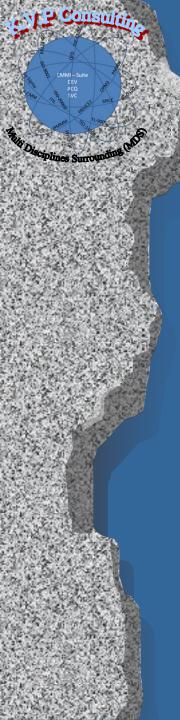
The baseline for evaluating what methods will be appropriate we did postmortem and retro- perspective on five programs that ends

The methods evaluation was conducted at different perspectives (vertical and horizontal) including the use of the following tools:

Game Theory; Quality Function Deployment; Bayesian Networks and Dynamic Bayesian Games

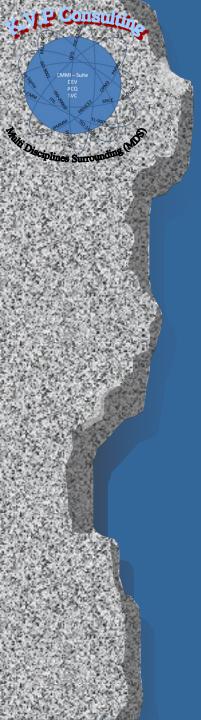
This presentation is a brief summery of the process elements that we were able to identify and the building parameters for its performance measurements

We will **include** in the presentation (as time will permit it) **tools walk through**; I am willing to share it and send it upon request

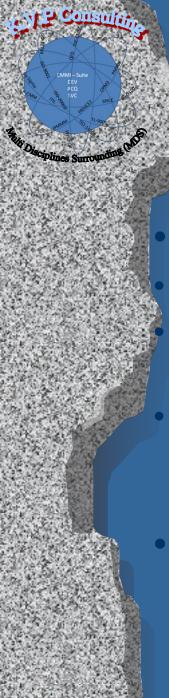


Agenda

- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts

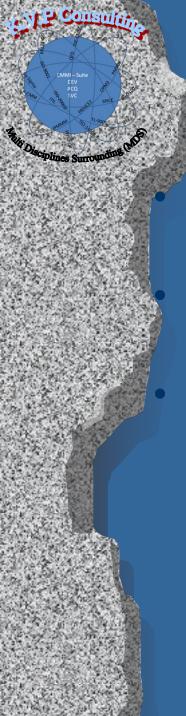


Game Theory



Introducing Example

- You are going to have a blind date in Jena...
- but you don't know where you will meet the other person
 - Only if you two choose the same location as a meeting point the date will actually take place
- To make it a little easier... assume there are only two places to go: "Pizza hut" in Tel Aviv and "Café place" in the Jerusalem
- Where would YOU go?



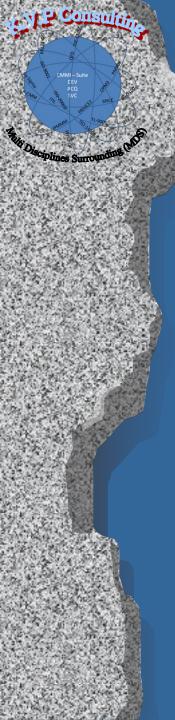
Expected Utility Theory

Developed by von Neumann & Morgenstern (1947)

In short: The option with the greatest utility is chosen

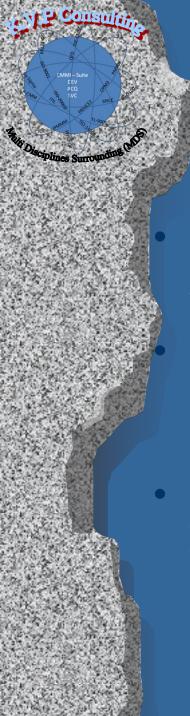
Based on the three assumptions (axioms):

- Completeness: If there are 2 alternatives, an agent will prefer A or B or is indifferent between A and B
- Transitivity: If an agent prefers A over B and B over C, he will also prefer A over C
- Context-free ordering: If an agent prefers A over B, he will still do this when additional alternatives (C, D, ...) are available



Game Theory

- Is an idealized abstraction of reality
- Is a normative, not a descriptive theory
 - It states only how people should behave if they wish to maximize their utility
 - It does not describe how people *actually* behave
- Can be tested empirically
 - Experimental gaming experiments



Game Theory: Assumptions

- There are two assumptions of *Common Knowledge and Rationality* (CKR)
- CKR 1: The specification of the game (e.g. number of players, payoff functions) are known to all players
- CKR 2: All players are rational in the sense of Expected Utility Theory
 - → All players will choose strategies that will maximize their individual expected utilities

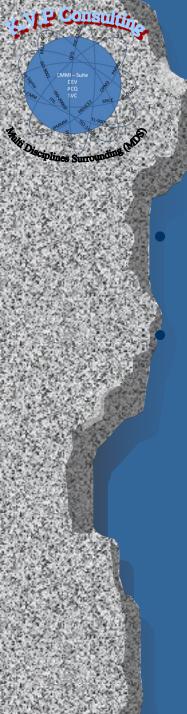


A Nash equilibrium can be seen as a cell in a payoff matrix and thus a certain combination of players' actions

- Definition: no player has anything to gain by unilaterally changing his or her strategy
- A game can have more than one Nash equilibrium

Note: equilibria are highlighted by red boxes

Example: Nash equilibrium		Player 2		
		С	D	
Player	С	3, 3	0, 2	
1	D	2, 0	1, 1	

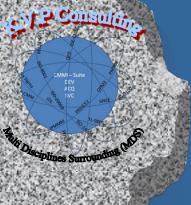


Team Reasoning

Explanation for cooperative behavior in social dilemmas

A team reasoning player...

- maximizes the collective payoff
- chooses not by individual but by collective preference
- violates the second assumption of Common Knowledge and Rationality on which game theory is based upon
 - CKR 2: "All players will choose strategies that will maximize their individual expected utilities"



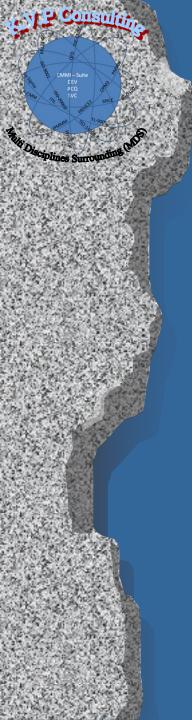
Summary and Conclusion

Classical Game Theory...

- is a *normative* theory based on Expected Utility Theory
- is not able to predict decisions in all interactive situations but sometimes remains *indetermined* and...
- predicts self-defeating behavior in *social dilemmas*

Psychological Game Theory...

- Suggests elements to explain empirical data which is contrary to the Classical Game Theory
- Conclusion: Classical Game Theory is useful to understand social interactions but needs to be modified



Bayesian Belief Network



Background

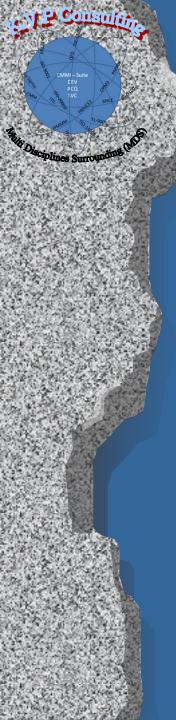
There has been little emphasis on the decision making process on project \ program scoping.

Scoping Rationale (SR) as a result of a decision is often not clearly captured

Even when SR is captured, it is often difficult to explain how decisions relate to and affect the architecture considerations

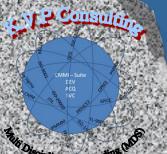
 Change impact cannot be systematically reasoned or explained during the different phases

It is difficult to quantify the impact of changes in requirement, design or decision



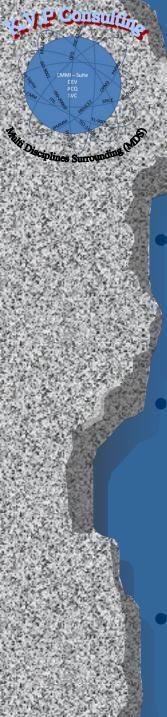
Project \ Product Scoping Decisions

- Early Decision Making
- Consider Multiple Factors including Functional Requirements, Non-Functional Requirements and Environmental Factors
- Consider Different Perspectives and Viewpoints
- Directly and Indirectly Influence the Design Structure of the System
- Create / Modify Design Elements to Satisfy System Goals / Sub-goals



What Is Decision Analysis?

- Decision Analysis Provides Effective Methods for Organizing a Complex Problem into a Structure that can be Analyzed
 - Identifies Possible Courses of Action
 - Identifies Possible Outcomes
 - Identifies Likelihood of the Outcomes
 - Identifies Eventual Consequences
- Decision Analysis Provides the Methods to Trade Off Benefits Against Costs
- Decision Analysis Allows People to Make Effective Decisions More Consistently

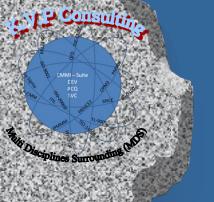


Problem Statements

How to capture rationale and represent architecture considerations related decisions in relation to design artefacts?

What is the change impact to the system when one or more requirements, designs or decisions are to change?

Tool walk through



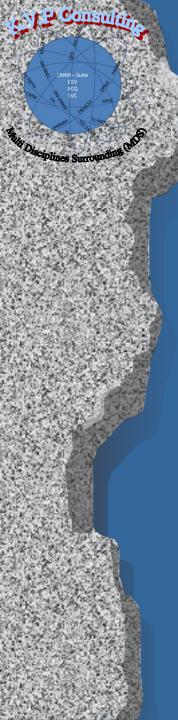
Game Theory and Bayesian



Static Bayesian Games

Multi-stage games

Dynamic Bayesian Games



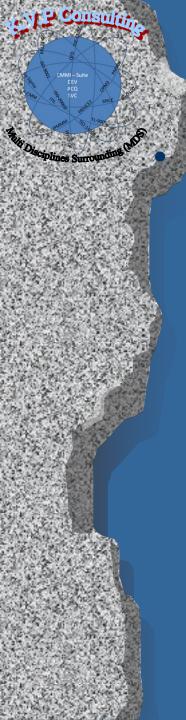
What is Bayesian Game?

Game in strategic form

- Complete information(each player has perfect information regarding the element of the game)
- Iterated deletion of dominated strategy, Nash equilibrium: solutions of the game in strategic form

Bayesian Game

- A game with incomplete information
- Each player has initial private information,
- Bayesian equilibrium: solution of the Bayesian game



Static Bayesian Games

Static Games of Incomplete Information

- In many economically important situations the game may begin with some player having private information about something relevant to her decision making.
- These are called games of *incomplete information*, or *Bayesian* games. (Incomplete information is not to be confused with *imperfect* information in which players do not perfectly observe the actions of other players.)
- Although any given player does not know the private information of an opponent, she will have some beliefs about what the opponent knows, and we will assume that these beliefs are common knowledge.
- In many cases of interest we will be able to model the informational asymmetry by specifying that each player knows her own payoff function, but that she is uncertain about what her opponents' payoff functions are



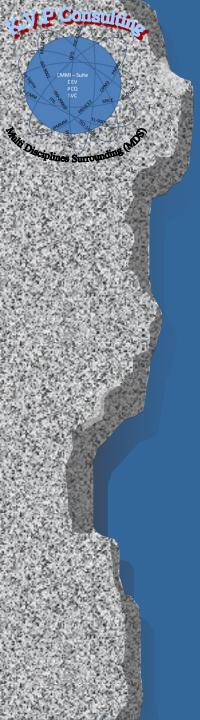
Difference Dynamics and Statics

- The only thing to learn in static game with asymmetric information is when types are correlated and then information about own type reveals info about types of other players
 - Usually, independent types are assumed
- In dynamic games with asymmetric information players may learn about types of other players through actions that are chosen before they themselves have to make decisions

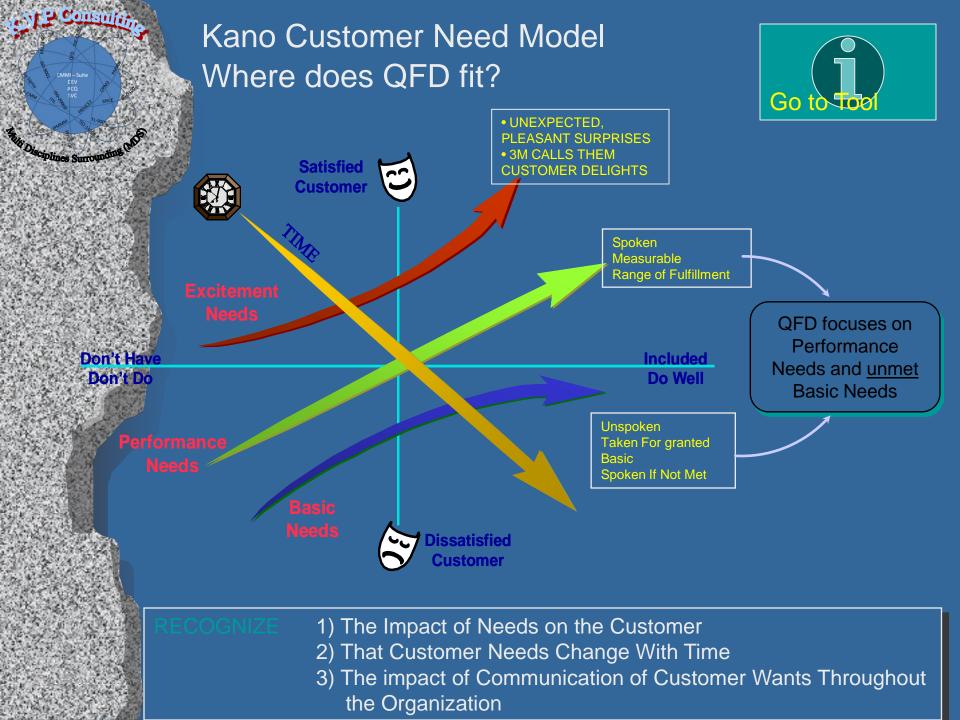


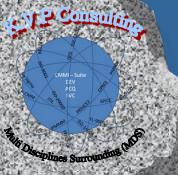
Important class of signaling games

- In signaling games there are two players, Sender and Receiver
 - Type of Sender is private information, sender takes an action
 - Strategy is action depending on type
- Receiver takes an action after observing action taken by the sender
- Type of sender may be inferred (revealed) on the basis of the action that is actually taken



Quality Function Deployment (QFD)

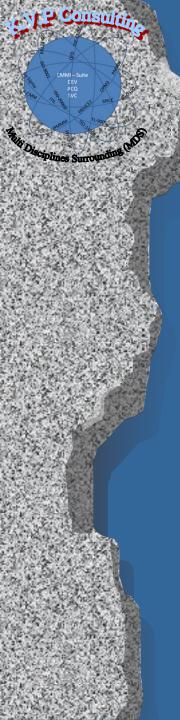




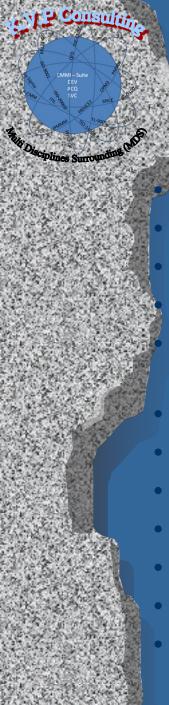
Kano Customer Need Model

Dissatisfiers	Those needs that are EXPECTED in a product or service. These are generally not stated by customers but are assumed as given. If they are not present, the customer is dissatisfied.
Satisfiers	Needs that customers SAY THEY WANT. Fulfilling these needs creates satisfaction.
Exciters / Delighters	New or Innovative features that customers do not expect. The presence of such unexpected features leads to high perceptions of quality.





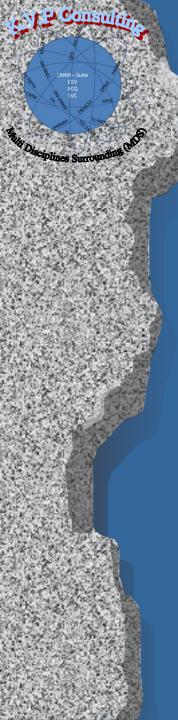
- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts



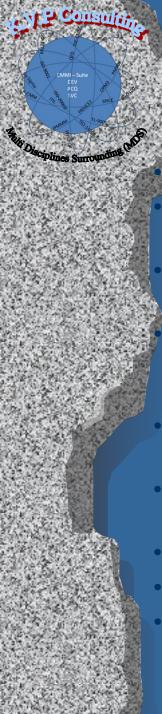
Business Challenges

Complex Product Development Initiatives

- Communications Flow Down Difficult
- Expectations Get Lost
- New Product Initiatives / Inventions
- Lack \ unclear Structure or Logic to the Allocation of Development Resources.
- Large Complex or Global Teams
- Challenges in processes efficiency And/or Effectiveness
- Teamwork coordination Issues
- Conflicts in Product Development Times
- Excessive Redesign
- Changing Teams
- Problem Solving, or Fire Fighting.



- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
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- Tool Used
- Challenges
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- Additional Posts



Business Goals

Simplified the Product Development Initiatives to clear scope and users Identify, map and assign appropriate priorities the different stakeholders and commitments

Identify and predict the New Product Initiatives / Inventions impact on the program and other stakeholders

Identify and predict the Large Complex or Global Teams coordination and alignment efforts Inventions impact on the program and other team members \ teams

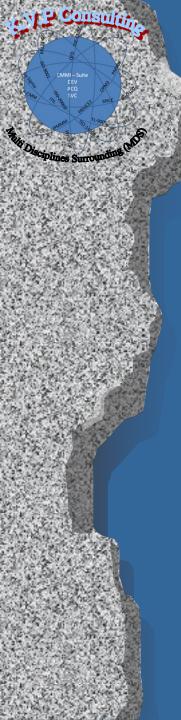
Identify and predict processes efficiency And/or Effectiveness impact on the program and teams

Identify and predict Conflicts in Product Development Time vs. the stakeholders expectations

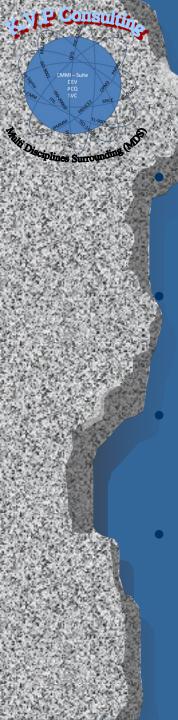
Identify and predict redesign Effectiveness impact on the program and teams

Identify and predict changing in teams impact on the program and teams

 How to choose the right way Problem Solving, or Fire Fighting based on quantitative and prediction of impact analysis



- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts



Goal Alignment with Models - 1

Simplified the Product Development Initiatives to clear scope and users

QFD and Dynamic Bayesian Games

Identify, map and assign appropriate priorities the different stakeholders and commitments

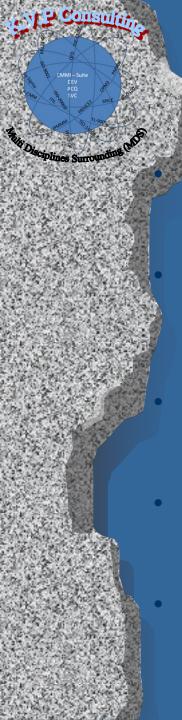
Quality Function Deployment

Identify and predict the New Product Initiatives / Inventions impact on the program and other stakeholders

• Game Theory; Bayesian Networks and Dynamic Bayesian Games

Identify and predict the Large Complex or Global Teams coordination and alignment efforts Inventions impact on the program and other team members \ teams

Bayesian Networks and Dynamic Bayesian Games



Goal Alignment with Models - 2

Identify and predict processes efficiency And/or Effectiveness impact on the program and teams

Bayesian Networks and Dynamic Bayesian Games

Identify and predict Conflicts in Product Development Time vs. the stakeholders expectations

 Game Theory; Quality Function Deployment; Bayesian Networks and Dynamic Bayesian Games

Identify and predict redesign Effectiveness impact on the program and teams

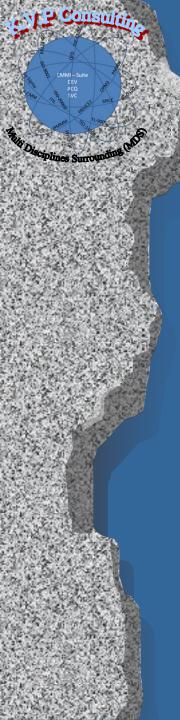
• Quality Function Deployment; Dynamic Bayesian Games

Identify and predict changing in teams impact on the program and teams

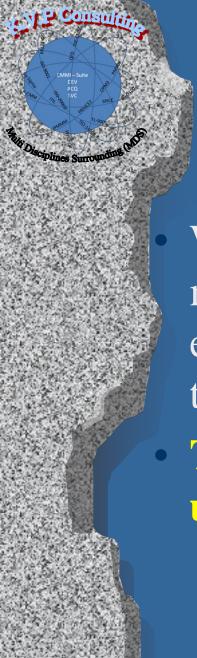
• Dynamic Bayesian Games

How to choose the right way Problem Solving, or Fire Fighting based on quantitative and prediction of impact analysis

Bayesian Networks and Dynamic Bayesian Games



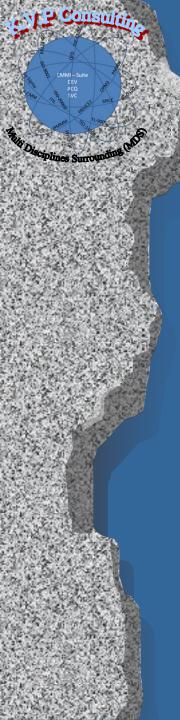
- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts



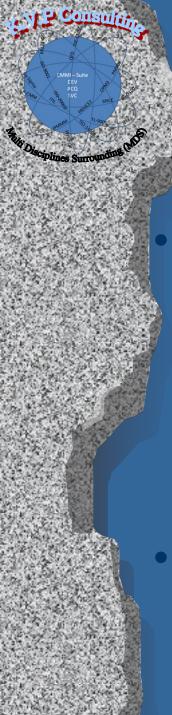
Outcome(s) Predicted

We have developed players \ stakeholders map we have include the description of the expected outcome(s) and its influence on the 'project' performance

 The map template and example will be uploaded to the website



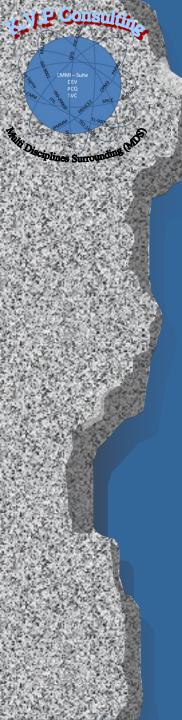
- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts



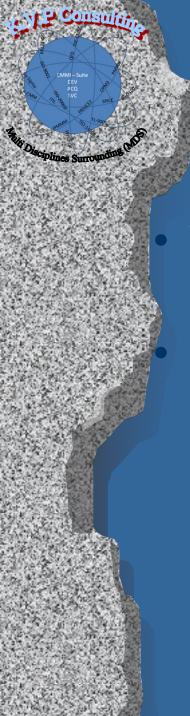
Stakeholder Audience

We have developed a players \ stakeholders map we have include the description of the expected outcome(s) and its influence on the 'project' performance, used to communication and negotiations on decisions

• The map template and example will be uploaded to the website

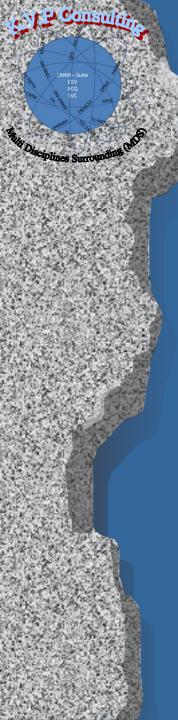


- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts

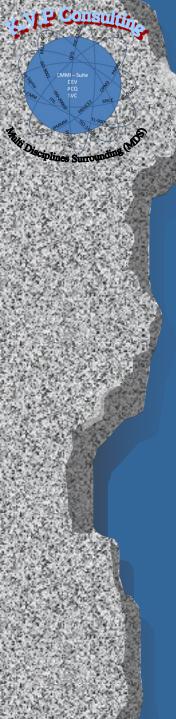


Factors used in the Process Performance Model

- We include the factors in our data map tool (e.g. influence)
- The map template and example will be uploaded to the website



- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts

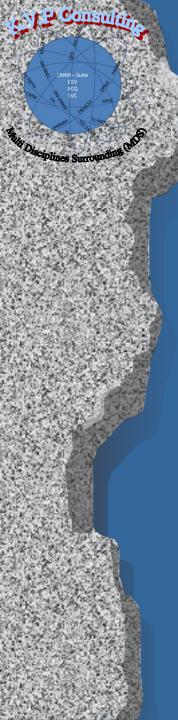


Tool Used

Game Theory (Using Excel)

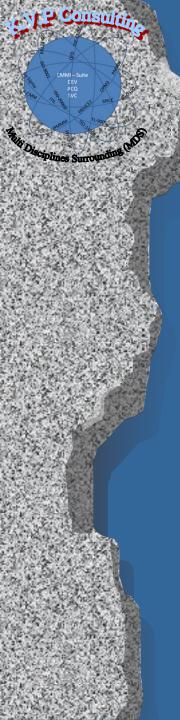
Bayesian Belief Network (Using HUGIN)

Quality Function Deployment (QFD) for Requirement Development (Using Excel)

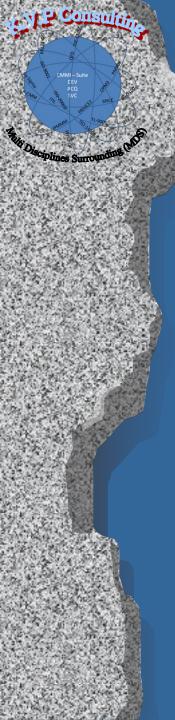


- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
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- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts



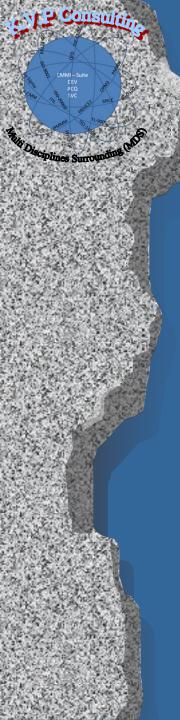


- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
- Tool Used
- Challenges
- What Worked Well
- Summary
- Additional Posts

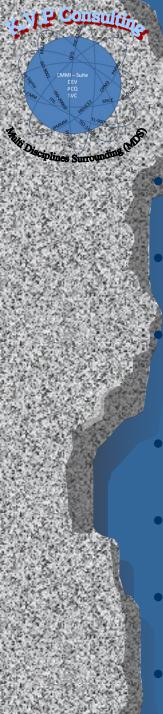


What Worked Well

- What worked well
 - Senior staff commitments
 - Stakeholders acceptance of the balancing results
 - Stakeholders acceptance of their 'position' and weight
- Between our side benefits
 - 'snow ball' effect from other departments
 - Request for generic model development
 - Request to adjust it to strategic and multi year programs
- Stakeholder inputs
 - Give clear world view of all aspects
 - Reduce the decision making and factors analysis complexity
 - The historical data base from past projects reduce resistance
- Model development team member inputs
 - Create more clear understanding on the
 - The historical data base from past projects reduce development time



- Introduction
- Methods Overview
- Business Challenges
- Business Goals
- Goal Alignment with Models
- Outcome(s) Predicted
- Stakeholder Audience
- Factors used in the Process Performance Model
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- Challenges
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- Additional Posts



Summary - 1

The process may look simple, but requires effort.

Many of the entries look obvious - after they are written down.

If there aren't some "tough spots" the first time, it probably isn't being done right!

Focus on the end-user customer.

Charts are not the objective.

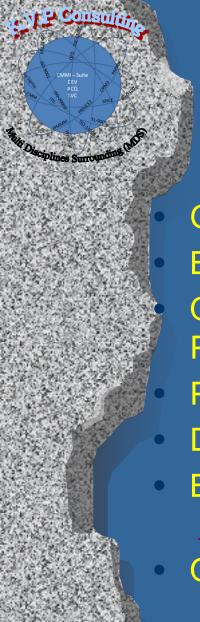
Charts are the means of achieving the objective.

Find reasons to succeed, not excuses for failure.



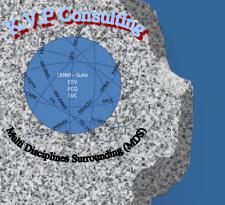
The combined methods that we have developed and use meant to serve as the main support tool for the project \ program Management, That Focuses on What the Customer Wants; and Then Provides a Systematic Approach, Involving Communication Between All stakeholders and Areas of the Organization, to Make Sure These Wants Are Satisfied within the given constraints.

- Decision Analysis Provides the Structure and Guidance for Systematic Thinking
- Decision Analysis Process Organizes a Complex Problem into a Structure that can be Analyzed
- Good Decision Analysis Requires Clear Thinking; Sloppy Thinking Results in Worthless Analysis!

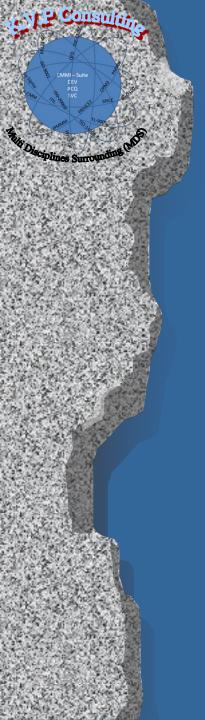


Additional Posts

- Game Theory Overview Presentation
- Bayesian Belief Network Overview Presentation
- Quality Function Deployment (QFD) Overview Presentation
- Players \ Stakeholders Map Excel Based
- Data Type Map Excel Based
- Bayesian Belief Network HUGIN Based
 http://www.hugin.com/Products_Services/Products/Demo/Lite/
- Quality Function Deployment Excel Based



Questions?



Contact

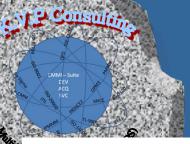
Kobi Vider

K.V.P Consulting

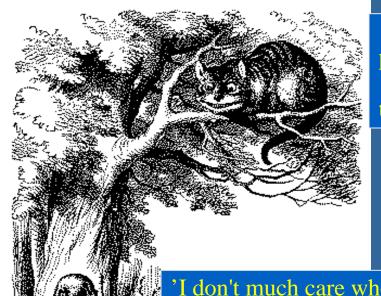
Kobi.Vider@hotmail.com

KobiVP@aol.com

Phone: +972522946676



Why to Monitor Processes



'Cheshire Puss,' she began, ... 'Would you tell me, please, which way I ought to go from here?'

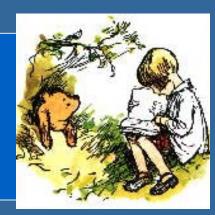
'That depends a good deal on where you want to get to,' said the Cat.

'I don't much care where –' said Alice.

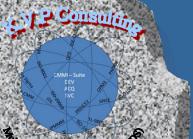
Then it doesn't matter which way you go,' said the Cat.

- so long as I get somewhere,' Alice added as an explanation.

'Oh, you're sure to do that,' said the Cat, 'if you only walk long enough.'



Tell me where you want to be and I will show (measure) you the way

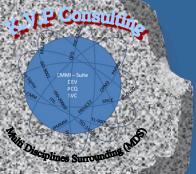


"which way I ought to go from here"

Call Center – Calls Database

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~45000 Records With 22 Attributes



"which way I ought to go from here"

Bug Database



~33000 Records With 36 Attributes