Value-Focused Thinking:

- Communicate Strategic Intent
- Enable a Community of Practice
- Improve MANPRINT's Overall Impact

MANPRINT Conference

17 March 2010

Purpose of VFT Project

- Communicate Strategic Intent
  - Create an assessment framework, aka Qualitative Value Model
  - Measure success (system score)
- Enable a Community of Practice
  - Share success stories, standards, and best practices
  - Looking for gaps / opportunities
- Improve MANPRINT's Overall Impact
  - Select better Lean Six Sigma projects
  - Manage portfolios of process improvement projects
  - Identify critical resource shortfalls
  - Simulate proposed interventions

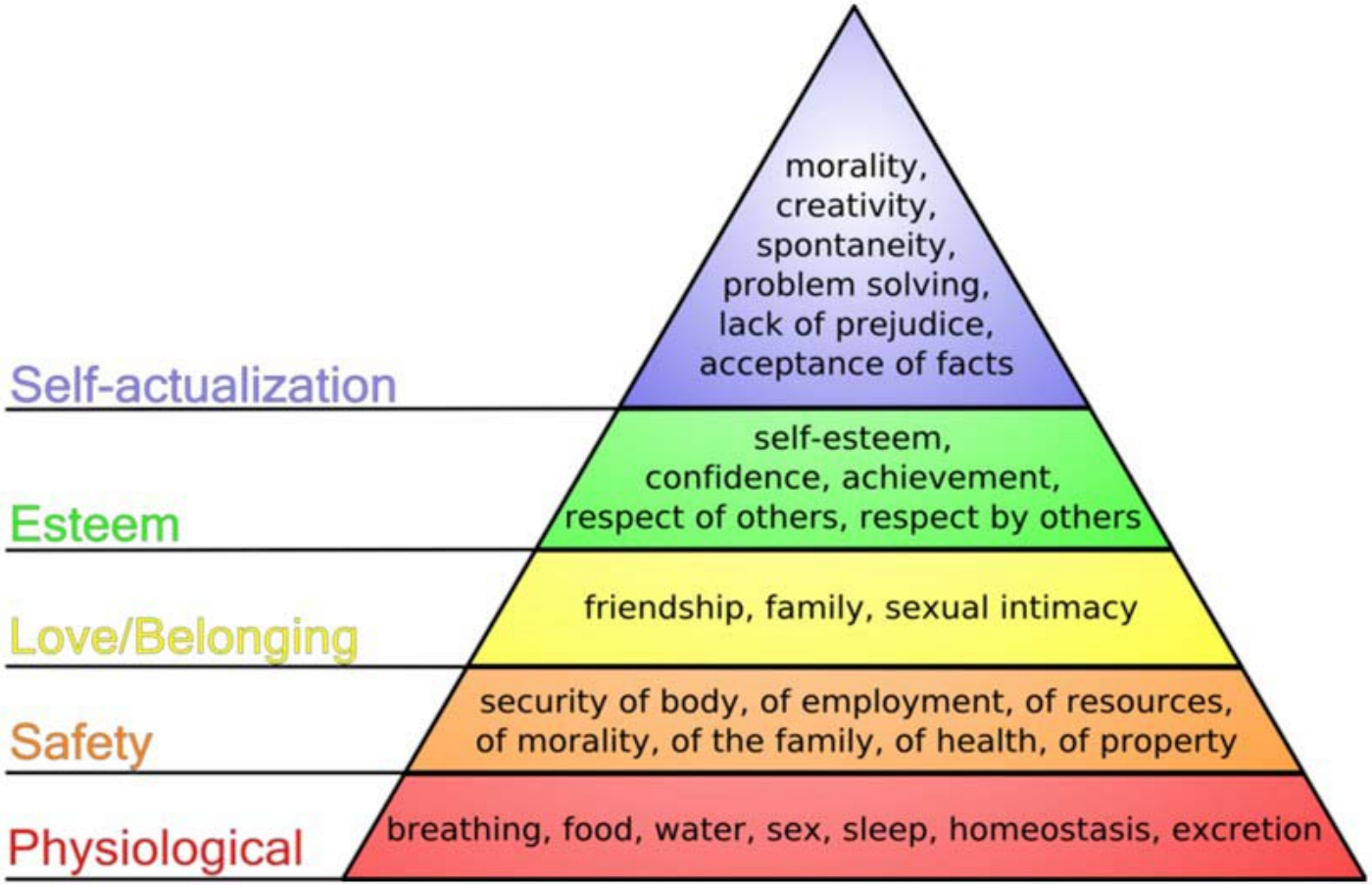
Presentation Objectives

- Explain Value-Focused Thinking (VFT)
  - What is Value-Focused Thinking?
  - How does it work? Why is it useful? What can we do with it?
  - Some pros and cons
- Describe Our VFT Project Opportunity
  - What is the opportunity we're working on?
  - What hypotheses are we testing? What data are needed?
  - What is the overall scope of the effort?
- Discuss Status of VFT Project
  - What are the expected outcomes?
  - How does VFT relate to L6S and META?
  - WIIFM? What's next? Way Ahead?

Value-Focused Thinking

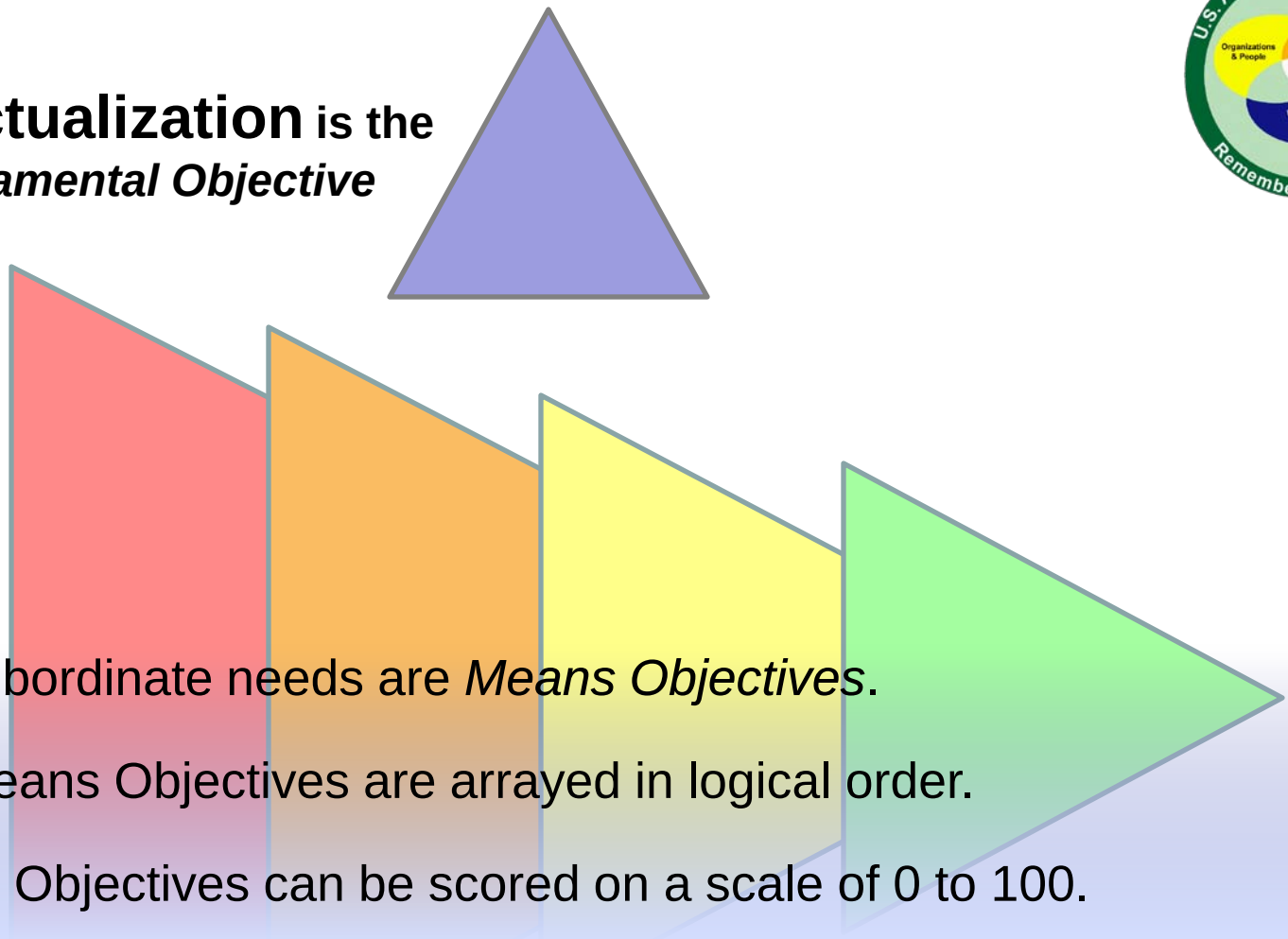
- VFT 101: an illustrative example
- The Art and Science of How VFT works
- Some Pros and Cons of VFT

Maslow's Hierarchy of Human Needs



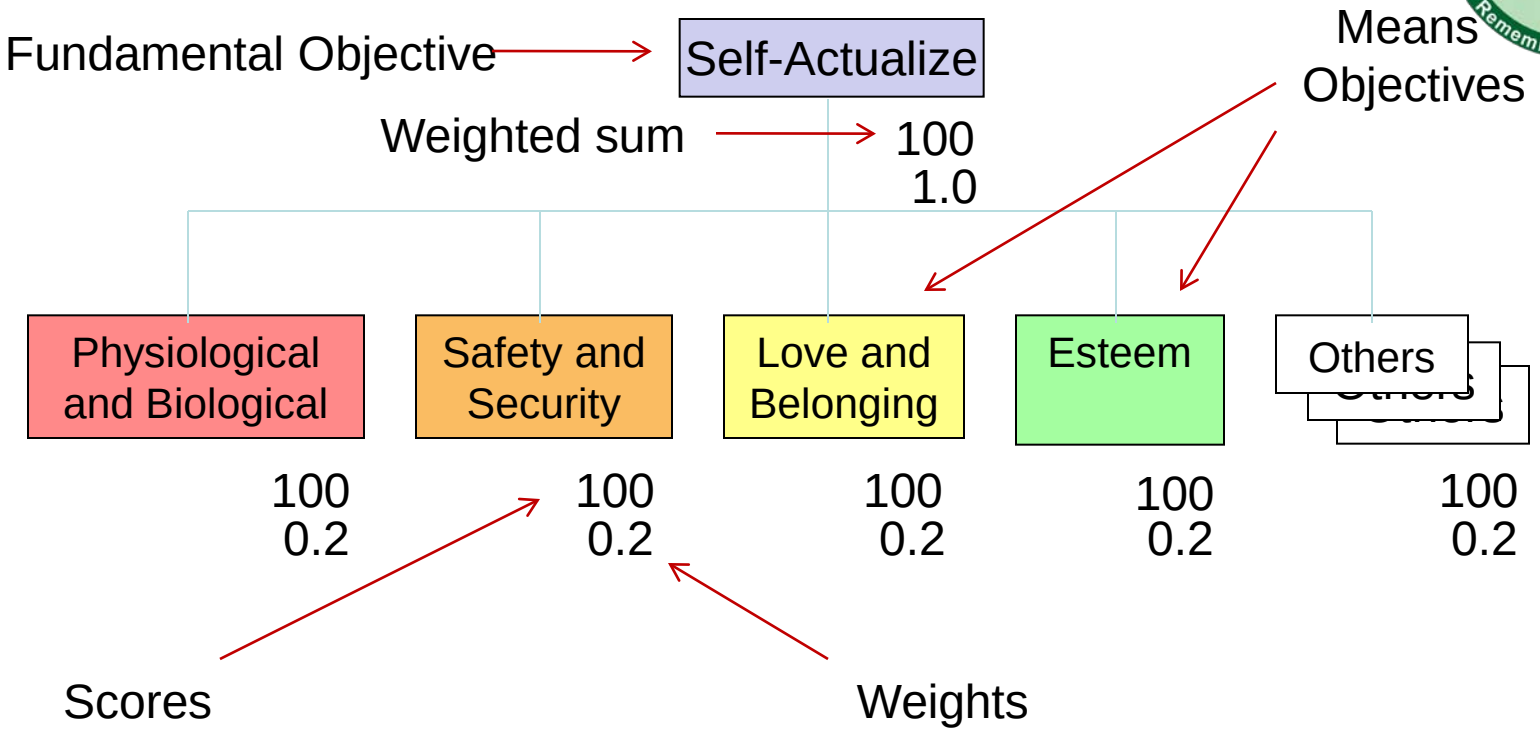
Accessed Feb 26, 2010, from http://en.wikipedia.org/wiki/Abraham_Maslow

Self-actualization is the
Fundamental Objective



- The subordinate needs are *Means Objectives*.
- The Means Objectives are arrayed in logical order.
- Means Objectives can be scored on a scale of 0 to 100.
- Scores depend on a variety of measureable factors.
- The Fundamental Objective score is a function of the success of the Means Objectives.

Objectives



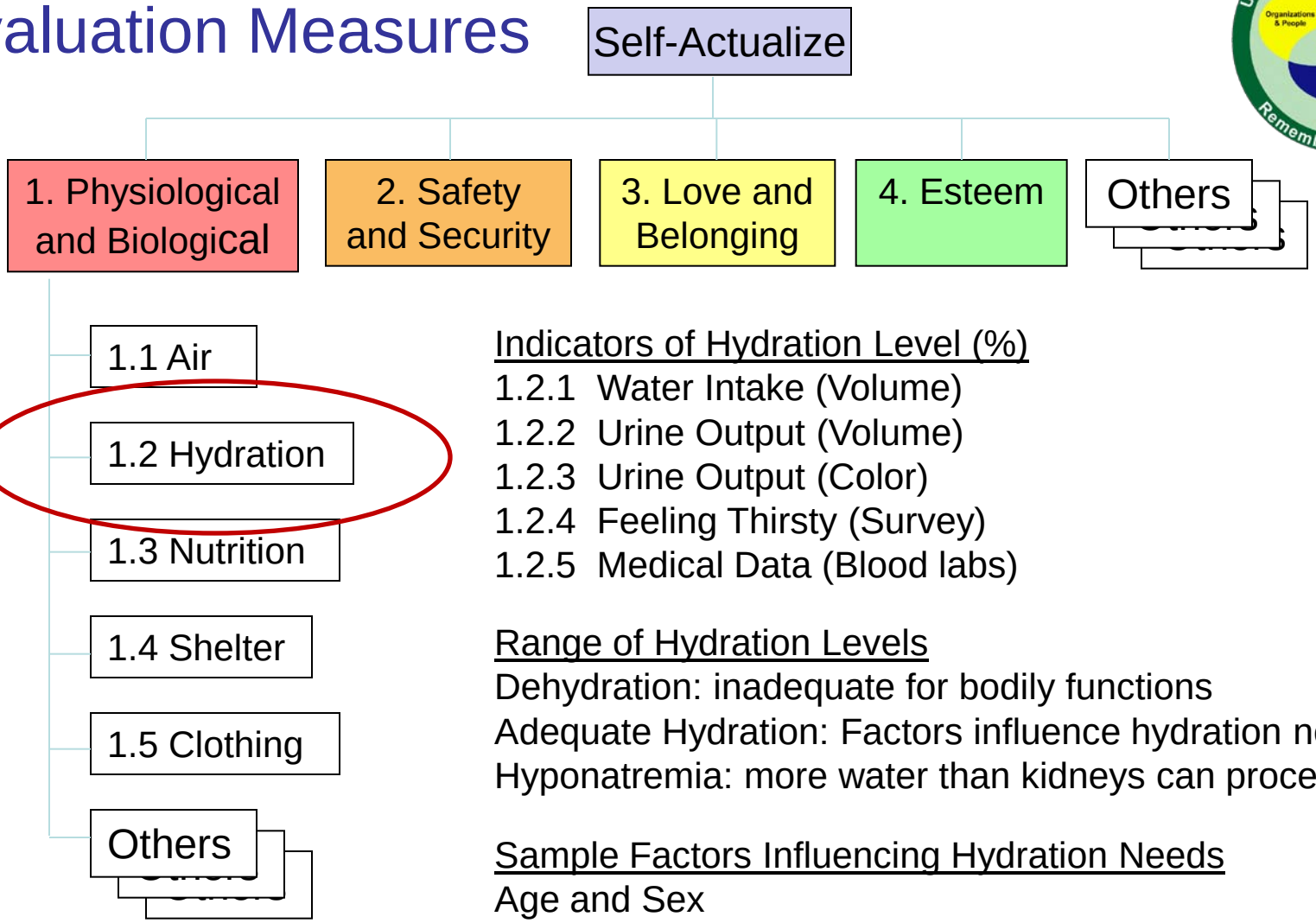
Score = Sum-product of Means Objectives' scores and weights

Subject to constraints:

- M.O. are collectively exhaustive and mutually exclusive
- Scores range from 0 to 100
- Sum of M.O. weights = 1

How will we know when the Means Objectives are met?

Evaluation Measures



Indicators of Hydration Level (%)

1.2.1 Water Intake (Volume)
1.2.2 Urine Output (Volume)
1.2.3 Urine Output (Color)
1.2.4 Feeling Thirsty (Survey)
1.2.5 Medical Data (Blood labs)

Range of Hydration Levels

Dehydration: inadequate for bodily functions
Adequate Hydration: Factors influence hydration needs
Hyponatremia: more water than kidneys can process

Sample Factors Influencing Hydration Needs

Age and Sex
Health status (Disease, Injury, Pregnancy)
Exercise level
Environmental factors

Value Functions

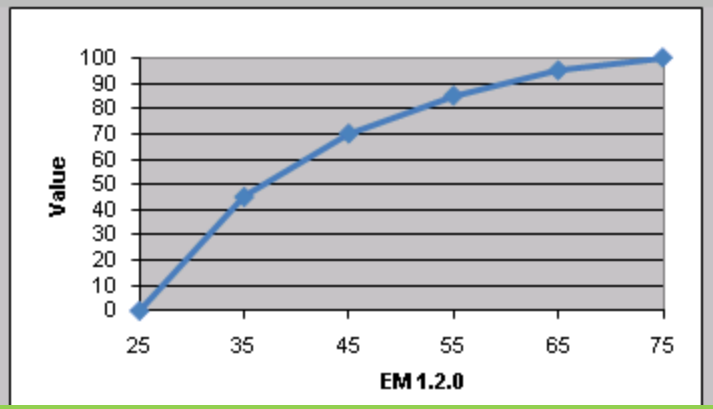
- Return value to scale
- Different types of evaluation measures
  - Direct or Indirect (Proxy)
  - Natural or Constructed
- Different shapes of value functions
  - Increasing or decreasing
  - Linear, concave, convex, or s-shaped

Hydration Level

Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.0		Hydration Level (%). Given the availability of calibrated equipment, hydration levels can be acurately measured by electrical impedence.
Evaluation Measure Units	x	Value	
Hydration Level (%) can be acurately measured by electrical impedence.	25	0	
	35	45	
	45	70	
	55	85	
	65	95	
	75	100	
Evaluation measure sources:	Electrical impedence		
Type of evaluation measure	Direct (Natural)		
Shape of value function	Increasing (Convex)		

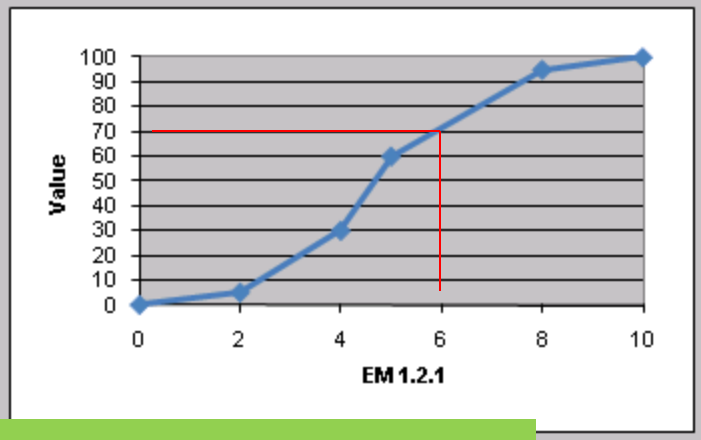
Senior decision maker determines the relative value of each data point

Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.0		
Evaluation Measure Units	x	Value	
Hydration Level (%) can be acurately measured by electrical impedence.	25	0	Hydration Level (%). Given the availability of calibrated equipment, hydration levels can be acurately measured by electrical impedence.
	35	45	
	45	70	
	55	85	
	65	95	
	75	100	
Evaluation measure sources:	Electrical impedence		
Type of evaluation measure	Direct (Natural)		
Shape of value function	Increasing (Convex)		



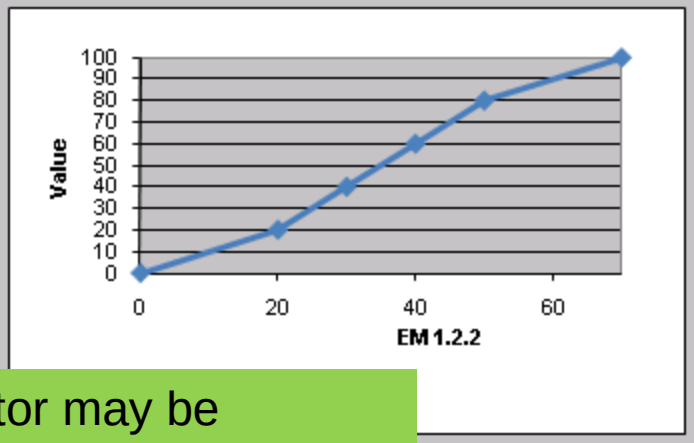
In this case, data collection and score depends on availability of accurate equipment

Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.1		
Evaluation Measure Units	x	Value	
Water Intake (Volume) measured in the number of 8 oz. cups of water from all sources, including water in food, per 24-hour period.	0	0	Water Intake (Volume). Intake requirements vary based on a number of factors but in general, to maintain hydration, people need to drink enough to replenish what they use.
	2	5	
	4	30	
	5	60	
	8	95	
	10	100	
Evaluation measure sources:	Individual report		
Type of evaluation measure	Indirect (Constructed)		
Shape of value function	Increasing (S-shaped)		



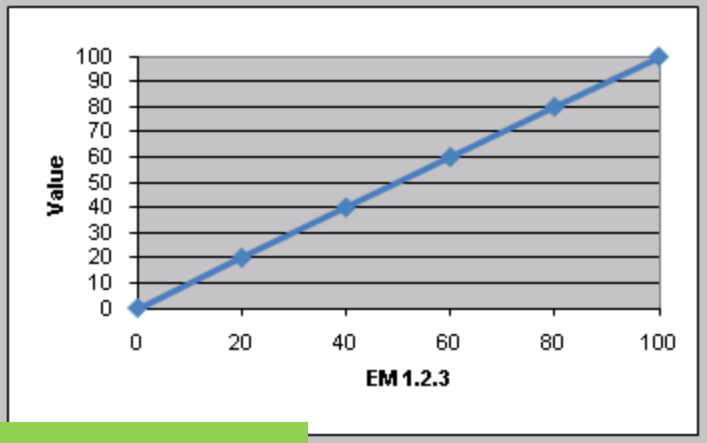
Data point of 6 cups of water produces a value score of 70%

Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.2		
Evaluation Measure Units	x	Value	
Urine Output (Volume) measured in ounces per 24-hour period.	0	0	Urine Output (Volume). A sign of dehydration is low urine output.
	20	20	
	30	40	
	40	60	
	50	80	
	70	100	
Evaluation measure sources:	Individual report		
Type of evaluation measure	Indirect (Constructed)		
Shape of value function	Increasing (S-shaped)		



This indicator may be correlated with Water Intake

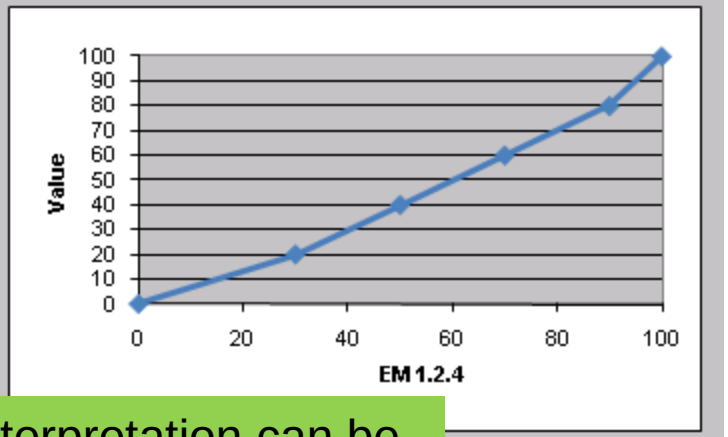
Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.3		
Evaluation Measure Units	x	Value	
Clear, colorless	100	100	Urine Output (Color). Darker urine indicates a lack of water and concern for dehydration.
Straw, very pale yellow	80	80	
Light yellow	60	60	
Bright yellow	40	40	
Dark yellow, amber	20	20	
Orange	0	0	
Evaluation measure sources:	Individual report		
Type of evaluation measure	Indirect (Constructed)		
Shape of value function	Increasing (Linear)		



Sometimes a scale must be constructed

Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.4		
Evaluation Measure Units	x	Value	
Dying for a drop of water	0	0	
Would drink from the trough	30	20	
Could guzzle a gallon	50	40	
More, please	70	60	
Maybe a bit if it's super cold	90	80	
Couldn't drink another drop	100	100	
Evaluation measure sources:	Survey results		
Type of evaluation measure	Direct (Constructed)		
Shape of value function	Increasing (Concave)		

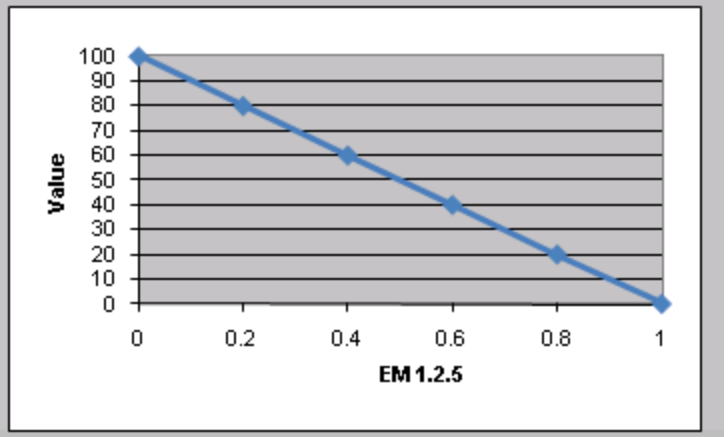
Feeling Thirsty. Survey data can show how respondants measure their own levels of hydration using thirst as a proxy. The problem: the sensation of thirst lags hydration levels.



Consistent interpretation can be an issue with constructed scales

Means Objective	1		Scoring Rationale
Evaluation Measure	1.2.5		
Evaluation Measure Units	x	Value	
The absolute value of the actual creatine level minus the expected mean creatine level, where the smallest difference is best	1	0	
	0.8	20	
	0.6	40	
	0.4	60	
	0.2	80	
	0	100	
Evaluation measure sources:	Lab results		
Type of evaluation measure	Indirect (Proxy)		
Shape of value function	Decreasing (Linear)		

Medical Data. Blood labs can provide doctors with information about kidney function. Normal levels of creatinine in the blood are approximately 0.6 to 1.2 milligrams (mg) per deciliter (dl) in adult males and 0.5 to 1.1 milligrams per deciliter in adult females.



Decreasing value functions can be confusing as we tend to read “up” as better

Indicators, Thresholds, and Trends

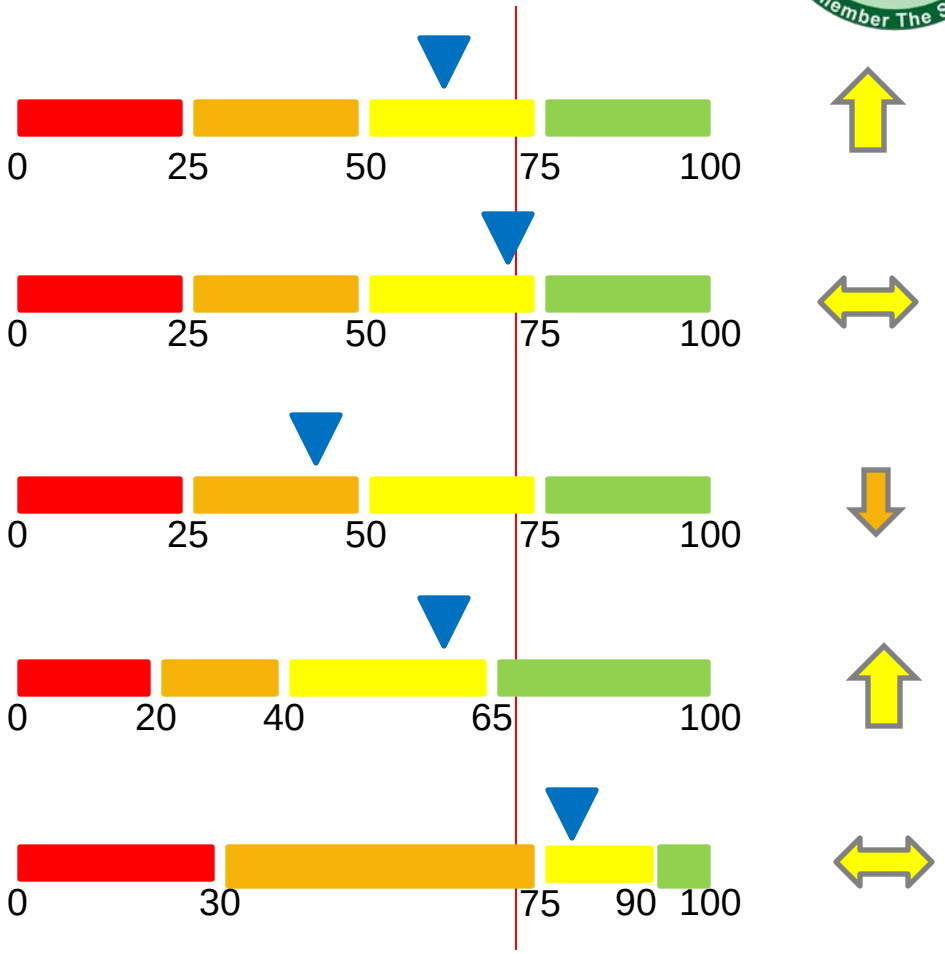
- 1.2.1 Water Intake (Volume)

Thresholds are often Quartiles

- 1.2.2 Urine Output (Volume)
- 1.2.3 Urine Output (Color)
- 1.2.4 Feeling Thirsty (Survey)

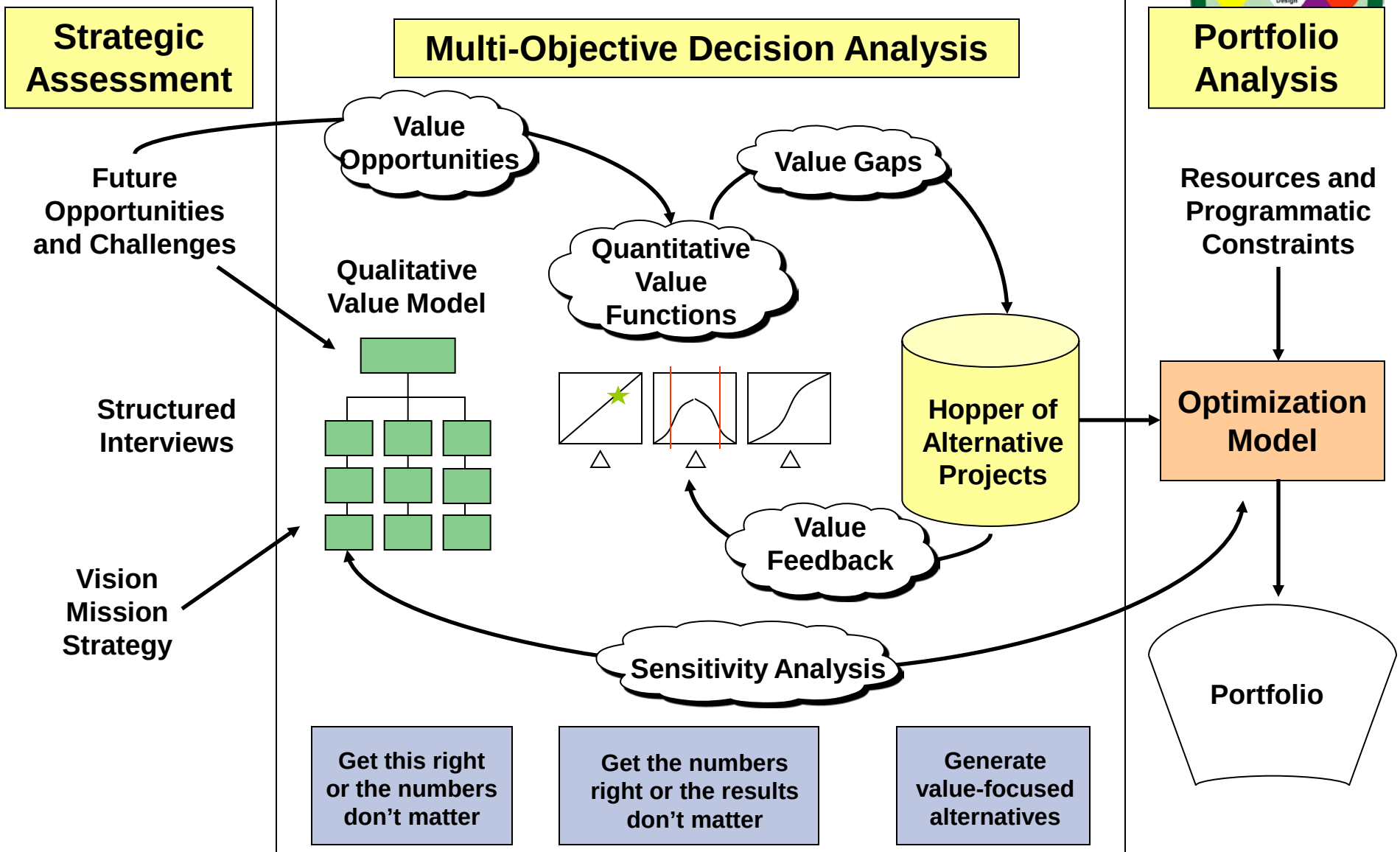
Raising (or lowering) the bar

- 1.2.5 Medical Data (Blood labs)



Rule of Thumb: If you drink enough fluid so that you rarely feel thirsty and produce 50 ounces or more of colorless or slightly yellow urine a day, your fluid intake is probably adequate.

Value Focused Thinking



VFT: What is Different?

Solution Focused Thinking

- Solve problems—reaction
- Bias for self-reliance
- Generate alternatives
- Rack and stack
- Choose based on weighted selection criteria

Value-Focused Thinking

- *Qualitative, Value-focused framework—PROACTIVE*
- *Bias for action, continuous process improvement*
- *Generate value gaps*
- *Supports a systems view*
- *Launch L6S projects to fill the value gaps and optimize portfolio*

Keeney, R.L. (1992). Value Focused Thinking.

Issues and Potential Pitfalls

- Time and energy to construct the model
  - Collecting meaningful, reliable data
  - Maintaining the model to keep it relevant and useful
- Organizational culture
  - Goal setting / Performance evaluation
  - Decision making style
  - Communication needs
- Setting and managing thresholds
  - Confidence in data
  - Grading on a curve
- Collaboration
  - Tracking trends
  - Making resource allocation decisions

Our VFT Opportunity

- Communicate Strategic Intent
  - **QVM as Performance Management System**
- Enable a Community of Practice
  - **META and VFT**
- Improve MANPRINT's Overall Impact
  - **Simulate proposed interventions**

Performance Management System

- How will you communicate strategic priorities?
- How will you sequence inter-related improvement projects?
- How will you know when the improvement is realized?

Balanced Scorecards
Strategy Maps
Alignment

Kaplan & Norton

Five Golden Questions

1. How do you measure it?
2. What is it now?
3. What would you like it to be?
4. What's the value of the difference?
5. What resources are required?

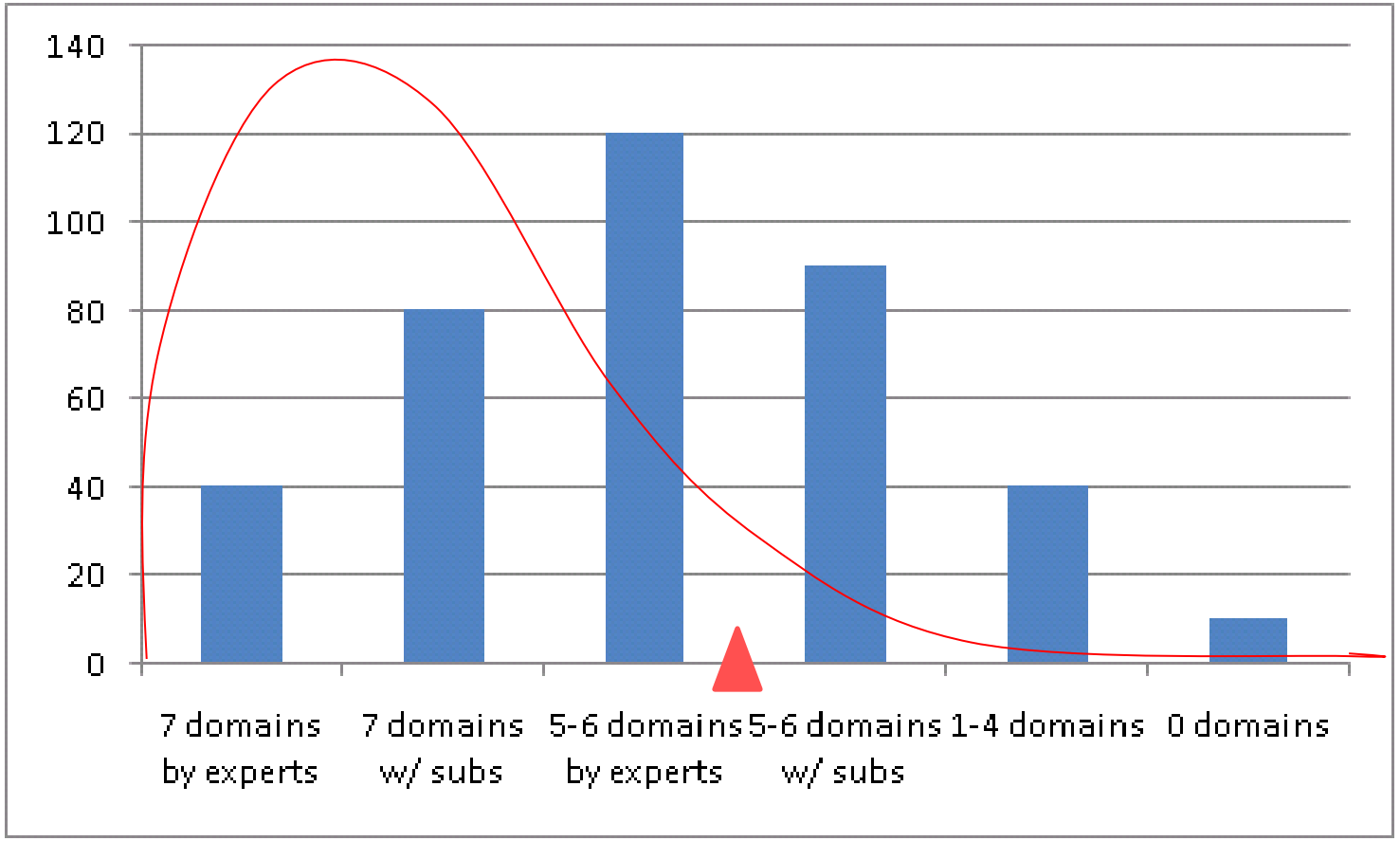
Covey, S (2004) The 8th habit.

META and VFT: Hand and Glove

- Communicate strategic intent and expected results
  - Internal and external audiences
- Score process results and analyze trends
  - Requires data (META, surveys)
- Model the MANPRINT process
  - Dynamic system model with Monte Carlo Simulation
- Calculate expected ROI of alternative process improvements
  - L6s project selection and project portfolio management
- Enable data-driven decisions
  - Re-allocate resources
  - Identify and manage risk

Simulation

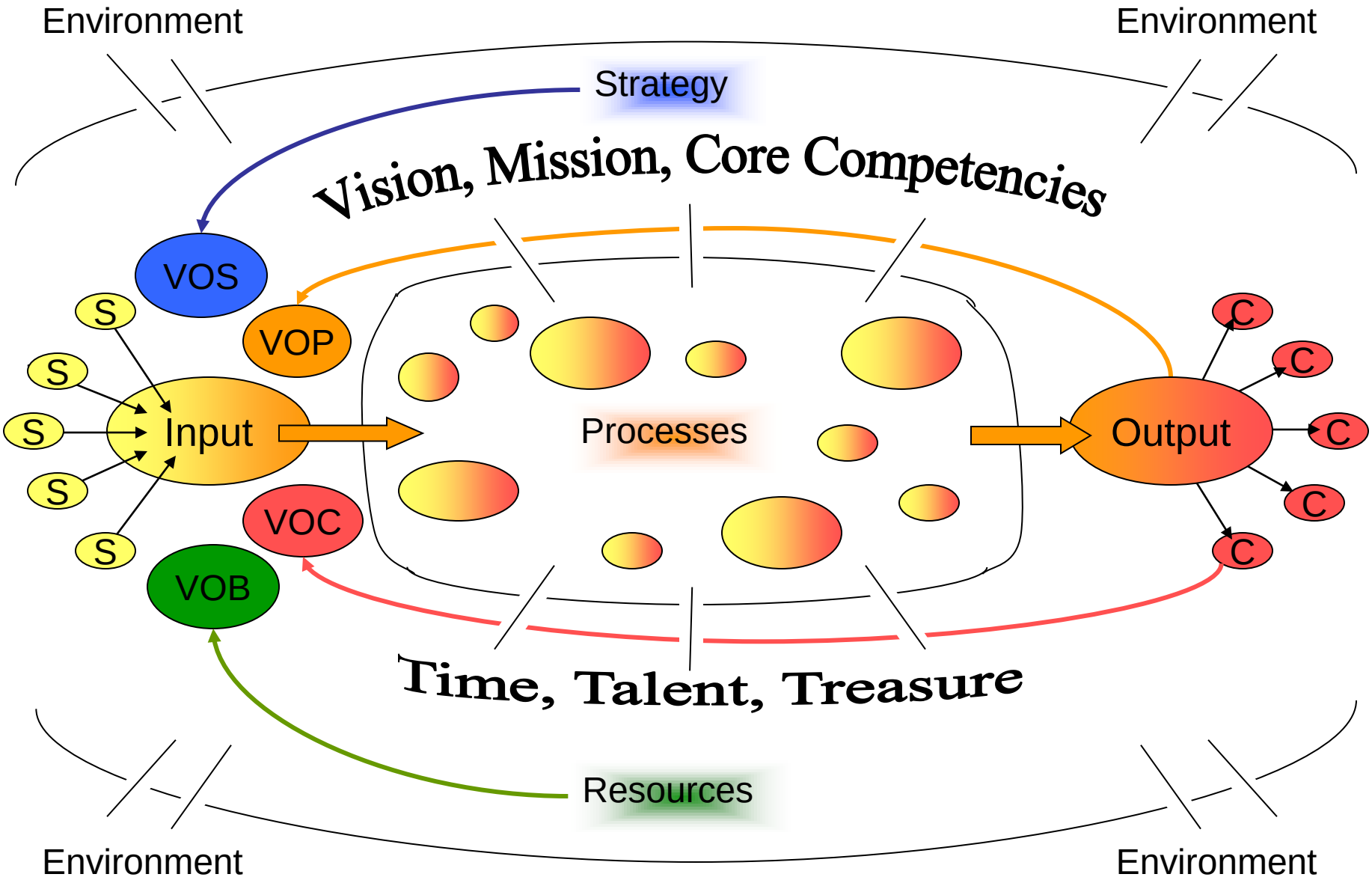
Domain evaluations by subject matter expert



Current Status

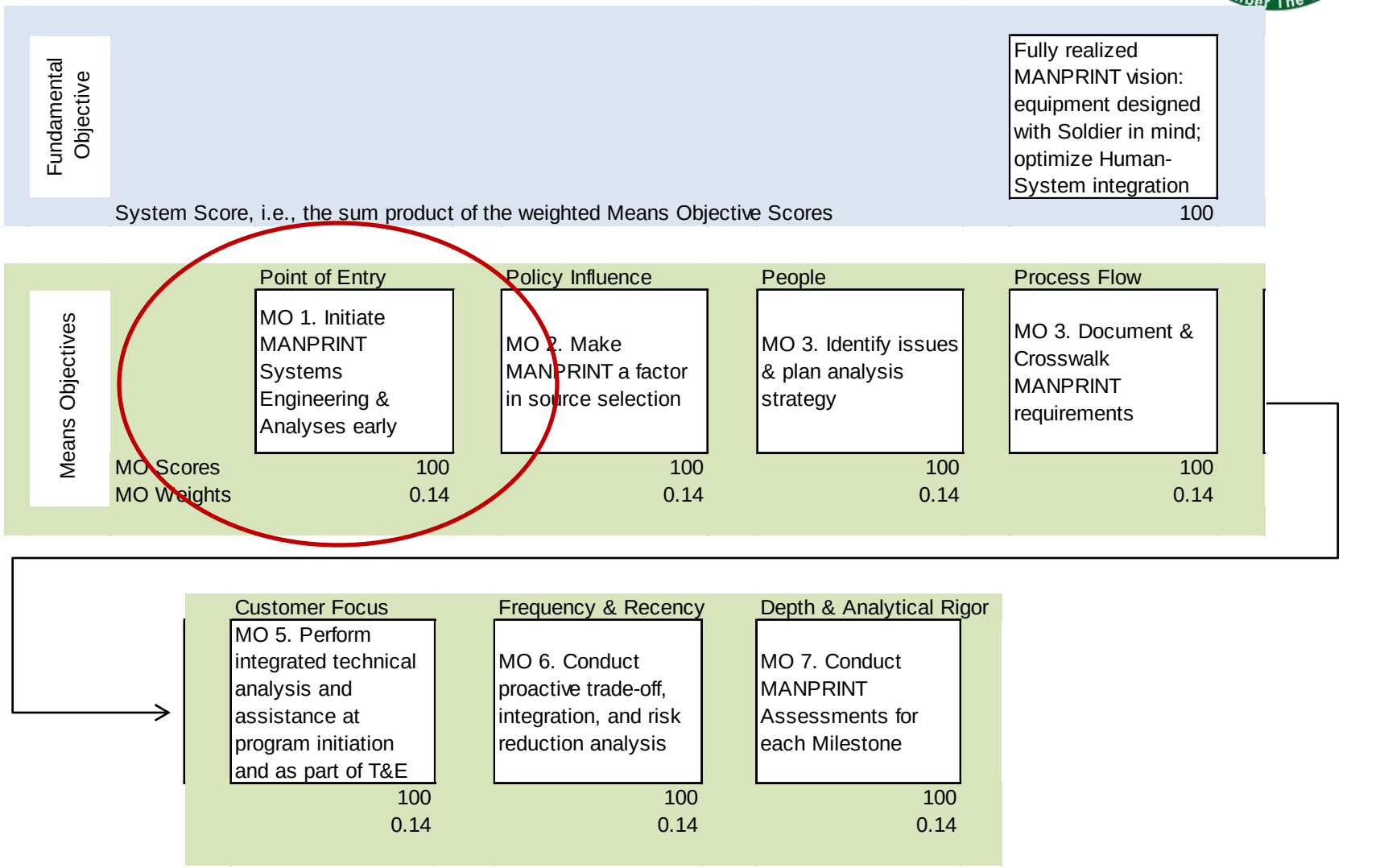
- System View
- Objectives
- Evaluation Measures
- Metrics
- Way Ahead

End-to-End System View



Checkland, P. (1981). Systems thinking, systems practice.

Objectives


Fundamental Objective
Fully realized MANPRINT vision: equipment designed with Soldier in mind; optimize Human-System integration
System Score, i.e., the sum product of the weighted Means Objective Scores
100
Means Objectives
Point of Entry
MO 1. Initiate MANPRINT Systems Engineering & Analyses early
Policy Influence
MO 2. Make MANPRINT a factor in source selection
People
MO 3. Identify issues & plan analysis strategy
Process Flow
MO 3. Document & Crosswalk MANPRINT requirements
MO Scores
MO Weights
100
0.14
100
0.14
100
0.14
100
0.14
Customer Focus
MO 5. Perform integrated technical analysis and assistance at program initiation and as part of T&E
Frequency & Recency
MO 6. Conduct proactive trade-off, integration, and risk reduction analysis
Depth & Analytical Rigor
MO 7. Conduct MANPRINT Assessments for each Milestone
100
0.14
100
0.14
100
0.14

Human-System Task Allocation

Means Objective	1		Scoring Rationale
Evaluation Measure	1.3		The human-system task allocation decision should be made as far left as possible. If the insight comes after simulation, then build that sim into pre-MDD analytical activities.
Evaluation Measure Units	x	Value	
JCIDS: CBA & ICD	100	100	
Mat'l Devel. Decision	90	90	
Milestone A	80	80	
Milestone B	60	60	
Milestone C	20	20	
Full Rate Production	0	0	
Evaluation measure sources:	META		
Type of evaluation measure	Direct (Constructed)		
Shape of value function	Increasing (Linear)		

Senior decision maker determines the relative value of each data point

Metrics

Type	Defined	Data
Impact	Perceived value of MANRINT on a given program --Increase survivability --Improve performance --Avoid Life Cycle cost	--HSI Fm 1 (ROI) for each Assessment of each Program --Customer Feedback from Testing Community
Breadth	Coverage of all Acquisition Programs at every opportunity --Is an assessment on file in META for every program? --Life Cycle Instances (Frequency) --Up-to-date (Recency)	--META database forms for each Program, by ACAT (I, II, III, and none)
Depth	Quality of each analytical product on a given program --Life Cycle Point of Entry --Number of agencies and MANPRINT domains involved? --Analytical rigor (Level of Effort)	--HSI Fm 2 (LOE) for each MANPRINT Assessment of each Program by ACAT
Efficiency	Continuous Process Improvement --Measure and report benefits, ROI (better) --Process cycle efficiency, flow, reduce waste (faster) --Align skills to tasks to objectives, leverage (cheaper)	--HSI Fm 3 (CPI) Longitudinal Survey --META statistics

Way Ahead

- Finish framework (QVM)
  - Metrics
  - Scoring functions
  - Adjust weights
- Data collection effort
  - META
  - HSI Form 1 (ROI)
  - HSI Form 2 (LOE)
  - HSI Form 3 (CPI)
  - Customer Feedback Form(s)
- Feed META, and extract reports
- Write Assessment Framework manual
- Knowledge database for Practitioners

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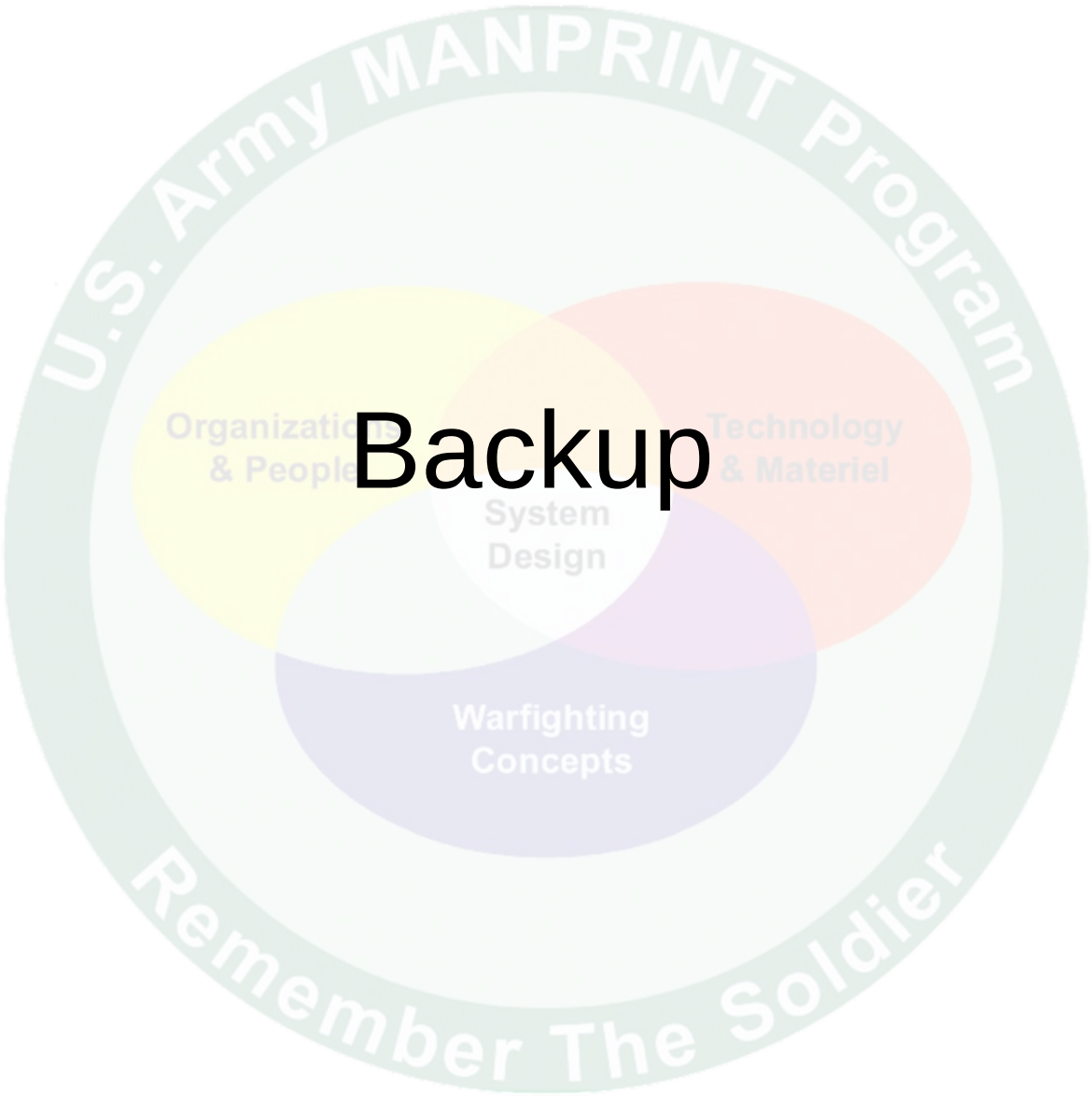
Conclusion

- Value-Focused Thinking (VFT)
  - Communicate Strategic Intent
  - Enable a Community of Practice
  - Improve MANPRINT's Overall Impact
- Cause & Effect Diagram
- Contact information
  - LTC Dave Doane
  - dave.doane@us.army.mil
  - (703) 602-7906


U.S. Army MANPRINT Program
Organizational & People
Technology & Materiel
System Design
Warfighting Concepts
Remember The Soldier

Backup

VFT Key Points

- Rich literature
  - Analytic Hierarchy Process (AHP)
  - Multi-Objective Decision Analysis (MODA)
- Art and Science:
  - Senior decision maker's values (subjective, qualitative)
    - Selecting Objectives and setting relative weights
    - Developing scoring functions and adjusting thresholds
  - Data-driven decisions (objective, quantitative)
    - Collecting data and reading indicators
    - Measuring performance and allocating resources
- Aid to collaborative decision making
  - Priorities are identified and shared
  - Improvement opportunities come to light
    - Reducing variance, or moving the mean, or both
    - Managing a portfolio of projects
    - Simulating alternative process improvement interventions
    - Optimizing the MANPRINT process

Stakeholders

- Joint HSI Community (DoD, Army, Navy, Air Force)
- Army G-1 MANPRINT Directorate
  - MANPRINT Research and Analysis Branch
- MANPRINT Practitioners in 7 domains
  - AMC / ARL
    - HRED: Manpower,
      Personnel Capabilities,
      Training
      Human Factors Engineering
    - SLAD: Soldier Survivability
  - OTSG / CHPPM: Health Hazards
  - USACRC: System Safety
- Acquisition professionals
  - PEOs / PMs
  - Defense Contractors
- Other Organizations
  - Research & Development
  - US Army Testing & Evaluation Command
- Soldiers, the ultimate beneficiaries of the MANPRINT process