

Army, Laboratory, Industry, University: Modeling Stakeholder Needs

Where It All Starts and Could Abruptly End

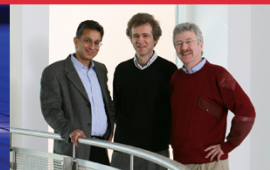
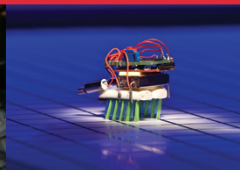
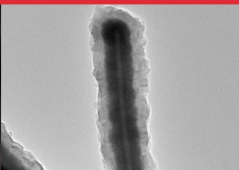
Kent de Jong, CSEP

Stephen J. Sutton, PE, ESEP

Model Based Engineering Workshop
NASA/Goddard Space Flight Center
February 18, 2016

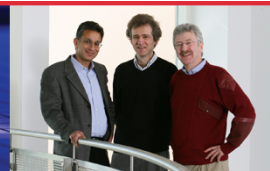
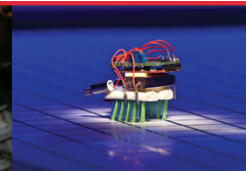
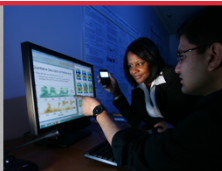
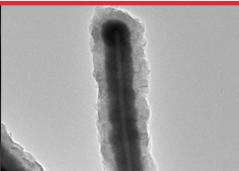
Modeling Stakeholder Needs-20160218

1



Agenda

- Steve and Kent's Background
- Our Thesis
- Experiential Lessons Learned Applied to Teaching MBSE
- Our Investigative Process
- An Exercise for You
- Lessons Learned from the Process
- Takeaway



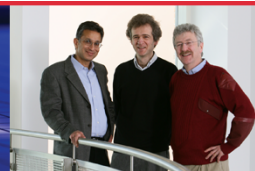
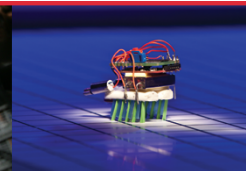
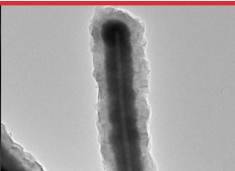
Steve and Kent's Background

Steve Sutton

- Degrees in EE; Registered PE; INCOSE ESEP
- 45 yrs SE for information systems for intelligence and military applications – conceptual design and analysis
- Director of SE Program at UMD/ISR – taught intro to MBSE

Kent de Jong

- Degrees in EE; Degree in Business; INCOSE CSEP
- 25 years SE for weapons systems, software systems, security systems, robotics & business systems - conceptual design & analysis through implementation & production
- Instructor at UMD/ISR teaching introduction to MBSE



Our Thesis

- Problem understanding not fully known before launching into functional design and developing values for performance

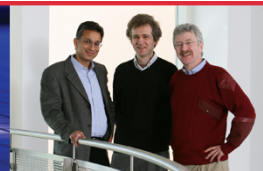
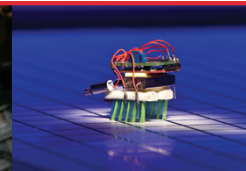
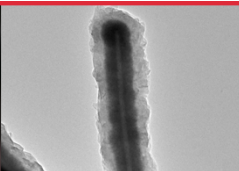
(Ready → Fire → Aim → Fire → Aim)

- Program/project risk increases and eventually failure or delay occurs
- Get the problem statement “right” and the remainder of the work has a solid foundation

Our experience led to this thesis and the lessons learned we emphasize with our students

Modeling Stakeholder Needs-20160218

4

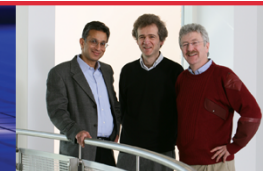
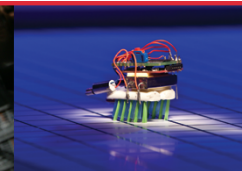
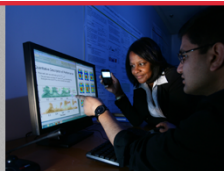
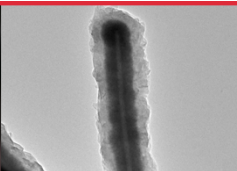


Lessons from Experience Applied to Teaching MBSE

- Ensure we have a clear, precise understanding of problem, its constraints, and stakeholders
- Express problem in terms and language of the stakeholder
- Keep the solution space wide open unless no alternative
- Precisely define textual language and terms
- Ensure unknowns addressed, resolved before proceeding to next stage in design
- Identify, assess consequences before changing course
- Include stakeholder in the process

Heuristic: Mistakes made on the first day constrain and haunt you for the remainder of the program

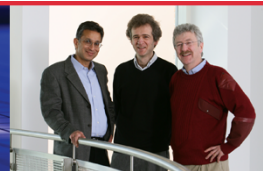
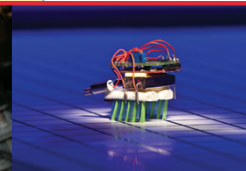
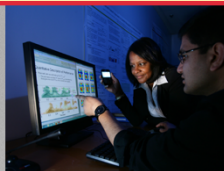
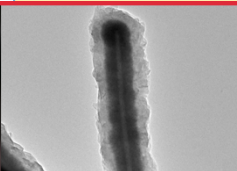
Modeling Stakeholder Needs-20160218



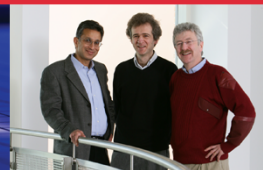
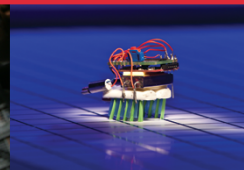
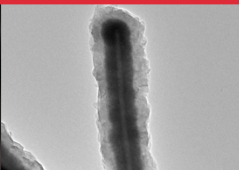
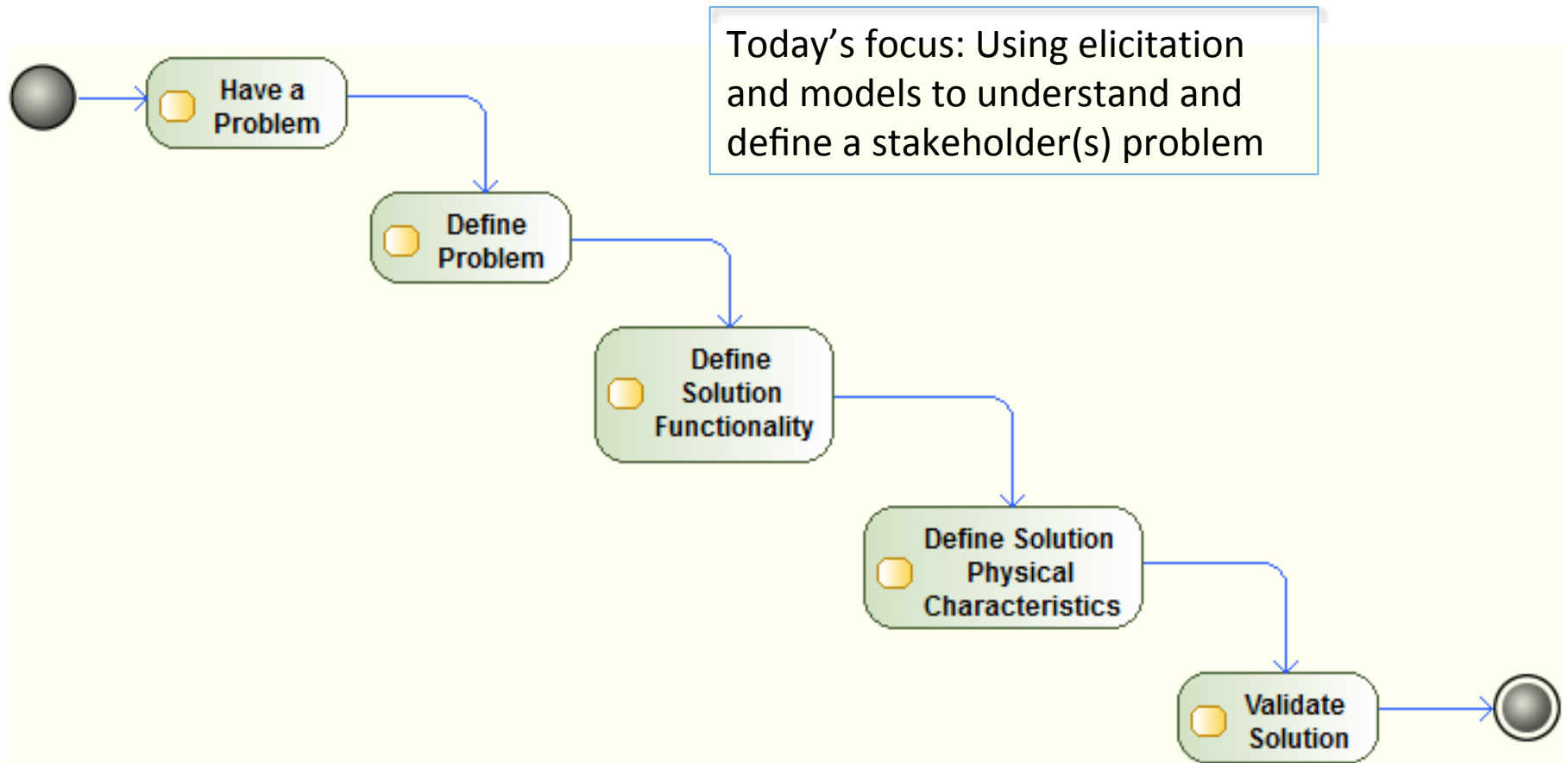
MB Language & Approaches

Help Apply Lessons

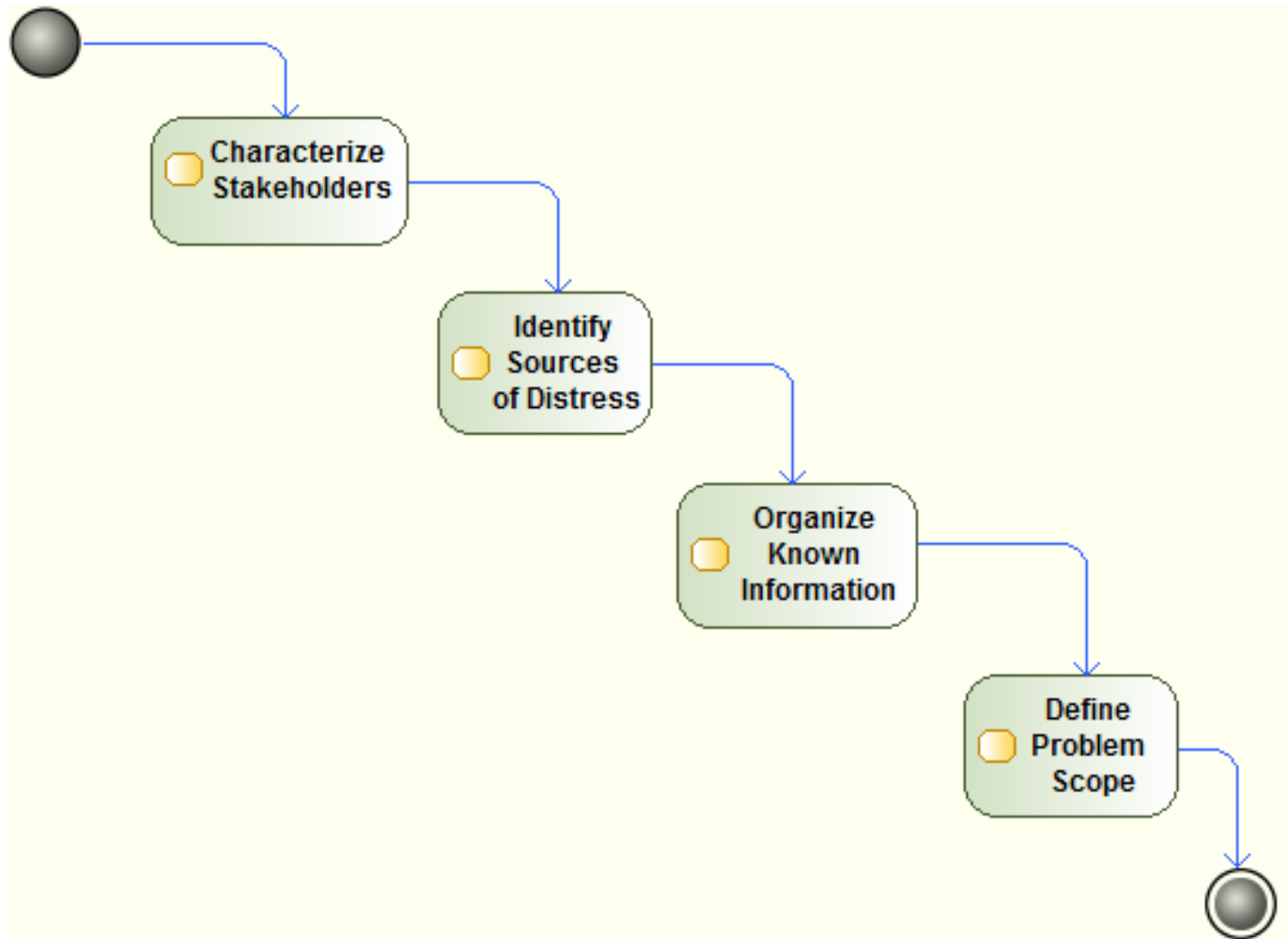
- Model artifacts help understand the boundaries of the problem
- Model artifacts help with understanding the problem from stakeholder's viewpoint
- Modeling language forces a more precise, if not perfect, expression of the problem – textual explanation clarifies the model
- Learn the language while addressing a problem
- Teach stakeholders to learn how to understand the models
- Use modeling language to take “notes” and from the notes build models that come under CM
- Use models to assess proposed changes



A System Engineering Method

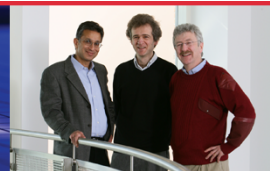
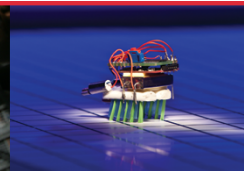
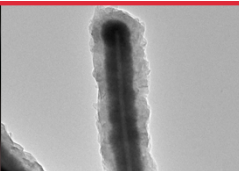


Define the Problem

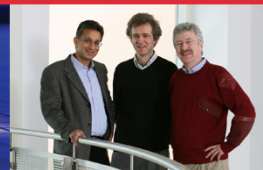
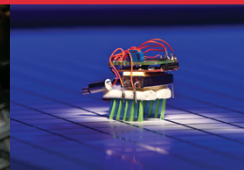
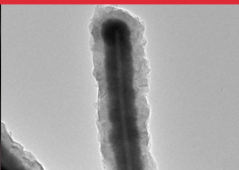
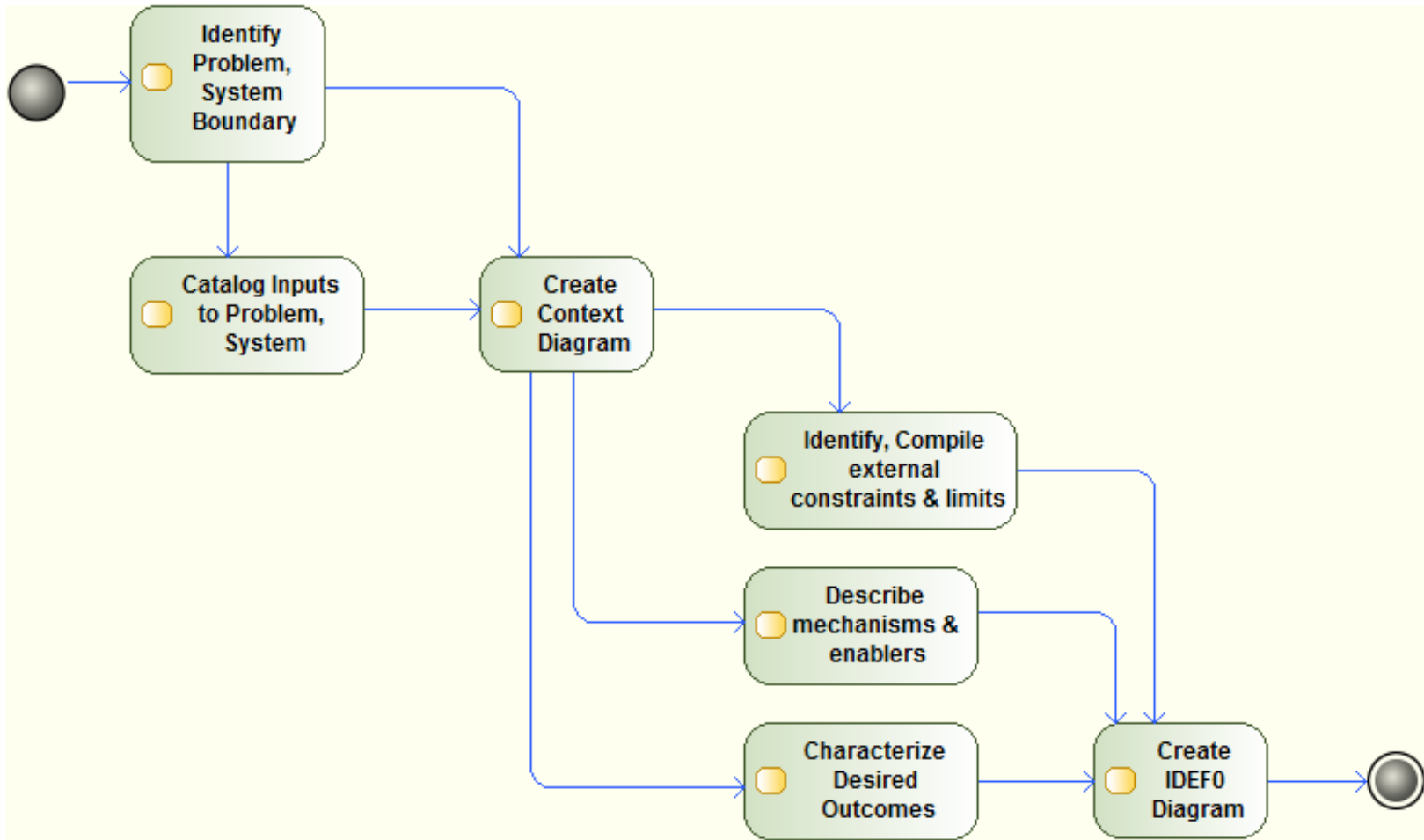


Modeling Stakeholder Needs-20160218

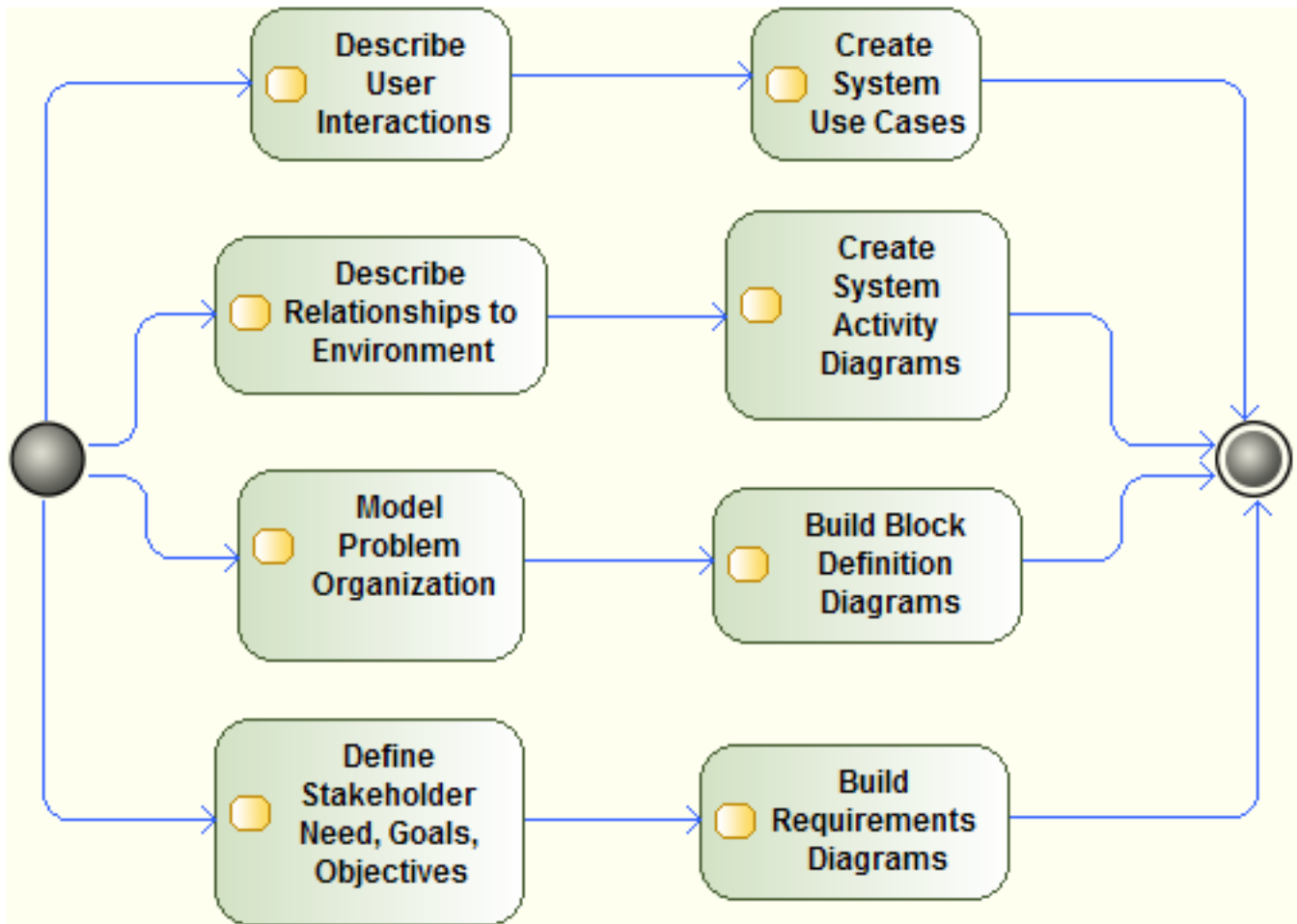
8



Organize Known Information

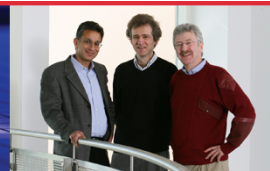
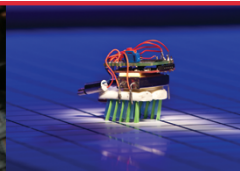
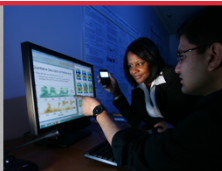
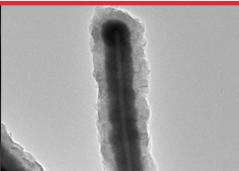


Define Problem Scope



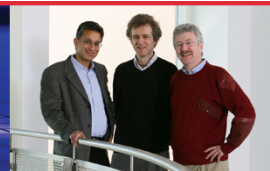
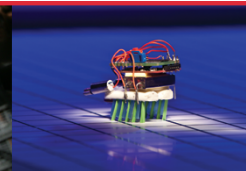
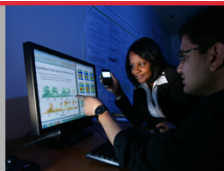
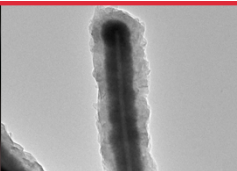
Modeling Stakeholder Needs-20160218

10



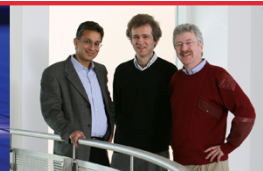
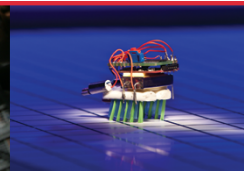
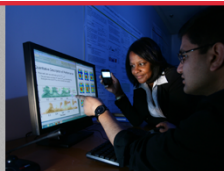
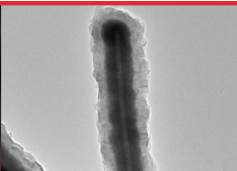
Exercise: The Automated Dog Walker

- Please review the problem statement provided
 - Customer owns dog
 - Customer wants a robot to walk the dog
- What questions would you ask of the customer?



Lessons Learned from the Process

- Defining a Problem is REALLY HARD
- Some uncertainty always
- Iteration is very helpful
- Models, diagrams help organize information
- Whatever we define, we need to validate



Takeaway

- Get the problem statement right and the rest of the program/project goes smoother
- Do try this at work or at home

