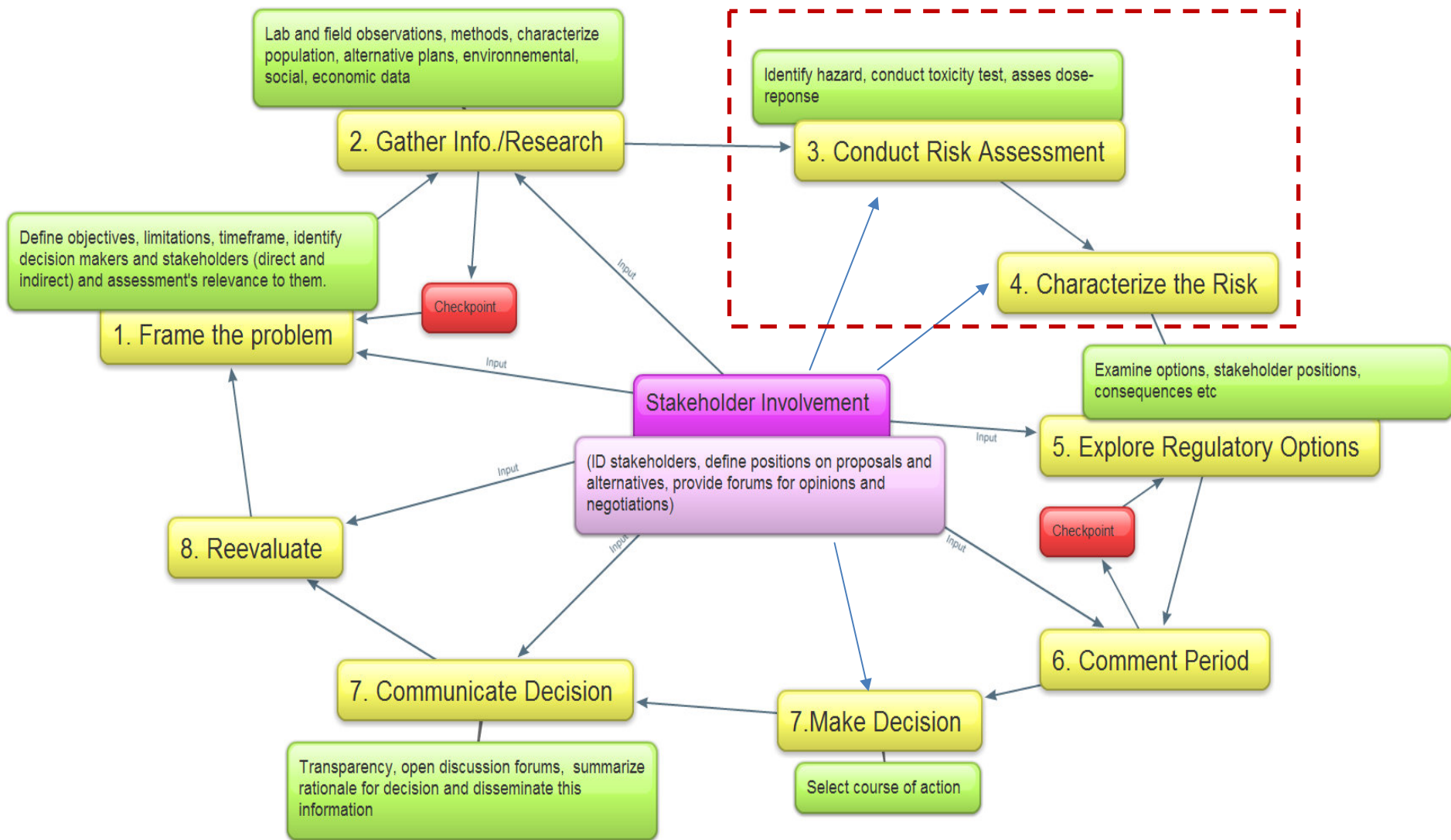
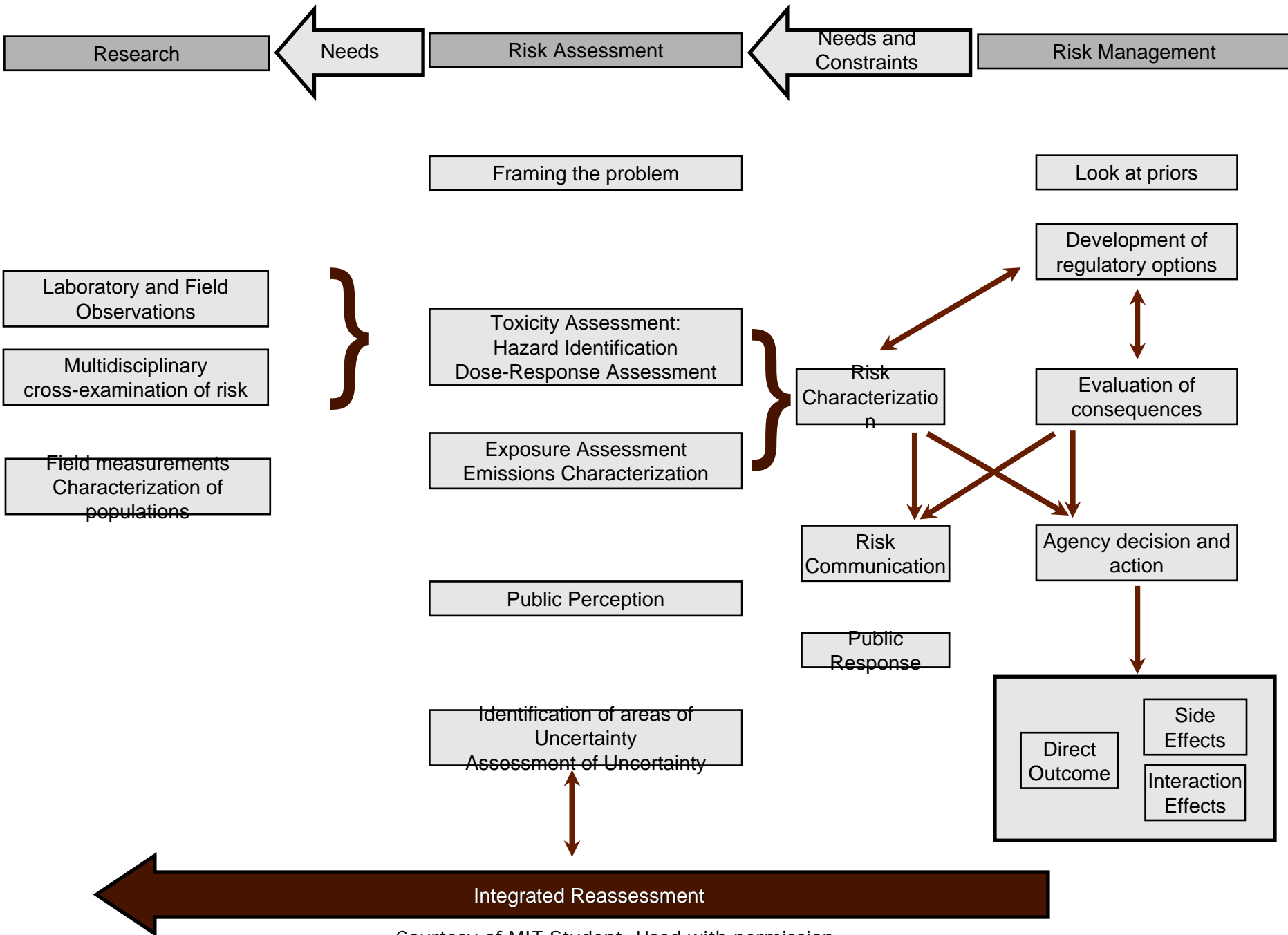


Courtesy of MIT Student. Used with permission.

Risk Analysis Framework



Courtesy of MIT Student. Used with permission.



Courtesy of MIT Student. Used with permission.

Company

Initial laboratory testing
Toxicity assessment,
exposure assessment, lab/
field observations

Regulatory Agency

Imposes guidelines & tests
that company must fulfill

Regulatory Agency

Further laboratory testing
Toxicity assessment,
exposure assessment, lab/
field observations

Low-Volume, Low-Risk

First production run
If complaints, return to
company/agency testing. If
no complaints, high-volume.

Public

Low-risk population reports
any hazards found.

High-Volume, Everyone

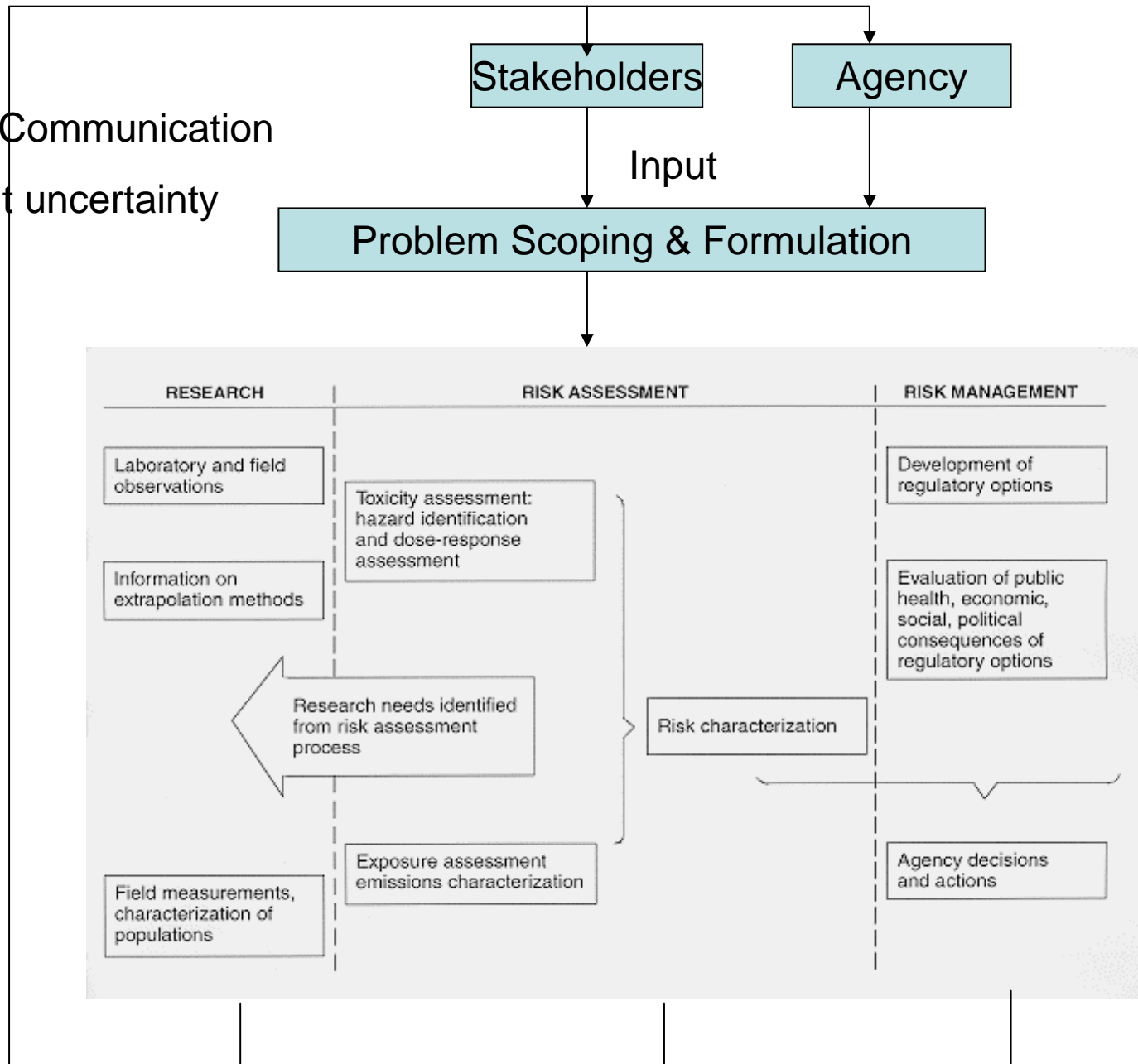
Full-production run
If complaints, return to
company/agency testing. If
no complaints, maintain.

Public

General population reports
any hazards found.

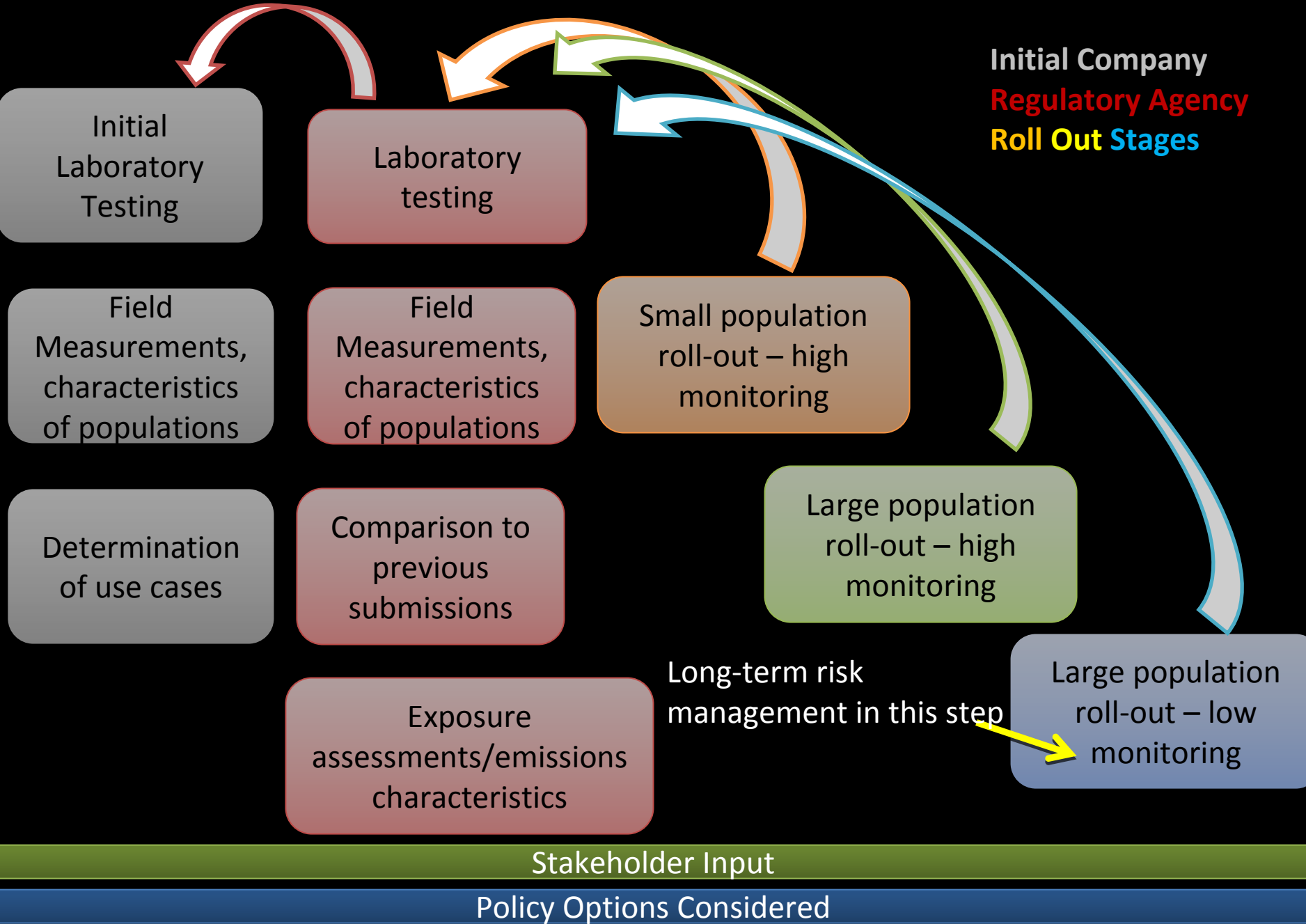
Courtesy of MIT Student. Used with permission.

Risk Communication
About uncertainty

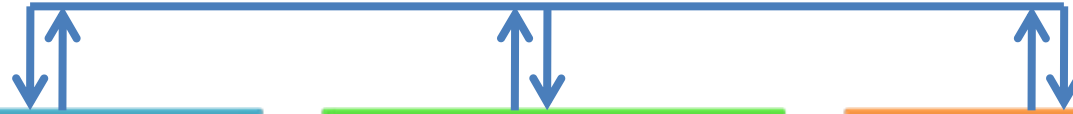


ESD 864
PS2 – Q1
3-8-2011

Initial Company
Regulatory Agency
Roll Out Stages



Mandated, adequate and transparent communication among stakeholders, decision makers, and researchers



Risk Analysis

- **Problem Framing**
 - What question is of interest to stakeholders and being asked by stakeholders?
 - How is the risk defined in this policy context?
- **Research Planning**
 - What are the scope, scale, budget/time constraints, etc., of the research?
- **Research**
 - Lab/field observation, information on extrapolation methods, field measurement, characteristic of populations, etc.
- **Report**
 - Uncertainty and limitations should also be communicated to stakeholders

Risk Assessment

- **Toxicity Assessment**
 - Hazard identification
 - Dose-response assessment
- **Exposure Assessment**
 - Emissions characterization
 - Susceptibility assessment
- **Perception Assessment**
 - Translation of the above technical risk assessment into a value-laden one by considering public perception of the risks being assessed

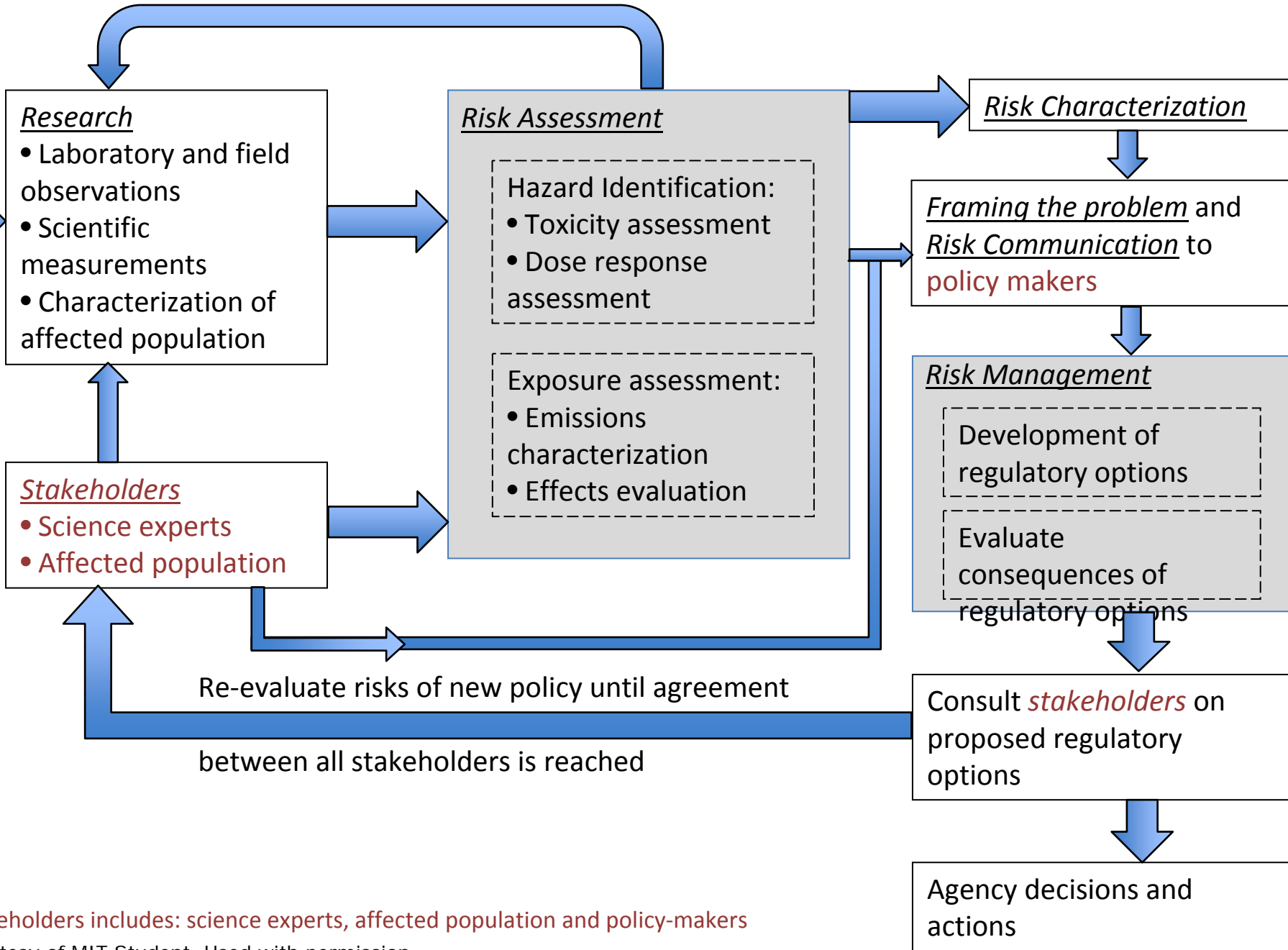
Risk Management

- **Option Search**
 - What are possible policy options that can manage the risk?
- **Option Analysis**
 - What are the public health, economic, social, political consequences of each option?
- **Option Negotiation**
 - What is the final option to be taken?
- **Option Administration**
 - What institute(s) will be responsible for administration of the option to be taken?
 - Monitoring and taking account of new information should be among the responsibilities

Possible revision within blocks

Possible revision due to new information (adaption)

Research needs identified from risk assessment process



*Stakeholders includes: science experts, affected population and policy-makers

Courtesy of MIT Student. Used with permission.

Research

Risk Assessment

Risk Management

Research needs identified from risk assessment process

Hazard identification by the public

Hazard identification by scientists

Determine the decision to be made
e.g. What restrictions should be placed on the use of this chemical?

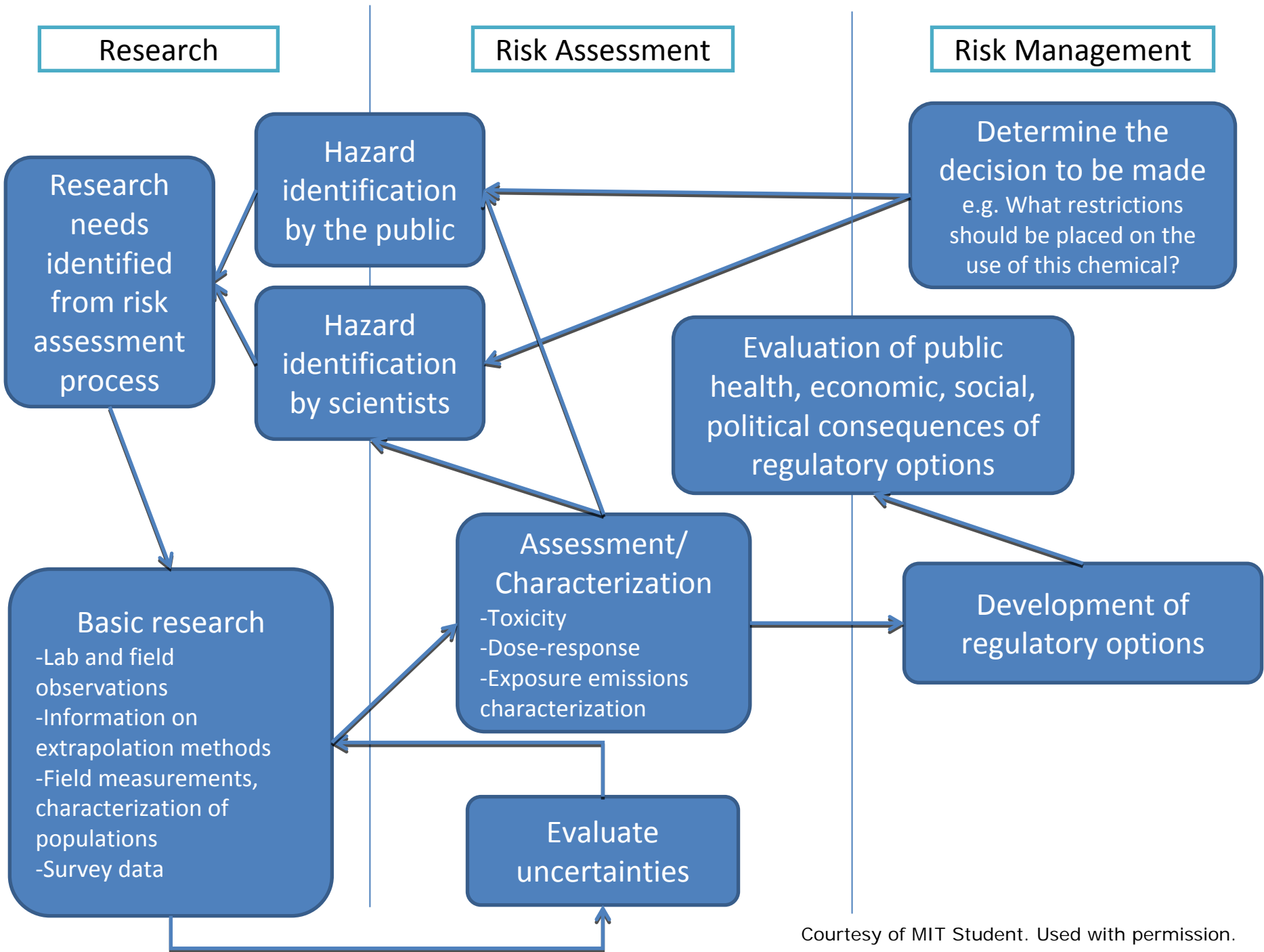
Evaluation of public health, economic, social, political consequences of regulatory options

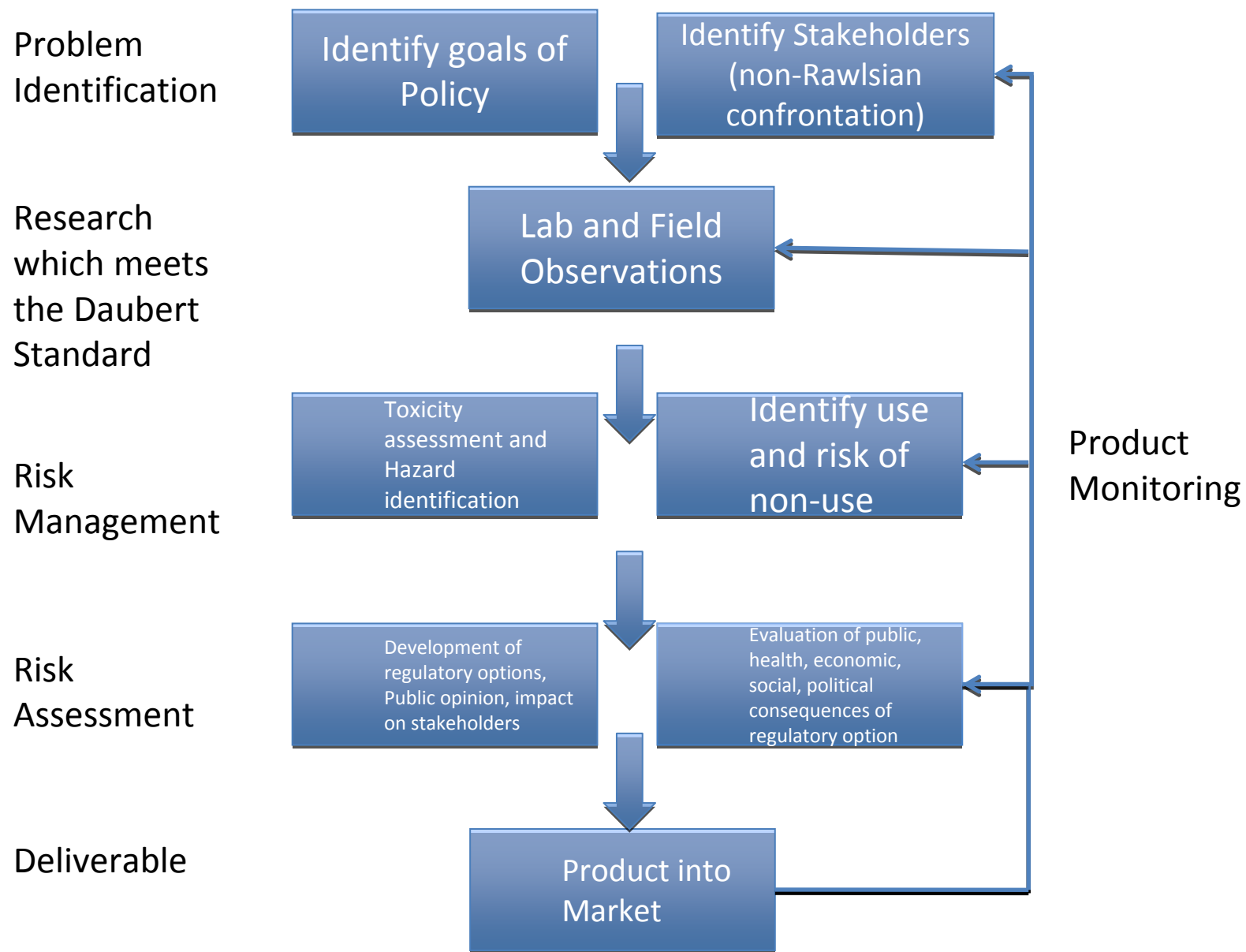
Basic research
-Lab and field observations
-Information on extrapolation methods
-Field measurements, characterization of populations
-Survey data

Assessment/
Characterization
-Toxicity
-Dose-response
-Exposure emissions characterization

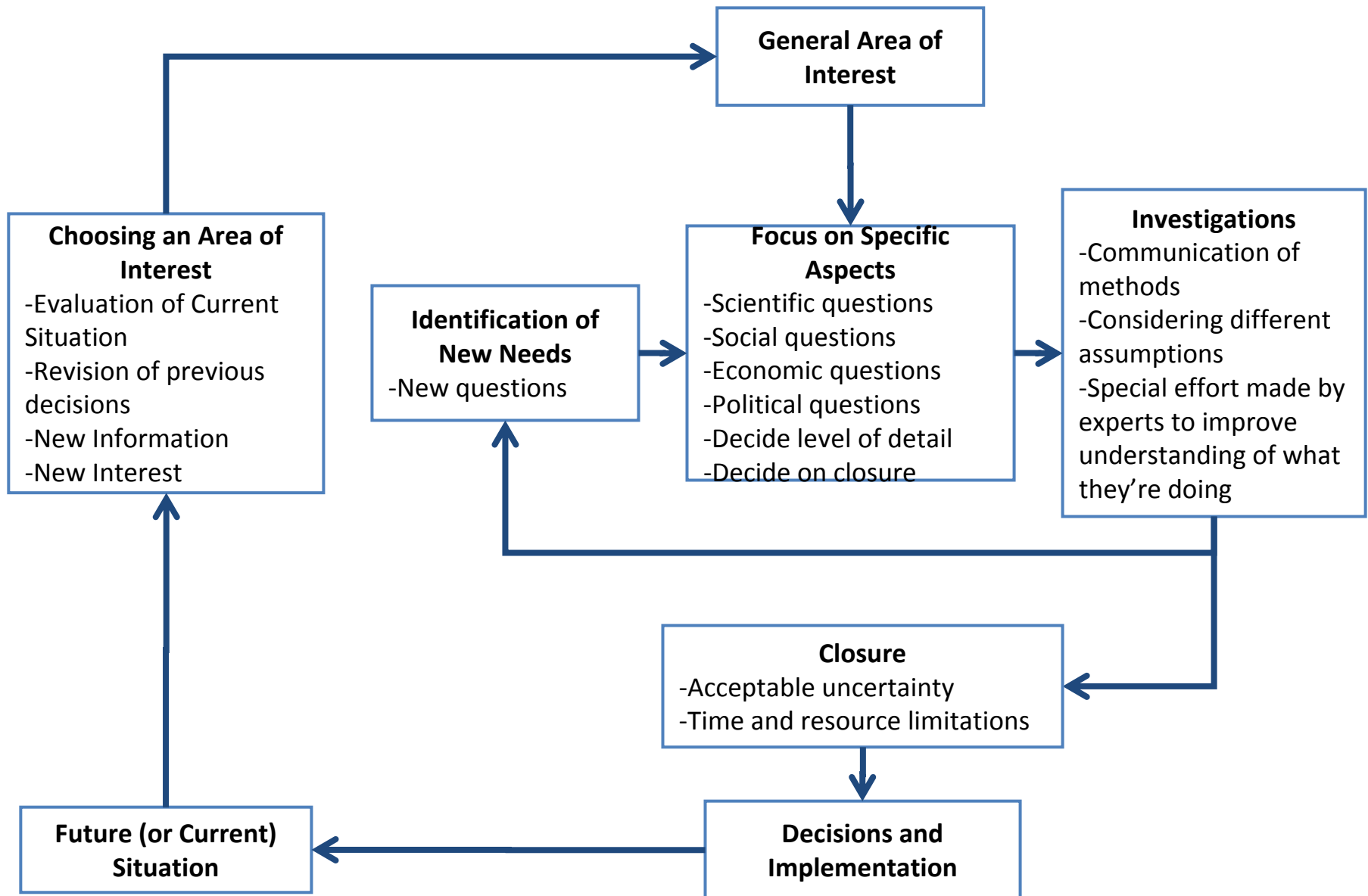
Development of regulatory options

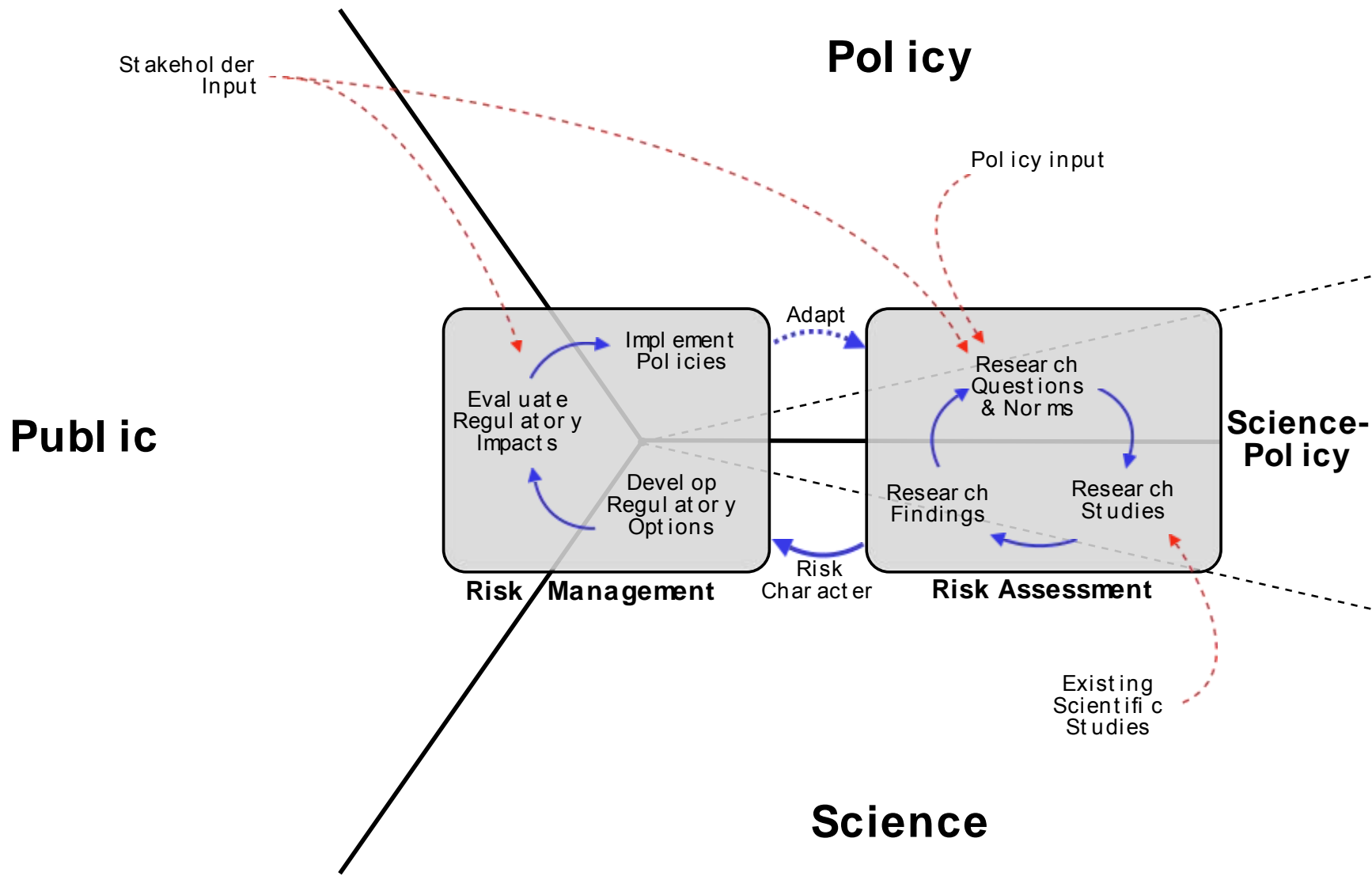
Evaluate uncertainties





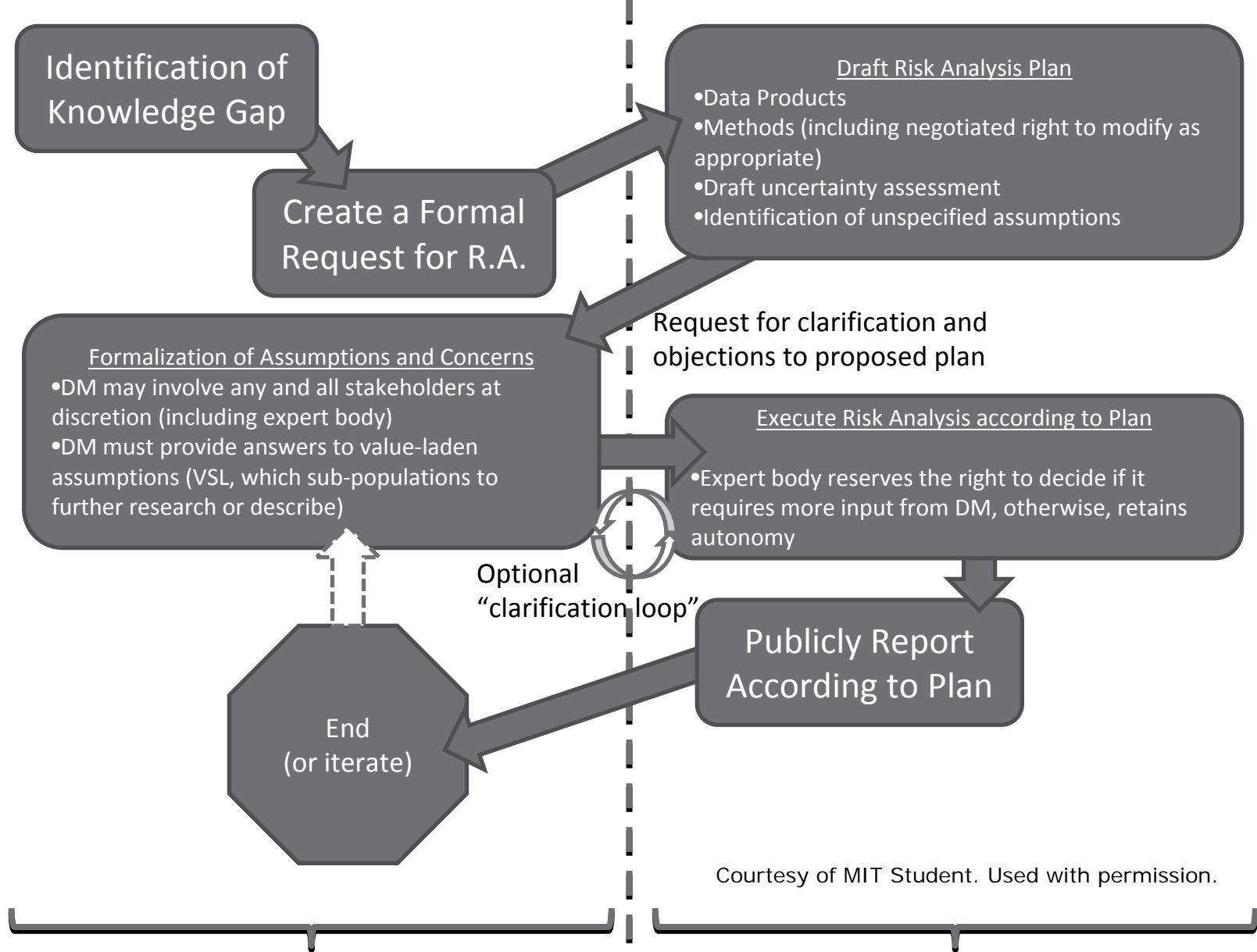
Courtesy of MIT Student. Used with permission.





Courtesy of MIT Student. Used with permission.
Risk Framework

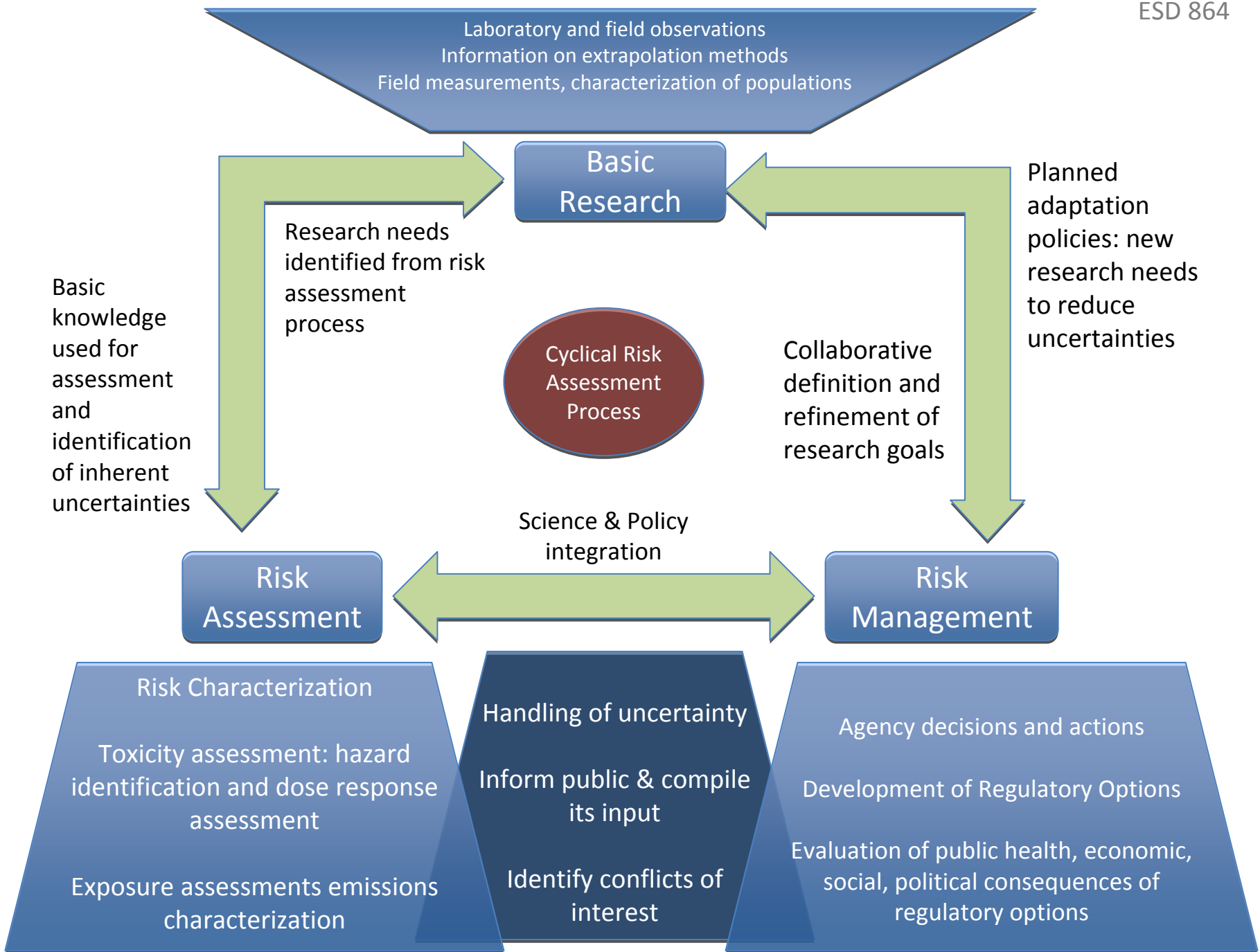
Risk Assessment Concept



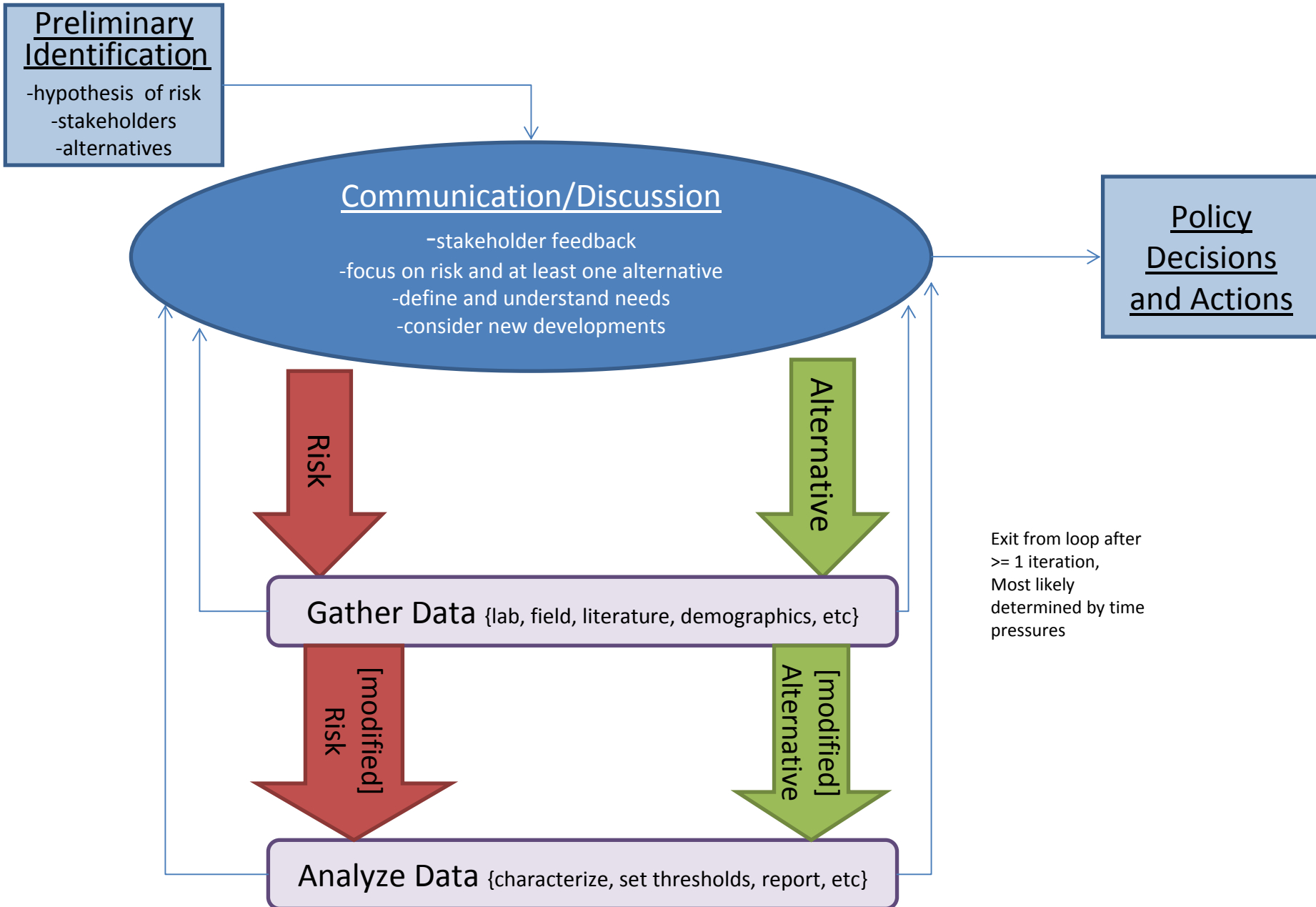
Courtesy of MIT Student. Used with permission.

The decision maker is responsible for value judgments including which stakeholders to involve and how

The "expert body" has the right to propose, refuse, and publicly request clarification and report



Risk Assessment Framework



PROBLEM FORMULATION

- Laboratory, field observation and stakeholders opinion.
- Definition of a clear set of options for decision making.
- Clarify questions risk assessment should address and desired outcomes.

RISK ASSESSMENT

Hazard Identification and characterization

Exposure Assessment

Uncertainty and Variability Analysis

Risk Characterization

Utility

No

Yes

RISK MANAGEMENT

- Benefit analysis of proposed options.
- Evaluation of the decision in terms of benefits, costs, uncertainties and public perception and valuation.

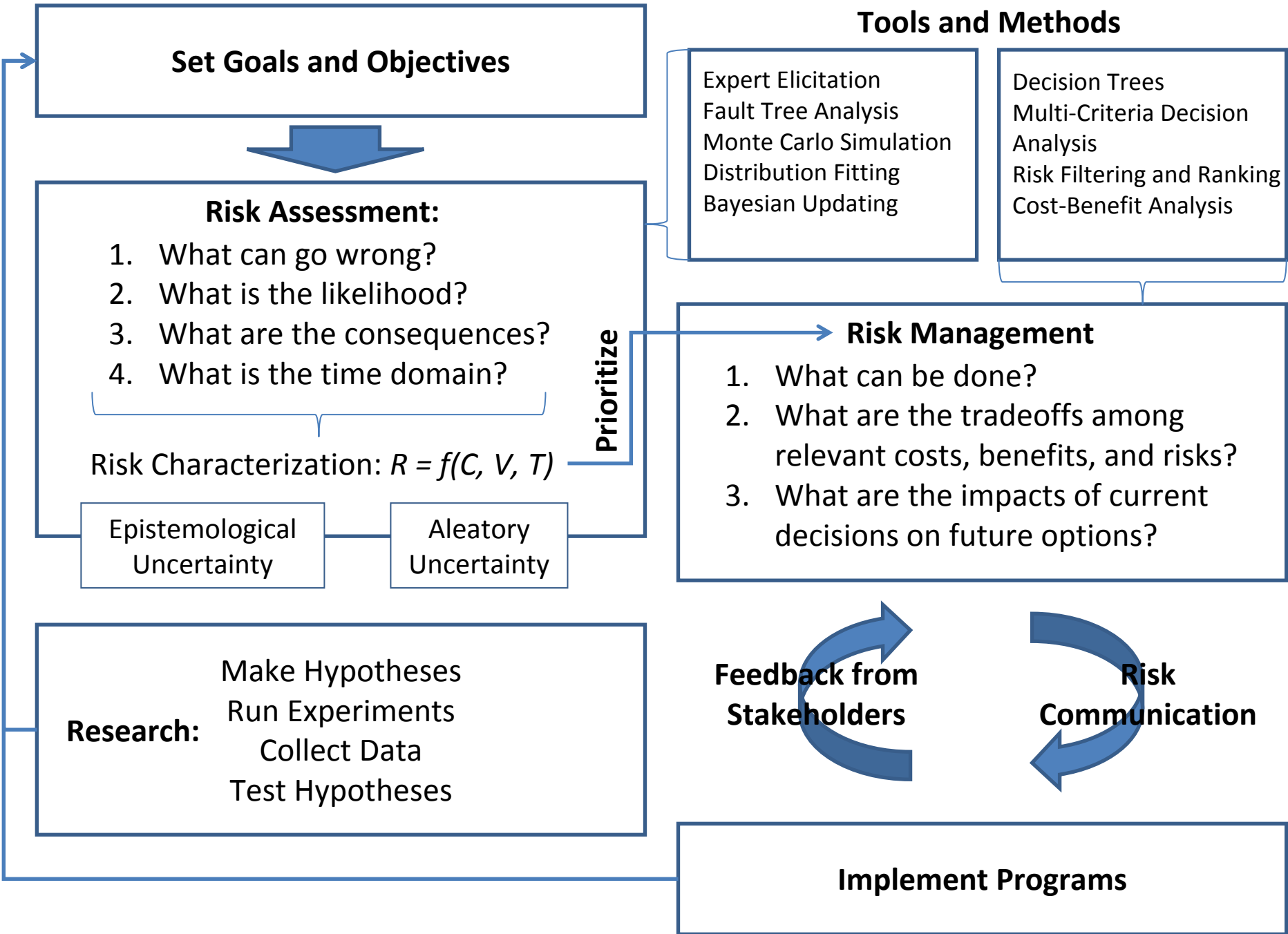
RISK COMMUNICATION

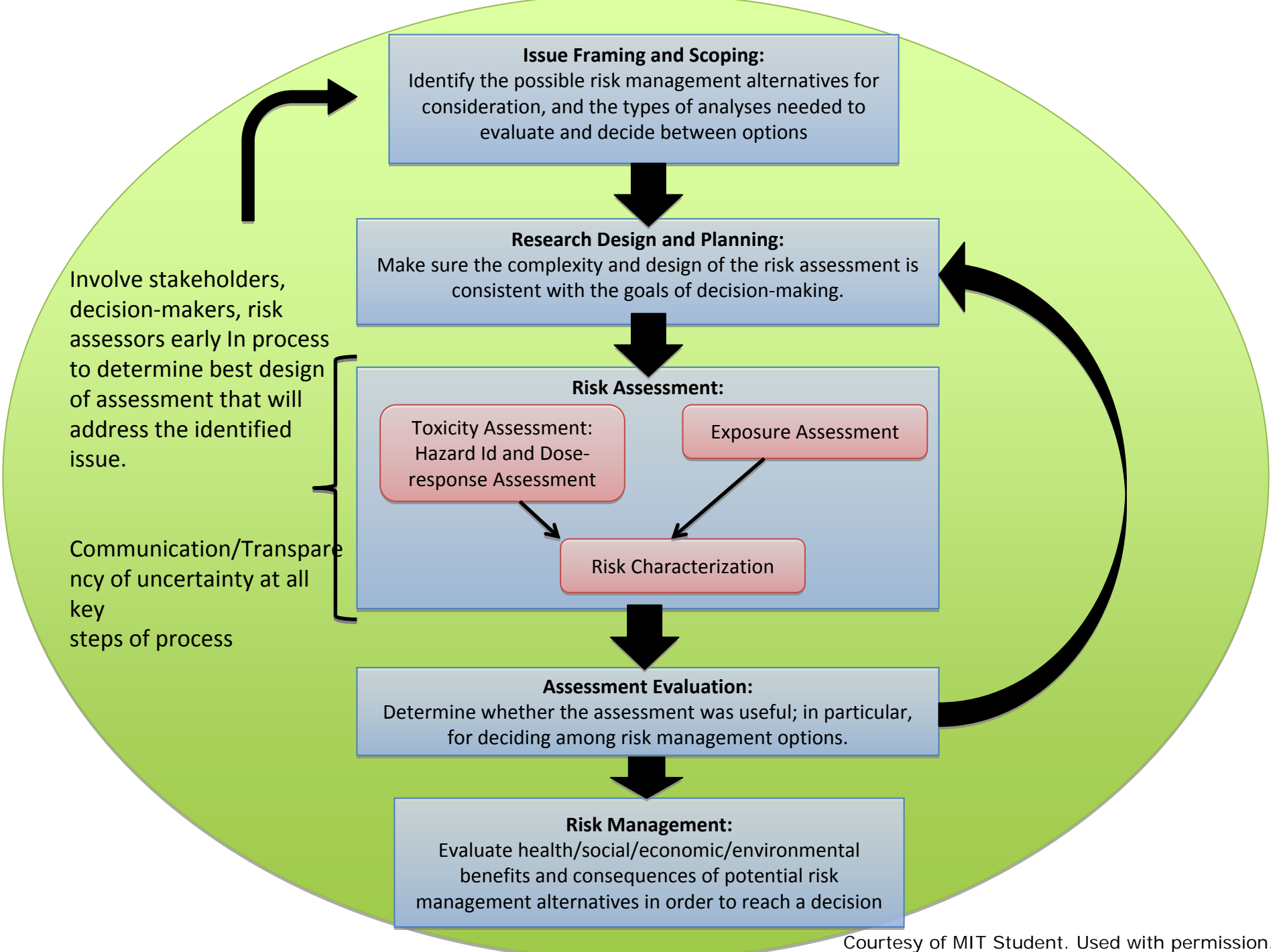
- Emphasis in communication to the public.

Decision makers, Risk analysis specialist, interested and affected parties.

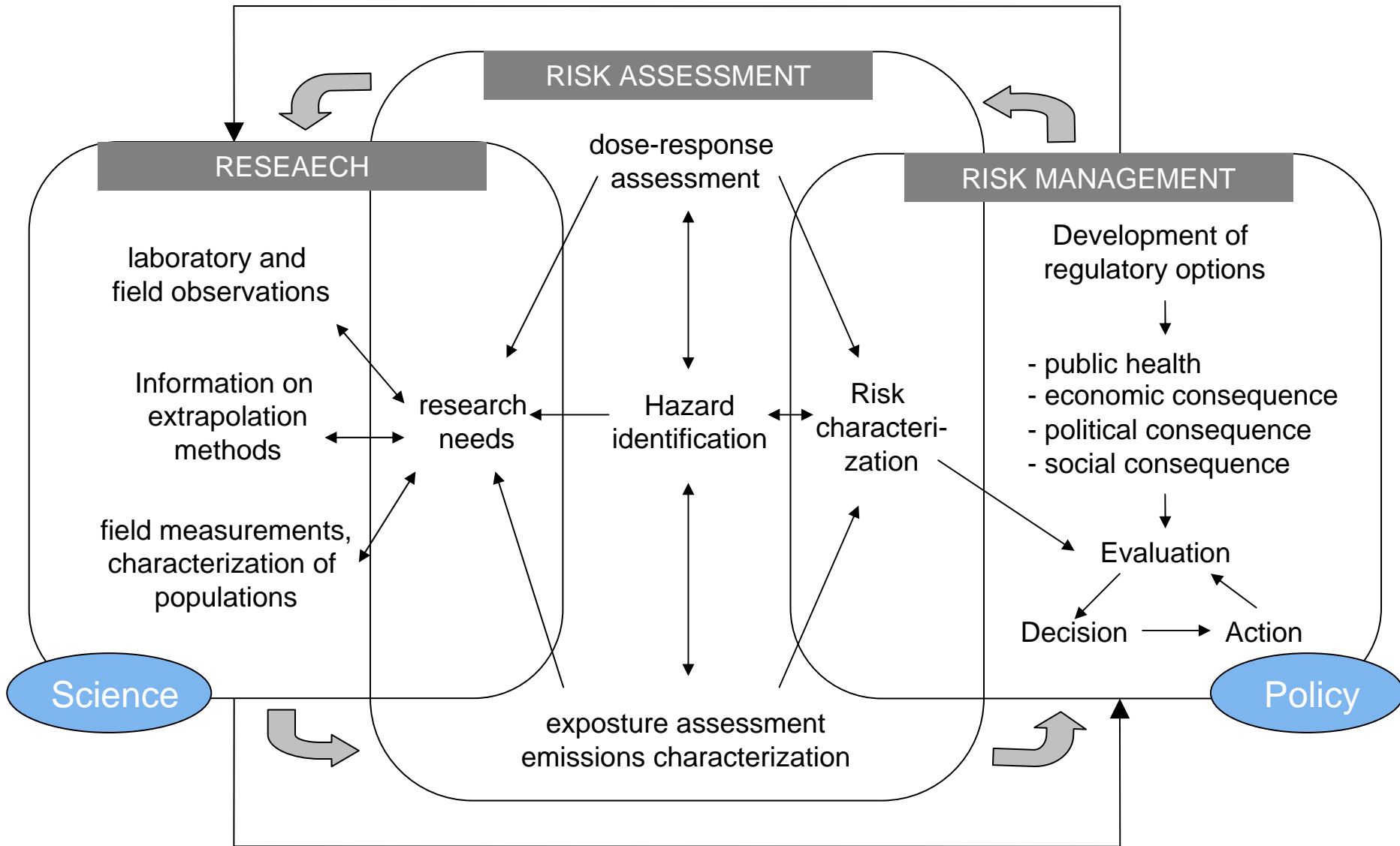
Model based on framework proposed by "Science and Decisions", 2009

Courtesy of MIT Student. Used with permission.





Risk Assessment Model

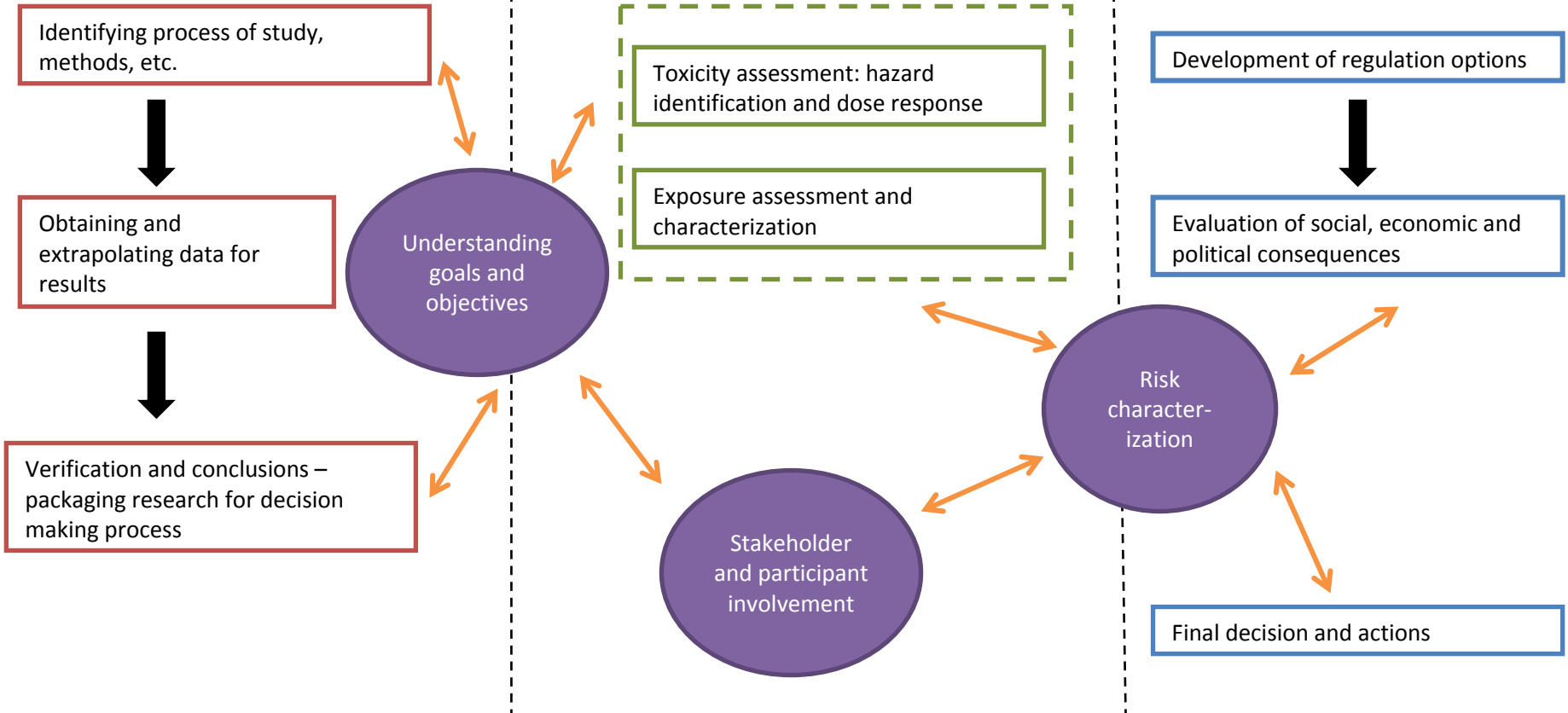


Courtesy of MIT Student. Used with permission.

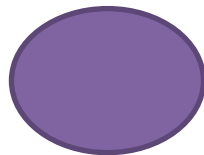
Research


Risk Assessment


Risk Management



-  = Research
-  = Risk Assessment
-  = Risk Management

 = Core communication stages/factors

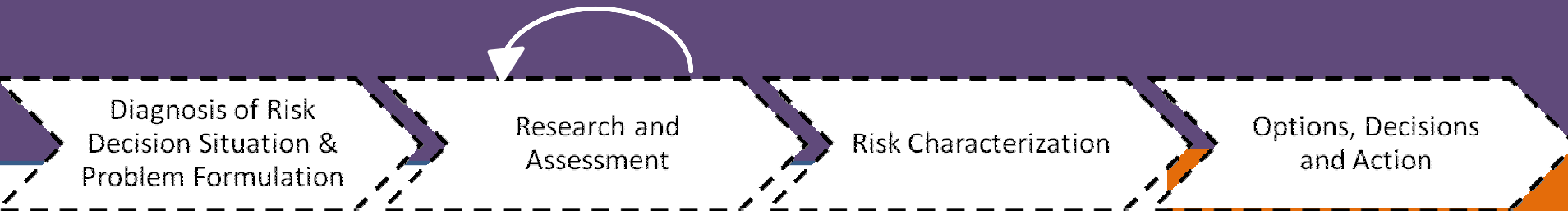
 = Influencing and influence by core factors

 = Primarily one way flow/progress

Analysis and Deliberation at Every Step of Risk Analysis

Deliberation

- Broad group of interested and affected parties
 - legislators, judges, industry groups, environmentalists, citizens' groups, and a variety of others
- Offer perspectives and specialized knowledge



• Design process

- Iterations of:
 - Field and Lab research
 - Assessment

• Accurate, balanced
Information synthesis

• Reviewed by all

Analysis

- Relevant expert community
 - Science, math, logic, law
- Responsible agency

Policy

- Make decisions
- Reflect on reactions
- Implement

MIT OpenCourseWare
<http://ocw.mit.edu>

ESD.864 Modeling and Assessment for Policy
Spring 2011

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.