

A thick blue border is present on the left and top edges of the slide. The left border is a vertical line that has a square-shaped notch at the top left corner. The top border is a horizontal line that starts from the left edge and extends across the top of the slide.

Introduction to Snowmass—  
Setting the Stage

Hermann A. Grunder

# Introduction

- **Welcome to Snowmass**
- **Snowmass is a process, not an event**
- **The Snowmass process has served other scientific communities well**
- **This is a time to look at yourself- a great scientific community at an historic meeting to embark process leading to a vision for the future of fusion.**  

a 40 yr \$ 40 B shared effort
- **Honored that you have invited me into your community and pleased to be here -**
  - **The fact that you have gathered here today, from both IFE and MFE is both significant and encouraging.**
- **Fusion offers challenges in so many parameters that I cannot help but have admiration for its practitioners, and I am happy to give whatever help I can to this community**

# Two Components of Fusion

- There are two components to a fusion program for the 21st century

**Plasma physics - an arena of science (MFE and IFE) that has demonstrated its worth and whose value is not questioned.**

*As a field of basic research, a federal responsibility.*

**Fusion energy- great potential for producing electricity:**

- in quantities consistent with future world demand
- sensitive to environmental concerns
- on the timescale of a half a century.

*Development of fusion energy becomes a federal responsibility because of the timescale involved.*

▷ We as a comm. go through a time of uncertainty - We have low cred with our spons

- Times of uncertainty are also times of opportunity :
- if you are not anxious, you probably shouldn't be here  
and
- we must overcome our anxiety to think "out of the box" to:
  - develop a program that will both serve the nation
  - excite and engage young people to enter the field (field that offers its practitioners both the opportunity to unlock the mysteries of the stars, and to develop a socially acceptable energy source that will meet our energy needs without further compromising our environment)

# Snowmass- Setting the Stage

Develop a common vision—  
Decide what your community  
ought to be  
“when it grows up”  
and go for it!!

## **Viewgraph- Develop a common vision...**

### **In plasma physics:**

- **Observe that plasma physics has shown astonishing progress in 40 years- we now understand plasmas a great deal better.**
  - *We are so close to demonstrate ignition in ICF*
- **Progress can only be accomplished by attracting a significant number of top students to the field. This requires:**
  - **a dynamic and innovative field with continued progress**
  - **Steady base funding for fusion science**
- **In a field as complex as plasma physics, without these top students - you can't get there.**

## Viewgraph- Develop a common vision... (continued)

### Energy Option:

- We can agree that there is a long way to go.
- To deliver cost-effective power to the grid will take ~~40~~ years and ~~\$50B~~  
with heavy on the D
- This is an unprecedented R&D program - YOU have to write the book!  
not only on substance itself  
on how to conduct such a huge R&D program
- At this point innovation is at a premium
  - Need new ideas and new perspectives on old ideas

*Don't get frozen in your thinking!*

- You do need a plan/you do need milestones/You do need to deliver on milestones

Need to be flexible as your knowledge and understanding grows

You owe your sponsors cost-effectiveness and accountability

innovative

Funding will follow from an innovative integrated plan

# Snowmass-Setting the Stage

RULE #1 :

Check your preconceived notions, prejudices and egos at the door.

**Viewgraph : Rule #1 - Most important —Check your preconceived notions...,**

- **Ticket for participation should be good ideas and an open mind**
- **All intellectually active individuals have to be free to participate in the process - regardless of national or community boundaries**
- **In this atmosphere the best ideas must float to the top across the entire field (IFE & MFE)**

We

▶ You can only rebuild the credibility with our sponsors through

- Innovative planning and competent execution of our milestones
- open and candid assessments of our successes and failures } credibility
- gain intellectual leadership and run with it  
our culture doesn't support also runs



# Snowmass - Setting the Stage

**RULE #2:**

**Don't be afraid to fail!**

## Viewgraph - Rule #2 - Don't be afraid to fail!

- **Fear of failure is inherently limiting - intellectual pursuits need to be expansive and inclusive**
- **Few great ideas are cut from whole cloth- they are patchwork quilts of ideas that have been tried and failed, refined and pieced together with other ideas.**
- **In developing the energy option, certain approaches will fail or yield results unacceptable for other reasons**
  - **Important to remain intellectually honest and cut your losses**
- **In fundamental plasma science, there are no failures because even negative results increase knowledge and understanding**

*The failure in plasma physics is mediocrity*



By dealing with occasional failures timely and honestly the overall effort is enhanced

# Snowmass - Setting the Stage

RULE #3 :

Work together as an inclusive  
community

## **Viewgraph - Rule #3 - Work together as an inclusive community.**

- **Important first step bringing MFE and IFE together - have most impact as a unified community**  
— *Include event. Engineering* *also of the sciences and*
- **Become scientific ambassadors for a unified and dynamic fusion program worldwide.**
- **Institutional considerations must take a back seat to what is best for the field.**
- **May the best approach win.**

In short

You need to become a pillar of the scientific/technical enterprise

# Snowmass - Setting the Stage

## RULE #4 :

Build an environment for breaking down barriers and initiating an intellectual dialogue driven by science and fueled by enthusiasm.

## **Viewgraph - Rule #4 - Build an environment for ...**

- **Largest handicap in the past was not lack of progress but lack of appreciation of effort required (time and cost)**
- **Some fundamental changes have been made - rescoping of fusion program**
- **More changes are needed**

**We must have a community that speaks with a single voice⇒ that's why we are here (choir practice)**

- **In a ~~\$~~0 year, ~~\$~~0B program there are no quick fixes**
  - **The endpoint is known**
  - **The status today is known**

**⇒ How can we get there for the minimum development cost?**

**⇒ What are the scientifically/technically relevant milestones?**

(cartoon - Uncle Sam- We Want You- To unlock the potential of Fusion)

# Summary and Conclusions

- Every crisis is an opportunity.
- Without the best young students, there is no chance of meeting the challenges of fusion.
- Leadership dedicated to the scientific and technical goals over institutional goals must emerge
- Such a huge R&D program requires a plan that is flexible but accountable
- The dialogue and spirit of Snowmass must be kept alive daily as you pursue your work.
- Costs associated with fusion energy R&D are small compared to the costs to society of not trying



**I WANT YOU**

**TO UNLOCK THE  
POTENTIAL OF FUSION**