

Vision 2020:

A Look at the Future of the Design and Construction Community

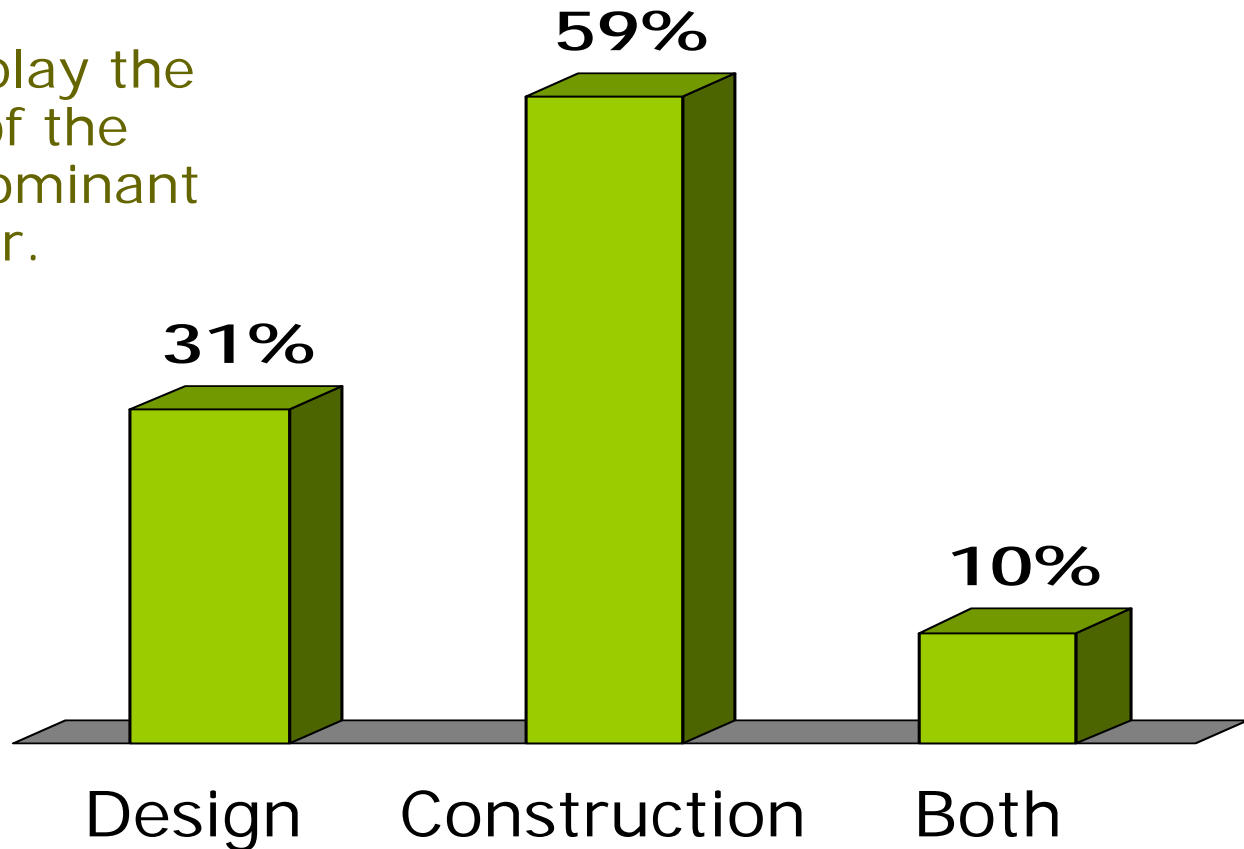


FACTOR SELECTION PROCESS & RESULTS

October 30, 2007

Attendees

- Approximately 75 members attended CIRT's 2007 Fall Conference.
- The bars display the distribution of the attendees' dominant market sector.



Factor Identification Process (1 of 2)

- During the six months before CIRT's 2007 Fall Conference, CIRT members submitted lists of the critical factors they believed would be the primary shaping forces of the E&C industry for the next 15 or so years.

- The factors were organized into six general categories that are fairly standard in forecasting and long-range planning processes:
 - Socio-Cultural Factors
 - Technological Factors
 - Economic Factors
 - Political/Legal Factors
 - Competitive Dynamics of the Industry
 - Natural Resources and Events

Factor Identification Process (2 of 2)

- ❑ FMI collected the ideas from the CIRT members and consolidated the items to minimize redundancies.
- ❑ Simple analyses were made to synthesize the thoughts and identify major themes.
- ❑ The consolidated and synthesized list was distributed to the CIRT members a couple week prior to the conference.
- ❑ CIRT members who would be coming to the conference could review the materials and be more prepared to discuss the relative merits of the items within each category.

Factor Prioritization Process (1 of 2)

- ❑ Prior to the conference, the CIRT members had pre-selected two of the general categories of factors that they would be interested in discussing.
- ❑ Two periods of discussion were conducted, facilitated by FMI and McGraw Hill Staff.
- ❑ All six categories of factors were discussed by two groups each.
- ❑ During each group discussion, the CIRT members identified the factors in the category that they felt were of most need for learning more about and being prepared to deal with in the future.
- ❑ There was no strict limit to the number of factors proposed at this time.
- ❑ The lists from each group within a category were combined and consolidated, resulting in one list of Top Issues for each category of factors.

Factor Prioritization Process (2 of 2)

- ❑ Three rounds of voting were used to narrow-down the lists.
- ❑ Round #1 asked the attendees to identify their preference for two factors from each category.
- ❑ There were 6 sub-rounds within Round #1, one for each categories for factors.
- ❑ A handheld wireless voting system was used for efficiency and effective data collection.
- ❑ At the completion of Round 1, two factors from each category will go forward into voting Round 2.
- ❑ Round 2 will include all 12 factors identified in Round 1 (2 factors each from 6 factor categories).

Round #1

Sub-Round #1 – Prioritizing Socio-Cultural Factors (1 of 3)

□ Three factors were on the Socio-Cultural ballot.

1. CHANGE IN WORKING LOCATION

Assumption: Distributed; disperse; not tied daily to central office or job site
(except PMs, PEs and superintendents)

1. Issue of cultural integrity
2. Issue of quality control

2. WORK FORCE DEVELOPMENT

Assumption: Shortage of #; lack of diversity; varying generation motives/desires

1. and how to minimize
2. Diversity and how to maximize with consistent QC, productivity, etc.
3. Aging & generation-based differences in wants from and ways of work

3. SUSTAINABILITY

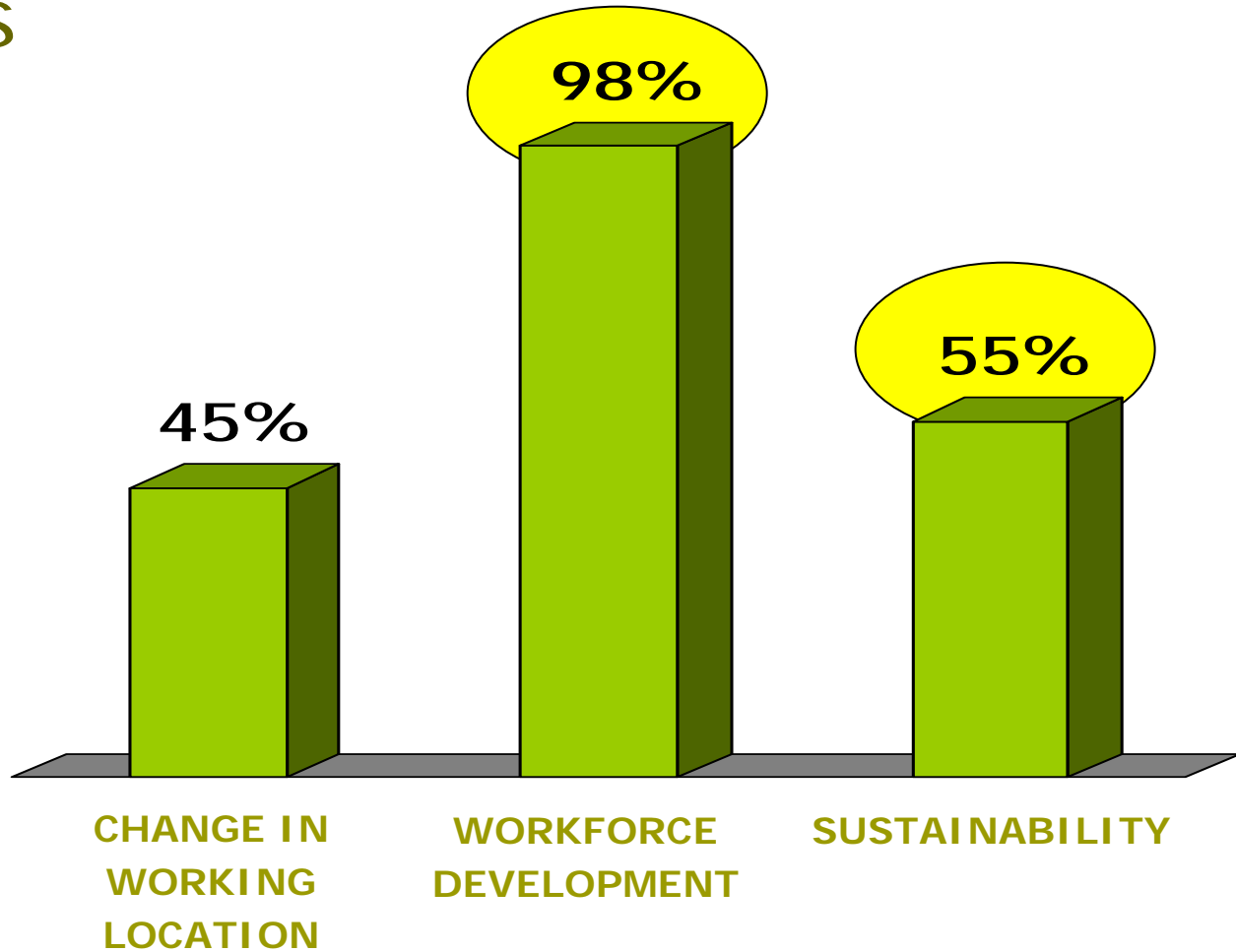
Assumption: Employee and client desires are not economic feasible

1. Education of employees to what is feasible
2. How set policies that are economically feasible
3. How to build teams of contractors and engineers to design economically feasible methods

Round #1

Sub-Round #1 – Prioritizing Socio-Cultural Factors (2 of 3)

□ Results



Round #1

Sub-Round #1 – Prioritizing Socio-Cultural Factors (3 of 3)

- A brief discussion followed the vote, enabling an in-the-moment capture of the key concerns regarding the chosen two factors.

- What is needed to know more of?
 - How do we set economically feasible policies?
 - What are the critical changing values?
 - How do we define quality control processes?
 - How do we create strong teams?

Round #1

Sub-Round #2 – Prioritizing Technology Factors (1 of 3)

- Only two factors were on the ballot for Technology; both went forward.

1. ADOPTION AND APPLICATION OF ENERGY TECHNOLOGY

Assumptions: Continuing rising energy prices will drive sustainable technology/energy efficiency as a standard, new or alternate materials will be needed to meet limited resource availability, grid has to be upgraded to support excess renewable energy generation, sustainability will significantly drive material use, types, supply chain, transportation

1. Drive innovation
2. Build value
3. Collaboration

2. ADOPTION AND APPLICATION OF BIM & INFORMATION SHARING

Assumptions: Universal adoption is required, will drive collaboration and total industry integration, reduce costs of integrated project delivery, major increase in technology adoption throughout supply chain

1. Change role of industry players
2. Increase productivity and efficiency
3. Knowledge management through education of industry.

Round #1

Sub-Round #2 – Prioritizing Technology Factors (3 of 3)

□ What is needed to know more of?

- How do you educate the industry not to “beat each other up”?
- How can we use technology to provide better solutions for the clients while increasing industry profitability?
- What technologies can be implemented to increase profitability?
- What are customers willing to pay for introduction of technology (increased value)?
- How do we use technology to reduce overhead?
- How do we change the culture in our industry to get paid for R&D/innovation & charge it as a cost of work?
- How do we educate the customer to spend more upfront to improve project delivery?
- How do we lower the cost of integrated project delivery?
- How can we achieve more collaboration across the industry to achieve greater efficiencies?
- How do we reverse the downward trend in industry productivity?
- How do we improve knowledge learning across the industry?

Round #1

Sub-Round #3 – Prioritizing Economic Factors (1 of 3)

□ Three factors were on the ballot of Economic Factors.

1. CHANGES IN THE COST AND AVAILABILITY OF ENERGY RESOURCES

Assumptions: Price is primary driver, developing countries will continued to drive demand and use a majority of the available resource, there are no significant shortages however renewable energy becomes critical

1. Options to mitigate risk
2. Alternative energy sources –sole source, diversification, stationary, mobile

2. CHANGES IN THE AVAILABILITY OF HUMAN RESOURCES

Assumptions: Declining exponentially (not incrementally) in craft availability and educated workforce, increased outsourcing of knowledge and the continued perception that the industry lacks attractiveness

1. Issue of corporate culture
2. Training and access to the right skill sets
3. Importance of quality infrastructure
4. Intellectual knowledge availability and management

3. GLOBAL INFLUENCES

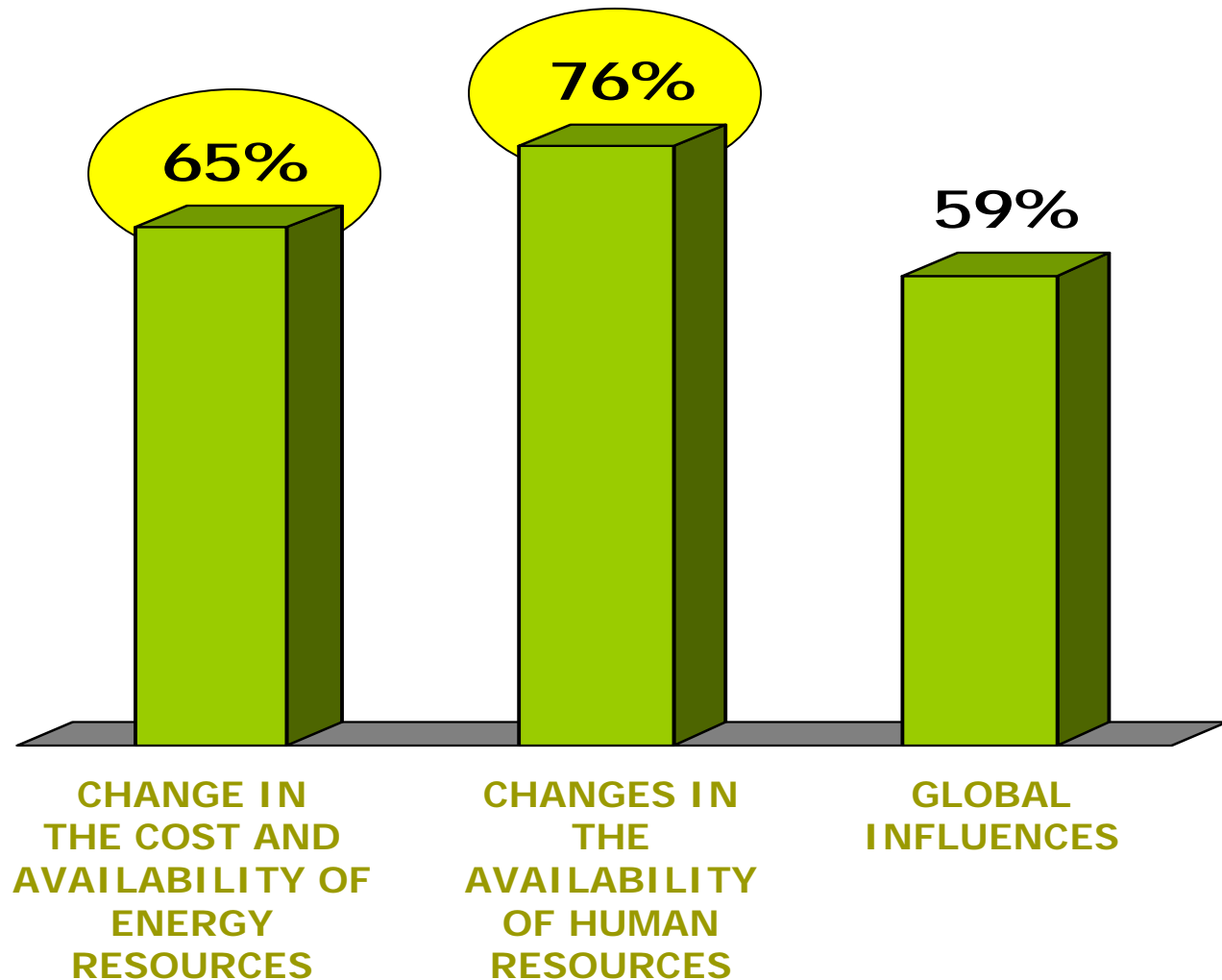
Assumptions: Global movement of capital, shifting financial centers, with integrated nations and common economic language through political stability, increased supplier consolidations, assumption of US debt will shift, government involvement would increase (limited free enterprise), as well as exposure to threats

1. Defining alternative financing options
2. Issue of quality control
3. Unidentified pressures from uncontrollable variables.

Round #1

Sub-Round #3 – Prioritizing Economic Factors (2 of 3)

□ Results



Round #1

Sub-Round #3 – Prioritizing Economic Factors (3 of 3)

□ What is needed to know more of?

- What incentives will drive the compensation structure?
- When does risk reap reward?
- How to sell solutions and avoid becoming a commodity?
- What is the potential for world supply and demand?
- How much influence does the government and economic theory to drive change?
- What does increased economic flexibility do to transportation and building demands?
- What is the predicted stability of countries?
- How does the immigration policy affect the U.S. economic stability?
- What will the relative size of the markets be in 20 years?
- What is the human labor force supply?
- What is needed in addressing the current education system?
- What are the unintentional outcomes of tax incentives?

Round #1

Sub-Round #4 – Prioritizing Political Factors (1 of 3)

□ Four factors were on the Political ballot.

1. HIGHER CONSTRUCTION COSTS TO ADDRESS INCREASED REGULATIONS/LITIGATION

Assumptions: Lack infrastructure to impact federal and international legislation, redundancy is likely to occur due to war and conflict uncertainties

1. Desire to mitigate risk
2. Contractual re-design
3. Intellectual property, patents and licensing

2. INCREASED INTERNATIONAL COMPETITION FOR OUR SERVICES

1. Undefined political competition internal to U.S.
2. Offshore companies have much greater ability to impact their home-country legislation
3. Responsiveness and adaptability of international firms

3. INCREASINGLY DIFFICULT FOR U.S. FIRMS TO COMPETE IN FOREIGN COUNTRIES

Assumptions: Reduced competition because of bifurcation or more difficult to operate in the middle market, greater difficulty in influencing/understanding international regulation, more government – international and national bodies – creating additional and further reaching regulations; energy policy will exist

1. PPP
2. Promotion of services vs. products

4. COMPETITION FOR LIMITED DOLLAR RESOURCES FOR INFRASTRUCTURE ASSETS vs. OTHER EXPENDITURES

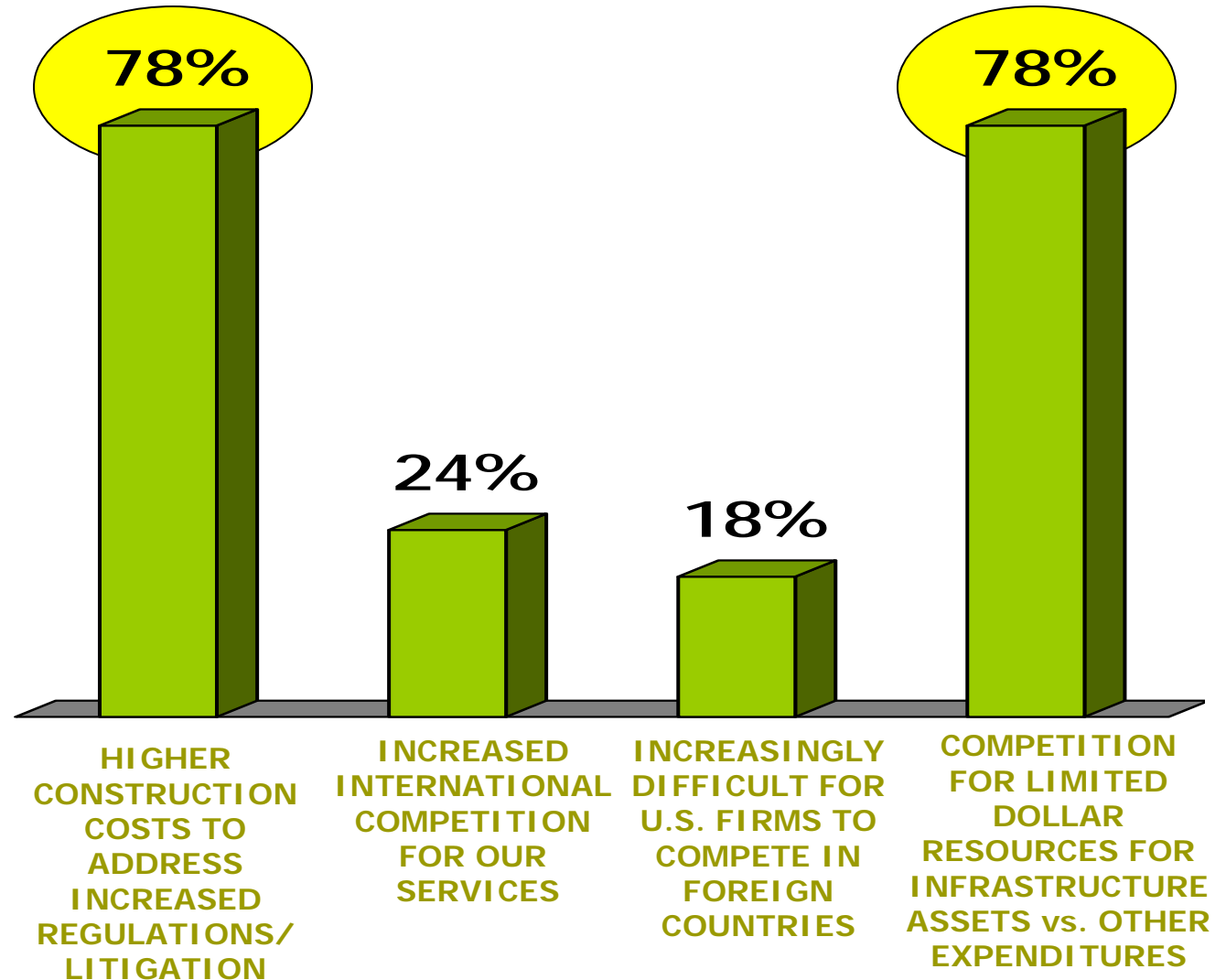
Assumptions: Funding is required, otherwise there is not a need for the workforce

1. The need to create a singular/power voice of industry to influence at the highest level and remain effective
2. Increasing pressure on limited resources; compete with each other, not simply investment dollars or systems
3. Competition of internal R & D investments to external capital assets
4. Funding models to attract investment; ability to create a funding stream

Round #1

Sub-Round #4 – Prioritizing Political Factors (2 of 3)

□ Results



Round #1

Sub-Round #4 – Prioritizing Political Factors (3 of 3)

□ What is needed to know more of?

- How will we compete for limited dollars?
- How do you raise the level of debate and how the model is presented? Can we change the historical funding models?
- What is the funding model that will attract needed \$\$\$?
- Is there a way for this industry to have a voice?
- How do we articulate the benefits (value derived) of this effort (marketing) verses only addressing the process
- Is there a way to reshape the entire infrastructure/debate/policy?
- Is our industry willing to invest the time/money to reshape the debate?
- How can the industry show he effectiveness of the key regulation or lack there of
- How or what regulations can be waived that improves delivery/time/costs?
- Can the industry demonstrate that it can regulate itself?
- What governmental competition will be promoted/allowed vs. private sector firms?
- How much are we willing to commit to research and innovation (public and private) to compete and improve our firm's competitiveness
- How much help can we get from our government policy/programs to support US companies oversees?
- What does this industry need to do to enhance public private partnerships here and abroad?
- What level of protectionism do we think we need?

Round #1

Sub-Round #5 – Prioritizing Competitive Factors (1 of 3)

□ Three factors were on the Competitive Dynamics ballot.

1. ATTRACTING, DEVELOPING & RETAINING TALENT

Assumptions: Attractiveness of industry is not increasing

1. Consistency in positioning of industry
2. Increased development and talent initiatives

2. IMPACT OF CONSOLIDATION

Assumptions: M&A activity will continue and larger firms will acquire smaller competitors, increasing risk profiles

1. Big firms would get bigger
2. Market would be mega companies; medium size firms will find it harder to compete; with small, nimble, niche companies surviving and prospering.

3. IMPACT OF GLOBALIZATION

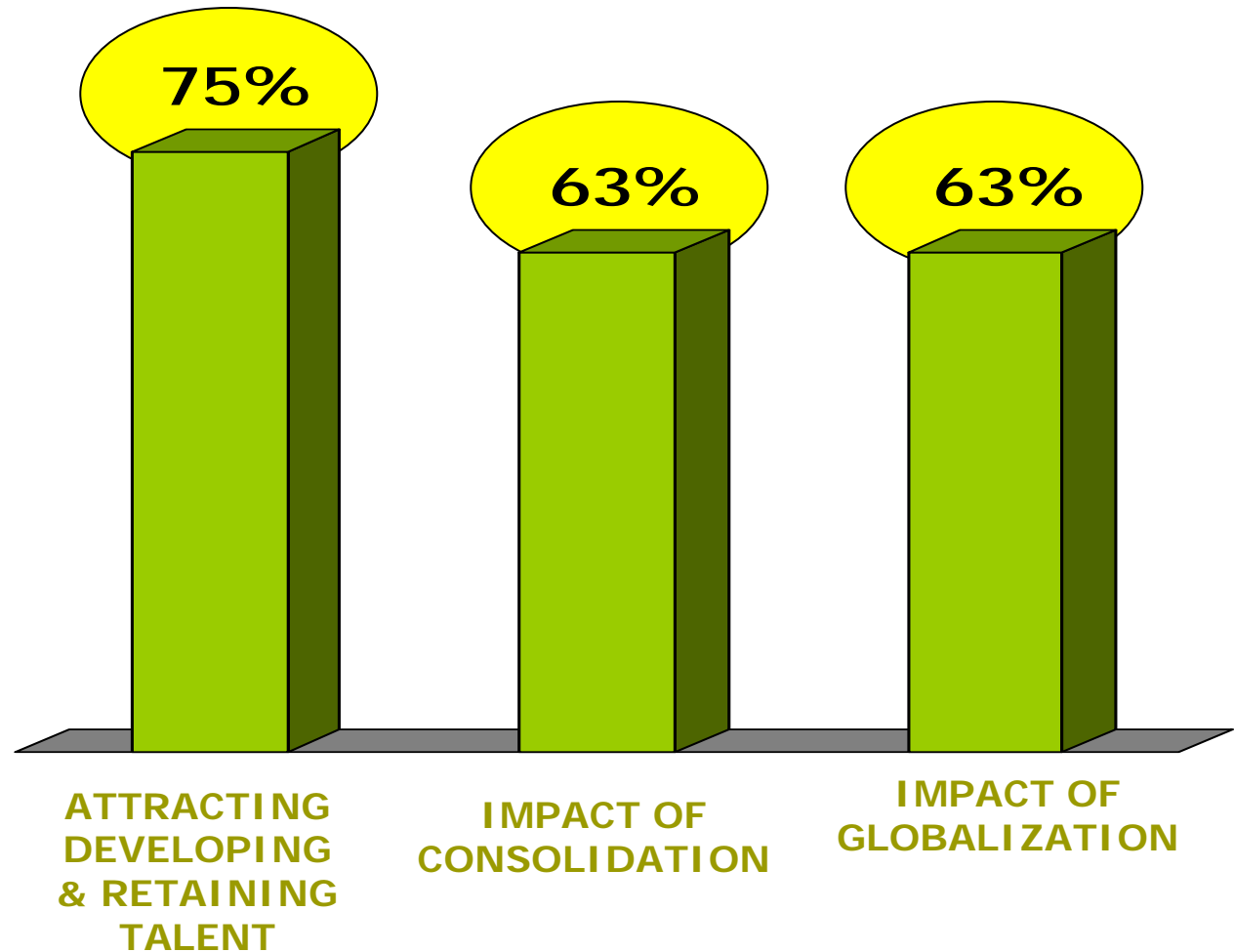
Assumptions: M&A will continue with foreign buyers targeting infrastructure. Traditional municipal clients will be replaced with foreign owners.

1. Foreign companies continue buying US firms and infrastructure
2. PPP model
3. Changes in the standard delivery systems with relationships in the forefront
4. Distributed business models with collaborative teams

Round #1

Sub-Round #5 – Prioritizing Competitive Dynamics Factors (2 of 3)

□ Results



Round #1

Sub-Round #5 – Prioritizing Competitive Dynamics Factors (3 of 3)

- What is needed to know more of?
 - How do we attract 20-somethings to the construction industry?
 - Factors used in buying design and construction services.
 - Design firm/construction firm consolidation. Is this trend continuing and what impact will it have on the industry?
 - What are the necessary risk management processes?
 - What will impacts be on the industry with new delivery methods?

Round #1

Sub-Round #6 – Prioritizing Natural Factors (1 of 3)

□ Four factors were on the Natural ballot.

1. CLIMATE CHANGE

1. Global warming continues with temperature increasing
2. Polar ice is melting, atmospheric CO2 is increasing

2. DEPLETION OF WATER RESOURCES

1. Fresh water creation in snow pack dwindles
2. Demand for water increases

3. DEPLETION OF ENERGY RESOURCES

1. Oil is close to peak
2. Coal use would drive CO2 and global warming
3. Uranium also is a fixed resource
4. Nuclear power plants are difficult to permit and build

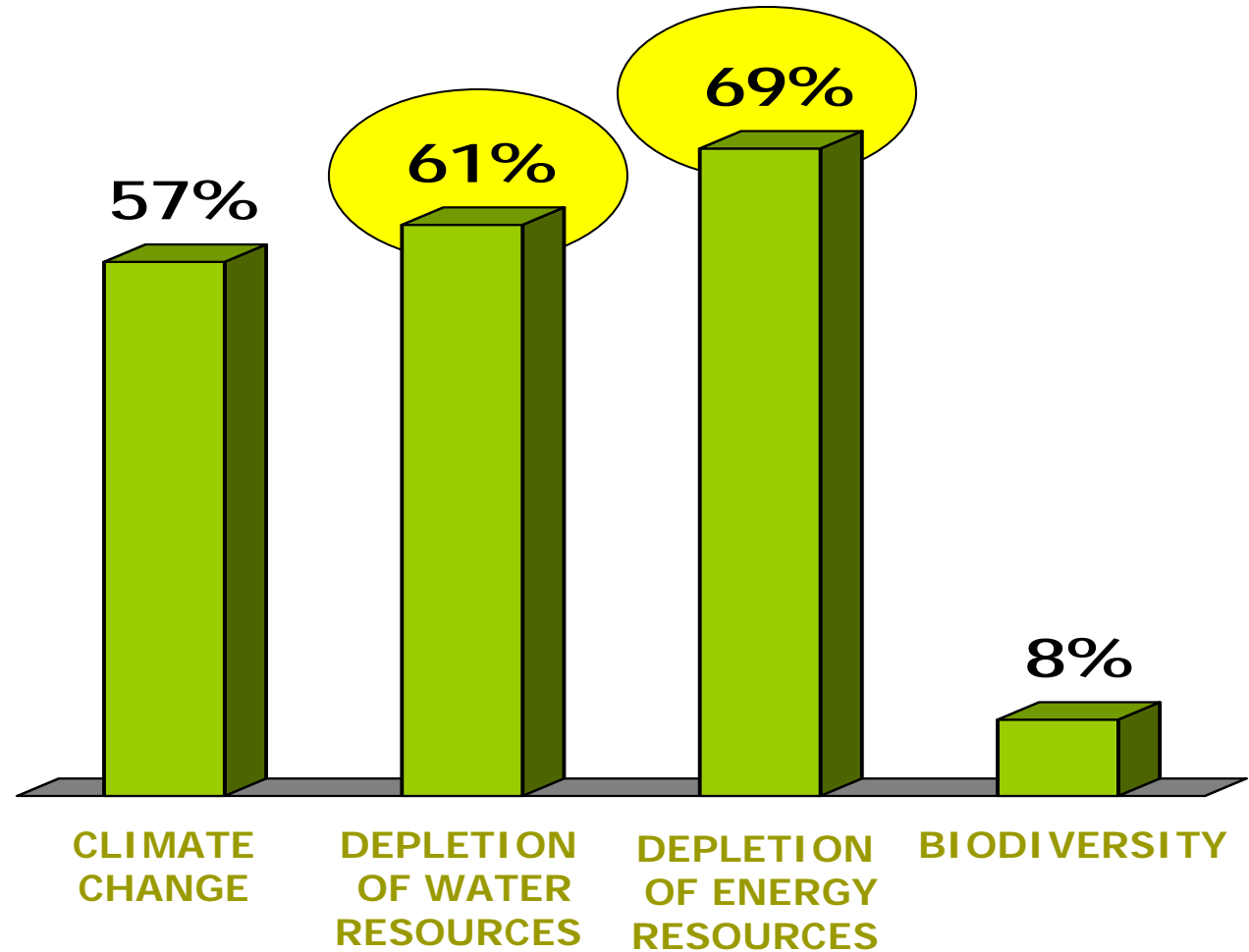
4. BIODIVERSITY

1. Will affect the creation of all future projects
2. Affects critical balance of life on earth

Round #1

Sub-Round #6 – Prioritizing Natural Factors (2 of 3)

□ Results



Round #1

Sub-Round #6 – Prioritizing Natural Factors (3 of 3)

- What is needed to know more of?
 - What is the likelihood of global warming to increase?
 - What will be the demand for natural resources?
 - How do we capitalize on natural resources?
 - What sustainability measures need to be put in place?

Round #2 – Prioritizing Remaining Factors (1 of 3)

□ 13 Factors Were Selected Through Round #1

- 2 Socio-Cultural
 - work force development
 - sustainability
- 2 Technological
 - adoption and application of energy technology
 - adoption and application of BIM & information sharing
- 2 Economic
 - changes in the cost and availability of energy resources
 - changes in the availability of human resources
- 2 Political
 - higher construction costs to address increased regulations/litigation
 - competition for limited dollar resources for infrastructure assets vs. other expenditures
- 3 Competitive
 - attracting, developing & retaining talent
 - impact of consolidation
 - impact of globalization
- 2 Natural
 - depletion of water resources
 - depletion of energy resources

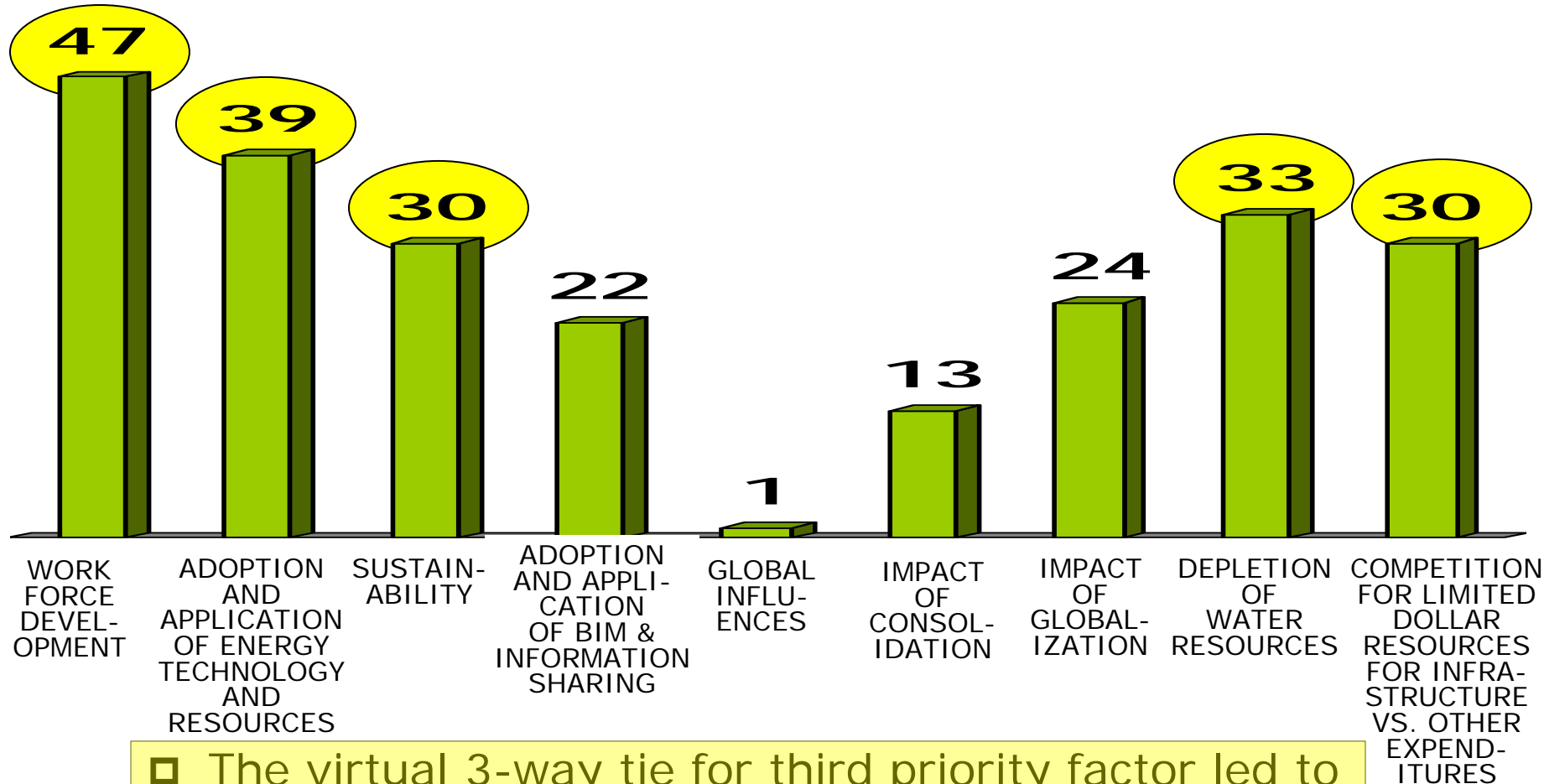
Round #2 – Prioritizing Remaining Factors (2 of 3)

- ❑ Before the voting in Round #2, the attendees discussed the 13 factors, clarified many details and restructured the list into 9 factors.

- ❑ The nine factors were non longer categorized.
 1. Work Force Development
 - ❑ Changes in the availability of human resources
 - ❑ Attracting, developing & retaining talent
 2. Adoption and Application of Energy Technology and Resources
 - ❑ Changes in the cost & availability of energy resources
 - ❑ Depletion of energy resources
 3. Sustainability
 4. Adoption And Application of BIM & Information Sharing
 5. Global Influences
 6. Impact of Consolidation
 7. Impact of Globalization
 8. Depletion of Water Resources
 9. Competition For Limited Dollar Resources For Infrastructure vs. Other Expenditures

- ❑ The goal of Round #2 was to reduce the consideration to 3.

Round #2 – Prioritizing Remaining Factors (3 of 3)



- The virtual 3-way tie for third priority factor led to more discussion, a reorganizing of the factors down to a set of six and a third round of voting.

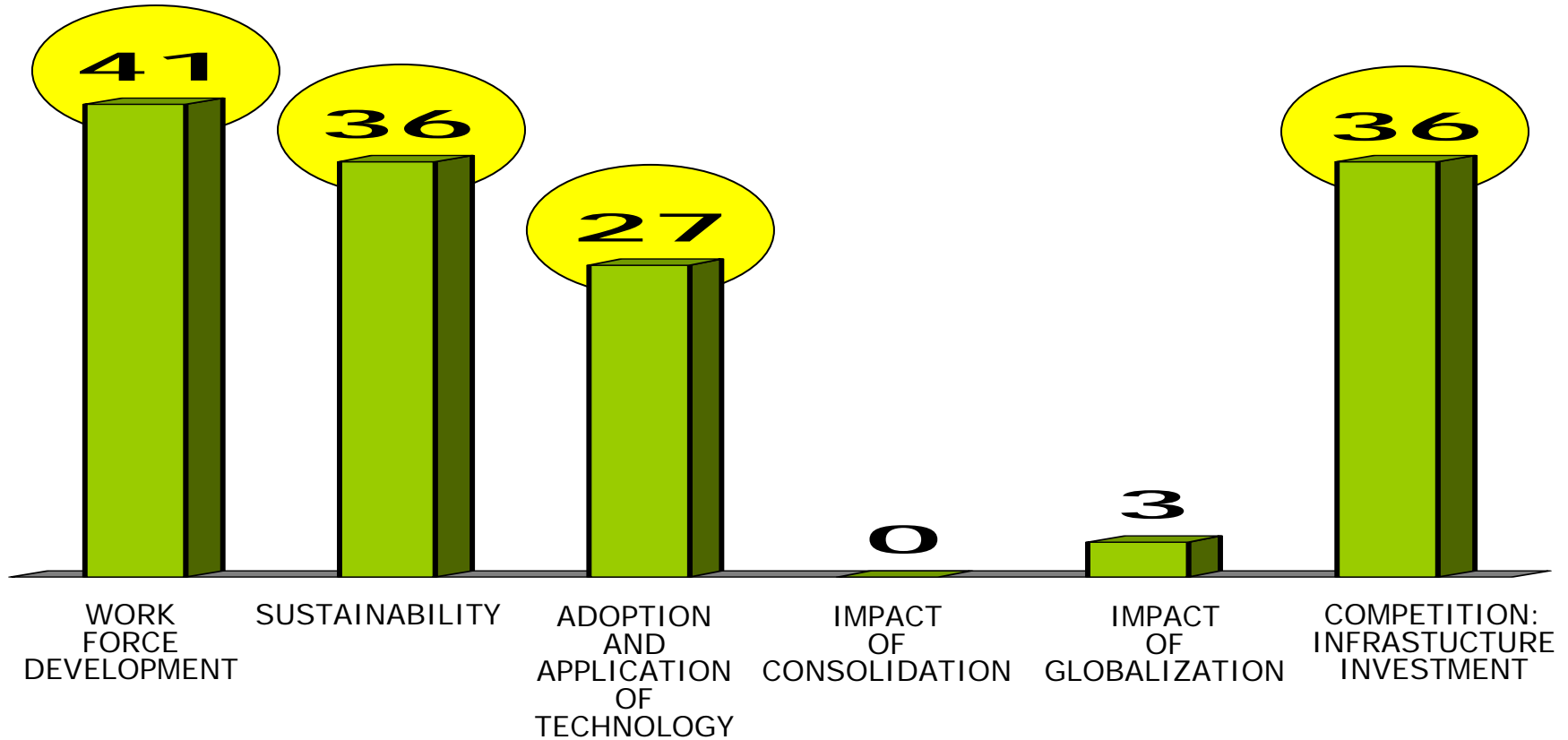
Round #3 – Final Prioritization (1 of 2)

□ The six newly configured factors were:

1. WORK FORCE DEVELOPMENT
 1. Changes in the availability of human resources
 2. Attracting, developing & retaining talent
2. SUSTAINABILITY
 1. Adoption and application of energy technology and resources
 2. Changes in the cost & availability of energy resources
 3. Depletion of energy resources
 4. Depletion of water resources
3. ADOPTION AND APPLICATION TECHNOLOGY
 1. Information sharing
 2. BIM
4. IMPACT OF CONSOLIDATION
5. IMPACT OF GLOBALIZATION
6. COMPETITION: INFRASTRUCTURE INVESTMENT

□ The goal of Round #3 was to reduce the list down to 3.

Round #3 – Final Prioritization (2 of 2)



Given the closeness of these four and the clear differentiation from the other two, all four of the “high scoring” factors were selected for further study.

Going forward . . .

- ❑ The attendees were asked to keep these factors in their minds during the coming months.

- ❑ Also, they were asked specifically to think about what knowledge they would be interested in to help them plan for and/or mitigate the effects of the these key factors?
 - What are the potential solutions to solve the challenge?
 - What are the barriers?
 - If we could create reasonable scenarios for this, what would the impact be?

~ end ~