



# Environmental, Safety and Health Chapter ITRS 2009

## ESH ITWG

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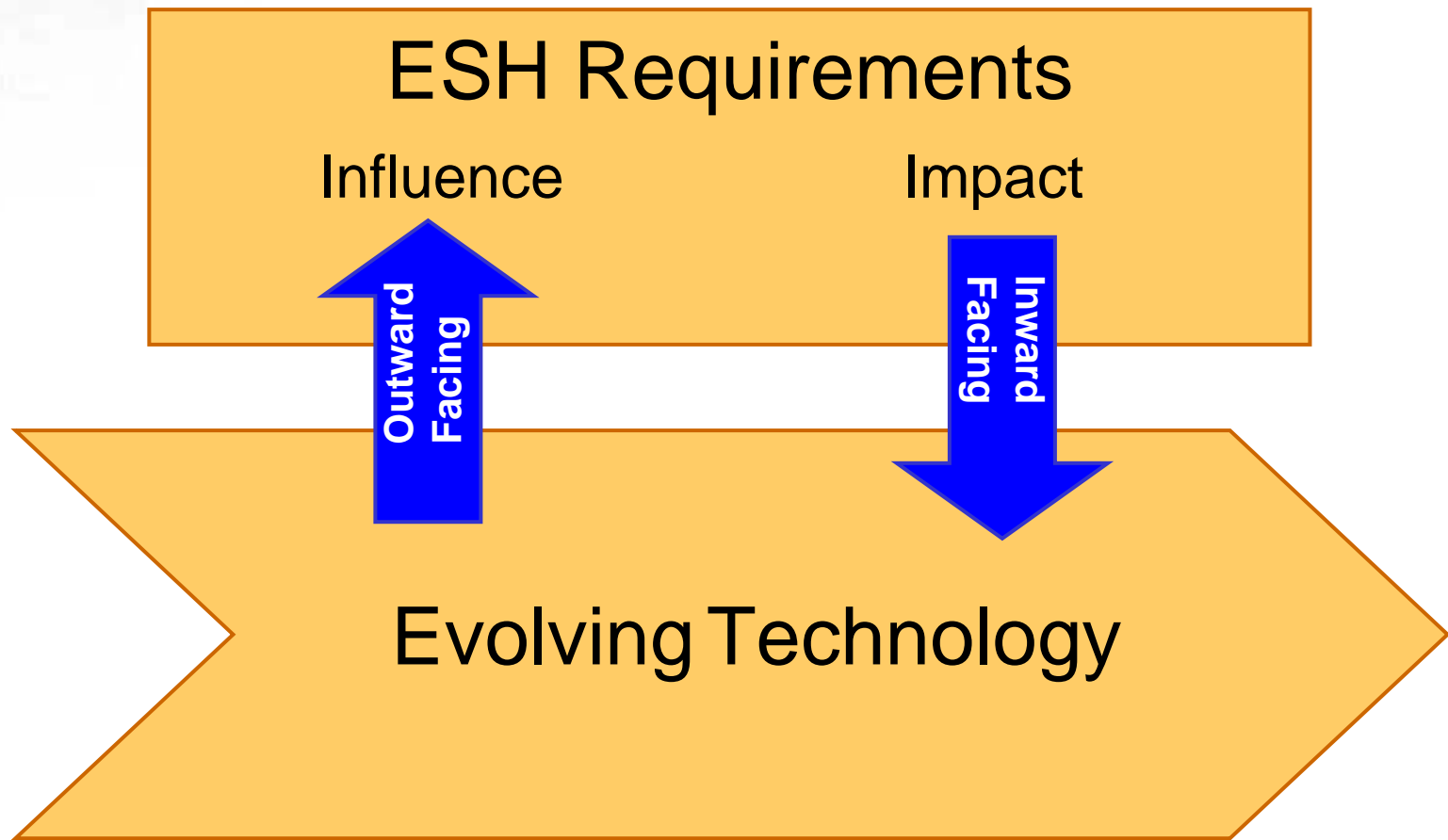


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# AGENDA

- Characterization Scheme
  - Segmentation of all ESH requirements into prioritization Categories
- 2010 Challenges

# Motivation for Prioritization Categories



- Missing the ESH ITRS requirements would not typically result in the technology not performing – but it may inhibit the technology from being implemented due to regulatory or economic factors



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# ESH Prioritization

## ESH Category Details

**Critical:** essential item for technology success/implementation as well as ESH benefits; failure to address could compromise the ability to insert the technology into manufacturing; normally related to a potential or existing regulatory issue, whether internally or externally based, and in at least one of the ITRS member regions (HIGHEST PRIORITY)

**Important:** key item for process success as well as ESH benefits; failure to address could compromise the CoO of the technology in manufacturing; normally related to factors such as throughput, yield, material and/or tool costs (including disposal/abatement), and the like (MEDIUM PRIORITY)

**Useful:** key item for ESH benefits, but without any clear additional factors which would place it in either of the above two categories; failure to address could compromise the ability to achieve the lowest ESH impact for the technology when inserted into manufacturing (LOWER PRIORITY)



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# Example Table of Prioritization Categories

*Table 4a. Chemicals and Materials Management Technology Requirements—Near-term Years*

The Environment, Safety, and Health new chemical screening tool ([Chemical Restrictions Table](#)) is linked online

Year of Production	2009	2010	2011	2012	2013	2014	2015	2016	2017
<i>Interconnect</i>									
Low-κ materials—spin-on and CVD <b>Important</b>	Establish PCU* and PE* baselines		Improve PCU and PE by 10% (relative) from baselines		Improve PCU and PE by 10% (relative) from previous values				
Copper deposition processes (conventional and alternative) <b>Important</b>	85% copper reclaimed/recycled		90% copper reclaimed/recycled		95% copper reclaimed/recycled				
Planarization methods <b>Important</b>	Establish consumables and emissions baselines		> 15% improvement in consumables***		2% reduction in consumables*** per year				
Plasma etch <b>Critical</b>	Establish PCU* and PE* baselines, and investigate alternatives with improved ESH impacts.		Improve PCU and PE by 10% (relative) from baselines, including potential use of alternatives with improved ESH impacts		Improve PCU and PE by 10% (relative) from previous values, including potential use of alternatives with improved ESH impacts.				
CVD chamber clean (plasma) <b>Critical</b>	Establish PCU* and PE* baselines, and investigate alternatives with improved ESH impacts.		Improve PCU and PE by 10% (relative) from baselines, including potential use of alternatives with improved ESH impacts.		Improve PCU and PE by 10% (relative) from previous values, including potential use of alternatives with improved ESH impacts.				
	Reduce Global Warming Impact (lower GWP emissions; improved utilization*) without increasing ESH risk		Reduce Global Warming Impact (lower GWP emissions; improved PCU*) without increasing ESH risk		Reduce Global Warming Impact (lower GWP emissions; improved CU*) without increasing ESH risk				



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## Example Table of ESH Requirements by Domain and Category

<p><b>Restricted Chemicals</b></p> <p><u>Assembly &amp; Packaging</u></p> <p>3D via etch <b>C</b></p> <p><u>FEP</u></p> <p>Plasma Etch <b>C</b></p> <p>Doping <b>C</b></p> <p><u>Interconnect</u></p> <p>Plasma etch <b>C</b></p> <p>CVD chamber clean <b>C</b></p> <p>3D via etch <b>C</b></p> <p><u>Lithography</u></p> <p>PFOS/PFAS/PFOA materials <b>C</b></p>	<p><b>New chemicals</b></p> <p><u>Intrinsic</u></p> <p>Chemical risk assessments <b>U</b></p> <p><u>ERM</u></p> <p>Materials for novel logic &amp; memory <b>C</b></p> <p><u>FEP</u></p> <p>High-k &amp; gate materials <b>I</b></p> <p>Alternative surface prep <b>U</b></p> <p>Non-silicon, active substrates [channel] <b>C</b></p> <p>Novel memory materials <b>I</b></p> <p><u>Interconnect</u></p> <p>Low-k materials <b>I</b></p> <p>Copper dep processes <b>I</b></p> <p>Advanced conductors <b>U</b></p> <p>Planarization <b>I</b></p> <p>Surface prep <b>I</b></p> <p><u>Lithography</u></p> <p>193 immersion resists <b>U</b></p> <p>EUV resists <b>U</b></p> <p>Imprint materials <b>U</b></p>	<p><b>Nanotechnology</b></p> <p><u>Intrinsic</u></p> <p>Nanomaterials risk assessment methods <b>U</b></p> <p><u>ERM</u></p> <p>Nanomaterials <b>C</b></p>
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## 2010 (and beyond) Challenges

### Managing Chemical Restrictions or Potential Restrictions

An increasing number of chemicals are being considered for or incurring restrictions, complicated by short time lines and geographic differences

### Timely availability of Chemical Assessment Data and Methodologies

Historical problem and increasing in magnitude

### Validate ESH Categories with Technology Requirements

Prioritization, Updating

### Energy Conservation

Improve perspective for new technology impacts on energy conservation

### 450mm

More in depth evaluation of 450mm impacts (new technology perspective)

### Determine if ESH requirements may differ between Memory and Logic Roadmaps



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