

**NIH Toolbox**  
Assessment of Neurological and Behavioral Function

**Domain Framework:  
Process for Selection and  
Priorities**

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**NIH Blueprint**  
Train, Resources and Training

For more information, please visit [www.nihtoolbox.org](http://www.nihtoolbox.org)  
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**Toolbox Domains from RFP**



<b>COGNITION</b>	<b>EMOTION</b>
<b>MOTOR</b>	<b>SENSATION</b>

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**Subdomains to Assess?**



<p>Executive function Memory • Processing speed Global function • Language</p> <p><b>COGNITION</b></p> <p>Problem solving • Attention Construction • Knowledge</p> <hr/> <p>Balance (non-vestibular) Locomotion • Coordination</p> <p><b>MOTOR</b></p> <p>Strength • Dexterity • Praxis Upper extremity function Mobility • Flexibility</p>	<p>Negative affect • Mania Self-regulation • Adaptability Positive affect • Self-regard</p> <p><b>EMOTION</b></p> <p>Substance abuse • Apathy Interpersonal relations</p> <hr/> <p>Sensory processing • Touch Olfaction • Temperature • Pain</p> <p><b>SENSATION</b></p> <p>Vision • Sensory integration Balance (vestibular) • Taste Proprioception • Hearing</p>
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## Subdomain Selection Process



- Systematic
- Iterative
- Involve experts and stakeholders
  - Content/methodological experts
  - End Users
  - NIH project team

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## Process



- Step 1. Information gathering
  - Request for Information
  - Literature Review
  - Expert Interviews
- Step 2. Domain team discussion and initial recommendations
- Step 3. NIH Project Team and Expert Working Group feedback
- Step 4. Review by expanded domain teams
- Step 5. Final domain team recommendations
- Step 6. NIH Project team approval

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## Step 1 – Information Gathering



- Request for Information (RFI)
- Literature Review
- Expert Interviews

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## Request for Information



- Goals: identify criteria for measures, candidate measures and subdomains to assess
- Sample drawn from consultant and investigator list, NIH recommendations, database of funded investigators
- Link to online RFI sent to 232 experts, with 150 total respondents (65% response rate)

Question: *Please indicate four areas of XXX **functioning** that you think are most relevant to assess in research*

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## RFI Respondents



Expertise		N	%
<b>Age Range</b>	Pediatric	27	18
	Adult	82	55
	Both	36	24
<b>Functional Area</b>	Cognition	95	63
	Emotion	65	43
	Sensation	40	27
	Motor	50	33
Longitudinal/Epi Research		130	87
Clinical Research		129	86

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## RFI Results-Motor Example



SUBDOMAIN	# Rated in top 4 (N=62)	%
Locomotion	52	84%
Strength	40	65%
Coordination	37	60%
Balance (non-vestibular)	35	56%
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Range of Motion	13	21%
Other	5	8%

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## Literature Review



- Purpose: refine list of subdomains
- Definition of each subdomain
  - Describe development or changes in subdomain across the lifespan (3 – 85 years)
- Significance of subdomain or change in subdomain in predicting function and health

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## Expert Interviews



- Goal: Gather more detailed information to help further refine list of subdomains
- Experts in each domain area (Cognition and Sensation N=9; Motor N=12; Emotion N=8) plus generalist (N=9) group
- Telephone or self-administered interview

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## Expert Interview Question



*The subdomains listed below were nominated during an earlier phase of this project. Keeping in mind the purpose of the Toolbox, please look at the subdomains below and rank them in order of how important it is for each to be included in the Toolbox, with 1= most important and 8= least important. Please also tell me your reasons for choosing each area.*

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## Expert Interview Respondents (N=44)



Expertise		N	%
<b>Ages</b>	Pediatric (age 3-5)	14	32
	Pediatric (age 6-12)	19	43
	Pediatric (age 13-17)	20	45
	Adult (age 18-35)	19	43
	Adult (age 35-65)	27	62
	Adult (age 65-85)	20	45
<b>Research</b>	Longitudinal	28	
	Epidemiological	14	
	Clinical	24	

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## Step 2 - Initial Domain Team Recommendations (May 2007)



- Presented and discussed at meeting with project team members and expert working group
- Teams included summary of information (RFI, interview and literature review results, other considerations) used in their decisions

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## Domain Recommendation – Sensation Example



Sub-domain	RFI - % (n) rating it as one of 4 most important	% (n) of experts ranking as one of top 4	Expert's Reasoning	Relevant Literature Review Results
Vision	26% (n=65)	100% (n=11)	<ul style="list-style-type: none"> <li>Impacts independence &amp; function</li> <li>Survival/Safety</li> <li>Impact on QOL</li> <li>Dominant Sense</li> <li>Many senses depend on it</li> <li>Frequently affects elderly</li> </ul>	<ul style="list-style-type: none"> <li>Important across life span</li> <li>Important for epidemiologic research</li> <li>Survival/Safety Issues</li> <li>Impact on QOL</li> <li>Many senses depend on it</li> <li>Frequently affects elderly</li> </ul>

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### Step 3 - NIH Project Team and Expert Working Group Feedback



- Domain specific questions and recommendations
- General recommendation– seek additional consultation from experts outside the teams

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### Step 4 - Review by Expanded Domain Teams



- Each team recruited additional consultants
- Sensory team expanded into six teams
- Teams held regular meetings to develop final subdomain recommendations
- Recommendations included identification of specific subdomain construct(s) to be assessed

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### Considerations for Subdomain Selection



#### Conceptual

- Relevance across lifespan
- Significance to health and function

#### Practical

- Entire Toolbox should have maximum administration time = 2 hours
- Maximum administration time for domain batteries= 30 minutes

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# Domain Framework



- Cognition
  - Six subdomains (8 constructs)
- Emotion
  - Four subdomains (14 constructs)
- Motor
  - Five subdomains (6 constructs)
- Sensation
  - Six subdomains (22 constructs)

**Total Constructs = 50**

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## Cognition



Executive Function  
*Inhibitory Control*  
*Cognitive Flexibility*

Episodic Memory  
*Visual*

Language  
*Vocabulary*  
*Comprehension*  
*Reading*

Processing Speed

Attention

Working Memory

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## Emotion



Positive Affect

*Positive Feeling States*  
*Life Satisfaction/*  
*Meaning*

Negative Affect

*Sadness*  
*Fear*  
*Anger*  
*General Distress*  
*Apathy*

Stress and Coping

*Perceived Stress*  
*Coping Strategy*  
*Coping Self-efficacy*

Social Relationships

*Social Support*  
*Social Network*  
*Integration*  
*Loneliness*  
*Social Distress*

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