Annual Summary Report – FY15

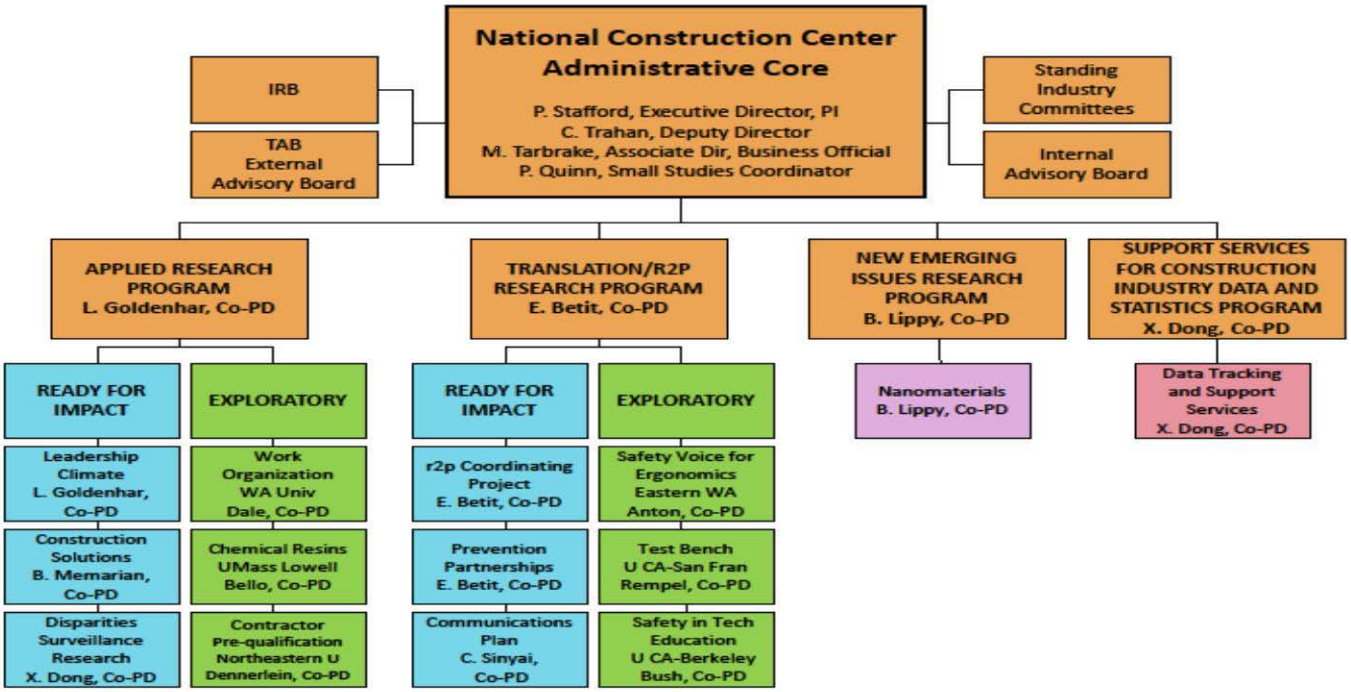
NIOSH-sponsored Center of Excellence for Construction Occupational Safety and Health Research and Translation CPWR-The Center for Construction Research and Training

SECTION I

Center Summary

CPWR's construction safety and health research program builds on our experience administering the Construction Center since 1990. As an integral part of the NIOSH Construction Research Program, our objective is to continue to reduce the injuries and illnesses in the construction industry by: 1) building on our current base of knowledge and intensifying and accelerating the identification and adoption of evidence-based best practices; 2) responding to the NORA Construction Sector Council goals and National Academy review: 3) focusing more on research to practice (r2p); 4) being prepared to respond rapidly to emerging issues and trends; 5) disseminating our findings in new and more innovative ways and: 6) tracking changes in the industry and evaluating changes in safety and health outcomes.

The Construction Center is comprised of an Administrative Core, including all planning, coordination, and administrative functions. It also houses the Small Studies Program, and has the primary responsibility of linking Construction Center investigators with construction industry stakeholders. In addition to the Administrative Core, within the Construction Center there are four operating research program areas: Applied Research, Translation/R2P Research, Emerging Issues Research, and Support Services for Industry Data and Statistics. There are 6 research projects within the Applied Research Program, 3 ready for impact and 3 exploratory; 6 research projects within the Translation/r2p Research Program, 3 ready for impact and 3 exploratory; 1 project within the Emerging Issues Research Program focusing on nanomaterials; and 1 Data Tracking and Support Services project. All of the ready for impact projects in both the Applied Research Program and the Translation//R2P Program are led by CPWR investigators, which is an appropriate reflection of the National Academies' recommendation that the Construction Center focus on getting best practices adopted by the industry. Identified through a broad solicitation, the exploratory projects in both categories are being carried-out by consortium partners. See Construction Center organization below:



Relevance

The Construction Center addresses NORA Goals 1-15 through the conduct of 14 projects across the 4 Research Program Areas, in addition to Administrative Core activities, including the Small Studies Program. It also responds to National Academy recommendations: 1) The National Construction Center should continue to be used as an important component in the Construction Research Program, and 2) Consideration should be given to having the majority of r2p efforts conducted through the National Construction Center.

Specific Aims are:
Core Functions:

- Administer a center that produces synergies as a result of being multi-disciplinary and fully integrated, that fosters the continued advancement of construction safety and health research, and that facilitates effective ties between investigators and the industry.
- Maintain and continuously update a repository of evidence-based best practices to prevent injury and illness hazards; promote the adoption of evidence-based best practices by workers, employers and industry-wide organizations.
- *Applied Research:* Test and evaluate risk-reduction strategies that prevent injuries and illnesses.
- *Translation/r2p Research*: Coordinate and promote research to speed up the adoption of best practices; evaluate impact of diffusion and continuously improve on diffusion strategies and tactics, and identify and overcome barriers to the diffusion and adoption of best practices.
- *New and Emerging Issues Research*: Continuously identify new safety and health risks or opportunities for prevention, and respond rapidly to them.
- *Support Services for Data and Statistics:* Track changes in industry characteristics, safety and health practices and occupational injury and illness outcomes; and provide support service for construction industry data and statistics for all industry stakeholders, and in particular for the NORA Construction Sector Council to track progress in achieving NORA research goals.

Key Personnel

Director	Role	E-mail	Phone
Erich Stafford	PI	pstafford@cpwr.com	301/578-8500
Chris Trahan	Deputy Director	ctrahan@cpwr.com	301/578-8500
Eileen Betit	R2P Director	ebetit@cpwr.com	301/578-8500
Xuiwen (Sue) Dong	Data Center Director	sdong@cpwr.com	301/578-8500
Linda Goldenhar	Director of Research and Evaluation	lgoldenhar@cpwr.com	301/578-8500
Bruce Lippy	Director of Safety Research	blippy@cpwr.com	301/578-8500
Babak Memarian	Construction Solutions Director	bmemarian@cpwr.com	301/578-8500
Clayton Sinyai	Communication Research Manager	csinyai@cpwr.com	301/578-8500
Dan Anton	EWU Project Director	dan.anton@ewu.edu	509/368-6661
Dhimeter Bello	UMass Project Director	Dhimeter_bello@uml.edu	978/934-3343
Diane Bush	UC Berkeley Project Director	dbush@berkeley.edu	510/643-2424
Ann Marie Dale	WUSL Project Director	adale@wusl.edu	314/454-8470
Jack Dennerlein	NEU Project Director	j.dennerlein@neu.edu	617/373-5428
David Rempel	UCSF Project Director	david.rempel@ucsf.edu	510/665-3653

Construction Center Web-link: www.cpwr.com

SECTION II

Selected Highlights and Accomplishments

CPWR's Construction Center follows a logic model developed to guide the administration of the program. It is derived from the NIOSH Construction Research Program logic model and supplements it. Each research project and activity of the Construction Center is directed at a NORA Construction Sector Goal and/or National Academies Recommendation. Each is expected to achieve one or more intermediate impact(s) that eventually should lead to reduction in injury and illness outcomes. Building on its experience in administering the program, each of the 14 research projects comprising the Construction Center have gotten off to an excellent start in Year 1 of the new 5-Year agreement. Because all are multi-year projects, high impact outcomes were not expected in the first year of research. In Year 1, however, we have engaged industry stakeholders in our Administrative Core planning activities, connecting them to our Construction Center projects from evaluation of construction tools to reactive chemicals in use in construction to ergonomics. Broad work organization studies are also being conducted involving contractor pre-qualification, effect of good general contractor safety programs on subcontractors, and occupational safety and health training in career technical education programs nationally.

Selected Highlights and Accomplishments, with a focus on Year 1 outcomes from the Construction Center's r2p and communications programs, nanotechnology research, safety climate work, construction solutions programs, and our Data Center, are as follows:

Research to Practice and Communications

Using Social Media to Advance r2p

As part of its r2p initiatives, we launched a coordinated program of digital and social media outreach to introduce and encourage the use of CPWR research findings. A new series of educational webinars enabled workers, contractors, trainers, and other stakeholders from across the country to hear directly from CPWR researchers about their research findings, products, and publications, and has enjoyed early and growing interest. We piloted the system in January 2015, and since that time 10 webinars have been held on CPWR research topics and r2p priorities. The number of registrants has varied by topic, ranging from 18 to the system maximum of 99. We are now recording, posting, and tracking these webinars for on-demand viewing in recognition that potential end-users -- contractors and workers -- may not be available to participate during normal work hours.

Engagement with CPWR content on Facebook and Twitter has doubled since the initiative began, reaching a record 846 clicks, shares, and likes on CPWR Facebook content in August 2015 (up from 367 in May). CPWR's August 28 Facebook post on fall prevention ("Can a fall from a stepladder really be fatal? Watch this 3-min. video to find out what went wrong"), for example, drew 62 likes, 57 shares, and 36 clicks to visit CPWR's YouTube channel to view the video. Another 27 followers checked out the video via the accompanying tweet. During the same month, users clicked on CPWR tweets 56 times, and retweeted them 44 times. CPWR also initiated a LinkedIn presence and is piloting efforts to use this popular and prolific professional networking platform as a mechanism to create a network of construction safety and health partnerships and establish communities of practice around key safety and health issues, starting with ergonomics. As CPWR continues its focus on using a range of social media platforms to reach construction stakeholders, we anticipate continued growth in audience engagement.

Overall, we saw dramatic increases in social media engagement metrics over the past year, as presented in the table below.

Metric	Year Ending August 2014	Year Ending August 2015	Change
CPWR and eLCOSH Facebook Likes	16,570	19,655	+ 3,085 likes
Number of @CPWR Tweets	62	203	+ 227%
@CPWR impressions	33,313	81,110	+ 143%
@CPWR retweets	104	161	+ 55%
@CPWR click-throughs	157	289	+ 84%

Evaluating the Reach of the National Fall Prevention Campaign

stopconstructionfalls.com

The OSHA-NIOSH-CPWR Campaign to Prevent Falls in Construction is in its fourth year and has, by all accounts, been successful. For example, our analysis of data compiled by OSHA on the National Safety Stand-Down shows that 794,500 workers participated in the 2015 Stand-Down. This is up from the 2014 data that showed 770,193 workers reached. Perhaps even more interesting is the number of companies who conducted company-wide Stand-Downs, encouraging participation on all jobsites. At least 343 companies held Stand-Downs on more than one jobsite – some covering jobsites in 15 or 20 different states. Additionally, 356 companies specifically mentioned that they held more than one Stand-Down day during the two weeks. Some sites even participated on all 10 days, or incorporated the Stand-Down into a full Safety Month.

Responding to Industry Needs: New Roofing r2p Partnership Leads to Multi-Trade, Labor-Management Focus on Emerging Hazard

In 2014, CPWR used the industry partnership model developed through its early r2p work to establish a new partnership in the high-risk roofing industry. This collaboration between the United Union of Roofers, Waterproofers and Allied Workers (unionized workers and contractors) and the National Roofing Contractors Association (non-union contractors and their employees) is allowing CPWR to better understand partnership dynamics with participants representing different perspectives and ethnically diverse constituents. The partnership has been tasked with setting goals and strategies for advancing research to practice (r2p) and practice to research (p2r) in the roofing industry. In early discussions, the partnership raised radiofrequency (RF) radiation as an emerging hazard of mutual and growing concern given the proliferation of RF-generating antennas on sites where roofing and other construction work is regularly performed.

Roofing contractors and their employees lack awareness of the hazard and risk, an understanding of the scope of OSHA's and the FCC's regulatory responsibilities, and knowledge of protective measures. Concerns are shared by other building trades unions and contractors associations, so a multi-trade labor-management RF Work Group led by the Roofing r2p Partnership was established. This Work Group is developing worker and contractor RF radiation awareness materials and training programs to help prevent exposures. The first product developed through this RF Work Group is a Hazard Alert Card "RF Radiation – An invisible danger" available in print and online. The Alert can be found on CPWR's website (www.cpwr.com).

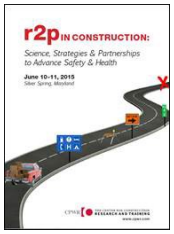
Tracking Efforts to Improve Safety Climate

In summer 2014, CPWR released *Strengthening Jobsite Safety Climate: Eight Worksheets to Help you Use and Improve Leading Indicators*. The workbook walks construction safety professionals through a rigorous self-evaluation of their firm's safety climate, and provides lists of ideas they can implement to improve their scores. In the first year of publication, CPWR's promotional activities brought the workbook to thousands of users, with more than 3,500 print copies distributed and nearly 5,000 downloads. In an exploratory research project, CPWR further identified a target audience of construction safety professionals and tracked their responses to the digital and direct mail promotions. Initial findings indicated that:

- General Contractors and Construction Managers were substantially more likely to request multiple copies of the workbook than were specialty contractors/subcontractors.
- Large firms on the Engineering News-Record (ENR) 400 or ENR 600 lists were twice as likely to request multiple copies than were smaller firms.
- Those who received the promotion by both modes were somewhat more likely to request multiple copies than those who just received a sample copy in the mail, and far more likely to do so than those who just received the email promotion.

Researchers are currently analyzing data from interviews with a sample of these users, and will release results in the coming year.

First Annual r2p Seminar & Partnership Workshop Strengthened CPWR's r2p Initiative



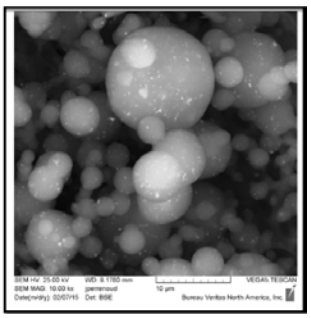
The CPWR r2p seminar & partnership workshop, *"r2p in Construction: Science, Strategies & Partnerships to Advance Safety & Health,"* held June 10-11, 2015 brought together industry stakeholders, researchers, and decision-makers as a first step in creating an ongoing dialogue on how to partner to reduce construction injuries and illnesses by increasing the use of research findings and interventions. Representatives from successful r2p partnerships at the national and regional levels, the insurance industry, government, academia, and non-construction sectors shared their r2p theories, successes, and challenges, and engaged the 84 attendees in discussions on how to use the information shared to advance r2p. An evaluation of the joint seminar-partnership workshop found that it met its objectives and established a foundation for future partnerships and collaborations. Surveys of attendees found that 95% gave it an overall rating of "Good" to "Excellent," with 64% rating it "Excellent." In addition, 98% said the sessions met the learning objectives, 95% said they were relevant to their work, and 98% said the information provided them with ideas to improve their own r2p efforts. This joint seminar-partnership workshop also advanced CPWR's efforts to build a partnership network, with 93% of attendees indicating they made valuable connections that will be helpful to their work.

Direct Mail Campaign

A strategically focused direct mail campaign distributing compelling samples of CPWR products has greatly expanded CPWR's presence among targeted audiences this year. CPWR started the program year with 124 industry leaders from ENR 400 and ENR 600-listed construction firms in its outreach database; 89 of these were subscribed to the CPWR UPDATE electronic newsletter. Today we have 184 of these industry leaders enrolled in our contact database, and have nearly doubled the number receiving our newsletter to 169. Another targeted population, scholars publishing new construction safety and health research in high-impact journals, has also been enrolled at a rapid pace. Starting the program year with 89, we now have 235. Eighty-one of these researchers subscribe to the UPDATE. The promotional campaign has also substantially boosted requests for CPWR print products, doubling the number of requests for CPWR publications and DVDs.

Nanotechnology in Construction

CPWR's nanotechnology research team has been collaborating closely with NIOSH's Nanotechnology Research Center. In October 2014 we launched the eLCOSH Nano inventory containing 487 products that appear to be nano-enabled or nanostructured. The inventory is the largest in the world focused on the health and safety issues of nano-enabled construction materials. Research suggests that some engineered nanomaterials may be hazardous, but the risks posed to construction workers remain poorly understood. Evaluating potential exposures to engineered nanomaterials during routine construction work will be an important aspect of risk assessment for these emerging technologies.



Photomicrograph at 10,000X showing ZnO nano-particles as bright white spots on larger spherical particles generated during spraying

In December 2014, we collected a broad range of industrial hygiene data during the spraying of a sealant containing nano-sized zinc oxide particles onto sheets of plywood, and again while sanding boards with dried sealant. In June 2015, we worked with a team of toxicologists from NIOSH to reproduce the sanding work to collect dust for in vitro and in vivo testing.

In addition to producing a hazard alert on construction nanomaterials, eight presentations were delivered and AIHA invited us to write a feature article for their Synergist magazine.

Construction Solutions

Twenty nine new solution records were developed and added to the Construction Solutions database, with a focus on falls and Prevention through Design (PtD). To protect workers when performing a task, using this database, a user will be able to easily locate a safety solution based on the occupation and the hazard associated with the task. For instance, to prevent falls when working on a sloped roof in residential construction, the database offers the "Sloped Roof Side Guardrail System" solution. Moreover, it provides additional information about the manufacturers and how this solution addresses the risk. The website attracted close to 4,500 users monthly, and approximately 70% of user sessions resulted in a user successfully reaching a solution record. To increase our site engagement and web traffic, we are working to connect Construction Solutions to fall prevention resources available on OSHA's website. Additional outreach efforts through quick informational webinars and social media were executed. The Construction Solutions database now has a LinkedIn Showcase Page, "CPWR Construction Solutions," that features new or pertinent solution records to the public on a weekly basis.

Data Center Disparities Study

Our research on disparities among construction workers has received public and media attention beyond the construction industry. Nearly 75% of workers migrating from Mexico to the US were undocumented or had false documentation on their first trip from 1982 through 2013. In addition, more than two-thirds of migrant workers were under 25 years of age during their first trip to the US. Almost 40% of migrants working in construction in the US were not construction workers in Mexico. Our findings and publications on Hispanic workers are widely cited, including the OSHA report "Adding Inequality to Injury: The Costs of Failing to Protect Workers on the Job," and the ASSE/NIOSH joint report, "Overlapping Vulnerabilities: The Occupational Health and Safety of Young Immigrant Workers in Small Construction Firms." Our findings on Mexican migrants in the US, presented at the 2015 National Hispanic Medical Association Conference, have been well received and requested by the audience.

Our findings on temporary workers in the construction industry were reported in the second CPWR Quarterly Data Report. The report raised issues on OSHA's Temporary Workers Initiative (TWI) after it was published on the CPWR website in June 2015 (http://www.cpwr.com/publications/second-quarter-temporary-workers-construction-industry). The comments we received suggest that OSHA's current TWI may not necessarily be feasible or practical for the construction industry. Temporary workers in construction may need distinct OSHA

guidance. Some safety and health professionals are voluntarily working with us on this issue. We delivered an informational webinar on the report attended by 24 construction industry stakeholders.

We have been invited to present our study "Economic consequences of workplace injuries in the United States: Findings from the National Longitudinal Survey of Youth" at the upcoming 143rd APHA Annual Meeting and Exposition in Chicago in October 2015. A paper including the main findings was greeted by reviewers of the *American Journal of Industrial Medicine* with positive feedback and the revised draft is currently under review for publication.

Data Center Tracking and Support Services

The first Quarterly Data Report, *Employment Trends and Projections in Construction,* has received public attention and positive feedback since it was published in February 2015 on the CPWR website. Some examples of interest and coverage:

- *Durability + Design: March 9, 2015* www.durabilityanddesign.com/news/?fuseaction=view&id=12826
- ISHN (Industrial Safety & Hygiene News): March 4, 2015 http://www.ishn.com/articles/100860-construction-recovery-continues
- Equipment World: March 17, 2015 http://www.equipmentworld.com/construction-expected-to-near-pre-recession-employment-highs-by-2022/
- IUPAT (International Union of Painters and Allied Trades): March 12, 2015 www.iupat.org/wp
- PAINTSQUARE: March 10, 2015 http://www.paintsquare.com/news/?fuseaction=view&id=12835&nl_versionid=654
- Construction Employer Association (CEA): March 11, 2015 https://www.ceacisp.org/news/construction-employment-hits-six-year-high-beige-book-finds-mixed-conditions

We have been invited to report our practice on fall injury surveillance and interventions in the construction industry at the 2015 APHA Joint Session: "Falls in the Workplace: A Multidisciplinary Approach for Prevention". Our presentation entitled "Primary Prevention: Preventing Falls before They Occur" is scheduled to be delivered on November 2, 2015. Additionally, the *Construction Chart Book* continues to be a go-to reference for all construction stakeholders. According to Google Scholar, as of 8/31/2015, there were more than 400 exact matches of professional publications citing the work and more than 2,000 websites used it as one of their major sources on safety and health. In addition, about 10,000 page-views, and nearly 2,000 downloads of the chart book were recorded through www.cpwr.com and www.elcosh.org in Year One.

The *Fatality Map* hosted at http://stopconstructionfalls.com/ remains a topic of OHS coverage and news. Users have provided positive feedback on the impact of the maps, indicating that they used the maps for Workers' Memorial Day activities and reports, incident-specific information requests and prevention efforts, worker training, and fall prevention campaign efforts at the local level.

Enhancing Safety Climate through Leadership

Picture of all CDT members at our first meeting in Boulder, CO

Our first major accomplishment for this project was to create a multidisciplinary Curriculum Development Team (CDT). The CDT includes 17 industry stakeholders including contractors, unions, authorized OSHA 30-hour instructors, OSHA, OTI (OSHA Training Institute), safety consulting groups and academia. The CDT brings together a group of subject matter experts to ensure that the leadership training module and all related materials, including evaluation instruments, were suitable for the industry, focused on relevant safety leadership concepts, and most importantly would be acceptable to a critical target audience; the decision-makers at OSHA Training Institute and to OSHA 30-hour trainers. We held two 2-day face-to-face CDT meetings and the group has been actively engaged with us throughout the year via many subsequent emails and phone calls.

With the help of the CDT we have achieved a second major accomplishment which is a ready-for-pilot-testing 2.5 hour leadership training module. It includes introductory information on what effective leadership is and focuses on the following 5 key leadership skills: 1) Lead by Example, 2) Engage Team Members, 3) Actively Listen & Practice 3-Way Communication, 4) Develop Team Members through Teaching, Coaching, & Feedback and 5) Recognize Team Members for a Job Well- Done. The module includes a facilitator and student guide, PowerPoint slides, and 7 scenarios (2-minute animated and narrated videos or written format) illustrating foremen exhibiting, and not exhibiting, the safety leadership skills. Pre and post- training surveys for the trainers, foremen, and workers were developed to evaluate the effectiveness of the training on a variety of outcomes.