Addressing Public Concerns about their Exposure to Low Doses of Anthropogenic Radiation

National Academy of Sciences Public Meeting

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Introduction to COG

The CANDU Owners Group (COG) is a private, not-for-profit corporation funded voluntarily by international CANDU operating utilities, Canadian Nuclear Laboratories (CNL) and supplier participants.

COG Activities

- Projects and Services
- Information Exchange
- Nuclear Safety and Environmental Affairs
- Research and Development

Two R&D Programs

Base Program

- Long-standing program
- Applied R&D – Short horizon – 3 years
- Focus on regulatory issues, operations & maintenance improvements within the industry. Includes a Health Safety and Environment research program

Strategic Program

- Recent program
- Long Term vision >10years
- Aimed at long term sustainable NPP operation >60 years
- Includes a strategic low dose research program.

Drivers for the LDR Program

Belief that fear of LDR has contributed to:

- Drained political support for nuclear power
- Resistance to the future deployment of SMRs in Canada
- Cut investment and development
- Generally increased industry operating and life-cycle costs

Currently little LDR information available for trusted communicators

There is a demand for new trained professionals.

- Nuclear industry and regulators
- Academia
- Pharmaceutical industry
- Nuclear medicine

COG LDR Program

- Is driven by public worries and concerns
- Facilitated by an independent advisory committee
- Budget ~$1.5M/y but, in addition, is extensively leveraged by Canadian government funds and international support
- Covers a diverse range of scientific disciplines
- Currently comprises 16 active projects
- Training / trained 18 Masters and PhD students to date
- Most research conducted by Canadian universities, but with extensive collaboration

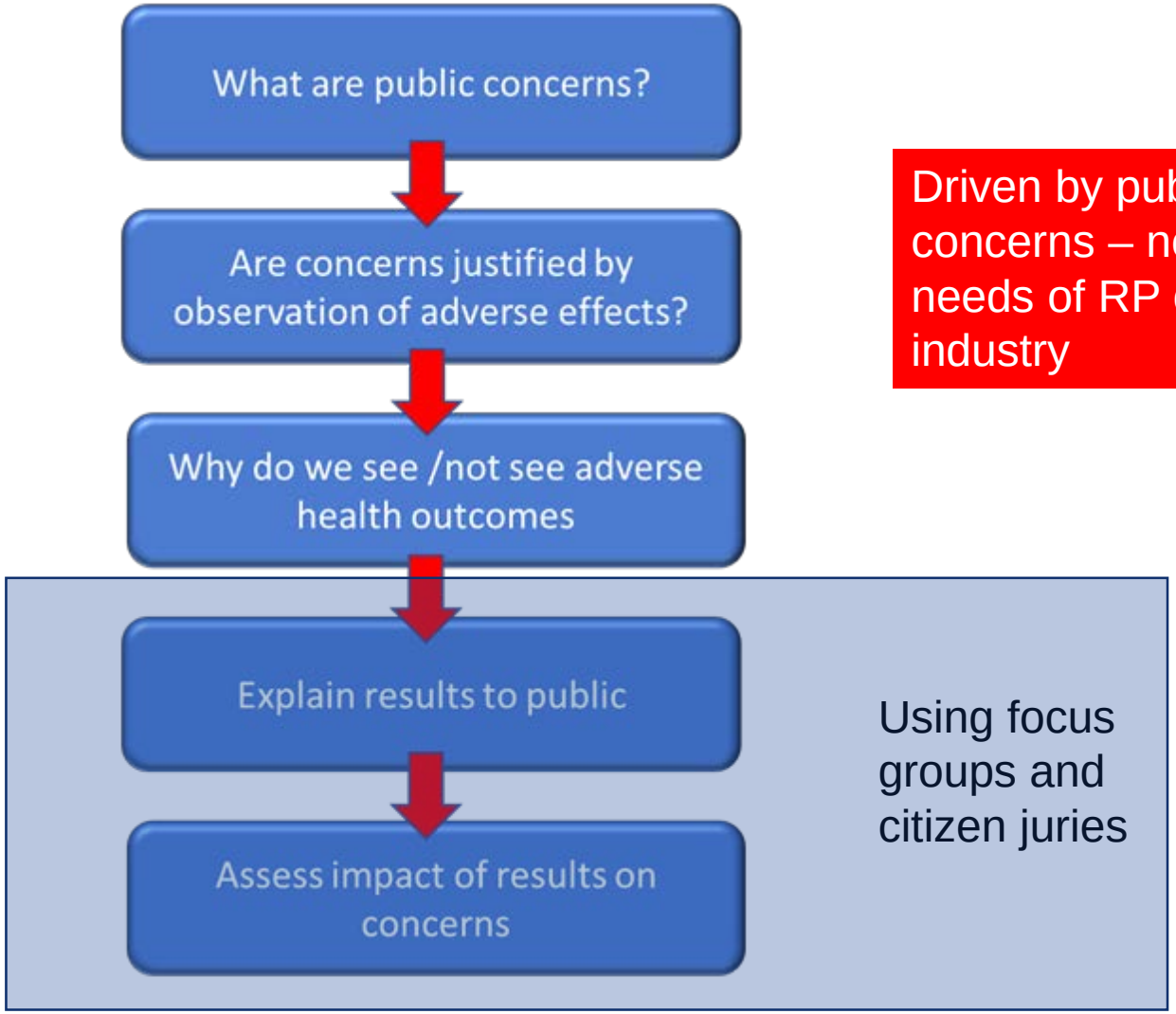
Benefits

The program designed to provide unbiased information on the health effects of exposures to LDR that could inform communicators and public perceptions.

Demonstrates the commitment of the Canadian nuclear industry to advancing our understanding of LDR effects in an effort to address the worries and concerns of the public.

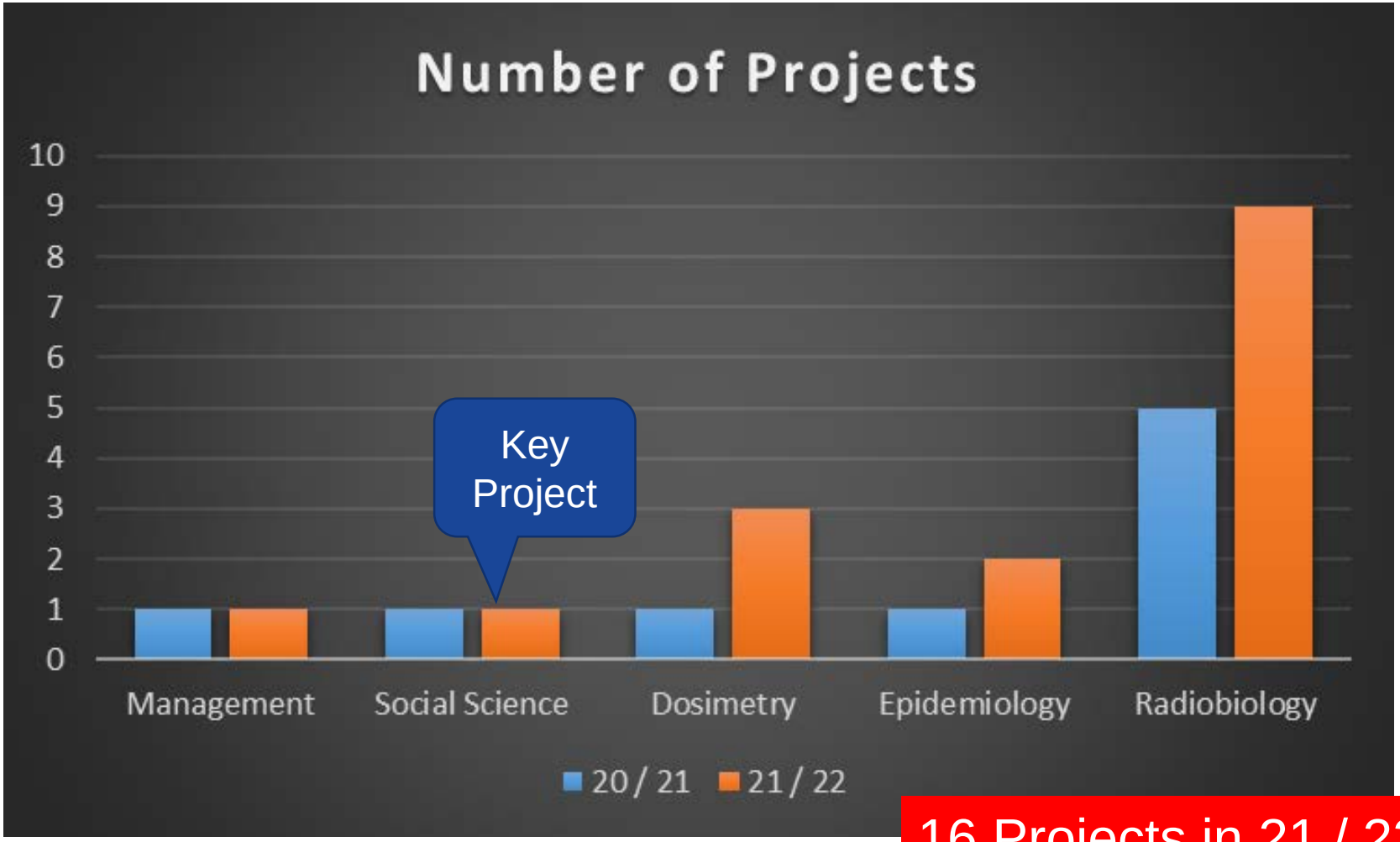
The project will provide experts to meet industry (and other Canadian) needs

Program Logic



Driven by public concerns – not by the needs of RP or the industry

Program Project Portfolio



16 Projects in 21 / 22

Priming Project

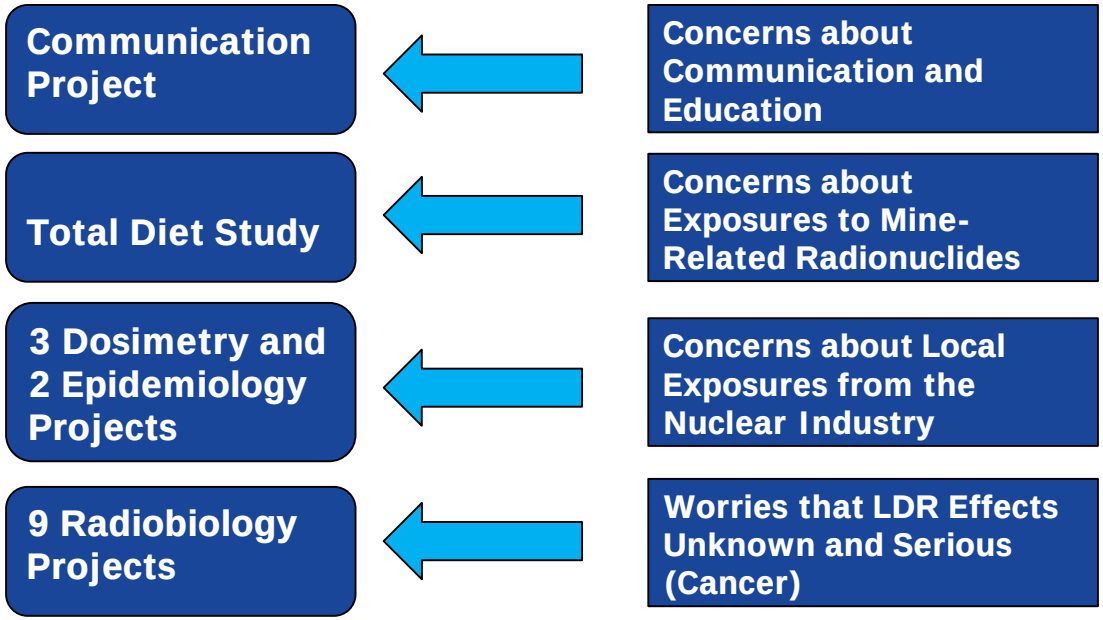
Centre for the Study of Science and Innovation Policy, University of Saskatchewan and University of Regina

- What are the concerns (Key objective)
- Why public has concerns
- Importance of gender, age, domicile, etc.
- Perceptions of northern communities
- Effectiveness of communications
  - Industry, experts, Government, conventional media, social media
- What research is needed

Some General Findings

- Lock-in of negative public perceptions which will be difficult to change
- “Convince instead of consult” approach to public engagement worsens polarization
- Building trust follows asymmetry principle: trust is slow to form but quick to erode
- Communications by industry, politicians and environmental activists least likely to be trusted
- With respect to LDR knowledge, nuclear workers little better informed than the public
- Comparison with alternatives most likely to succeed
- Concerns identified

Project Links to Concerns



Current projects map to social science findings

Radiobiology Projects

Molecular Changes
- DNA damage and repair
- Mutations
- Epigenetics

Cell Changes
- Metabolism
- Ageing
- Stem cells

Tissue/Global Changes
- Tumour frequency and growth
- Microenvironment
- Immune system
- Inflammation
- GI microbiome

Early Radiobiology Messages

Exposures to sub-chronic and acute doses of 10mGy (1rad):

- Activates specific immune responses which may help with clearance of tumour and damaged cells
- Produced alterations in O_2 consumption rates, metabolic responses, DNA biochemistry and gene regulation
- Uncovered specific pathways linked to radiation-induced adaptive responses
- Boosts immune function sufficient to reduced cancer progression in *ex vivo* cell cultures
- Reduces inflammatory responses