Table of Contents

1.0 – BACKGROUND ................................................................. - 3 -
  1.1 – THE PROBLEM .......................................................... - 3 -
  1.2 – THE OPPORTUNITY .................................................... - 4 -
  1.3 – THE HISTORY OF MSK RESEARCH AT WESTERN ............ - 4 -

2.0 – WHAT IS THE BONE & JOINT INSTITUTE TODAY IN 2018? - 5 -
  2.1 – THE BJI MEMBERSHIP ................................................ - 5 -
  2.2 – THE KEY PARTNERSHIPS & FACILITIES ......................... - 6 -
  2.3 – THE PURPOSE OF THE INSTITUTE ............................... - 7 -
  2.4 – THE GOVERNANCE STRUCTURE ................................... - 8 -

3.0 – BJI PROGRESS 2015 TO 2018 .............................................. - 8 -
  3.1 – A PRODUCTIVE TRANSDISCIPLINARY RESEARCH ENVIRONMENT - 9 -
    Exemplars of High Impact Research & Partnerships ............... - 10 -
    National Initiatives ..................................................... - 11 -
    Publications & Funding ................................................ - 12 -
    Technology Transfer .................................................... - 13 -
  3.2 – CANADA’S LARGEST TRANSDISCIPLINARY MSK RESEARCH TRAINING PROGRAM - 13 -
    Trainees ........................................................................ - 13 -
    Trainees Publications & Funding .................................... - 14 -

4.0 – WHERE ARE WE GOING? ..................................................... - 14 -

5.0 – SUMMARY ........................................................................ - 17 -
1.0 – Background

This summary provides an overview of progress made in achieving the goals of the Bone and Joint Institute (BJI) that was established in March of 2015. Also, it outlines its vision for the future as it strives to contribute to improved quality of life for over one billion people who suffer from musculoskeletal (MSK) conditions worldwide. Below, is a description of the need and rationale for initially proposing the Institute and why it is crucial to sustain and grow its work now.

1.1 – The Problem

“Many MSK conditions don’t directly result in mortality. This makes these conditions a lower priority for many sectors. People learn to cope or modify their lifestyle or just learn to ‘live with the pain’. Unfortunately, this pain and potential disability can have huge societal consequences like increased absence from work, family breakdowns, less active lifestyles, social isolation, more obesity, and other risk factors that worsen life-threatening co-morbid conditions – they are a big burden for individuals and systems.” – Cathie Hofstetter (BJI Research & Business Advisory Committee - Consumer Rep)

Burden: MSK conditions such as arthritis, skeletal fractures, back pain, metabolic bone diseases, and sport/work-related injuries are a major burden on people and systems worldwide. They affect over 1.7 billion people globally, and have the 4th greatest impact on overall health in the world (1). They are the most common medical cause of long-term absence from the workplace (1), and the second-most common cause for consulting a doctor (2). The Public Health Agency of Canada reported the economic burden of MSK diseases as the highest of any group of diseases in the country, totaling $22 billion annually (3,4). The prevalence of MSK conditions has increased by 45% over the last 20 years and will continue to rise unless concerted action is taken globally (1).

Challenge: The complexity of MSK conditions presents a multi-faceted health and societal problem that requires the diverse perspective of transdisciplinary research teams. Such teams bring together the expertise and scientific skills needed to accelerate discoveries and the translation of successful innovations (5). For teams to be effective, they must breakdown traditional academic silos and go beyond to include sectors responsible for translation into practice and policy (e.g. industry, government, and
community-based organizations) in all the stages of the research process. The Harvard Business Review and Thoughtful Leaders have described these types of collaboration as rare because they are challenging and full of pitfalls. Creating supportive structures can greatly improve teams’ ability to collaborate efficiently despite the inclusion of widely disparate disciplines.

1.2 – The Opportunity

Western University is committed to advancing collaborative, transdisciplinary research required to address complex issues of societal importance like MSK conditions. With expertise in molecular and cell biology, imaging, biomaterials, biomechanics, regenerative medicine, medical devices, clinical trials, epidemiology, health services, community health research and more, Western provides the necessary components to tackle critical issues in MSK research and innovation.

By focusing on a complex issue, identifying alignment in the Strategic Research Plans of participating Faculties and by defining synergies, University-wide Institutes enable collaboration among investigators across Faculties to accelerate research success and improve knowledge translation. In turn, this has the potential of enhancing the impact of research breakthroughs on basic science, clinical practice, the health care system, the economy, and society.

1.3 – The History of MSK Research at Western

“MSK Health” was recognized by Western in 2013 as one of eight Signature Research Areas (http://www.uwo.ca/research/excellence/strength.html). It was described as “a rapidly emerging area of research strength … a health science and technology-based cluster [that] builds on multi-Faculty excellence in skeletal biology, bioengineering, medical devices and clinical application.” To grow this strength, an Interdisciplinary Development Initiative (IDI) was awarded in 2011-14 and numerous MSK-focused activities were launched: a monthly symposium series; workshops; biennial research retreats; and the biennial Canadian Bone and Joint Conference. The IDI supported establishment of

“The time of the independent researcher as a ‘lone wolf’ is over. The problems we work on and the funding climate that supports our research demands that we think creatively about problems... The best way to do this is in teams of like-minded people focused on the greater good, as opposed to their own success.” ~ Cheryle Séguin, Co-Director of CMHR

“The creation of a formal Institute was necessary to take full advantage of university-wide MSK research expertise. Western was fortunate to have a number of very strong research groups (i.e. orthopaedics, skeletal biology, rheumatology, physical therapy, imaging, biomedical engineering), but a formal structure was required to catalyze synergy across Faculties and Departments.” ~ David Holdsworth, Scientific Director

“A university-wide institute enabled us to take advantage of our critical mass and strengths... to benefit from major funding opportunities and to improve the quality and impact of MSK research and education.” ~ Trevor Birmingham, Director of Training and Education
Canada’s first and largest Collaborative Training Program in MSK Health Research (CMHR) – an intra-university graduate program of study that provides transdisciplinary MSK-focused training through courses, workshops and seminars for students completing the degree requirements for Master’s and PhD programs. The IDI assisted with the submission of two large infrastructure funding applications that generated over $4M in external funding. IDI activities also generated information to populate a database and website that facilitated collaborations, enabled the recruitment of trainees and colleagues, and profiled Western’s growing strength in this area.

Two complementary initiatives were awarded by Western in 2014/15 to build and expand on local MSK research success: 1) the Cluster of Research Excellence in MSK Health (Cluster), and 2) the Bone and Joint Institute (BJI). Envisioned as the nexus for discoveries and innovations in MSK health locally, regionally, and nationally, the BJI was well positioned to advance the University’s mission and strategic objective to maintain and enhance its stature as a leading Canadian research-intensive University. The Institute and Cluster programs were crafted to align with – and contribute to – the University’s strategic research plan to:

- maximize research synergies and success;
- increase the involvement of undergraduate, graduate, and postdoctoral trainees;
- enhance the engagement of partners and knowledge users;
- promote interdisciplinary and international projects; and
- track and celebrate successes.

2.0 – What is the Bone & Joint Institute today in 2018?

Nearly four years into its operation cycle, BJI has successfully been launched as a virtual University-wide research enterprise. It has established the necessary components to foster and support transdisciplinary collaborations that have accelerated high-quality research yielding tangible impact.

2.1 – The BJI Membership

The BJI membership has grown to over 250 people from 5 Faculties with a broad variety of research expertise. It includes researchers at various career stages, and it is balanced across the BJI Primary Objectives (section 2.3). Members hold prestigious awards including: 14 Research Chairs (6 Endowed/Industry-funded), 2 Fellows of the Royal Society of Canada, 3 Fellows of the Canadian Academy of Health Sciences, 1 NSERC Fellow, approximately 10 recipients of Early Career or New Investigator Awards, 3 Distinguished University Professors, and 3 current Faculty Scholars.

“Most researchers are still solitary in their work and most institutions are resistant to the changes needed to foster multidisciplinary integrated research in the way that it needs to be done... The Bone and Joint Institute is the epitome of how to carry out this type of new research in a meaningful way. It’s the first University-designated Institute under our new guidelines and policies and it has done a remarkable job so far.” – John Capone, VP Research
2.2 – The Key Partnerships & Facilities
Bone and Joint Institute (BJI) at Western University

BIOMECHANICS & NOVEL TECHNOLOGY LABORATORIES
- Bioengineering Research Laboratory at HULC
- Facility for Biomedical Device Design and Fabrication
- MSK Biomechanics Laboratory
- Organic Mechatronics and Smart Materials Laboratory
- Wearable Biomechatronics Laboratory
- Wolf Orthopaedic Biomechanics Laboratory (WOBL)

CANADIAN CENTRE FOR ACTIVITY AND AGING CLINICAL RESEARCH SITES & CLINICAL OUTCOMES LABORATORIES
- Rheumatology Centre
- Pain and Quality of Life Integrative Research Laboratory (PIRL)
- Clinical Research Laboratory at HULC
- Advancement of MSK Health Research Facility at Fowler Kennedy
- Arthroplasty Clinical Unit
- Canadian Surgical Technologies & Advanced Robotics (C-STAR)
- Dr. Sandy Kirkley Centre for Musculoskeletal Research
- Orthopaedic Research Lab
- Orthopaedic Spine Centre
- Rorabeck Bourne Joint Replacement Clinic
- Spine Clinical Unit
- Trauma Clinical Unit

IVEY INTERNATIONAL CENTRE FOR HEALTH INNOVATION

JL RETIREMENT LIVING

MSK IMAGING LABORATORIES
- BIOMEDICAL IMAGING RESEARCH CENTRE (BIRC)
- Pre-Clinical Imaging Research Centre (PIRC)
- Load-bearing Imaging, Biomechanics and Clinical Orthopaedics Research (LIBCOR) in WOBL
- Sustainable Archaeology Collaborative Initiative

SCIENCE FACILITIES & LABORATORIES
- Western Nanofabrication Facility
- Surface Science Western
- Laboratory for Biomaterial Synthesis
- Integrated Microscopy Facility at the Western Biotron

SKELETAL BIOLOGY LABORATORIES
- Biomaterials Science Laboratory
- Mammalian Embryonic Stem Cell Laboratory
- Photon Technology International—Horiba Fluorescence Imaging Core Facility

2.3 – The Purpose of the Institute

Guided by the BJI vision, mission and core values, collaborative teams focus on advancing the primary research objectives of the Institute:

- Understanding bone & joint diseases;
- Innovating in diagnosis & evaluation;
- Developing & evaluating new therapies; and
- Influencing key knowledge users.

The overarching goal is to reduce the burden of MSK conditions by:

- enhancing active living, mobility and movement;
- investigating causes, prevention, diagnosis, and treatment options for MSK conditions; and
- improving support systems and palliation for a wide range of MSK conditions.

Vision
- Lifelong mobility.

Mission
- To lead transdisciplinary research, innovation, and education in MSK health.

Core Values
- Collaboration
- Knowledge translation
- Excellence in innovation
- Education & research training
2.4 - The Governance Structure

The Executive Committee consists of the Scientific Director (David Holdsworth), Director of Operations (Jeff Dixon), Director of Training & Education (Trevor Birmingham), and Co-director of CMHR (Cheryle Séguin). They provide leadership and direction, support day-to-day activities, and ensure alignment with partner priorities. The Operations Committee, with representatives from all Faculties, enables a grass-roots approach. This committee plays a crucial role as a liaison with the broad membership. Details about each committee are available on the BJI website and within our Annual Reports (http://boneandjoint.uwo.ca).

“"The Bone and Joint Institute has recognized the severity and impact of MSK conditions on people’s general well-being and quality of life. This organization is investing time and effort to bringing stakeholders together in a new way so that we can find solutions. They have made great progress in breaking down academic silos and have recognized the need to go outside of academia to include other sectors in their governance structure and events like the seminars, research retreats, and conferences.””  – Anne Lyddiatt (BJI Governing Board - Consumer Representative)

3.0 - BJI Progress 2015 to 2018

""We have built strong teams and we can’t wait to see what they will do – how they will mentor new researchers to embrace disciplinary differences as strengths … to recognise that transdisciplinary research opens new doors for research outputs and career trajectories.””  – Jeff Dixon, Director of Operations

The Institute has become a focal point for MSK research locally, regionally, and nationally. From transdisciplinary research, to training and education, to community outreach and industry engagement, the BJI is well on its way to becoming recognised as a leading centre that inspires MSK research discoveries, develops innovations, and takes them all the way to clinical application. Detailed descriptions of Institute accomplishments are available in the online versions of Institute Annual Reports at http://boneandjoint.uwo.ca/about_us/Institute%20Reports/index.html
### 3.1 – A Productive Transdisciplinary Research Environment

The coordinated activities of the BJI, including focused events, workshops, funding programs, communications, training activities, and special initiatives have expanded transdisciplinary MSK research at Western. The growth in the degree of internal collaboration is evidenced by co-authored MSK research articles. The node plots below demonstrate that from year to year, the collaboration among Western BJI member authors has increased (co-authored publications – lines between the dots) and the number of independent publications has decreased.

The pillars of strength and collaborative environment of the Institute have attracted and enabled the recruitment of 2 Early Career Researchers (Health Economics - Jacqueline Marsh, start date of July 2016 with the Faculty of Health Sciences; and Orthopaedic Biomechanics - Ryan Willing, start date of July 2017 with the Faculty of Engineering – details provided in our 2016 annual report), and Michele Crites Battie as the Western Research Chair (WRC) in Exercise, Mobility, and Health in the Faculty of Health Sciences. BJI has also provided support, enabling our partner Faculties to leverage our research strengths for additional MSK-related recruitments including Emil Schemitsch (Richard Ivey Chair of the Department of Surgery - Schulich School of Medicine & Dentistry), Joy MacDermid (Gender in Measurement & Rehab of MSK Work Disability - CIHR and James Roth Research Chair in MSK Measurement & Knowledge Translation - Health Sciences), Tom Appleton (Schulich School of Medicine & Dentistry), Emily Lalone (Engineering), Mikko Karttunnen (Materials and Biomaterials Science CRC Tier 1 - Science), Andrea Waters-Rist (Social Science), and Jay Stock (Social Science).
Our members participate in significant international collaborations and serve as global opinion leaders, as evidenced by work published in journals such as *Lancet* and *Cell; Annals of the Rheumatic Diseases* (the highest impact journal in the field of rheumatology); the *European Spine Journal* (in which one of our teams published the paper that received the 2017 Prize in Bioengineering Science from the International Society for the Study of the Lumbar Spine); and the journal *Arthritis & Rheumatology*.

"Transdisciplinary research teams excel due to the additive nature of their combined expertise and new ideas that come from bringing engaged minds together to work on a problem from diverse perspectives.”  – Cheryle Séguin, Co-Director of CMHR

### Exemplars of High Impact Research & Partnerships


BJI Members received the 2017 Charles S. Neer Award in Clinical Science for their publication entitled: “A rapid method for detecting *Propionibacterium acnes* in surgical biopsy specimens from the shoulder” – (Holmes, S., Diaz, A. M. P., Athwal, G. S., Faber, K. J., O’Gorman, D. B. Journal of Shoulder and Elbow Surgery, 26(2), 179-185. (2017) doi:10.1016/j.jse.2016.10.001). The article described the development of an assay to confirm infection, a common and serious complication following shoulder arthroplasty, within 24 hours of taking a sample – compared to current methods that require 7-14 days. This new tool will facilitate treatment decisions, including targeted antibiotic therapy and improved monitoring that will minimize implant failure and the need for costly revision surgery.

Note: The prestigious Charles S. Neer Award is presented annually in recognition of outstanding clinical investigation that contributes to the understanding, care or prevention of injuries to the shoulder and elbow ([http://www.ases-assn.org/?p=physic-awards](http://www.ases-assn.org/?p=physic-awards)).
BJI scientists and staff were instrumental in establishing a collaboration with a multinational private sector partner (Renishaw), which led to a major investment, with additional support from the City of London and Western University, to establish the Additive Design in Surgical Solution (ADEISS) Centre on campus. This 3D metal printing facility (unique in North America) can produce working implants and components. Recent successes in high-profile veterinary applications (3D-printing “snout” for a 7-year old Bernese Mountain dog http://www.renishaw.com/en/additive-manufacturing-in-veterinary-surgery-saving-a-well-loved-member-of-the-family--42950 and 3D-printed skull for 9-year old “Patches” with cancer https://www.cnn.com/2018/09/25/health/dog-3d-printed-skull-trnd/index.html) demonstrate the great potential of this facility, once certified for the production of human components (end of 2018). “Patches” has made national and international headlines in the New York Times, TIME, CNN, Boston Globe, NBC, Globe and Mail, CBC News, CTV News, UK Daily Mail and National Post. Several BJI members including basic scientists, engineers, orthopaedic surgeons, and dental clinicians now work collaboratively with ADEISS.

National Initiatives

“In the last year, we made important steps to build our teams beyond Western, by leading the establishment of the Canadian MSK Rehab Research Network and the Canadian Consortium of MSK Research Groups and co-hosting a national conference attended by over 300 delegates.” – Trevor Birmingham, Director of Training and Education

BJI partnered with the Canadian MSK Rehab Research Network to welcome over 300 attendees from around the world to the 3rd Biennial Canadian Bone and Joint Conference in May 2018. More than double the attendance of previous years, the conference included plenary and invited podium talks, oral and poster presentations (160+ submitted abstracts), concurrent workshops, and panel presentations. The conference included focused breakout workshops on wearable technologies, running injuries and biomechanics, regenerative medicine, and journal writing with editors from the top international MSK journals. The Gala featured an inspiring discussion of human mobility by special guest Robert Buren (paraplegic Ironman triathlete). Conference activities were aligned with pre-conference events, which included the first Canadian Bone and Joint Young Investigator Forum (a preconference event planned by and for trainees with podium presentations and interactive career building workshops), the Annual Suzanne Bernier Memorial Lecture, and a Canadian Institutes of Health Research (CIHR) Institute of Musculoskeletal Health and Arthritis (IMHA) Town Hall meeting with incoming Scientific Director, Dr. Karim Khan. Evaluation feedback from conference attendees indicated a high level of satisfaction with the event and enthusiasm for attending the next biennial conference in the spring of 2020.
2017 was the first full year of operations for the **Canadian MSK Rehabilitation Research Network**. BJI support was instrumental to the conception and development of the Network, including providing in-kind and cash contributions for a successful CIHR catalyst network grant. Two of the Network’s 5 Principal Investigators are based at the BJI, along with the Network coordinator (http://mskrehabnet.com/aboutus/administrative_hub.html). The network held its first annual meeting in conjunction with the 2017 Quebec Congress in Rehabilitation Research, to establish research priorities. As described above, it then partnered with the BJI to hold its second annual meeting in 2018, in conjunction with the Canadian Bone and Joint Conference. The network launched its Pilot Grant and Trainee Awards Competition to distribute over $150,000 to support MSK Rehab research projects. These programs were modeled after the Catalyst Grant and Transdisciplinary Training Award programs of the BJI.

The BJI executive team established a **self-assembled national consortium of Canadian MSK research groups**. Co-funded by CIHR, BJI, and the McCaig Institute for Bone and Joint Health (University of Calgary), BJI organized a series of meetings that unified academic leaders, consumers, advocacy groups, decision-makers, and funders from across Canada. In 2017, a face-to-face meeting was hosted by the BJI where representatives explored options to put together an **action plan to increase the profile of MSK research in Canada**. They discussed various mechanisms to solidify relationships, foster new partnerships, increase awareness of strengths, identify synergies, and recognize national collaborative opportunities. With consensus on a name – Canadian Network for Mobility Research, slogan **“Active for life! Muscle, bone and joint health research to keep Canadians moving”**, and mission to “**bring researchers and partners together to generate solutions that will improve the health of Canadians, through prevention and management of musculoskeletal conditions**”, the next steps are to develop short-term goals and priorities.

### Publications & Funding

BJI members produced **over 650 MSK research papers** between 2015 and 2017. With active BJI investigator-led projects currently supported by **over 500 grants totaling nearly $100 M in multi-year funding**, the number and impact of these publications will continue to rise.

The BJI Catalyst Grant Program directly supported the initiation of innovative, high-
impact, and early-stage projects that led to the leveraging of external funding for continued research. The 2015 awards were leveraged to secure additional funds from various foundations or agencies, to obtain dedicated laboratory space or to better access the population of interest, and to inform and position funding proposals. Both 2015 and 2016 catalyst teams formed new and expanded collaborative relationships among stakeholders, within and external to academia. (Additional information about publications and funding is available in the Annual Reports [http://boneandjoint.uwo.ca].)

**Technology Transfer**

This year, our members doubled the total number of technologies submitted to our technology transfer office, WORLDDiscoveries, for a total of **nearly 50 technologies since fiscal year 2015**. Given the transdisciplinary nature of our work at the Institute, it is common to have multiple inventors listed on a single submission. The total number of patent applications filed has fluctuated from 6 to 13 in the last three fiscal years. Since fiscal year 2015, there has been a total of 31 patent applications. Sixteen patents have been issued, growing to 8 in this most recent fiscal year. These data do not include applications filed independently of WORLDDiscoveries or via other Institutions.

### 3.2 – Canada's Largest Transdisciplinary MSK Research Training Program

“*The establishment of Canada’s first and largest transdisciplinary training program is our greatest achievement to date. Graduates from our program will have a new, contemporary perspective of the value of collaboration, team-based research, and transdisciplinarity.*” – David Holdsworth, Scientific Director

**Trainees**

The Collaborative Training Program in MSK Health Research (CMHR) had its highest ever enrolment of 89 trainees in 2017. Since 2015, over 20 trainees have graduated from their home program (Master’s or Doctoral) with an “*in MSK Health Research*” degree designation. Some trainees transferred directly into a doctoral program that extended their graduate studies. Following completion of their program, most graduates continue to work in academic or health-related fields. We estimate that 20 trainees will graduate in 2018, and nearly 30 in 2019.
Trainees Publications & Funding

In 2017, trainees continued to grow their success in attracting competitive scholarship funding - nearly 50 awards totaling over $1.4 M in multi-year funding from various sponsors including NSERC, The Arthritis Society, CIHR, OGS, WGRS – and publishing 30 peer-reviewed MSK-related articles. They are showcasing their accomplishments by participating in national/international conferences such as the American Academy of Orthopaedic Surgery, American Society for Bone and Mineral Research, Australia New Zealand Orthopedic Research Society & Radiostereometric Analysis Network, Canadian Connective Tissue Conference, Computer Methods in Biomechanics and Biomedical Engineering & Imaging and Visualization, Design of Medical Device Conference, Gordon Research Conferences, the International Cartilage Repair Society, the International Society for Magnetic Resonance in Medicine, the Orthopaedic Research Society International Spine Research Symposium, the Orthopaedic Research Society, and the Osteoarthritis Research Society International (OARSI) World Congress.

Since its launch in 2015, the BJI Transdisciplinary Bone and Joint Training Awards Program has directly funded 37 trainees with research projects that demonstrated clear relevance to MSK health and that were co-supervised BJI Faculty members from distinct disciplines. Furthermore, the Summer Research Program has engaged approximately 80 undergraduate students, 26 of whom were awarded a CMHR Summer Studentship Award to grow their research skills and experience via lunch and learn sessions, by presenting their work in the annual Summer Research Symposium, and by contributing to peer-reviewed publications (Additional information about the CMHR program and awards program is available in the Annual Reports (http://boneandjoint.uwo.ca.).)

4.0 – Where are we going?

BJI priorities for the next 5 to 10 years are to continue to promote and facilitate transdisciplinary teams to enable accelerated research success and innovation, enhanced education, and improved knowledge translation. The ultimate goal is to improve the quality of life of millions of people of all ages living with MSK conditions (details available in the draft strategic plan).

Institute activities will be centered on, but not limited
to, targeted research themes – **arthritis, trauma, and spine** – to capitalize on current and emerging strengths and resources at Western. Priority research objectives and associated goals include:

- **Accelerating research that will result in improved quality of life for people living with MSK conditions**
  - Proactively develop comprehensive research teams (multiple academic disciplines, clinical, public, government, and/or industry representation) to identify priority research questions, to facilitate major grant submissions, and to enable high-impact research and publications.
  - Bridge our expertise in advanced technologies (e.g. wearable or implantable devices for monitoring and/or biofeedback, biomaterials, drug delivery applications), therapies, and rehabilitation programs to help reduce pain, infection, and side-effects, provide less invasive and joint-preserving treatment options, decrease recovery time, support self-management, and improve health outcomes.
  - Establish research registries and data collection guidelines to enhance the sharing of data and/or samples (e.g. images, tissues, and gait data).

> "Most academics would agree that transdisciplinary collaboration is highly productive, but there are many barriers including a full load of research / teaching and lack of university credit for work done as part of a team versus as a sole PI. Because complex problems require multiple perspectives to find timely solutions, granting agencies are encouraging and rewarding team approaches. The BJI will work to reduce these barriers to collaboration in the most efficient and cost-effective manner possible. In time, researchers who join the Institute and participate in transdisciplinary research will experience accelerated success and more easily recognize the value of this research approach and the support of the Institute."  ~ BJI Executive Committee

- **Enhancing clinical and business applications to encourage the transfer of research findings to the “real world” and decrease the burden on individuals and our health and social systems**
  - Establish a stakeholder consultation mechanism to obtain feedback (e.g. research ideas, designs, relevance, and feasibility) and increase research contracts with industry.
  - Promote the use of standard research tools/protocols as part of usual clinical care to increase available data, decrease research costs, and reduce participant burden.
  - Increase the number of clinical trials to evaluate current and new therapies.
“We are engaged as partners and look forward to seeing the engagement of consumers grow as the Institute builds better mechanisms to bridge the gaps between academics and non-academics. The BJI leaders have a great vision for integrating both worlds and this will most definitely accelerate the development and implementation of solutions that will make a real difference in people’s lives.”

~ John Coderre (BJI RBAC – Vice-Chair & Consumer Representative)

- Training the next generation as a means of ensuring the continuity of transdisciplinary research success across academic and non-academic realms
  - Promote CMHR to enhance the recruitment of top doctoral and post-doctoral trainees in order to increase the number of MSK leaders.
  - Develop program(s) to better educate MSK trainees regarding career opportunities within and outside academia, as a means of accelerating their career progression post-graduation.
  - Expand engagement with industry partners to create industry opportunities/research experiences that will enable trainees to explore various career options and develop industry-specific skill sets.

- Provide leadership at the national and international level to expand the impact of our discoveries and innovations, and to attract world class talent and partners.
  - Engage and increase the interconnectedness of the MSK community.
  - Lead in the creation of Provincial and National Networks that will attract funding for large multi-centre initiatives.

“Progress has been made in building the profile of BJI in Canada through leadership of the Canadian MSK Rehab Research Network and CaNMoR. Building a presence at an international level will be important over the next few years.

A stronger national and international profile will facilitate the recruitment of established investigators into our prestigious WRC Program and will attract high quality trainees from all over the world into our collaborative training program. The successful recruitment of Michelle Crites Battié (WRC in Health Sciences), among others, has elevated our spine program to national prominence.

With structure, policies, and processes now in place, we look forward to dedicating more time to our newly drafted strategic priorities – e.g. facilitating major funding applications, team building, training, outreach, and partnerships.” ~ BJI Executive Committee
5.0 – Summary

Western’s MSK researchers established an Institute in an area where we have demonstrated strength across multiple Faculties. Our group of over 100 faculty has a track record of working together to achieve high-impact scientific results, to obtain significant research funding, and to acquire word-class infrastructure. The Bone and Joint Institute is enhancing Western’s reputation by producing high-impact results in an area of increasing societal importance, related to the growing impact of chronic MSK conditions. Western is now recognized as a national leader in bone and joint health research and we are confident that, within the next five years, Western will achieve international prominence in this area as a result of BJI activities.

“This type of organization has really fostered an approach to research that is different, a way to make meaningful advances that would have been impossible to do under normal structural constraints that we all face. It is a great model... From my perspective, the Bone and Joint Institute has shone a light on the way that we need to operate to be competitive and have a real impact on our communities and in our world”.

– John Capone, VP Research

6. Node plot analysis was prepared using the Science of Science Tool (Sci2), Indiana University and SciTech Strategies - https://sci2.cns.iu.edu each circle signifies an author and each line symbolises a co-authored article