



SMART TECHNOLOGY. SMART REGION. SMART FUTURE.

WHIN EDUCATION & SUPPLY-CHAIN REPORT 2018

This report covers two projects at Purdue, funded by the Lilly 'WHIN' Project. In this report, we highlight what we have already done to support manufacturing in the ten-County area around Purdue.

The WHIN-Education Team engaged with 139 manufacturers, with 94 of those being outside Tippecanoe County.

The purpose of these engagements was to discover the most pressing needs that manufacturers face and the opportunities for them to become smart companies, using digital tools, to increase their competitiveness in a fast-changing global market. The following pages discuss some of the WHIN-Education Team initiatives that are already supporting companies.

What the WHIN Supply-Chain Team is doing to support Companies

The WHIN Supply-chain team is working to leverage the supply-chain within the WHIN area. The chief objective is to create a web-site enabling suppliers to supply and work with one-another and to increase supplies to the big Original Equipment Manufacturers (OEMs).

Web-scraping and a New Web-Resource

Web-scraping i.e., extracting digital information about companies in the internet, is our start point, and we have identified 279 WHIN manufacturers and their company details with equipment inventory details for 229 companies to date. We are creating a web-based, interactive site where the search-tool

will allow a buyer to identify goods and services that companies supply, so local OEMs and others can buy from you. We anticipate that local suppliers will use the site to find and partner with other local suppliers. For example, to jointly provide composite parts/products with added value. The nascent site has already been used by our WHIN Supply-chain team to provide supplier information to a potential OEM, so that they could make an informed decision about setting up premises in the WHIN area. Local companies have also expressed a desire to be able to search for other local companies with needs for purchasing similar stock from one large supplier; they anticipate forming purchasing-consortia to bring in bigger

orders at reduced cost. All this has to be a WHIN-WIN!

What the WHIN Education Team is doing to support Companies

The schematic shows how the WHIN Education team's support initiatives, coupled with proactive engagements, tie together to leverage impact across the ten County area. As well as the Education themes shown, there are a number of generic development projects helping companies towards smarter management. We are supporting the expressed needs of companies in management, shop-floor application/systemization and technology, (please see Projects Leveraging Excellence).

All the 'Engage' initiatives in the schematic are already working and being rolled-out more widely. In the 'Support' initiatives, we have already published the first two Newsletters. All of the other support activities will be operational this year. Where there have been successes, there are stories to tell about those successes.

With 85% of OEM purchasing going outside the State of Indiana, anything the WHIN Supply-chain team can do to improve vertical movement of goods and services, will impact on business success and economic growth in our area.

**DID
YOU
KNOW**

What does the acronym WHIN stand for?

WHIN stands for Wabash Heartland Innovation Network.

How many counties are included in the initiative?

There are 10 counties in the WHIN Initiative.

What is the mission statement of WHIN?

To support the ten county area around Purdue to revive and stimulate economic advance of the WHIN area.

Who is leading WHIN Education & Supply-Chain?

Dr. Ananth Iyer, Steve Dunlop, Roy Vasher, Dr. Angus McLeod

Who provided the funding for the grant?

With ~ \$39 Million in support from the Lilly Foundation

What counties does the ten county region include?

**Benton
Carroll
Cass
Clinton
Fountain**

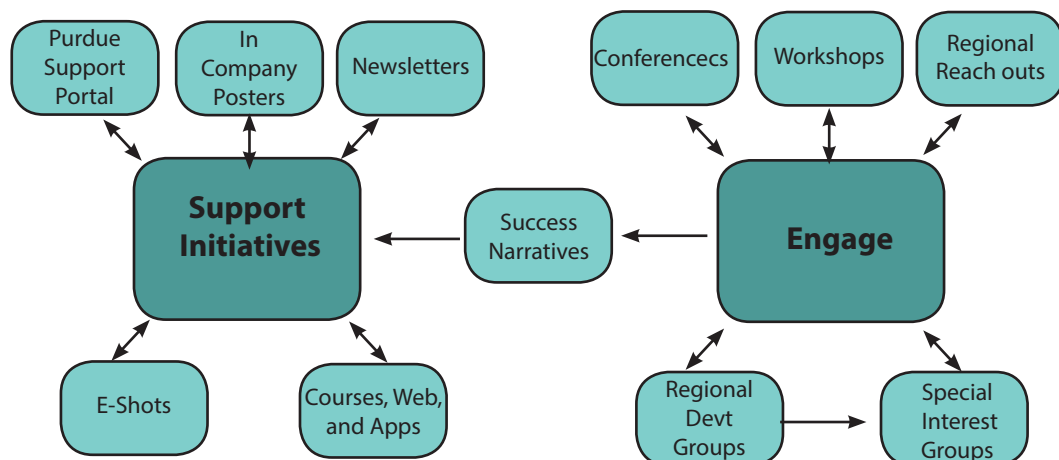
**Montgomery
Pulaski
Tippecanoe
Warren
White**

Q&A about WHIN

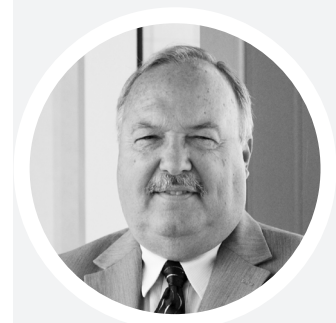
What initiatives does WHIN support?

The grant supports three broad initiatives:

- Resident 'connectivity' such as broadband, waterways and transportation
- 'Vitality' including projects of community benefit with more attractive spaces, and
- 'Economic sustainability and education' including training and development access to prepare current and future employees for work in smart manufacturing and digitally-enabled agriculture.



Dr. Ananth Iyer



Steve Dunlop



Dr. Angus McLeod



Roy Vasher

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MAIN ISSUES FOR LOCAL MANUFACTURERS:

► **Results of Gap Analyses** from our engagement with companies All the company issues fall into three dimensions, these are:

1. **Smart People: Leadership/management**
2. **Smart Application: Next Gen manufacturing systemization, and**
3. **Smart Technology.**

The issues have been mapped across the three dimensions to establish the specific needs shared by many companies in the WHIN area. Our objective is to narrow the gap, so that companies perform at the next level up. Read on to find out how we have started doing that already.

► **STAFF TURNOVER**
Where companies reduce their staff turnover, their costs (tangible and intangible) are reduced. Reducing staff turnover also reduces the need for new-hires and so three of the most pressing needs of WHIN companies (including turnover of experienced staff) can

be impacted by initiatives to reduce turnover. The leading companies have staff turnover between zero and 15% per year. Most WHIN companies experience levels of turnover around 40% per year with a few having turnover much higher than that.

► **The figure shows the most pressing concerns facing over 80 surveyed companies locally.** The

most concerning issues facing our manufacturing companies are: Applicant skills and new-hire staff turnover. These two HR issues are preventing evolutionary change. For example, many companies have full order books, but do not have enough staff on the shop-floor to keep up with orders. The employment & on-boarding needs are frequently found to be so demanding, that there is no capacity left to take on developmental projects.

► **COMPANY WORK-CULTURE AND OPERATIONAL EXCELLENCE**

At all levels, from shop-floor to Strate-

gic Management, our human resources, the people, are vital. The biggest issues facing WHIN companies are hiring and retaining productive staff, as well as on-boarding and retaining those that are not yet productive.

Retention involves a combination of art and science and always requires changes in work-culture from top-to-bottom. One of the most important of these is raising the people-management skills of supervisors; the adage "people leave their manager, they do not leave their company" is supported by research. In the WHIN area, coaching skills are repeatedly identified as a key current need to upskill supervisors and managers. Our remit is predicated on education providing productivity enhancements that generate wealth and that leverages competitive manufacturing best practices.

WHIN IN THE NEWS

<https://krannert.purdue.edu/news/features/home.php?story=5053>

WORKSHOPS DELIVERING SMART CHANGE

The WHIN-Education team is running workshops. Value Stream Mapping and Problem-solving workshops have been well-supported by fourteen WHIN companies sending nineteen people to attend. Some of these have led to improvement projects back in-company. Team-based coaching helps people to apply the learning and where applicable, project-work embeds that learning, providing confidence to undertake more projects and creating quantifiable manufacturing value.

A Long Way to Go

The majority of WHIN manufacturing companies state that they do not have any IoT technology or experience of IoT. Some manufacturers have machines that generate data and a sub-set of these companies are capturing the data, but do not know what to do with it. ● ● ●

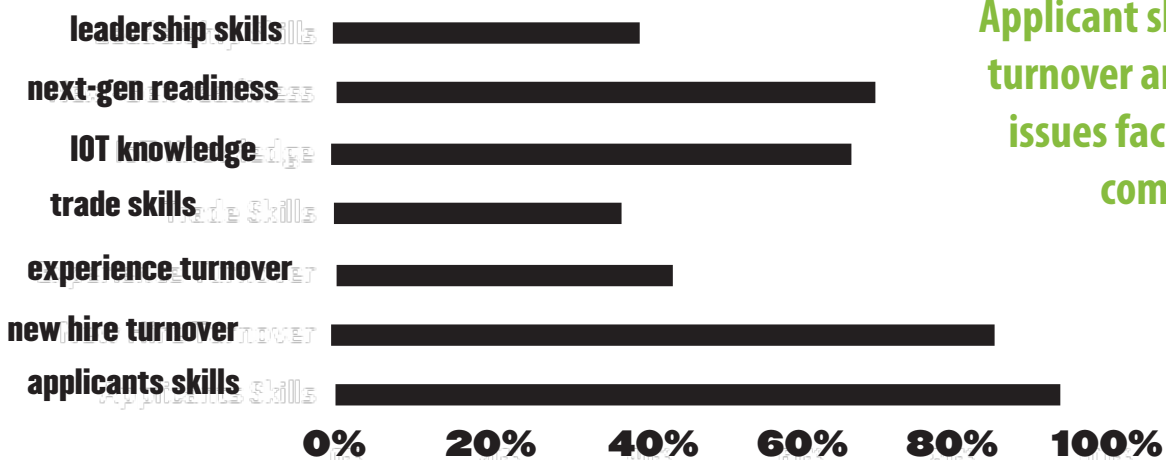


MICRO-COURSE DESIGN AND ACCESSIBILITY

Learning styles in education and in the work-place have changed dramatically in the last decade. There is year-on-year demand world-wide for more micro-courses delivered by web pages and by Digital Apps. Typical course offerings are now invariably bite-sized, with durations between five minutes and fifteen minutes. The WHIN-Education team has identified 80 such courses, both web-based and Digital App based of our own, as well as some from our partner organizations and a few external providers. The majority of these courses are free-access to WHIN company personnel at all levels. This first broad range of courses will be launched in the coming few months and then followed by more.

DID YOU KNOW?

The DCMME engagement center provides hands on demos of innovative manufacturing technology.



Applicant skills and new-hire staff turnover are the most concerning issues facing our manufacturing companies and preventing evolutionary change

"If we're going to be using Internet of Things and sensors, the workforce needs to understand technology, and we need to develop appropriate return on investment goals, so there's a training and education component,"

--Steve Dunlop

Natural Language Processing Explained by Steve Dunlop

Natural Language Processes are a subset science of Artificial Intelligence whereby interactions between the language of humans and computers is facilitated. Natural Language processing can analyze large amounts of language data to enable, at best, the computer to understand the nuances of language as most humans do.

Temp Min
Temp Max
Temp Amb

Date
Time
Job

1

BUZZ WORDS: 4TH INDUSTRIAL REVOLUTION EXPLAINED, BY ROY VASHER

“There is contention about what counts, but the prevailing view is that we are experiencing a new level of connectivity via the Internet of Things that is part of the golden age of the 4th revolution, ‘Digital Technology’. In case you are wondering, the first was regarded as agrarian efficiencies, the second to steam and mechanization including transport, and the third, science & technology including power, motors and plastics.”

2

BUZZ WORDS: SMART ECO-SYSTEMS EXPLAINED, BY ANANTH IYER

Smart Eco-Systems happen when we get smart about all three dimensions of advanced manufacturing. These are, leadership/management, application/systemization (e.g. Next Gen Manufacturing) and technology (including digitalization, IT/OT, sensors and

Internet of Things). With our competition now being in other nations, rather than just down-the-road, we need to catch up with the quiet revolution that is already happening worldwide. By working with you across all three dimensions, we can help. Excellence in all three dimensions are needed to be successful. Whatever your corporate levels of attainment, we want to help.

3

BUZZ WORDS INTERNET OF THINGS (IOT) EXPLAINED, BY STEVE DUNLOP

The Internet of Things is simply a web-based means of connecting data between systems. The simple public example is making a purchase by touching an enabled credit/cash card with a reader in-store; the connection is between the store and your bank. In manufacturing, IoT can connect data from sensors and logging devices, via programs to ERP systems both in the plant, but also, between a company’s locations and/or with the supply-chain, including suppliers and customers. Au-

tomating the connected systems can lead to reduced costs, improved efficacy and lower unit costs.

4

BUZZ WORDS: ERP EXPLAINED, BY ANANTH IYER

ERP stands for Enterprise Resource Planning. The use of ERP is predicated on the connectivity of smart devices in manufacturing to computers. Software programs monitor, count, calculate, alert and instruct devices and equipment to improve the efficiency of production. One of the most obvious examples illustrating just one part of a full ERP system are the videos showing the picking of Amazon products by robotic equipment in huge warehouses. The warehouses are not static of course and warehousing is just one dynamic part of a process that feeds into the ERP software, so that everything runs smoothly and safely at optimal levels of production at all steps from ordering goods-in to delivery of product to the customer.

5

BUZZ WORDS: BLOCK-CHAIN EXPLAINED, BY ANGUS MCLEOD

“Back in the day, I used to conduct Business Process Investigations for pharmaceuticals, so my clients could understand all the factors influencing inter-corporate transactions in their supply-chain, from goods-in to goods-out. The investigations defined best practices and flagged up the necessary changes needed to prevent failures. Block-chain is a similar approach to inter-corporate transactions, but based wholly in the cloud. Every step in the process of transacting business is owned. Everything waits if one step is not satisfied by meeting the contracted requirements. In effect, the block-chain is a shared ledger containing a complex chain of transactions (events) that are specifically and immutable fixed. Block chain leads to higher efficiency and reduced costs. Not for the faint-hearted!”

6

BUZZ WORDS: SENSORS EXPLAINED, BY DR. ANGUS MCLEOD

“I first became interested in sensor technology while forming a consortia of international companies to attract major developmental funding for micro-engineering development of sensors. Back then, these were fabricated by removal and additive process on 7” silicon wafers. That was in the late 1980s. Since then, the field has moving towards similar productive processes on reel-to-reel substrates, providing high-volume, continuous manufacturing and reducing the cost of many sensors to a few cents. Sensors are most often producing at least one electrical output to provide measurements of movement, temperature or heat, for example. When sensors like these are connected to logging/computational systems, it becomes possible to predict when a vital motor in a manufacturing plant will fail, preventing breakdown and enabling repairs to be made in an allotted time-slot, reducing costs.”



MANUFACTURING COMPETENCIES: How are you doing?

The figure shows the four areas that make up the best-of-the-best and a top potential score. The four areas are:

- Shop-floor skills
- Shop-floor systemization
- NextGen awareness & application of technology
- Leadership Agility

The biggest variables that separate the best from the

'very best' are in managerial agility and the application of technology. The developmental gap is, on average, just 18%.

In median companies, the gap to optimal performance is 33% leaving greater scope for improvement, especially in improving shop-floor skills.

At the lower levels, we found that the four areas can vary

enormously from company to company with the gap to optimal performance being 47%. A one-size fits all approach to upskilling is not therefore possible. We have to adapt our resource offering to needs.

To be our best, we have to upskill in all four areas. Where should you focus?



TIP:
CONSULTANCY PROJECTS
LEVERAGE EXCELLENCE.

Company-specific projects are flowing in to us, due to pressing needs. As well as pointing out how we can help with generic education (workshops, courses etc.) within the WHIN grant, these company-specific projects are consultancy-based and not supported by the grant. Independent project-work with Purdue and other partners, can help make a positive impact on operational excellence. Already, nineteen potential projects are in the supply funnel. These projects include the use of sensors to predict machine failure and weld-quality, data-handling and paper-to-digital systems. The gap-analysis project that WHIN Education completed in 2018 indicates strongly that management projects will also come forward, including staff-retention initiatives and coaching-skills for supervisors; key examples of first concerns expressed during our surveying period and since then. If you have projects that will help your business become more operationally excellent, please reach out. We are here to help!



- Shop-floor skills
- Shop-floor systemization
- NextGen awareness & application of technology
- Leadership Agility

Outreach

DID YOU KNOW?

The DCMME Conference at Purdue University annually offers key insights into a competitive edge in manufacturing

Regional Groups

We established the first Regional Group of non-competitive companies in the North-East of the WHIN ten-County area. Originally conceived as having meetings 6-8 weekly, the first group has been meeting monthly. The objective is to inform, collaborate and then test out projects in-company. As the companies are non-competitive and next door, there is a higher potential for real collaborative synergy to drive education and smart changes in-company, saving dollars. Another two Regional groups will be launched in April 2019.

The WHIN Education & WHIN Supply-chain teams ran two large (free, 1-day) conferences during the year, attracting international speakers, with contributions from Steve Dunlop, Dr. Ananth Iyer, Dr. Angus McLeod and Roy Vasher.

Other Outreach

We held WHIN-company events after both conferences to facilitate engagement with each other and WHIN teams.

We worked with the LEDOs, giving presentations to companies and other stake-holders including civic officials and press. We learned more about shared concerns and sometimes shared solutions that otherwise prevent companies from smart development, harnessing inter-business sales or hiring/keeping good people at all levels.

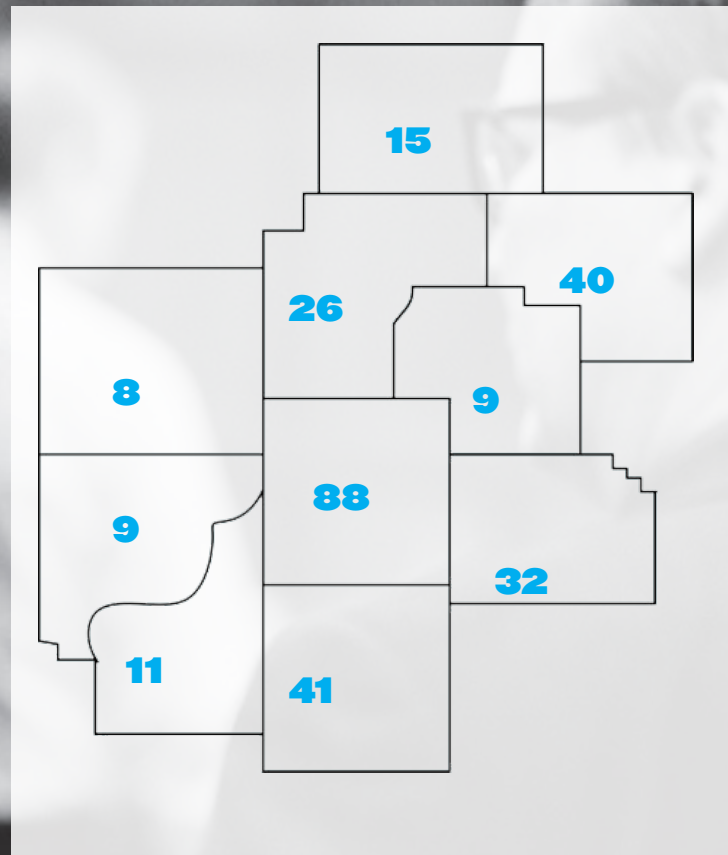
CEDOs have advised and supported our initiatives in their Counties and greatly helped

to disseminate information of commercial benefit to their local businesses. Three of them presented at our September DCMME Manufacturing Conference in September.

Learning from 'LEAN'

Wabash Valley LEAN Network hosted Roy Vasher, to talk about LEAN, or NextGen best practices, informed by his experiences at Ford and Toyota, where Roy influenced change and development of the Toyota Production System. Roy's most important message is that to successfully roll out a LEAN program, it is vital to build a vision to energize all employees, so they embrace and support the LEAN initiatives. That message means linking LEAN outcomes to individual and team advantages. The work-culture has to be ready to take on new systems and technology. Is your work-culture ready for change?

MANUFACTURERS BY COUNTY



Tip: Necessary Change:
Building confidence
'bit-by-bit'

Technology is being applied successfully in many local companies, but 'bit-by-bit'. Decisions for innovation can be a stretch for smaller companies. Would-be projects such as data-analysis, machine-learning and IoT may not be initiated due to lack of know-how, confidence and appropriate work-culture. What works, in real manufacturing businesses, is not to put off progress, but to start with smaller projects, succeed and move on from there. Confidence breeds more confidence for innovation. WHIN Education has been promoting projects to do just that and with early successes in manufacturing. Where should you start your necessary change? Call us!

Special Interest Groups in Education (& Supply-chain)

Our Special Interest Groups bring non-competitive companies together. The companies learn from their errors and their successes. The first of these is the ERP (Enterprise Resource Planning) Special Interest Group and we expect other groups to form where the needs of several companies are shared. Topic areas may include, Value-Stream Mapping, Business Cases for Investment, Joint-venture product design & development, coaching-skills for supervisors, staff retention best practices, on-boarding and leadership. These Special Interest Groups can be local/regional groups or, more widely-based groups in the WHIN area, depending upon the numbers of companies wanting to get together. Suggest a Special Interest Group? Contact us!

In-company Projects & Success

We have been seeing large gains in efficiency resulting from in-company and Purdue-supported projects with the WHIN-Education team. Examples include over 30% production-line improvement (a scheduling Purdue project) and in-company Value Stream Mapping projects stimulated by our WHIN-Education free workshops running since July. Do you have a potential in-company project to develop smart people, smart applications or use smart technology? Contact us!



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